Report on Workshop - Travel Time Use: Developing a Research Agenda

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Summary

It can be argued that travel time and (assumptions about) its use and evaluation have shaped, do shape and will shape fundamentally the nature and use of our transport systems and society as a whole. While there is a longstanding field of research concerning forecasting and appraisal that embodies assumptions and interpretations of travel time, its use and travel time savings, there has been a growth or resurgence of interest in the understanding and treatment of travel time use across a broader cross-section of the research community. This paper summarises the findings emerging from a one day workshop convened expressly to bring such a cross section of commentators together to discuss and expose areas of limited understanding, misunderstanding and differences of opinion concerning travel time use, the valuation of travel time (savings) and the forecasting of future travel levels and patterns. It highlights a number of apparent contrasts between (anecdotal) examples of observed behaviour and theorised behaviour or assumptions and yet also helps to clarify a substantial degree of legitimacy concerning the treatment of travel time (savings) within the current and longstanding approach to economic appraisal. A number of potentially important questions are derived from the workshop discussion. The paper then concludes with consideration of how research might suitably be taken forward. A collaborative approach is advocated which brings together economists and modellers with sociologists and behavioural scientists. Two specific research topics are highlighted as test cases for such an approach: a critical examination of the interpretation and thought processes of stated preference survey participants; and a cross-disciplinary multi-method investigation into travel time use of 'briefcase' travellers.

Introduction

Decisions by individuals about where, when and how to travel determine the flows of people goods and vehicles on our transport networks. Decisions by politicians about where, when and how to implement new transport schemes and initiatives influence the nature and use of our transport systems. These decisions in turn extend beyond transport as they influence further decisions about land use development, where people live, work, shop and play etc. and thus the nature and size of social and business networks. In short, these ongoing decisions are shaping transport and society. The quantity and quality of the time allocated to travelling has an important influence on the decisions of individuals and politicians. Thus it

follows that travel time use and its valuation has been and will be a key determinant of the shaping of transport and society.

On the basis of the above our understanding of travel time, its use and value is of crucial influence and significance. Transport modelling assumes that travel decisions are based on comparison of options based on their "generalised cost" - a linear combination of time and money, and produces forecasts of the level of use of the transport network in question by mode, route and time of day. Such forecasts can then be used for appraisal to determine the benefit in terms of time and money savings across all travellers that is attributable to a proposed transport scheme. The economic benefit of the scheme is then largely determined by empirically-based estimates of how much the saved time is worth in monetary terms. Faced with the economic assessment of the scheme, now situated in a wider assessment including an attempt to identify the social and environmental (dis)benefits of the scheme, decision makers use this as the basis to inform their judgement about whether or not the scheme should proceed and be implemented.

The importance of travel time seems incontestable. "Travel time savings are the single most important component in the measured transport benefits/disbenefits of most schemes and policies. Hence the methods of valuing them critically effect the measurement of the economic impacts of schemes." [1] A recent example which highlights this was the economic evaluation (using established current *assumptions*) of a proposed high-speed railway line from London to the north. For scheme option 1, the total scheme cost was estimated to be Â£8.4bn. The total scheme benefit was estimated at Â£11.8bn - of which it was noted that Â£8.8bn are "primarily journey time savings to users" [2] .

Against this backdrop a 1-day workshop was convened in London on 22 September 2005 to examine our understanding of travel time use and its valuation and to critically reconsider current assumptions and approaches. The workshop was organised and facilitated by Professor Glenn Lyons of the Centre for Transport & Society at the University of the West of England, Bristol. It was hosted and sponsored by the UK Department for Transport. 21 people attended the event, invited principally because of their current roles and their knowledge of and/or significant interest in travel time. The individuals in question are briefly introduced in an annex to this paper. The paper itself aims to provide an account of the key issues that were discussed during the workshop. Discussions examined current understandings of travel time and its use, how travel time (savings) are valuated and the treatment of travel time in forecasting future demand for travel. Subsequently key questions were identified and in turn the potential research needs that follow were considered.

The paper does not attribute contributions to individuals. It aims to be a reflection of the collective discussions that took place. It does not necessarily represent the views of the Department for Transport.

[1] DETR (1999). *Transport and the Economy*. The Standing Advisory Committee on Trunk Road Assessment, October, TSO, London.

[2] Atkins (2004). *High Speed Line Study: Summary Report*. Strategic Rail Authority, October.

Key issues

There are a number of issues that were addressed. Consideration of these below reflects explanations of current orthodoxies and knowledge, areas of poorer understanding and challenges to current orthodoxies.

A constancy of travel time

Great Britain has one of the best national datasets on travel arising from the National Travel Survey which has been running for over 30 years. This reveals that over this period the average travel time per person per year has remained unchanged within 90 per cent confidence intervals: *on average*, people are consistent in travelling for about one hour per day. Currently, about 60 per cent of this time is spent in cars/vans, 20 per cent walking, 10 per cent in buses and 5 per cent on surface trains, though these proportions *have* changed over time. It is important to note, however, that while this constancy may be valuable it reflects an enormous range of (changing) travel behaviour by individuals - in effect what has remained constant is that many people are travelling less than one hour per day and many people are travelling more than one hour per day.

Some commentators see a contradiction here: the invariance of travel time at the aggregate is empirically proven on the one hand, and yet on the other travel time continues to be treated conventionally as a variable and something to be reduced and minimised. They suggest that the long run value of travel time saving is therefore zero, which contrasts markedly with the estimations made from stated and revealed preferences and used to support the current methodologies that in turn lead to a demonstration that travel time saving is significant.

However, the current methodologies do not imply that the long run outcome of investment decisions based on an assumption of the value of saving travel time will be a reduction in overall travel time at the aggregate. Rather, such decisions typically enable a speeding up of travel that allows people to travel further using the same amount of time and thus access a wider geographic range of destinations. Over the past 30 years or so the average distance travelled per person per year has increased by about 50 per cent. The question then becomes one of whether and to what extent travelling further ultimately yields net economic, social and environmental (dis)benefits. There is not a clear answer to such a question.

