



Traveller Information Systems Research: A Review and Recommendations for Transport Direct

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-- F I N A L R E P O R T --

**TRANSPORT DIRECT PROGRAMME:
REVIEW OF EXISTING RESEARCH ON TRAVEL INFORMATION AND RETAILING**

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EXECUTIVE SUMMARY

Transport Direct was announced in July 2000 as part of the Government's ten year spending plan for transport. It is an ambitious Programme to provide the U.K. with a travel information service that can present the public with the opportunity to compare travel options across public and private transport modes. Using the Internet as its principal delivery medium it seeks to offer a one-stop-shop journey planning, booking and payment service, complemented with real-time update information.

As part of the Transport Direct Programme the Department for Transport, Local Government and the Regions expects a need to commission specific elements of research to assist in moving the Programme forward. To inform its decisions in this context a comprehensive review of previous, current and planned research in areas of relevance to Transport Direct was commissioned.

Research literature and information were collected through two main lines of enquiry. Direct contact was made with some 500 individuals representing local authorities, transport operators, consultants, academics, suppliers and others. Academic and web-based literature sources were searched. Given the pace of development in the field of information provision, the review has principally considered documents produced from 1995 onwards.

The review has covered over 200 reports, papers and other articles addressing research in the U.K., North America, Europe and Australasia. These are now catalogued as the Transport Direct Research Compendium. This report draws on the material within the Compendium to discuss a broad range of issues that impinge upon the aims of Transport Direct. The report identifies 13 topic areas covering:

- consumer demand for information;
- information requirements of the end user;
- embracing walk, cycle and car information;
- the importance of awareness and marketing;
- effects of information on behaviour;
- willingness to pay for information;
- the importance of partnership and buy-in;
- making the business case;

- media and presentation formats;
- feasibility of including retailing with information;
- technical standards and technological solutions;
- integration of real time systems into travel information systems; and
- interpreting integration and distinguishing it from coordination.

For each of these areas the report assesses the coverage, findings and limitations of research to date. In some areas a paucity of research is highlighted. In light of the review findings and an assimilation of key issues, a research recommendation is put forward for each area. An indication of priority and timing for the proposed research is also provided. Of the research recommendations the following are considered urgent and of high priority. A unique selling point needs to be identified for Transport Direct and against this, likely demand for such a service should be judged. The potential attitudes towards, and behavioural consequences of, Transport Direct in terms of travel choices should be assessed: this might be achieved by exposing prospective users to the provision or emulation of a Transport Direct-like service. The need for partnership amongst, and viable business cases for, the parties involved is instrumental to the degree of success of Transport Direct: existing examples of partnerships, both new and evolving, should be monitored and evaluated. It is suggested that an industry working group will be required to address the business planning associated with Transport Direct.

The report highlights over 30 key issues across a diverse range of areas. This in itself is indicative of the challenges that lie ahead for the Transport Direct Programme. The situation is not made easier by the fact that in many respects the aims of Transport Direct are pioneering and there are few examples globally from which lessons can be drawn.

RECOMMENDATIONS

In light of an extensive review of previous, ongoing and planned research of relevance to the Transport Direct Programme, the following recommendations are made concerning the immediate and future research that the Programme itself might need to pursue. For each recommendation an indication of relative priority in terms of importance to the Programme is provided. It is assumed that more than one tranche of research is likely to be commissioned by the Programme. Therefore, independently of importance, an indication of relative timing is offered. Some research should be undertaken immediately to maximise its value to the Programme. Other following research is less time critical and could form part of a later tranche.

1. Consumer Demand for Information

Alternative unique selling points (USPs) for Transport Direct should be identified and discussed from a customer perspective. Subsequently, demand for a service clearly offering such a USP should be assessed.

priority: **high**; timing: **immediate**

2. Information Requirements of the End User

Customer understanding of the term *reliability* associated with travel options needs to be defined and understood. Possible representations of reliability as information should be conceived and assessed in terms of their usefulness to customers.

priority: **medium**; timing: **following**

3. Embracing Walk, Cycle and Car Information

The extent to which the quality of, and information concerning, end-legs of longer distance journeys influences choice of mode(s) for travel must be understood. The current limitations should be identified in consultation with the population at large, local authorities and public transport operators.

priority: **low**; timing: **following**

4. The Importance of Awareness and Marketing

A best practice guide on promoting travel information services to the public should be developed. This should also address the relationship between promotion of transport services and the role of travel information.

priority: **high**; timing: **following**

5. Effects of Information on Behaviour

Prospective users of the envisaged Transport Direct service should be exposed to the provision or emulation of a Transport Direct-like service in order to ascertain their attitudes towards the service and the behavioural consequences, if any, of its provision.

priority: **high**; timing: **immediate**

6. Willingness to Pay for Information

The extent to which and how much the public are willing to pay for a service like Transport Direct needs to be understood. The range of means of obtaining charges (either directly or indirectly from the public) to (partially) cover the costs of service delivery should be identified.

priority: **low**; timing: **following**

7. The Importance of Partnership and Buy-In

Specific ongoing case studies of new and evolving partnerships in the U.K. covering both public transport information as well as highway information and their combination should be identified. These should be subject to monitoring and evaluation exercises to highlight key factors governing, and barriers to, success.

priority: **high**; timing: **immediate**

8. Making the Business Case

A transport and technology stakeholders working group to address business planning associated with Transport Direct should be established. This group should then be the principal means to administer, as appropriate, research and the associated funding for this aspect of Transport Direct.

priority: **high**; timing: **immediate**

9. Media and Presentation Formats

Alternative interface designs and information structures should be identified for a Transport Direct service. Prospective end users of the service should be engaged in the design of the service through an iterative process of consultation and usability testing.

priority: **medium**; timing: **following**

10. Feasibility of Including Retailing with Information

Provider and end-user stakeholders should be consulted to establish the extent to which there is a demand for on-line booking and payment as part of Transport Direct and to determine what form it might take.

priority: **low**; timing: **following**

11. Technical Standards and Technological Solutions

The ongoing research into technological standards and solutions should be encouraged and directed if appropriate but there is not a need for additional specific research concerning Transport Direct *at this stage*.

