

TMfS – What can it do for you?

1 Introduction

- 1.1 Transport Model for Scotland is now some 10 years old, with its origins going back to the Central Scotland Transport Model (3), which was prepared in 1996. In the summer of 2006 Transport Scotland awarded a further contract for the maintenance and development of the model, covering the period 2006 to 2009. In this context we need to remember that TMfS does not stand alone – there has been a matching Transport Economic Land use Model of Scotland (Telmos) since the 2003, and in general it is this combined modelling suite to which this paper refers when the acronym TMfS is used.
- 1.2 A number of past conference presentations and workshops have considered the technicalities of the model, its data requirements and some of the analyses which can be carried out. This paper and the subsequent presentation present a different view – answering the question **‘What can it do...for you?’** In answering this question we hope to show how relevant the model is to today’s questions in transport and also why the programme of enhancements being considered by Transport Scotland is important to the continued value of the model.

2 Transport is a derived demand

- 2.1 Before we look at the model, or even the issues which drive the form and the use of the model we need to be reminded of a fundamental truth – people travel because they want to do something at a place which is not where they are. This is what the term ‘transport is a derived demand’ means.
- 2.2 This sets dimensions for any model:
- it must be spatial, to represent the displacement of where I am and where I want to be; and,
 - it must be linked to activities, to represent what I want to do at the end of my journey.
- This introduces the key linkage between transport and land use, a linkage which is integral to the TMfS/Telmos suite and which makes the combination such a powerful tool for analysing the implications of our desire (need) to travel.
- 2.3 There is a further dimension – we need to look forward, because the need for travel changes as our patterns of activity change, and the means of making the journey also change, either for individuals (who might buy a car for example) or for people as a whole because a new piece of infrastructure opens up new opportunities. Much of this change results from one simple fact – we are getting richer.
- 2.4 This has significant implications because:
- as we get richer we do more, because we have the money to spend on activities which are not on our doorstep;
 - as we do more we travel more – further and/or more frequently;

- we use personal transport if we can, because it gives us freedom, which our wealth entitles us to;
 - we use powered transport because we can afford it, and we use our wealth to be more comfortable.
- 2.5 As a result of becoming richer we now have a range of issues related to travel which need attention. These issues are at the heart of transport policy – or at least they should be.

3 What are the issues?

3.1 The issue of **connectivity**:

- Am I connected to other places – can I travel?
- What am I connected to - the things I want to do?
- Am I connected all the time – can I travel when I want to?
- How big is my network – do I have a choice of connections?

These become issues when I'm not connected – or not connected as much as I need to be. In general if I have access to a car and I live on the Scottish mainland I am connected – to use the jargon of the IT age 'always on'. However the quality of the connection can vary and there are some key questions around the need for consistency of provision which may need to be addressed.

3.2 The issue of **Accessibility**:

- Have I got access to the things which are important to me?
- Is that access judged 'reasonable' – that is can I get access within an acceptable time/cost envelope?
- If I am dependent on public transport how much worse is my accessibility than if I had a car?

Accessibility brings a time dimension into connectivity – can I get to a particular activity within a certain travel time, and/or by a certain time? Accessibility analysis has traditionally considered the simple question of access to a specific activity at a single location 'Can I get to a GP practice within 60 minutes?' but the more complex analysis of 'aggregate accessibility' is also of significance as this drives many of our choices, particularly for housing and employment locations.

3.3 The issue of **Congestion**:

- What constitutes 'congestion' and is it a relative term?
- Where is the total transport network congested?
- How bad is the congestion and what makes it 'bad' – the length of delay or the unpredictability of delay?
- Who does it affect and does that matter?
- What are the impacts – loss of productive time, reduced accessibility, increased noise and emissions?

Congestion on the transport network has always been a problem - even when people moved entirely on foot there were times when places became crowded and free movement was not possible. Today we are caught between two conflicting pressures – we try to cram more into a day and so the ability to move freely between places is vital if our pattern of activity is to be sustained – and – because we travel more there is more pressure on the transport networks and so there are more places and times when this network is crowded. Because congestion is headline news we need to measure its true extent, forecast changes and consider mitigation measures.

3.4 The issue of **Noise**:

- Noise from transport systems is affected by the number of road vehicles, trains, planes etc in the vicinity – so the amount of travel is an influence on noise.
- Noise varies with speed and so there may be a compromise between speed (and hence accessibility) and noise levels.
- There are other attributes of the transport system that affect noise levels - the road surface for example.