Neither is there a full understanding of, or explanation for, this constancy of travel time at the aggregate. It does seem that this constancy is not something that can be ignored. It may hold the key to better interpreting future behaviour and travel demand.

Intrinsic utility of travel

It could be posited, though with as yet far from any comprehensive and compelling empirical underpinning, that the enduring constancy of the total amount of time devoted to travel is explained in part by an intrinsic utility of travel itself. In other words, the benefit derived from travel is not only the engagement in the activity at the destination. There are benefits to be enjoyed both from what is done while travelling and from the act of travelling itself. Such benefits vary in degree and extent across people and travelling situations - for example, sitting on a crowded underground train may not be enjoyable but can allow (economically or socially) productive time use; meanwhile riding a motorcycle can derive a lot of enjoyment of itself while not allowing opportunity to be productive while travelling. Separating out the value of travel time use from the value of the experience of travel itself is problematic and raises methodological challenges for research as are discussed later. The *use* of travel time in particular is the point of contention for much of which follows in this paper. Indeed, *at the outset* of the workshop some commentators suggested that conventional economics totally neglects this intrinsic utility of travel, though in response it was argued that the set of assumptions embodied in current orthodoxies are well able to account for the possibilities of being able to use travel time productively and different levels of comfort

(as considered later).

Working time and non-working time

In terms of the approach of the last 30-40 or so years to economic appraisal in the UK, an important distinction is made between travel that is undertaken in the course of work and that which is not. In the case of the former, savings in travel time have a benefit to both the individual and the employer; in the case of the latter, savings in travel time have a benefit only to the individual. The key assumption for travel in the course of work is as follows. "Time spent travelling during the working day is a cost to the employer's business. It is assumed that savings in travel time convert non-productive time to productive use and that, in a free labour market, the value of an individual's working time to the economy is reflected in the wage rate paid" [3] . Meanwhile for travel outside work, which is assumed to include commuting, the value of time is taken to reflect people's willingness to trade time for money. Table 1 below shows the current standard values of time adopted by the Department for Transport.

Non-working values of time are national average values based on willingness to pay. Working time values are based on the average wage of individuals travelling on a particular mode. It can be seen from the values in Table 1 that for the purposes of appraisal, determining whether or not travel is undertaken during the course of work or not is influential: for example, if one travels *to work* by car such time is valued at Â£4.17/hour whereas a subsequent journey by car *during the course of work* would be valued at Â£21.86/hour - over five times higher. "Because the average value of employers' business time is of the order of four times the average value of non-working time, roughly half of the travel time benefits are accounted for by employers' business time savings even though this is only one sixth of car traffic." [4] .

A reasonable question which arises is: if people are working while commuting to their workplace, how can it make sense to assume this is non-work time or outside of the working day? This question can be dealt with by means of a point of clarification from the current orthodoxy. The reference given above to "time travelling during the working day" is in fact misleading. Whether or not the travel in question is inside or outside of the working day is irrelevant. The distinction between working time and non-working time in Table 1 is based upon whether the travel in question is for employer's business purposes or not. Thus if one is going from home to the main place of work this is not classed as a business trip *even if business is being done during the trip*. It follows, the orthodoxy would argue, that if working cultures evolve over time such that an increasing proportion of people are using their journey to work for employer's ends in terms of how that time is used, any possible time savings will remain valued at a lower rate by virtue of the journey being considered a commute. As current assumptions stand, going from one's home to the office would be considered a commute trip. Meanwhile, going from one's home to an office a similar distance away for a meeting would be considered a business trip. Thus, the classification of journey purpose that respondents to the National Travel Survey use is the basis for attributing value to journey time savings.

Table 1. Values of Time per person (2002 prices) [5]

Working Time:	**Market Price (Â£/hour)**
car driver	26.43
car passenger	18.94
PSV (bus) passenger	20.22
taxi passenger	44.69
rail passenger	36.96
underground passenger	35.95
walker	29.64
cyclist	17.00
motorcyclist	23.91
Non-Working Time:	**Market Price (Â£/hour)**
commuting	5.04
other	4.46

Herein may lie one of the current impasses, certainly in terms of the views of those subscribing to the current orthodoxy and assumptions of economic appraisal and those questioning it. Both sides appear to rely upon anecdotes and examples of journeys that support or contradict the logic of the assumptions. The creditability of the orthodoxy is based upon what the dominant and prevailing types of journey are that 'characterise' the journey purpose categories adopted. It may be noted that business travel does not only refer to middle-management knowledge workers (the 'briefcase traveller' - see below).

Certainly there are questions to be asked about how the nature and extent of journeys falling under the current categories is changing with time. For example, how many 'business' trips have their start or end point in the home? When people work on occasions from home and then travel to a meeting or work at home before later travelling into their normal workplace for a meeting, what does or should happen to the distinction between it being a work or non-work trip purpose? If people are working when at work and when travelling to and from work then they may be in effect doing unpaid overtime because of the commuting - how is the economic value of such work reconciled in economic evaluation? Ethnographic research concerning car-using service sector workers found that they can bill their time from the point they leave their house and get in their car. Any travel that can be billed is thus deemed by them to be 'business travel' thereby potentially contravening the present interpretation of the commute. For such individuals work begins when they get in their car with the start of making phone calls - travel time being constantly bound up with being productive time.

The briefcase traveller

Work for the Department for Transport by the Institute for Transport Studies at the University of Leeds made use of the term 'briefcase traveller'. This refers to the individual who has a form of work activity (communication, information and knowledge management etc.), in the context of their travel, that lends itself to potentially being done while travelling. It is tempting in debate concerning business travel to assume, implicitly, that all business travel is comprised of briefcase travellers. In reality this is, in general, far from the case. There are many individuals who are professional drivers such as lorry and bus drivers for whom travel time is clearly and legitimately a cost to their employer. There are other individuals, such as service engineers, whose work predominantly can only be undertaken once they reach their destinations. If the vast majority of travel during the course of work does not concern the briefcase traveller then the current logic of assuming a saving in travel time releases time for productive use may be deemed sufficiently sound. Indeed this appears to have been the adopted viewpoint overall for business travel in terms of current conventions.