priority: **low**; timing: **following**

12. Integration of Real Time Systems into Travel Information Systems

Depending on the results of a separate DTLR scoping study into real-time information provision at the time of writing, the following is recommended. Research to accelerate the understanding and delivery of real-time information to mobile devices is needed concerning user take-up, technical aspects (including development of information sources such as AVL), costs and presentation of information.

priority: **low**; timing: **following**

13. Interpreting Integration and Distinguishing it from Coordination

A fact finding mission encompassing initiatives in other countries and regions which intend to or are in the process of pursuing a Transport Direct-like vision should be undertaken to draw insight and guidance for the U.K. Programme. Liaison with an appropriate international body, perhaps UITP, should also be included. Contacts established through this might subsequently enable ongoing dialogue or facilitate subsequent visits as appropriate.

priority: **medium**; timing: **immediate**

1 Introduction

- 1.1 In June 2001 the Transport Technology and Telematics Division of the then Department of the Environment, Transport and the Regions (DETR) awarded a contract to the Transportation Research Group (TRG) at the University of Southampton to conduct a review of existing research on travel information and retailing (where retailing refers to booking of, and payment for, travel) relating to its Transport Direct Programme and to assemble a database of completed, ongoing and planned research work. The latter has subsequently been named the Transport Direct Research Compendium. Stemming from the review the contract's requirement was then to provide a series of recommendations for further research that the Transport Direct Programme might commission to assist in achieving its goals. For reference, explanatory documents concerning Transport Direct, produced by the Department for Transport, Local Government and the Regions (DTLR), are included as Annex A. The review project has been carried out by the TRG in partnership with John Austin of Austin Analytics and Alastair Duff. For background, short biographies of the report's authors are provided as Annex B.
- 1.2 The review has involved three main activities:
 - i. pursuit of information and acquisition of documentation;
 - ii. compilation of Research Compendium entries; and
 - iii. distillation of key issues and findings from the documentation and the subsequent formulation of recommendations.
- 1.3 A detailed account of the process leading to the Research Compendium and this report is provided as Annex C. The Compendium catalogues and summarises over 200 reports, papers and other articles.
- 1.4 This report provides a full consideration of the contents of the Research Compendium. 13 topic areas of relevance have been identified and the report is structured accordingly. The topic areas in themselves provide an indication of the breadth and diversity of issues that Transport Direct must seek to address. These range from end-user requirements and behavioural issues through technological matters concerning data acquisition and management and information delivery to the institutional and financial issues concerning development of information services. For each topic area key issues are highlighted and discussed with extensive reference to the Compendium entries (reference numbering in the main text corresponds to the numbering within the Compendium) and a research recommendation is made.
- 1.5 During the course of the review a general issue became very apparent, namely the use, misuse and ambiguity of terminology in the field of traveller information provision. Whilst at one level this might be deemed a purely academic matter, at another level it becomes crucial in seeking to clearly understand activities within the field and to correctly interpret findings from research. A discussion of this issue is provided as Annex D. The following section begins the coverage of the 13 topic areas identified.

2 Consumer Demand for Information

- 2.1 There is a need to understand how people make use of an information service and how in turn its design can be enhanced both in terms of information content and interface. However, such consideration relies to a great extent on individuals electing to use an information service in the first place. The level of demand for such a service is a fundamental consideration. It is important in terms of persuading those parties that can, in partnership, provide the service that to do so will be worthwhile and ultimately that a business case exists. It is also important in terms of the scale of effect on travel choices and behaviour at an aggregate level that the service might achieve.
- 2.2 Alongside demand for information is the issue of demand for the additional facility of booking and payment beyond the enquiry. Research to date concerning matters associated with booking and payment facilities, either in the form of telesales or the Internet, has been very limited. This issue is discussed further in section 11.

Acceptable and maximum levels of demand

- 2.3 A study of bus passenger needs and priorities (1a) found that most passengers do not use information in making bus journeys and that passenger information was a major priority for only 7-11% (1b). Market research for the U.K.'s national public transport information traveline service (3) found that half of the U.K. population do not use public transport information services and "among current users of public transport, those who use public transport information services only slightly outnumber those who do not". This research appears to have treated public transport as a collective term although the survey of 1500 people found that most typically, potential users of the envisaged national information telephone service would be seeking timetable and fares enquiries for long distance leisure, rail or multi-modal journeys.
- 2.4 Such findings raise two issues. Firstly, the need to identify *for what* demand is being assessed. Demand will vary where the information relates to different modes of (public) transport and in turn is likely to be different again where an information service represents more than one mode. Secondly, a need to determine what level of demand would be considered acceptable. The 7-11% mentioned above might be deemed discouraging and yet an equivalent % drop in patronage through lack of information provision might render some bus services no longer commercially viable. Equally a similar increase in patronage could maintain or enhance a service.
- 2.5 Alongside the issue of identifying what constitutes an acceptable level of demand is the need to be mindful of a maximum level of demand. The latter is unlikely to equate to the total travelling population. An appraisal of attitudes towards Advanced Traveller Information Systems (ATIS) (25) concluded that most travellers (drivers) listen to radio but few seem motivated to explore other sources. This raises the key distinction between active and passive acquisition of information. Work by London Buses Limited (cited in 112) led to a three-way classification of information users as *phobics*, *lovers* or *pragmatists*. The proportions of users in each of these is not made clear. However, the suggestion is made that pragmatists are a key target market for information providers, i.e. those individuals who can be persuaded to use an information service when their need is sufficient.

- 2.6 Other research portrays potentially contradictory messages regarding the demand for information. Recent qualitative research highlighted the habitual behaviour of people with regard to their travel choices, in particular mode choice (55b). For given journey purposes people tend to have a *primary* mode of travel. They automatically use this and will revert to a predetermined *default* mode should the primary mode become (temporarily) unavailable. The demand for information to assist in the mode choice decision would therefore appear to be limited. This is reinforced by the time and effort required to seek information which for many is cause for not doing so (16c). Strong modal allegiance across journey purposes has been found in other work (104) (126).
- 2.7 In contrast, use of rail information services including the National Rail Enquiry Service and the Railtrack website have seen sustained and substantial levels of increase in use. The major U.K. Internet portal for public transport information (PTI) (<http://www.pti.org.uk>) has experienced continued strong growth year-on-year, particularly since its official launch in 1998 (62). The information culture that technological revolution and notably the Internet has seemingly brought about would suggest a general increase in the propensity for the public to seek information of all kinds (55a).