There is increasing recognition of the adverse link between noise and well being – the European Noise Directive is one manifestation of this, leading to the production of noise maps for large settlements and key transport corridors. Traffic noise is a major component of noise in many places and its impact has grown steadily over the years. If we are to make our communities quieter reducing traffic noise may be a critical factor – but what can be achieved and how?

3.5 The issue of **Emissions**:

- Air quality, particularly in urban areas, is often poor, with transport being a primary source of pollutants. The amount we travel affects the air we breathe!
- Greenhouse gases are produced when we travel – how much can we reduce them?

The precise impact of transport on 'global warming' may be disputed, but it is an undeniable fact that transport is a major contributor to both greenhouse gas production and also to some of the more noticeable and immediately damaging emissions (NO_x and particulates). A sound understanding of the relationship between technology, travel and the resulting emissions can help us reduce pollution in the future.

3.6 The issue of **Resource use**:

- Most travel requires fuel, with some forms of fuel being 'scarce commodities' with potentially unstable long term supply – how dependent are we on such resources?
- Transport networks take up land, and expanding those networks requires additional land – which might have a better use or might currently be used for something which is valued more highly than transport.
- Public (mass) transport systems require a labour force, which is becoming relatively more expensive and in some places could become scarce, with a static or declining population and less inclination to work unsocial hours.

These issues are less often considered when the transport network is being analysed but are never the less significant issues of policy which should be explored.

3.7 The issue of **Health**:

- The steady reduction in personal activity levels is of concern as a contributor to declining fitness, obesity and other health problems, with motorised transport being a factor in this.
- Access to healthcare, with the increasing trend towards centralised facilities, has recently become a major factor in looking at longer term transport strategies, and is now a required component of regional and local strategies.

Our transport choices are now seen as having a long term impact on our survival – and the perceived convenience of the car – universal access to facilities – is allowing other decision makers (eg Health Boards) to make assumptions about access which potentially ignore both the full costs of their decisions and also run counter to other initiatives. Perhaps there is a case for an audit of the health impacts of any change in travel patterns and vice versa.

3.8 The issue of **Safety**:

- What is the 'best' speed, when access and economy are balanced against safety, and what impact does speed have on the pattern and nature of travel?
- How is the comparison between modes affected by the differential in safety by mode?

Safety is one of the five strands of appraisal within STAG, but it is often only the consequential effect of an intervention on safety which is considered. Much broader issues of policy could (and perhaps should) be explored – for example, looking at the impact of much lower average speeds on the road network, or a fundamental switch away from car use in urban areas, reducing traffic levels on residential streets and around schools.

3.9 The issue of **Social Inclusion**:

- Lack of connectivity in remote areas means that certain activities are simply not available to sections of the population – does this contribute to a sense of exclusion?
- Accessibility is one of the keys to inclusion – if I can't get there I can't do it!
- How does affordability affect perceptions of connectivity and access – if I can't afford to travel the provision of facilities to travel may have no impact on social inclusion.

For someone to be included they must be able to participate. One (and only one) element of inclusion is the ability to get to activities – particularly education, employment and healthcare. A lack of affordable travel opportunities is therefore widely considered a contributory factor in creating a sense of exclusion.

3.10 The issue of **Choice**:

- Who has choice....is the transport system inclusive?
- How good is the choice...is my connectivity to multiple places with the same activities, or am I limited to just one place?

Choice is the concept which underlies much of current policy across a whole range of public services, particularly health and education. Without the opportunity to travel my choice in these other fields may be limited – indeed it may not be possible for me to participate in the choice based system in any meaningful way.

4 What's a model got to do with all this?

4.1 Behind each of these issues lies a host of descriptive statistics, drawing together:

- The number and types of people in different groups;
- The characteristics of the transport network;
- The location of activities;
- Current levels of demand and the associated congestion, noise, emissions, resource use and other impacts.

Such statistics provide a baseline – a comprehensive view of the current condition of the system.

4.2 However much of this information, even for current conditions, is only partial. To get a complete picture we need to interpolate, infer or infill those missing values. Without this we may be misled, assuming that problems are more widespread than they actually are, or that influences are more local than is the case in reality. In order to create such a comprehensive baseline picture we also need a framework for both analysis and reporting.

4.3 A comprehensive model such as TMfS provides a valuable tool in this process. The model structure and the data management tools provide a systematic method for analysis and reporting, allowing relationships to be explored and spatial attributes to be considered. More importantly the relationships which have been derived between the different statistics can be used to allow a consistent approach to interpolation, inference and infilling.