There appears, nevertheless, to be agreement that the area where current assumptions underlying the 'wage rate approach' are least robust does concern the briefcase traveller - if in practice travel time is being used productively for work. It follows that for specific schemes (such as the high speed rail link referred to earlier) where there may be a high incidence of those individuals being affected by journey time savings being briefcase travellers, the conventional economic appraisal approach may not be particularly appropriate.

VBTT	=	[(1-r-pq) MP + MPF] *employer value*	+	[(1-r) VW + rVL] *employee value*
VBTT	=	value of savings of business travel time		
MP	=	marginal product of labour		
MPF	=	extra output due to reduced fatigue		
VW	=	work time value relative to travel time		
VL	=	leisure time value relative to travel time		
R	=	proportion of saved travel time used for leisure		
P	=	proportion of travel time saved at the expense of productive work travel time		
Q	=	relative productivity of work done whilst travelling relative to the workplace		

Figure 1: The Hensher Formula [6]

It is not the case, however, that alternative means to the wage rate approach of interpreting briefcase travel have not been considered in the past. Indeed in the early 1970s David Hensher [7] put forward an approach to the valuation of business travel time that attempted to embody the positive utility of travel time use which became known as the 'Hensher formula' - see Figure 1 [8] . There have been a small number of attempts to populate the Hensher formula with data. These have appeared to conclude (having taken account it must be said of a range of assumptions), at least for the (cross-sectional) data in question that

the resulting value of time is very similar to the UK's conventional wage rate approach. On this basis it has been concluded, for the moment, that the present approach is sufficiently fit for purpose. This said, there is a recognition that the apparent similarity of outcome may have been coincidence rather than anything more. A remaining problem with the Hensher formula is the ability to acquire the data necessary to populate it.

[3] DfT (2005). *Values of Time and Operating Costs*. TAG Unit 3.5.6. Department for Transport, June.

[4] Mackie, P. et al (2003). *Value of Travel Time Savings in the UK â Summary Report*. Report to the Department for Transport, January.

[5] DfT (2005). *Values of Time and Operating Costs*. TAG Unit 3.5.6. Department for Transport, June.

[6] As shown in: Mackie, P. J., Fowkes, A. S., Wardman, M., Whelan, G., Nellthorp, J. and Bates, J. (2003). *Value of Travel Time Savings in the UK*. Report to Department of Transport.

[7] Hensher, D. A. (1977). *Value of Business Travel Time*. Pergamon Press, Oxford.

[8] It may be noted that those who employ stated-preference approaches for business (briefcase) travel are invariably left with the problem of determining the attribution of the value â it is the employeeâs or the employerâs or both?

Marginal savings in travel time

It is argued that for non-work travel time, consideration of how productive the journey experience itself is and the time used during it is suitably captured by people's willingness to trade time for money. Thus, if people are judging the travel time to be increasingly productive, the value of saving such time would reduce accordingly. Hence values of time derived from revealed and stated preference studies are considered to be robust. Two points of possible contention that are returned to later are that: the experimental approaches to stated preference may not readily capture a *full* interpretation of the range of benefits and costs of a journey, especially concerning productive use of travel time; and willingness to pay established at one point in time does not necessarily endure when projected to a future time horizon some 30-60 years ahead.

In terms of the briefcase traveller where value of time seems most hotly contested, the importance of the distinction between travel time and travel time *saving* comes into play. There is an argument that any time saved from a journey would naturally be that time which was least productive within the journey. It follows, for example, that if *some* work was done during a journey it does not matter if this is productive because any saving in journey time will not encroach on that working time. The problem here may again be one of assumptions. The argument seems logical, certainly when accompanied by an example: a 2 hour journey during which an hour of work is done - if a ten minute journey time saving can be achieved this will come from the non-working (unproductive) hour of the journey. Consider another example, however: a 2 hour journey during which 110 minutes of work is done and a 20 minute journey time saving is being considered - here the saving *does* encroach on productive time use. Which example is more plausible and more prevalent? This is not clear and thus in the minds of many the explanations to support the appraisal orthodoxy remain far from irrefutable. However, even such examples risk being misleading. Is work really done, whether in the office or on the move, in continuous highly productive blocks of time, interspersed by blocks of unproductive time? It may be that an individual works intermittently for the *whole* of their

journey with a fluctuation in levels of productivity. It may be that apparent 'wasted' time during the journey either side of working time is actually necessary resting or thinking time which, indirectly, performs an important part of the individual's overall pattern of activity and work output.

Using the two examples in the paragraph above highlights an issue with appraisal assumptions and reasoning for the briefcase traveller especially: they are taken to apply across all conditions. If, taken to the extreme, journey times could be reduced to zero (or fully productive time use to be increased to fill the entire journey time) - the core assumption could not possibly then hold true. This being the case at what point moving backwards from this position does the assumption hold true? This query suggests the assumption should be bounded in some way. It is a reminder that appraisal and its assumptions are intended to be 'fit for purpose' and nothing more - the intention is not to reflect accurately the spectrum of real behaviours but to reflect reality *sufficiently*.

Having focused on the (marginal) savings in travel time, it should also be noted that if productive time use occurs during journeys then this does have an economic value that should be acknowledged. Indeed if the extent of productivity varies between means of travel then changes in mode choice brought about by a new scheme may accrue economic gains and losses based on the relative productivity of travel time use on the different modes alongside the assumed gains attributable to overall travel time savings. One could also consider that a scheme that seeks to achieve marginal improvements in travel time productivity could be subject to economic appraisal just as a scheme seeking to achieve marginal savings in travel time. However, improvements in productivity are very difficult to measure.