Demand for journey planning versus mode choice information

- 2.8 An explanation for the apparent dichotomy above points to a significant issue for Transport Direct to consider. Demand for an information service concerning journey planning for a pre-determined mode should not be confused with demand for a service that offers mode choice information/guidance. It would appear from research to date and the usage statistics of information services that the demand for information on a specific mode is substantial and may be growing. The demand for mode choice information is less well understood – principally because, as yet, the availability of multi-modal information services has been more limited. However, a recent survey in England found that 32% of the general public “often find themselves in a situation when they don’t know what is the best means of transport to their destination” (173). Of these people, 93% indicated a likelihood of using “a single enquiry service giving information about all methods of making a journey” to make decisions about the best method of travel. Demand is likely to be dependent in part on the extent to which modal alternatives are deemed viable when compared to the primary (and default) mode. A study involving the use of personalised marketing to increase public transport (bus) use (105) found it very difficult to motivate members of households with little experience of bus travel to give the bus a reasonable trial even when offered a free one month pass. The study concluded that it is very difficult to entice car users onto local bus services. As such demand for bus information amongst car users is likely to be low.

The need for a unique selling point

- 2.9 Research in the U.S. concerning marketing strategies for the SmarTraveler telephone information service (111a) highlighted that marketing of the service would have little influence on service demand if those most likely to seek information believe that SmarTraveler provides only the same information as can already be obtained from other sources. The research notes that, because the service requires the user to actively seek out the information (by calling) while radio and TV travel reports are routinely

available as a passive (or incidental) activity, it is very important for the service to distinguish its unique advantages to potential users. This relates strongly to the potential situation for Transport Direct. Suppose Transport Direct is used predominantly by those who have predetermined their mode(s) of travel and who only seek to plan their journey. Why would people elect to use Transport Direct at all when existing mode specific information services (with which they may already be familiar) can already provide such journey planning (and in some cases booking and payment) facilities? The attraction of Transport Direct may be its *one-stop-shop* status – a need for customers to remember only one web address for all their travel enquiries.

- 2.10 This points towards a key issue – the requirement for Transport Direct to identify one or more *unique selling point(s)* (USP(s)). It is important in efforts to assess demand for Transport Direct to distinguish between two measures of demand. The first is the demand for a service such as Transport Direct *in the absence of* any other similar or alternative services. The second is *in the explicitly recognised presence of* other similar or alternative services. The latter is the more accurate level of demand. For demand to be generated and increased, Transport Direct will need to capture the public's attention with unique features that distinguish it from other services and which are valued by consumers. This is not to suggest that the intentions of Transport Direct should be to package the concept in such a way that it can compete with other services. Rather it is pointing to the importance of ensuring that the added value Transport Direct can bring to the information marketplace is well recognised by the public and that in turn the demand for such added value is properly assessed.
- 2.11 At a political level the USP might be the ability to easily compare modes for a given journey. However, the public must be engaged to determine whether and how this USP or others can be created in such a way as to attract the custom of consumers. For example, the portrayal of mode comparison might be packaged as being an ethical journey planner – playing to the future if not present mood of the public as environmental concerns continue to grab high profile headlines. The USP could be a service that can address *Is Car The Best? Why Not Check The Rest?*. This highlights the subtlety of how a USP must be portrayed. This example could have the adverse effect of turning off motorists. Equally it could serve to create a high level of intrigue amongst the motoring public. The effectiveness of a USP in influencing demand will also be dependent on the way in, and extent to which, the USP and service are marketed. This is the subject of the next section.

Information as a facilitator or barrier

- 2.12 The format of information provision is discussed later but this in itself is likely to contribute to the demand for a service. In particular, journey planning software holds enormous value in quickly telling an enquirer that a journey from A to B by public transport is possible. When such services become well known about and trusted they can encourage people who might normally not have chosen public transport, but who are amenable to considering it, to enquire about public transport availability for a journey that they think might be possible. Poor information accessibility can pose a barrier to public transport use that is as serious as the potential barriers of physical access to public transport services.

What is the Transport Direct service?

- 2.13 Measuring the types and levels of demand for existing services (3) can provide a useful yardstick when contemplating demand for future services. However, this offers a poor second to measuring demand for a service directly. Transport Direct faces the problem that it is difficult to even draw inference from existing services because of the pioneering and potentially unique nature of the Transport Direct service that is envisaged. This is a difficult issue to tackle immediately with research. The public may struggle to accurately envisage what Transport Direct might offer and in consequence the use of stated preference survey techniques (which consider responses to hypothetical choices as opposed to considering observed choices) could produce misleading results concerning demand. One means to confront the issue of demand would be to aim to achieve a rudimentary interim version of Transport Direct. This might effectively be comprised of a relatively crude amalgamation of existing information services. At this point, research into an existing service could be conducted including a more credible extrapolation of enquiry concerning a more developed version of Transport Direct. However, the impression of what Transport Direct is should be reconciled with what the public might more specifically wish it to be. This returns to the need to identify a USP.
- 2.14 Identifying an appropriate USP will help to clarify Transport Direct's anticipated position in the information marketplace. This will focus the dialogue concerning Transport Direct and in turn enable tangible projections of service demand to be obtained. These will be crucial to promoting buy-in from stakeholders. Research in this area is therefore considered urgent.