4.4 However, much as it is important to know where we are now it is also crucial to be able to forecast future conditions. In a fast changing social and economic context the demand for travel is also changing – in general we currently face increasing demand for travel.

4.5 Many of the issues outlined earlier in this paper also lead to concerns 'We should do something to.....' Even if there is no further growth in travel there are impacts from existing demand which need to be addressed. We also need to consider the impact of some key changes outside transport – an ageing population, a changing economy, climate change, more worldwide competition for limited resources – on the need to travel and the cost of each journey.

5 What's TMfS got to do with this?

5.1 Transport Model for Scotland (TMfS) and Transport Economic Land use Model Of Scotland (Telmos) already cover 95% of Scotland's population, with a zone structure which gives an average of less than 5000 people per zone across the country. This model already contains most of the linkages discussed in chapter 3 of this paper – linking locations, through travel patterns to impacts. It provides a forecasting framework and a 'What if...' capability.

5.2 With an overarching model such as TMfS we aim to get consistency across the country. Such consistency would not be possible through a series of independent regional models, and without it there will always be difficulties reconciling the conclusions of different analyses.

This is particularly true of the assumptions on land use and the also the underlying behaviour of travellers.

- 5.3 It is also true that Scotland is a small country, with increasing interdependence between communities. Changes in one place have an impact elsewhere as people travel extensively between previously distinct areas. As a result we need to explore feedback at a national level and look at the national impact of previously local decisions.
- 5.4 The issues outlined in Chapter 3 are mentioned frequently by the wider public and politicians and so need to be addressed regularly albeit in different guises. We **should** need the capabilities of a complex transport model often if these interactions are to be explored as questions arise and when new information about future events becomes available. This needs a model which is 'always on' – ready for action. In turn this needs maintenance to keep abreast of changes in the transport network and development, and consistent interpretation.
- 5.5 TMfS provides this capability, so..
 - Why reinvent the wheel preparing other models which simply replicate TMfS?
 - Why waste time and resources doing something which has already been done and is available for immediate use?

6 So what does the next generation of TMfS (TMfS:07) bring?

- 6.1 The current model (TMfS:05) has some geographic gaps – the Highlands and Islands – but is also too large to be used for analysing some local issues. It is an aspiration that the updated model will be fully national but also regionalised so that more detail can be incorporated and regional issues can be first studied without the distractions of the more distant interactions. This structure will maintain consistency across the country – particularly in relation to patterns of development and changing demographics. A key to the structure will be mechanisms to pass information between the tiers of the model – national and regional. This will be aided by the construction of the entire model as an entity so that two way data exchange can be incorporated.
- 6.2 Most of the wide range of issues identified in chapter 3 are already a feature of the use of the model, and the inbuilt analysis tools. However some new features will be incorporated into the model to better represent the transport network and the choices now available to people, including:
 - an improved representation of multi mode journeys (traditionally referred to as 'park and ride');
 - the inclusion of High Occupancy Vehicle lanes within the modelling of the road network;
 - with the expansion of the model to cover the whole of Scotland, ferries and internal air services need to be included within the choices available for public transport passengers;
 - a more disaggregate approach to representing demand for public transport, to take into account concessionary travel (30%+ of demand for buses) and the potential impacts of integrated ticketing (a Transport Scotland policy objective);
 - more explicit modelling of parking provision and charges;

- extending the use of the Land Use model to incorporate new thinking on the wider economic benefits of transport – for example agglomeration – within the model framework.
- 6.3 As well as these changes to allow more explicit modelling of the transport network there are also significant opportunities to improve the precision of the model through the use of new or enhanced data sources. This element of the 'new' TMfS encompasses, amongst other things:
- Closer links with the SRTDb database of traffic counts and speeds;
 - Use of a wider range of journey time data to validate the model;
 - Direct use of the public transport timetable data held for Traveline;
 - Targeted collection of new data to increase confidence in the outputs in key areas.
- 6.4 These enhancements and the general updating are all part of a process which keeps TMfS fit for purpose – a purpose which was originally specified (10 years ago) in terms of infrastructure enhancement of the trunk road network in the Central Belt and now encompasses the wide range of policy issues outlined earlier, and across the whole country.
- 6.5 *For more insights into the enhancement process and the possible uses of the model come to the conference and listen to the presentation.*