Interpreting productivity

Travel time savings are a straightforward notion to deal with in that a very tangible unit of measurement exists and, in the case of the current assumptions for business travel, a straightforward translation of minutes saved into money saved can be made. If, however, one seeks to establish the extent of productive time use during a journey then things are far from straightforward. Certainly survey work has been undertaken in the past which has asked people for what proportion of their journeys they worked. However this arguably amounts to only a crude approximation based on clock time. In reality it is very difficult to record the nature and extent of time use in journeys. In particular it can be difficult to separate out time use that would be classed as productive and that which would be classed as enjoyable. Ethnographic work has found that people can be doing a mixture of activities during a journey and benefiting or not from such activities in different ways. For example, sitting and staring out the window may be enjoyable in terms of mental space or it may reflect a period of intense thinking and reflection about work matters. Suitably defining activities also becomes challenging. For example, using a laptop may be a very visible and thus observable activity but the actual period of use of the laptop may involve switching between game playing, being distracted by observing other travellers or window gazing, addressing personal and work-related emails and preparing a presentation for a meeting. In a simple world, minutes of travel time would conveniently be allocated to either fully productive or entirely unproductive time. In practice, the personal and economic value of a minute of time use may vary wildly.

Comparing travel and non-travel time use

It is important to acknowledge that judging the utility of time use in relation to travel is a matter of comparison - could I get more out of my time if I was not travelling than I am getting while travelling? There tends to be an assumption that time not travelling must have greater utility than travel time. For example, it is assumed that reading a newspaper or playing games on a computer or checking emails is something one would naturally prefer to do at home or at the office rather than in a vehicle. Yet this is not necessarily always the case. Indeed, qualitative research reveals that for *some* people who have others around them dependent upon them and who may have a duality of roles (such as being a mother and an employee), travel time is the only time they have truly to themselves and it can become a special time for them: the travelling environment and travel time may represent the only environment where they can be truly selfish when remote from the demands and expectations of others. However, this perspective should also not go unchallenged or be deemed to widely apply. For many people, although they may use their time while travelling this does not imply that they are attracted to travelling because of this, rather they seek to make the most of the situation they find themselves in. This raises an important question in terms of forecasting future travel behaviours - does travel time use influence decisions about when, where and how to travel or is it incidental in this regard? [9] Nevertheless, even if the motivation for travel or the period of travel time endured was not to use the time, this time could prove fruitful and either economically productive or beneficial to the wellbeing of the individual. Once again the issue of prevalence becomes important as is it to remember that appraisal and modelling do not attempt to capture the full distribution of values but to capture the mean or average values within specified market segments. In the absence of sufficient and robust evidence there is a danger in presuming that the notion of 'relished travel time' is remote from the norm and insufficient in incidence to warrant much attention.

There is also the potential importance of bounded conditions to consider once again. It is highly unlikely that many people would relish a ten hour journey because they would probably have exhausted their selfish indulgences after only a fraction of the journey time. However, at the other end of the spectrum there appears to be evidence of a 'minimum desired travel time' - research has revealed that people do not necessarily aspire to a 'teleportation' scenario of zero travel time but suggest that a commute journey of 20 minutes or so is about right [10] . This might point towards an important social role of travel in enabling transitions to occur between the different life roles and personas that people enact. As such, were travel time reductions to take journey times below this boundary or threshold then a natural (perhaps even unconscious) tendency over time might be to move towards journeys or routes of longer distances.

Methodological issues

A considerable number of studies have been done over many years on willingness to pay and many have used stated-preference as a means of gauging the trade-offs between different travel factors and journey scenarios and thus arriving at values of time. As mentioned earlier, it is argued by the users and proponents of such methods that they implicitly if not explicitly take account of the positive utility of travel associated with travel time use and journey experience: people are assumed to be factoring in their views on this utility when making their choices in the experiments. However, others are suggesting or at least raising the question over whether this is in fact the case. If such experiments are framed by metrics such as time and cost, what thought processes are the experiment participants going through in making their decisions and indicating preferences? Such a challenge is countered in part by pointing towards the results of revealed preference studies but nevertheless there remains an argument for more directly

examining this contention to the approach and outcomes of stated preference experiments. For example, in focus groups when people are asked if they would like the idea of instantaneously getting to their destinations some are immediately and instinctively positive towards the proposition. However, following further discussion about journeys and travel time use, some individuals are seen to reflect upon and change their initial reaction and recognise the appeal of (some) journey time. This suggests that reactions to straightforward questions or choice scenarios may not always be all that they seem.

In a similar vein it is suggested by some in the field that existing methods are well able to 'find out the facts' if not also establish the understanding behind them. Thus it is argued that asking questions of travellers is sufficient to establish, for example, what proportion of a commute journey is spent working. A healthy challenge to this is put forward by others. Taking the same example and assuming a question framed along the lines of 'how much of your time on the journey to work did you spend doing work?' this may fail to capture the legitimate 'work' during the car journey that consists of listening to the radio while mentally running through a number of issues in preparation for the meeting upon arrival at the office. Once again, it is not to suggest that the currently used methods are failing in such regards but there is a need to examine more closely the methods themselves to provide reassurance that they are 'fit for purpose'.

An inherent struggle for those commentators in this area who are not economists and fully subscribed to the orthodoxies of modelling and appraisal is that there is a significant and possibly impenetrable set of assumptions, presumptions about common sense and 'reasonable' propositions that are grounded in theory or intuition, as opposed to in a robust understanding of human behaviour. In terms of methods employed to measure behaviour or behavioural intention then the struggle remains. While demonstrations of consistency of findings may suggest that the methods are robust and getting the right answers to the right questions, it could also be suggested that this is simply a consistency of asking the same 'wrong' questions: if different questions were asked or asked in a different way then different answers might emerge.

Should travel time savings be valued?

Much of the commentary in this paper is directly or indirectly oriented towards how appropriately we value travel time. Some have argued with the basic assumption, that travel time savings *have* a value or should be valued, and suggested that a monetary value should not be attached at all to travel time savings within the appraisal process - decision makers should simply be presented with the 'facts', i.e. the travel time saving achieved by a scheme. Since appraisal must take account of a range of other social and environmental impacts of a scheme, many of which cannot be easily valued in monetary terms, presenting the 'facts' in this way might provide a more level playing field for the decision-maker to weigh up the merits of a proposed scheme or the relative merits of different schemes. When only some elements of the appraisal process are given monetary values there is a strong likelihood, some believe, that greater weight will be given in the decision making process to such elements and, by implication, less weight will be given to other elements which for society may be just as important if not more important. (This is not to suggest that decisions are always governed by whether in economic terms the benefits outweigh the costs - for example some schemes may be given the go-ahead on the basis of national pride.)