RESEARCH RECOMMENDATION 1

Alternative unique selling points for Transport Direct should be identified and discussed from a customer perspective. Subsequently, demand for a service clearly offering such a USP should be assessed.

priority: **high**; timing: **immediate**

3 Information Needed by End Users

User reactions versus user requirements

- 3.1 Many research projects seemingly report on information requirements of the end-user although it is often the case that such work concerns a survey of user reactions to an implemented or prototype system. Two points should be made here. Firstly, it is implicit that by addressing the reaction of *users*, the issue of whether *potential* users will be minded to become *actual* users is ignored. Reactions of potential users or former users may be very different and potentially more adverse than those of existing users. The latter, by implication, must achieve some degree of satisfaction from use of the system. Equally, *actual* users can become *former* users if they do not achieve an adequate degree of satisfaction. The second point leads on from this: user reactions to an actual system cannot be equated to user requirements from a preferred system

design. Whilst researchers and systems' designers face the problem to some extent that "users do not know what they need to know" (16a), assessing user reactions to a predefined service in effect only enables people to judge a sub-set of possible information requirements that could be satisfied by an information service. Alternative approaches achieve a compromise whereby a system evolves rather than only being produced and seeks to achieve continual improvement through regular consultation with end users (151).

Individual versus market needs

- 3.2 A review of telematics relevant to public transport highlighted the diverse range of user types that exist and the need for flexibility in meeting information needs (5). A recent survey of over 500 individuals assessed the relative importance of five travel factors (16b). Overall the most important of the five factors was reliability, followed in order by time, convenience, cost and comfort. Other research has highlighted the importance of convenience to travellers (55d). Greatest attention at present is placed on information provision concerning time and cost and yet such findings suggest that to be of value services should also be concentrating on how to convey reliability and convenience information to (would be) travellers. Convenience can be seen as an attribute associated with a particular mode or service. As such it is something that individuals may be able to judge for themselves in the absence of information. However, reliability is more likely to relate to a specific trip by a given mode and be difficult for the traveller to judge in the absence of information being provided.
- 3.3 The study above (16b) also stressed the fact that travellers are not a homogeneous group. It considered in detail the importance of a whole range of specific information items to different individuals according to their personal characteristics. This work highlighted the incompatibility between the needs of the travelling public as a whole and the needs of individual travellers. If the former is addressed in system design then this can in principle lead to greater benefits to the system provider and greater effects on travel behaviour and patterns of travel. However, to do so overlooks the information needs of sub-sets of the travelling public. If the corresponding information items are not made available, this could result in trips not being made or not being made using the mode under consideration.

Basic and static information can play an important part

- 3.4 In some cases a *design for all* philosophy that can accommodate the needs of individuals as well as the masses will not be practical. This is particularly the case in the short term where such information requirements introduce a resource burden that cannot be offset by the benefit of provision to the provider. However in other cases, returning to the issue of travel factors, some information which might be classed as *basic* or *static* information can be very cheap to provide (particularly in comparison to the sophistication of real-time information systems for example). At the same time such information might deliver great benefit to substantial numbers of travellers.
- 3.5 Consider the issue of interchange during a journey. It is recognised (11) that uncertainty en route where interchange is needed is seen as a barrier to the attractiveness of public transport. Information concerning the layout of the interchange itself (which will typically be negotiated on foot) can greatly aid the unfamiliar traveller in negotiating this barrier (thereby improving the convenience and

mental comfort of making the journey) (140). Information need not only be about specific journeys being planned, particularly where public transport is concerned. It can also be of use to (would be) travellers in increasing their familiarity with and confidence to use particular services or modes (140) (160).

Information overload

- 3.6 The maxim *less is more* can be applied to traveller information provision. Design for all can suggest the provision of growing volumes of information to cater for differing needs. What individuals actually want is quick and convenient access to information of relevance to their personal needs. This dilemma is resolved if care and attention are given to information structure and hierarchy within a service (140). This is discussed further in section 10.

The merits of providing information on transport service reliability

- 3.7 Reliability is highlighted in 16b as the most important travel factor for many individuals. Other recent research also found that punctuality/reliability is the top priority for the public above a number of other conditions and services – frequency, level of fares, overcrowding and journey time – for trains and local buses (173). This is an issue that is seen raised at stakeholder meetings and workshops. However, the suggestion that travellers should be provided with past performance indicators for a specific journey by a given mode is often met with disapproval. The assumption is made that such a proposition would mean openly publicising that a particular service is unreliable or failing in some regard. The retort to this is twofold. Firstly, the provision of such information will also serve in other instances to highlight how reliable a service is. Ideally if such information were available across modes including the car it might also highlight the relative reliability of travel options in an equitable way. Secondly, in refraining from alerting travellers to an unreliable travel option for a particular journey, the provider is merely forestalling the point at which the traveller will experience first hand the failing of that option. In turn the individual may then elect to refrain from considering that option in future. Indeed if the individual finds a mismatch between their journey according to the information service and that journey as experienced in execution then he or she may be prone to (wrongly) blame and discredit the information service.
- 3.8 Reliability is a facet of the Government's New Approach to Appraisal (NATA). The provision of reliability information across modes, whilst not trivial, may prove to be of benefit to travellers, and also to transport network and service operators in identifying failings in their operations and in providing the impetus to initiate improvements. In a Japanese study (67) it was found in stated preference surveys that providing the information that car delay travel time is zero gives more positive support for car use than no information. Less appears to be known about the effect of *negative* information on highway reliability in terms of mode choice yet it is important for public transport operators to appreciate the positive effect such information could have on their overall business.
- 3.9 The desire from the traveller for a wholly reliable transport service should be distinguished from the desire for information concerning the *degree of* reliability in practice of a transport service. More specifically in the case of the latter, the traveller is likely to want to compare the reliability of particular travel options either in terms

of the modes or routes used or the time or day of travel. Measures of reliability and reliability targets exist but these differ across modes and particularly between public and private transport. The definitions employed are designed to provide overall service performance measures. Such measures are not necessarily compatible with the experiences of the traveller on a given journey. There has been little if any work to assess ways in which reliability levels could be conveyed as information to the public, especially in a way that allows comparison across modes.

- 3.10 Such thinking concerning reliability is speculative yet may prove significant given the importance travellers attach to whatever they consider reliability to mean. As ten year plan capital investment is injected into infrastructure improvements there is likely to be added disruption to transport networks in the coming years. Reliability (including the knowledge of reliably unreliable journeys) is likely to be of increasing interest to information service customers.
- 3.11 There appears to be a wish amongst travellers for information concerning reliability. For Transport Direct, reliability as a mode descriptor alongside time or cost could prove significant in terms of its influence on mode choice. The public are often quick to blame a public transport service which arrives late at its destination. Yet the same is not so often true of a car journey. Transport Direct might pursue the provision of reliability information as a means to deliver a (more) level playing field for mode comparison. However, it is acknowledged that time and cost will remain the primary considerations for service delivery at least in the short term. For this reason the research proposed is not seen as a high priority and not something that, set against other requirements, demands immediate attention.

RESEARCH RECOMMENDATION 2

Customer understanding of the term *reliability* associated with travel options needs to be defined and understood. Possible representations of reliability as information should be conceived and assessed in terms of their usefulness to customers.

priority: **medium**; timing: **following**

4 Embracing Walk, Cycle and Car Information

From 'point to point' to 'origin to destination'

- 4.1 In deliberating the vision for Transport Direct the need to make and address the distinction between point to point and origin to destination becomes apparent. Information provision will not only be concerned with offering alternative modes for the journey but more specifically it will concern offering alternative modes for the different legs of a journey. Different modes should work together to promote the opportunities for both the use of multiple modes within a journey and the opportunities for using alternative modes for different legs of a journey. For this to be achieved then the interchanging between journey legs, and principally between trunk and local end legs, needs to be adequately addressed in information terms to support the traveller.

- 4.2 As noted earlier (para 3.5) this raises the importance of walking as a mode which can frequently act as the glue between, for example, an end leg bus journey and a trunk leg rail journey. As information across modes moves closer towards coordination and in turn integration then the legitimate place of walking, cycling and indeed the car needs to be considered, notably for the end legs of journeys. There is some evidence and activity focused on this in terms of walking. INFOPOLIS (124) produced mock-ups of walking guides and maps (in some cases using photos to orientate the user) that were developed as potential useful tools for the traveller. The public can already use, for example, Multimap.com to produce a street map centred on a specified final destination in London (or elsewhere) on which the tube stations are also marked.

The data needs for walking and cycling information

- 4.3 The point is rightly made that in isolation there would appear little of substance to create a business case for a cycling and walking information service. However, indirectly the business case may exist for such a service where cycling and walking act as feeders of patronage to public transport modes. Some journey planning services within traveline now have the capacity to include walk links and other projects are seeking to do likewise (156). Geocoding allows routes along public roads from a given A to a given B to be displayed on a map. Technically this is already achievable. However, what is lacking are the data necessary to provide such information to the public. This concerns both data quality and coverage. Data detail and quality would ideally support the ability to provide more sensitive route selection. The most suitable route for a pedestrian, for example, might not be the same as that for a cyclist both in terms of the attractiveness of that route and its distance. As with other data types a critical mass of data is required to ensure sufficient coverage and to avoid gaps in information provision.

A general need for research into cycling and walking

- 4.4 In due course research concerning display techniques for walking and cycling information may be appropriate. However, given the current paucity of data it would be premature for Transport Direct to pursue such research. With the continuing pace of technological developments, display techniques and information access devices and formats are prone to change. It will be important, therefore, for any specific research into display techniques to be conducted at a time when its findings can be acted upon.
- 4.5 The sensitivity of route selection and the quality of walking and cycle links are issues that merit further research. However, such research extends beyond only the matters associated with information provision into issues of urban planning and policy and urban form. Hence research specific to or limited to the needs of the Transport Direct Programme would not be appropriate. However, the Transport Direct Programme should encourage greater provision and availability of data concerning walking and cycling stages of multi-modal journeys.
- 4.6 Greater provision and availability of data concerning walking and cycling might be achieved in part through developments in company travel plans. These, in seeking to reduce dependence on the car for journeys to/from work and whilst at work, often consider cycling and walking at a local level as alternative means of travel.

Driver information to encourage public transport use

- 4.7 It might appear that car or driver information has received considerable attention within ATIS and associated research. This is certainly true where the car is the mode used for the entire journey, where information can assist navigation and route choice. However, little work appears to have been done with regard to how information can be used to positively support the use of the car to access alternative modes for the trunk leg of a journey. As noted earlier (para 2.8) car users appear reluctant to change to bus use for local journeys. Hence it might not be realistic to assume that the bus can meet the expectations of the travelling public concerning the end-legs of a multi-modal journey.
- 4.8 Although parking guidance information systems have been developed and researched and park and ride systems also investigated, there has not been significant consideration of the inclusion of driver information alongside or integrated with information on, for example, journey planning by rail. The principal role of information would be to inform travellers of parking provision in terms of either capacity or in real time with regard to availability of spaces. As with cycling and walking this is an issue that cannot be confined to information. Parking capacity for rail is a problem. So too is the overcrowding on many services during peak times – something noted as a problem also in the U.S. SmarTraveler project concerning mode switching and transit capacity (111c). Any future success of park and rail will depend upon a partnership between increased capacities and improved information concerning them.

Feeder links and glue

- 4.9 There appears to be little research that specifically addresses the role of walking, cycling and driving as modes that can facilitate alternative travel options to a door-to-door journey by car. Their potential importance is substantial and further research in this area is required. However, for the reasons stated above, research into information provision alone would appear to lend little advantage to the Transport Direct Programme, at least in the short term. The research recommendation below, specific to Transport Direct, is judged accordingly in terms of priority and timing.