This argument of only providing details of the travel time savings and not the associated valuation of the savings can be countered: aggregating time savings for each individual together makes no distinction between the relative importance of time savings for different (groups of) individuals affected. It is argued

that whilst such aggregation implicitly weights time savings equally, valuation draws on empirical evidence to apply some discrimination or weighting to savings in the process of aggregation.

There is another quarrel with how travel time savings are aggregated and valued. The valuation of travel time savings is based on the additionality of individual values into a societal value. Yet this amalgamation of individual economic values does not (necessarily) equal a value that reflects the interests of society as a whole. (However, this would be true of any approach to making decisions - what constitutes social value is subjective.)

The proposition to not value time in appraisal provokes two rebuttals. The first is to say that rather than not valuing travel time savings, efforts should be redoubled to be able to attach monetary values to other elements in the multi-criteria appraisal process. The second is to question the abandonment of the orthodoxy when it is underpinned by considerable research and when the case for the values themselves seems so meticulously and well argued. It is also argued that to remove information on the valuation of time savings would make the decision maker's job more difficult. However some commentators argue that the decision maker's job *is* difficult and that removing information on individuals' valuation of time savings would allow them to reach decisions on the basis of a more balanced and fair representation of supporting information.

Views on whether or not travel time savings should be valued for the purposes of appraisal it seems remain somewhat divided, in spite of the huge significance of the issue. At present, however, the status quo prevails and thus time *is* valued and seen to be valued by decision makers and this appears set to remain the case.

Reliability versus speed

It may appear that the issue of journey time reliability is tangential to travel time use. However, albeit in the absence of empirical evidence, it may be that the extent of worthwhile time use during journeys is correlated with the degree of reliability of journey times. Possibly as a result, an individual may find themselves more content with a slightly longer but *predictably* longer journey time than with a shorter but less predictable journey time. The former arguably allows the individual to prepare for their travel time use to best effect whereas the latter places them in an unexpected situation for which they may be less well prepared for or comfortable with how to use their time. Indeed for regular, routine journeys a repeatable, reliable journey time lends itself to settling into habits of travel time use. When journey times are disrupted, either becoming longer or shorter on occasion then this might unsettle the routine and the potentially lower mental effort of habitual travel time use behaviours.

However, mobile technologies may be countering some of the negativity surrounding unreliable journeys, by allowing the traveller in principle to become more adaptable to externally imposed scheduling problems. This is in addition to the general contribution which they can make to the more productive use of time, both because of being able to remotely contact others but also because of having a much greater amount of information with which to work or be entertained during the journey.

Looking to the future

Modelling and appraisal are concerned with looking to future time horizons which may be from 30 to 60 years ahead. There is a strength of feeling that forecasting should be the area where greatest effort is devoted to better understanding and reflecting the nature and consequences of travel time and its use. A variety of issues arise in looking to the future. There should be a recognition if not a cautionary note associated with the fact that we are using present day empirical data, behavioural intentions and assumptions to project forward in time. In effect we are presuming we can know the preferences and choices of generations of individuals not yet born into a world that may be shaped very differently from the world we know today. This of course is almost unavoidable in any form of futurology. The modelling tools used today are marginal models geared towards accounting for the effects of small changes. They are not developed to cater for substantial changes such as a rapid four-fold increase in fuel prices or a rationing of personal motorised mobility. As such there could be a need to develop non-marginal models to address this. In the marginal modelling context assumptions of constancies in behaviour and preference structures are made or trends are assumed to continue. Once again, such assumptions are vulnerable if a reasonable probability of departure from them over time exists.

An area where such departures could occur is that of information and communication technologies (ICTs) and their impact on travel choices and the value of travel time. There is precious little empirical evidence or even speculation on this matter. The technologies themselves may in the end prove superficial: one can readily observe people playing card games on their laptops and PDAs today during journeys - something which suggests the fundamental uses of travel time have not changed over the last 100 years. However, mobile communications have made it possible to have social and business networks that can operate independently of location or co-location - such a development would not likely have been envisaged in the modelling of 25 years ago, but with what consequence it is not clear.

Forecasting and the invariance of travel time

There is a suggestion that in the face of this array of uncertainties about the future that more (explicit) attention in forecasting should be given to the apparent certainty of annual average time spent travelling and indeed the extent of invariance in the number of trips. Such certainties could at least frame a scenario-type modelling of the future where projections concerning any societal group (analysis of NTS data appears to suggest constancy can apply at some degrees of disaggregation) would assume in the first instance that average travel time would remain unchanged. However, this suggestion is met with some scepticism and caution. It is agreed that the expectation of constancy could at least offer a modelling safety check but the problem beyond this is that there are many ways and distributions of travel times that allow the average to be arrived at.

[9] Travel time use *is* often accounted for (implicitly) in mode choice modelling as a *modal constant* forming part of the generalised travel cost â however this constant for a given mode is taken to represent all other factors than those identified separately such as monetary and time costs of using a mode and thus the influence of travel time use on choice cannot separately be identified from factors such as comfort, convenience and security. An alternative is to allow the value of time savings to vary by mode, reflecting the different possibilities for time use.

[10] See for example Mokhtarian, P.L. and Salomon, I. (2001). How derived is the demand for travel? Some conceptual and measurement considerations. *Transportation Research A*, **35**, 695-719.

Emerging questions

Further to examining the issues above attention turns to considering what important questions might emerge or remain to be addressed as a consequence. Potential questions put forward are set out below. The ordering carries no implication of relative importance and indeed opinions may be mixed concerning how important these questions are and how swiftly or urgently they could or should be addressed. In some cases they are already being addressed.