RESEARCH RECOMMENDATION 3

The extent to which the quality of, and information concerning, end-legs of longer distance journeys influences choice of mode(s) for travel must be understood. The current limitations should be identified in consultation with the population at large, local authorities and public transport operators.

priority: **low**; timing: **following**

5 The Importance of Awareness and Marketing

Public ignorance of information sources

- 5.1 A study of social exclusion and public transport (11) suggested that disadvantaged groups are able to find their way around on services they depend on (i.e. they do not need information). However, they are unaware of other possibilities open to them (i.e. information could help). Demand for an information service can only arise from those individuals who are aware of the availability of the service. Research in the U.S. is not unusual in highlighting public ignorance of information sources (135). Conscious awareness is also linked to the extent to which an individual needs to use an information service and whether the individual concerned is an information *phobic* or *lover*. Recent qualitative research (55b) included a focus group comprised of people aged over 60. None of those present were aware of the existence of the National Rail Enquiry Service (NRES). This is in stark contrast to the usage statistics for NRES published in regular bulletins which show huge demand for (and by implication awareness of) the service. 1500 interviews carried out with a nationally representative sample of the population of Great Britain found that 70% would consider making a long distance public transport journey by train. When asked how they would get information for such a train journey, only 21% mentioned telephoning NRES (a further 41% would telephone a British Rail station – although they would be unaware, they would also be using NRES) (3).
- 5.2 A study of bus passengers needs (1a)(1b) found that most passengers do not know about available information – much of the information currently provided is very little used by the public because they are unaware of it, cannot easily obtain it, or cannot understand it. A recent survey of rural residents (35) found that just over two-fifths of respondents had timetables. Most thought that they should be made available by delivery to the door and at the local shop / post office. It would be reasonable to assume that timetable information exists in printed form for a particular bus service. However, the issue raised here is that the inclination to become aware of how to obtain such information can in itself be a barrier to awareness and in turn use.

The need to raise awareness

- 5.3 Information service providers must be proactive in raising awareness – there is a need for marketing and advertising. There are striking examples of this having been done, notably with the television and newspaper advertising campaign by TheTrainLine.com. Yet in contrast the Railtrack website (<http://www.railtrack.co.uk/>) has attracted high levels of use with virtually no formal advertising. The need for advertising is influenced by the degree of competition amongst similar or overlapping services. Much could be learnt concerning these heavily used U.K. services in terms of public awareness and what distinguishes those individuals who are aware of them from those who are not.
- 5.4 The mixed observations drawn out above highlight that it is not possible to generalise over the issue of awareness. In some quarters awareness appears to be a problem whilst in others high levels of awareness are demonstrated. Formal advertising campaigns, particularly at a national level, are expensive. Market research is required

to determine how such campaigns if taken forward can be targeted to be effective. It is important to ascertain whether those individuals who are aware of an information service are the ones of interest, i.e. those likely to change their travel decision as a consequence of information provision. If this is not the case then market research is also required both to identify the target market and in turn develop an effective advertising strategy to secure them as service customers. This would include the promotion of a unique selling point as discussed earlier (in section 2).

Campaigning to raise awareness and promote information services

5.5 A substantial marketing campaign was undertaken and its effect studied in association with the SmarTraveler telephone information services in the U.S. (111a). The study found that the majority of non-users did not recall being exposed to any marketing mention or advertisement and concluded that most travellers are simply not information seekers. Neither users nor non-users found the radio or television advertisements very memorable. It was considered that only 31% of the target market could be characterised as truly aware of the service since more than one third of those surveyed who said they were aware of SmarTraveler were not sure what it is. This latter point is significant – awareness or lack of it should be gauged according to whether or not an individual is familiar enough with an advertised information service to know how and when it might serve a useful purpose to that individual.

5.6 The example above highlights the effort that can be required to achieve success in promotion. The European project INPHORMM (166), in addressing campaigns to change attitudes and travel behaviour, concluded that real change in travel behaviour requires integrated and sustained campaigns, supported throughout by the organisations concerned, to generate wide awareness. An 84% increase in bus use and a corresponding reduction of 7% in car use by staff at Heathrow has been achieved by the British Airports Authority (BAA). However, this has been the result of a sustained and multi-faceted marketing campaign (involving travel information and ticketing initiatives) to reduce single occupancy car use (172).

Partnership in promotion

5.7 Information services can perform a role in promoting the associated transport services. However, to do so the information services themselves must be prominent. Major bus groups and rail operators will have marketing initiatives directly concerning their services. In many cases these will include information on service availability. The relationship between services, information, marketing and awareness is poorly understood. There seems broad agreement that the public have a distinct preference for a one-stop-shop approach to information access. It therefore seems tenable that the economies of scale that could be achieved if information providers were to pool their advertising resources could lead to a centralised national advertising campaign which in turn could produce mutual benefit for those parties involved. This is already a reality within the passenger rail industry. In spite of being comprised of 24 separate train operating companies, the industry puts forward a unified front via its National Rail website (<http://www.nationalrail.co.uk/>). At the time of writing, National Rail, with the support of the Strategic Rail Authority, is running a national television campaign in the U.K. promoting rail travel. (This includes the website address and NRES telephone number for (only) the last 6 seconds of the 42 second advert.)

- 5.8 Transport Direct holds the prospect of becoming a national portal to traveller information and as such would be a natural focus in due course for such a campaign. It is recommended that more needs to be understood about awareness of current information services and the role that advertising has and could play. There are undoubtedly lessons in other areas which, not least, highlight how sensitive an advertising campaign can be to the distinction between success and failure. For example, the Tesco advertising campaign with Prunella Scales would seem to have enjoyed success in contrast to the abandonment of an apparently similar style of campaign by Sainsburys involving John Cleese. The proposition of pooling resources for advertising would also present some serious partnership challenges to overcome for the parties involved which would require investigation.
- 5.9 There appears a need for the public transport industry in particular to do more to promote to the public the availability of information concerning its transport services. Awareness, and as necessary, promotion of Transport Direct will be critical to its eventual success. Individual organisations (both within and beyond the field of travel information provision) will have explored and learnt from different approaches to promotion and the issues involved. If such experiences can be pooled together then it should be possible to elicit guidance of value to all those concerned in traveller information provision and to Transport Direct. It is suggested that the availability of a best practice guide for promotion of travel information services is essential. The timing of the recommendation below reflects two points. Firstly, promotion of Transport Direct itself is not immediately required and so guidance to do as much is not urgently required. Secondly, findings from other more urgent research/initiatives recommended in this report would be likely to further support or inform a subsequent formulation of best practice guidance.

RESEARCH RECOMMENDATION 4

A best practice guide on promoting travel information services to the public should be developed. This should also address the relationship between promotion of transport services and the role of travel information.

priority: **high**; timing: **following**

6 Effects of Information on Behaviour

The need for evidence

- 6.1 Mokhtarian (137) provides a dispassionate perspective on the assumptions and conventional wisdom about the benefits (derived from behaviour change) that are assumed (or hoped) to flow from providing more and more travel information. She acknowledges that such benefits might exist but questions the availability of the evidence.

Habitual behaviour and perception

- 6.2 Any effect of information on behaviour should be assessed in the context of preceding discussion concerning the habitual behaviour of travellers (55d) (126). Information can only bring about behavioural change if viable alternatives to the primary travel choices exist. The viability of alternatives must not be considered only in absolute terms but in terms of *perceived* viability on the part of the travellers (157). Forthcoming research to be commissioned by the Scottish Executive will be looking to identify the barriers to modal shift. These are taken to include hard factors such as cost, time and reliability as well as soft factors and the perception of obstacles (170).

Past research oriented towards driver guidance

- 6.3 A 1996 review of studies on the effects of traveller information provision assessed their relevance and sought to identify evidence (if any) that transport behaviour might be affected significantly by information provision. The study concluded that, despite the wide interest in provision of traveller information, with significant activity in some areas, there was little evidence of the impact the systems have on travel behaviour. There was even less on the results for transport systems in terms of traveller numbers and mode choice. In part the lack of evidence is because a lot of the systems studied were market driven, mostly driver guidance. A consideration of the effectiveness of ATIS in the U.S. (23) noted that, whilst individual commuters (drivers) may act on information where major incidents occur, otherwise they do not change route, meaning that information has little overall effect on the network. Since the 1996 review there are a number of publications which offer some insights into the effects of information on behaviour.
- 6.4 Development of information services on the Ile-de-France motorways is considered to have had significant measurable impacts (27). A tendency for a growing number of travellers to move from simple reactions (leading to changed route or departure time) to sophisticated awareness (leading to changes in mode and use of several modes) is confirmed in relation to increasing information provision. It is considered that creating a growing population of *intelligent travellers* is possible but requires continuing development of information on current and potential future situations. This research would suggest that pre-implementation market research might underestimate the consequences and scale of effects of the system on behaviour – users need prolonged exposure to evolve their reactions.
- 6.5 Recent research in Germany concerning the pilot BAYERNINFO state-wide information system in Bavaria (77) determined from (user) surveys and simulation modelling that the project would bring very substantial changes in travel behaviour on a single working day in Bavaria: changes in route choice and in departure time would be the major impacts, but there would also be significant transfer from car to public transport, though also some transfers from public transport to car. A telephone survey of peak hour travellers in the U.S. assessed attitudes to the future provision of specific high quality information services (34). It concluded that timely and reliable information would change travel behaviour, especially increasing transit use in place of car. These examples suggest that there is significant potential for information services to bring about changes in behaviour. However, such examples should be tempered with others that are less optimistic.

- 6.6 A U.S. study (40) which investigated the effect of PTI on commuter propensity to use transit services found that older people and those commuting shorter distances were more likely to use transit if information is available, wealthier commuters and women less so. It was considered that overall potential for change was not high. Other U.S. research has found that many commuters are unwilling to modify their habits (131). Stated preference evaluation of the THEPIS public transport information system in Greece (54) estimated it could produce a modal shift to public transport of about 3%. The European CONCERT project (57b), which demonstrated an Internet multi-modal travel information service, found that it did not have much effect on travel behaviour in the short term, but surveys indicated very positive user reactions, with considerable potential for impact in the longer term.

The validity and transferability of previous research findings

- 6.7 A particular issue which emerges from the above examples in the literature concerns survey methods. Many results concerning behaviour stem from stated preference surveys. Whilst the findings cannot be invalidated simply because of this, such results should be treated with some caution particularly if generalizations are to be drawn from them. Particularly where behaviour is concerned then the origin of the research is likely to have some significance in terms of cultural differences between countries, the degree of engagement with the information society, the nature and extent of car dependence and the extent and quality of public transport provision. This is particularly an issue concerning the U.S. with its lower land use densities and more extensive urban sprawl (55e). The specific nature of the different information services, both in terms of their usability, information content and promotion, will also impinge upon the transferability of findings between studies.

Changing behaviour over time

- 6.8 Other studies raise the issue of per-trip choices versus longer term choices. A U.S. study of traveller stated preference for bus and car modes (33) made the distinction between strategic (monthly) choice and tactical (daily choice) scenarios. The European TABASCO project (43d), although embracing the longer-term goal of achieving a mode split change, recognized that most people only shift mode as a result of some change in their life - a new job, for example. It was considered that the positive change in attitude towards public transport demonstrated in this project will make such changes more likely to go towards public transport. The same study also concluded that (Internet-based) information systems will only be effective as part of an overall policy aimed at improving the quality and performance of public transport services. This highlights the supporting role of information services in securing behaviour changes either in response to changes in personal circumstance or to the introduction of substantial change in an aspect of the transport system that has a relevance to an individual's pattern of travel. In this context, evaluating an information system in isolation of external contributory factors might not indicate the degree of effect on behaviour that could occur in practice as external factors change.

A focus on mode change

- 6.9 Behaviour like other preceding concepts cannot be treated as a single issue. It is multifaceted reflecting the range of different travel choices that can be influenced by information and bring about behavioural change. Much of the study of travel

behaviour has focused on driver choices, and notably route choice, as noted at the beginning of this section. Choice of mode is likely to be the principal choice of interest to Transport Direct developments. Research for the Highways Agency found a limited inclination to seek mode choice information. However, this research also highlighted the potential for attitudes towards different modes and choice of modes to be influenced by the presentation to travellers of comparative information for alternative mode options for a given journey (55d). The ultimate success of Transport Direct will not depend merely on the level of use of the envisaged service but crucially on the extent to which the information provided can bring about changes in travel choices and notably mode choice. There is little evidence to date of the potential affect of an integrated multi-modal information service on mode choice.