1. Is there an intrinsic utility to travel separate from the utility gained at the destination and if so what are its determinants and economic implications?
2. What are people doing with their travel time and what contribution is this making to their working and social practices and how has travel time use changed over time and is it likely to change in future?
3. What are the social implications of travel time use and is it appropriate to assume that the sum of individual values equals the societal value?
4. What do we understand or do we need to understand about the non-linearities of travel time use and its value across the range of journey times?
5. Is the current treatment of briefcase travelling in appraisal appropriate and if not how could this be better addressed and with what consequences?
6. What are the appropriate relative weightings placed on time savings versus increased comfort when considering transport investments?
7. Should travel time savings be given a monetary value in appraisal and does the transport profession have a sufficient understanding of how decision makers are interpreting the outcomes of modelling and appraisal?
8. If travel time savings remained monetised in appraisal, how can other elements of multi-criteria appraisal be 'brought into line'?
9. Has the time arrived to take (greater, more explicit) account of journey time reliability in modelling and appraisal and if so how can understanding in this area be developed alongside taking advantage of the increasing availability of data sources concerning reliability?
10. Should the 'equity' values of time for travel outside work be applied as widely as they have been or should specific scheme appraisals, especially where the investment does not come from the Treasury, more accurately reflect willingness to pay associated with the schemes in question?
11. Should the fundamental assumptions about constancy of time or money and thus the relationship between the two in current approaches to forecasting be revisited?
12. What are the merits of introducing greater market segmentation into the models used?
13. Is there a need for more holistic models that extend beyond only travel behaviour in ways that can attempt to cope with more substantial changes into the future rather than only marginal changes?
14. Should there be concern that stated preference and revealed preference approaches to establishing understanding of trade-offs may focus upon short-run values as a consequence of short-run considerations and thus not adequately reflect long-run considerations and values?
15. Is the balance between actual and theorised behaviour appropriate in our current economics-based approaches to modelling and appraisal and is there an enduring over-emphasis on utility

maximisation?

16. Is there (or could there be) a practical alternative paradigm to individual utility maximisation in relation to transport modelling which, for example, better accounts for the satisficing behaviour that seems often apparent in actual travel decisions?
17. How can greater clarity be established between misconceptions and differences of opinion in terms of the treatment of travel time in modelling and appraisal and how can the understanding and underpinning of the current orthodoxies be better explained and communicated to reduce the degree of misconception?

Towards a research agenda

The preceding list of questions could comfortably consume the resources of a substantial research programme in being addressed. In the context of this paper they are not intended necessarily to point to such a programme but to act as a point of reference and stimulus for different parts of the research community to respond.

There has, however, been some consideration more broadly given to the ways in which it would be appropriate to respond to such questions with research.

It appears that two spheres of interest exist in the collective research community - one on travel time use and the other on forecasting and appraisal. In over simplified terms, the economists and modellers are strongly associated with the second sphere and the sociologists and behavioural scientists are more strongly associated with the first. There is a question concerning how substantially the spheres of interest do or should overlap and in turn how much both these parts of the research community should be seeking to cross-fertilise. At present it seems to remain the case that overlap in terms of what is researched and who is doing the researching is very limited. The situation seems characterised in broad terms by the travel time use community struggling to understand how (some of) the assumptions of forecasting and appraisal can legitimately reflect observed behaviour and the forecasting and appraisal community struggling to help the other community in its understanding. The language of the two disciplines and thus communication between them appears to remain a significant problem.

What is derived from the above and from the workshop discussion is that the way forward should be through collaborative working rather than (only) a continuation of two parallel streams of working that may seldom interact. As noted earlier there are undoubtedly misconceptions held in *both* communities. These are distinct from shortcomings of understanding or differences in opinion in the absence of conclusive evidence. If an open-minded approach can be taken on both sides then through improved communication it should be possible to identify and remove the misconceptions and then focus more fruitfully on the areas needing greater understanding - understanding that might most effectively be arrived at through a joint approach. Thus an important recommendation from the workshop is that one or two modest pieces of research on travel time use should be commissioned with an explicit intention of fostering and testing the merits of joint working and cross-fertilisation.

Two specific topic areas came to light and are offered as a starting point for the beginnings of a research agenda:

1. **Methodological understandings**
   Stated preference (SP) surveys have a proven track record whilst carrying an acknowledged limitation that ’people do not always do what they say they would do’. The combination of methods

being used currently in the EPSRC-funded 'Travel time use in the information age' project [11] (including questionnaires, focus groups and travel ethnography) is highlighting the different perspectives on behaviour that can be revealed from different approaches. It is suggested that a similar approach of using mixed methods might usefully be employed in the examination of SP methodology itself. Qualitative research could be used in conjunction with the implementation of an SP survey to better understand the interpretation and thought processes of the SP survey participants that in turn governed their stating of preferences.

2. **The briefcase traveller**
   It appears that the area that is least convincingly addressed in the current 'wage rate approach' to economic appraisal's treatment of travel time savings is that of briefcase travellers. This is an area that lends itself strongly to joint working and brainstorming and an application of different research methodologies. One example of this already is the PhD research being undertaken by David Holley entitled 'Time use of the business traveller' [5] .

In closing, it is appropriate to observe that the deliberations set out above in this paper are not entirely new - many of them in various guises have been the subject of examination and debate for 35 years or more. Indeed hard copy proceedings still exist for the conference on "*Research into the Value of Time*" that took place in May 1970 (Department of the Environment - Time Research Note 16. July 1970). However, it is perhaps indicative of the importance (and complexity) of the issue of travel time that it has continued over such a long period to be the subject of investigation and divided opinion.

Acknowledgements

The author of this article very gratefully acknowledges the generous contributions made to the workshop debate by all those who attended without which the content of the article would not have emerged. The UK Department for Transport is thanked for hosting and supporting the workshop.

[11] For further details on this research project see
http://www.transport.uwe.ac.uk/research/projects/travel-time-use.asp

Annex - Biographical notes for workshop participants

Please note - the three individuals whose names have an asterisk next to them were due to attend the event but for personal reasons were unable to do so - their positive support and contributions surrounding the workshop are nonetheless acknowledged and appreciated.

Steve Atkins

Since 2001 Steve has been Assistant Direct of Planning at the Strategic Rail Authority. Prior to this he was responsible for development policy at Southampton City Council and Policy Studies Manager at London Transport (1992-1998). He is also visiting Professor of Transport Policy at the University of Southampton.

Jo Bacon

Jo Bacon is branch head of SRE2, responsible for social research relating to distributional impacts and ’disadvantaged/vulnerable’ groups. Recent work includes research on understanding community severance. Current work is seeking to draw together evidence on behaviour, attitudes and choices and includes and evidence base review of transport choices and barriers for different social groups, and understanding the travel aspirations, needs and behaviour of people in later life.

John Bates

John Bates is an independent consultant in Transport Economics. After graduating in Maths and Economics, he joined the (then) Ministry of Transport to work under David Quarmby at a time when the early research into Value of Time was being consolidated in MAU Note 179. When, at the end of the 1970s, the DfT decided to review the evidence, he became a technical advisor to the MVA/ITS/TSU (1987) study, developing the theoretical basis from the earlier work of DeSerpa, directing the analysis, and being the main author of the Final Report. This study pioneered the use of SP for VoT measurement, an approach which has subsequently become the norm. More recently, he has collaborated with ITS to produce updated recommendations on VoT, making extensive use of the data collected and analysed by Accent/Hague Consulting Group. These recommendations underlie the recent WebTAG Unit 3.5.6. In addition to this work in the UK, he has played an advisory role in VoT studies in Sweden, Norway, New Zealand, Switzerland, and Denmark

Richard Clarkson

Richard Clarkson is an economic advisor working in DfT’s project modelling and appraisal branch. He has been working as an economist within Government for seven years, three of which have been spent working in the transport modelling and appraisal division of the DfT. Richard is part of the team responsible for disseminating the department’s published transport appraisal guidance. He manages a number of strands of the research and development work across the branch including work on the valuation of transport related noise impacts, the valuation of accident benefits, the treatment of cost estimation, risk analysis and optimism bias, the treatment of distributional issues within appraisal and the valuation of travel time savings.

Lowri Davies

Lowri is the Programme Manager for the Strategy, Economics and Mobility research programme in the DfT. This covers ITEA’s work on traffic modelling and appraisal, social research and evaluation, Transport Direct and the research to support the DfT’s Mobility and Inclusion Unit. The programme has an annual budget of about Â£4.5million and reports to the DfT’s Chief Economist, David Thompson. Another aspect of her role is to support the DfT’s Chief Scientific Adviser, Frank Kelly in promoting the use of evidence, research and technology within the DfT. For example, she is currently exploring how work on scenarios can be used to inform future DfT policies.

Tony Fowkes

Tony Fowkes is currently Reader in Transport Econometrics at the Institute for Transport Studies, University of Leeds. He first researched in transport in 1976, looking at Car Ownership forecasting. He was a member of the 1980's DTp Value of Time project, simultaneously studying Business Travel for EPSRC. During this work he became well known for developments in Stated Preference methodology. He audited the work of the Accent/Hague 1990's Value of Time study, supporting their recommendation to use the same unit value regardless of the size or direction of the journey time change. He was also a member of the team that reviewed Value of Time policy for DETR in 2000/1, looking particularly at commercial vehicle traffic and business traffic. For the latter, the accepted recommendation was that the simple wage rate approach currently used was appropriate and that complex adjustments relating to the offsetting value of work done while travelling were not worthwhile.

Phil Goodwin*

Phil Goodwin is currently Professor of Transport Policy at UWE, having previously been director of the Transport studies unit at UCL, and before that at Oxford University. He has also worked at the Greater London Council, and as a non-executive director of the Port of Dover. He worked on travel time budgets in the 1970s, value of time in the 1980s, the effects of changing journey times on the demand for travel in the 1990s (including co-authorship of the SACTRA report on induced travel, and follow-up research on suppressed traffic), and currently on the treatment of time savings in longer term appraisal.

Gary Grubb

Gary Grubb is Associate Direct, Research, Training and Development, at the ESRC. Gary currently has responsibility for transport research.

Hugh Gunn

Hugh is an independent consultant, Principal of HGA Ltd and Visiting Professor at Tri, Napier University. He has research experience in personal travel time budgets and interaction therein between mandatory and discretionary. He has been involved in a number of value of time studies: UK VOT 1980 - study, data, statistical and modelling aspects; Dutch VOT studies 1988, 1998, UK VOT 1985, design and direction; Danish VOT 2005, expert advice; VOT for business travellers - extension of the Hensher formula to use SP; and Freight VOT studies in NL and FR. He has applied his multi-modal personal travel demand modelling experience to a number of national and regional transport models. His research interests are in: non-marginal models; the non-linearity of time/cost trading; and prediction.

Stephane Hess

Dr Stephane Hess is a researcher in the Centre for Transport Studies at Imperial College London, and a part-time employee of Rand Europe. His research is concerned with the development and application of advanced discrete choice methods. As part of this research, Dr Hess has looked intensely at the issue of the modelling of the valuations of travel time savings, and especially the variation in such valuations across respondents.

David Holley

David Holley is a full-time PhD student at the Centre for Transport & Society at the University of the West of England, Bristol. His research is examining how business travellers use their time and how this time use relates and compares to non-travelling time during the working day. His interest is in assessing the validity of current assumptions in transport appraisal concerning how travel time savings are interpreted and valued and considering alternative approaches.

Geoff Hyman

Geoff Hyman is a member of ITEA division of DfT and advises on transport modelling, appraisal and on methodology and policy issues related to road user charging. Recent and current research interests include: the development of methods for modelling of time of day choice; the effect the Manchester motorway box on travel choices; and the effect of the M6 toll road on travel behaviour.

Juliet Jain

Juliet Jain has a doctorate in the sociology of transport and is the principal research on a collaborative study into travel time use in the information age. With a background in geography, sociology and science studies, she is interested in how information and communications technologies (ICTs) coexist with everyday travel practices, and the interface between social practice, ICTs and travel infrastructures in a ’networked society’.

Eric Laurier

Eric Laurier is Senior Research Fellow at the Institute of Geography, University of Edinburgh, Scotland. He has a range of research interests: public space, mobility, technology, human-animal relations, everyday life in the city, practical reasoning, ethnomethodology, conversation analysis, social and cultural theory. Currently he is the principal investigator on ’The Cappuccino Community: Cafes and Civic Life in the Contemporary City’ and ’Habitable cars: the organisation of collective private transport’ both funded by the ESRC. Previously he had an Urban Studies Research Fellowship which allowed him to pursue research on community practices in the city and before that he was a research assistant carrying out ethnographic fieldwork in sites of informal interaction in an Edinburgh suburb as part of the Living Memory Project. From 1997 onwards he was the principal researcher on an ESRC funded project: ’Meet You At Junction 17: a socio-technical and spatial study of the mobile office’.

Glenn Lyons

Glenn Lyons is Professor of Transport and Director of the Centre for Transport & Society at the University of the West of England, Bristol. His research interest and expertise is in the users of transport systems, their needs and travel behaviour and the implications for transport policy and practice. He is currently leading a major study into the use of travel time with an interest in the potential consequences for mode choice, levels of mobility and transport appraisal.

Peter Mackie*

Peter is an economist and Professor of Transport Studies at the Institute for Transport Studies, University of Leeds. He has a longstanding interest and is well-recognised in the field of transport appraisal. From 1990 until 2000 he was a member of the Government's Standing Advisory Committee on Trunk Road Assessment (SACTRA). He has recently undertaken work for the World Bank, European Commission and led a research team investigating the valuation of travel time savings for the UK Department for Transport - this latter piece of work formed the basis for the DfT's current position on the treatment of travel time savings in appraisal.

David Metz

David has been a visiting professor at the Centre for Ageing and Public Health, London School of Hygiene & Tropical Medicine, since 2000. Prior to this he was the Chief Scientist, Department of Transport (1992-97). His relevant research interests include: the mobility of older people and their quality of life; transport policy; human mobility. Recently he has produced a number of papers relevant to travel time and its use and argues the importance of a stable average amount of travel time per person per year in considering the case for investment in infrastructure intended to save travel time.

Chola Mukanga

Chola Mukanga is an Economic Adviser working in DfT's Aviation Economics Branch. He has responsibility to advise DfT on issues related to Stansted Airport. This includes appraisal and modelling of surface access, air traffic forecasts, financial assessment and other airport related case work. Chola has held a number of different posts within DfT and ODPM, over the last 4 years that have related to matters including advice on valuing time savings, transport and development, local government, regeneration and urban economics, housing economics and developing methodology for PSA measurements.

Mark Perry

Mark Perry is currently a senior lecturer at Brunel University in the school of Information Systems, Computing and Mathematics. The focus of his work lies in the investigation of social and organisational behaviour and its application to the design of technology. Mark's core research interests cover the investigation of mobile work and home life, and the design and use of mobile and ubiquitous technologies within these domains. Over the last six years, Mark has been involved in a series of ethnographically-oriented field studies of mobile workers, and of particular note, investigations of 'dead time' in mobile work, and he has developed a number of prototype technologies to support mobile work. Mark has degrees in Psychology (BA) and Cognitive Science (MSc) from the University of Cardiff and was awarded his PhD from Brunel University. Prior his current position, he has been a visiting scholar at Stanford University and a research fellow at Brunel. As you might imagine from the suggested discussion topic areas, Mark is particularly interested in people's current activity and practices within a variety of modes of transport, and the use and design of emerging and future technology developments in the area of transportation.

Chris Smith

Chris Smith is head of DfT's project modelling and appraisal branch. He has 30 years experience in transport modelling and appraisal in central government. He was directly involved in the development of the Government's 'new approach to appraisal' (NATA) and its development as a cross-modal appraisal tool providing decision takers with information on the economic, environmental and social impacts of transport projects. He coordinates research and development work across the branch, ensuring that it contributes to improvements in modelling and appraisal practise through promulgation as guidance on the Department's guidance website www.webtag.org.uk.

Gillian Smith

Gillian is head of Social Research and Evaluation Division (established in July 2004) at DfT. Recent or ongoing areas of research include: public acceptability of road pricing; public perceptions of climate change; understanding the travel needs and aspirations of older people; and reviewing the approach to evaluating the impact of trunk road schemes. Gillian is also involved in standing back and reviewing DfTs requirements for evidence on attitudes to transport issues including issues to do with customer satisfaction, public attitudes to and acceptance of policy measures and the linkages between attitudes and behaviour/ the underlying drivers of behavioural change.

Laura Watts

Laura has over eight years experience working as researcher, designer and business strategist in the telecommunications sector, and is currently completing a PhD in Sociology on the future of mobile telecoms. She is also applying her dual industry and academic experience as a researcher on a current study into travel time use in the information age. She brings to the study both an understanding of the interaction between telecoms and transport, and a commitment to the translation of social theory into industry practice.

Gerard Whelan

Gerard Whelan is a Senior Lecturer at the Institute for Transport Studies, University of Leeds. His background in economics and transport planning is the root of his expertise in modelling the demand for transport systems. His work covers road, rail and air sectors with a focus on competition and traveller choice. A common theme running through his research is a level of expertise in stated preference survey design and advanced discrete choice modelling which have been applied to a diverse range of applications to model demand, predict market share and value product attributes. Dr. Whelan was a leading researcher on the latest Department for Transport Value of Time Study and in particular was involved in the re-examination of the Accent/HCG data to look at size and sign issues.

John Urry*

John Urry is Professor of Sociology at Lancaster University where he is the founder and Director of the Centre for Mobilities Research. He has a BA and MA in economics (Cambridge) and a PhD in sociology (Cambridge). John is a Founding Academician, Academy of Social Sciences and Fellow of the Royal Society of Arts. He has published c 30 books and edited collections, including: Sociology Beyond Societies (2000); The Tourist Gaze, Second Edition (2002); Global Complexity (2003); Tourism

Mobilities (2004); Automobilities (2005); Performing Tourist Places (2004); Complexity (2005); Mobile Technologies of the City (2006); and Mobilities and Materialities (2006). He is currently working jointly with Professor Glenn Lyons on a major study supported by the EPSRC entitled 'Travel Time Use in the Information Age'.