A means to assess the behavioural consequences of Transport Direct's use

- 6.10 It is not considered sufficient for the behavioural consequences of Transport Direct's provision and use to be judged by the use of stated preference research techniques. To secure what is crucial insight into this fundamental aspect of Transport Direct requires a means to provide the public with a Transport Direct-like service which they can use in practice. In research terms, *intervention in real life* is needed. This might be achieved in two ways. The first would be to manually provide a Transport Direct-like service to a sample of individuals. There is sufficient information available from a number of existing information sources to manually collect and collate much of the response information that Transport Direct itself is envisaged to eventually provide automatically. Participants in a research study could be provided with such manually prepared responses associated with intended journeys. Their reactions to, and the behavioural consequences of such information provision could then be monitored and evaluated.
- 6.11 The second means of achieving intervention in real life would be to actually build a limited Transport Direct *prototype* whose use and effects could then be assessed. Given the paucity of end-leg information across modes (as discussed in section 4) it is suggested that such a prototype might take the form of creating an interface that could automatically interrogate separate web sites for rail, coach and car for an *inter-urban* trip and present comparative information across these mode choices back to the user. It may be that both approaches are worthwhile to pursue. Indeed, the creation of a prototype might serve to also assist in other areas covered in this report. The understanding that such research should yield and the time required to prepare for and conduct the research means it should be treated as urgent and of high priority.

RESEARCH RECOMMENDATION 5

Prospective users of the envisaged Transport Direct service should be exposed to the provision or emulation of a Transport Direct-like service in order to ascertain their attitudes towards the service and the behavioural consequences, if any, of its provision.

priority: **high**; timing: **immediate**

7 Willingness to Pay for Information

An incidental consideration in research to date

- 7.1 Willingness to pay for information can be an issue at the heart of formulation of a business case to run an information service on a commercial footing. The issue is touched upon in a number of research sources. However, it seems it is seldom given detailed and thorough consideration. In such sources the messages are mixed.

Mixed messages on willingness to pay

- 7.2 A U.S. telephone survey of peak period travellers (34) found that a high proportion of travellers are willing to pay for an ATIS service – younger people are more willing to pay than older people, regardless of education/income. Stated preference assessment of the THEPIS PTI system in Greece found that both public transport users and non-users would be willing to pay a small extra fare for its use (54). In a seemingly bold and rather unsubstantiated fashion an article concerning the European INFOTEN project (115a) states that “as the availability of information in many cases will save a lot of time and money (travel/trips can be conducted more effectively) the willingness to pay for information seems obvious. After a period of ‘prime pumping’ with a lot of investments a break-even point can presumably be reached.” In spite of conceding that “demand behaviour of the potential target groups is presently an unknown figure” the article considers two market scenarios up to 2007 concluding that “it is overall likely to achieve a positive Cash-Flow development”. About 70% of test users in the PROMISE (personal mobile traffic and travel information services) project were moderately or satisfied with the demonstrated PROMISE services and the concept. The users are prepared to pay for the traveller information services at a rate of 7 euros per month or 50 cents per request (22f).
- 7.3 In contrast, bus passengers seem unwilling to pay higher fares for better information but might pay small charges for timetables, telephone services or personalised services (1a). U.S. research has found that ATIS services for complex transit networks would be very useful but users would not expect to pay (25). Other U.S. work has concluded that the market for personalised in-car travel services and systems appears doubtful because most motorists do not apparently wish to pay (32). Elsewhere (23) it is suggested that individual users appear to like ATIS but it is questionable how far users will pay for it. Meanwhile a telephone survey in Southern California (concerning driver information predominantly) found that one-third of respondents thought that individuals should pay for information provision, one-third thought it should be funded by Government and private companies; most think the split should be 50/50. Respondents were found to be much more interested in car safety devices (24).

Means of payment

- 7.4 The suspicion that this issue to date has generally only been considered as an incidental aspect of research projects suggests a need for further research. In particular what are not (well) addressed are the means of payment that are available. Straightforward hypothetical questions regarding willingness to pay unsurprisingly draw a rather guarded response. Yet payment in practice may not appear as an up-front cost. For example, information services provided by a mobile phone network

can generate an income through call charges with the possibility that users will either assume that the information service itself is free of charge or will not be fully aware of the call charges associated with their use of the information service. Another issue is the prospect of two-tier information services where the lower tier provides a free service associated more with *broadcast* information while an upper tier provides a charge-based service associated more with *narrowcast* information personalised to the needs of the user. Private sector companies in the U.S. are now looking for ways in which to make information feel more value added (29c). Using the Internet as a delivery medium at present poses challenges for payment mechanisms other than via metered Internet use as a means to charge users.

- 7.5 There does not appear to have been research which looks at where a line between free and charged-for information should be drawn for a two-tier service. More particularly there does not appear to have been research which considers public perception and expectation regarding when and when not to pay for information. Findings from research into willingness to pay and into means of obtaining charges could be insightful for Transport Direct. However, in relative terms this is not research that should be of high priority or addressed as a matter of urgency.

RESEARCH RECOMMENDATION 6

The extent to which and how much the public are willing to pay for a service like Transport Direct needs to be understood. The range of means of obtaining charges (either directly or indirectly from the public) to (partially) cover the costs of service delivery should be identified.

priority: **low**; timing: **following**

8 The Importance of Partnership and Buy-In

The information chain

- 8.1 The information chain from collection of raw data through its conversion into meaningful information to its delivery to end users will usually involve a number of organisations spanning the public and private sectors. As such, the delivery of an information service, particularly one which involves multiple modes or a wide geographical area of coverage, will necessitate a form of partnership between organisations for the service to be developed, to function and to achieve success. Public authorities typically have a requirement to collect traffic data for traffic management purposes. As the field of ITS has developed many have continued to invest in information gathering infrastructure and have recognised the added value of using the collected data for traveller information purposes. For this reason, a common division of responsibilities seen in partnerships is as follows. The public authority has the role of data provision and maintenance of data quality. Meanwhile the private organisations have the role of using that data to deliver (commercial) information services to the public (18) (49) (61) (113).

Different forms of partnership

- 8.2 A workshop in the U.S. sought to explore the roles and partnership potential of the private and public sectors in delivering advanced traveller information services. A number of forms of partnership were set out (103): i) the national weather service model - a public/private partnership in which the government collects the raw data and private weather reporting services interpret, customise and market the data to customers; ii) private franchise model - public sector responsible for data collection and then awards exclusive distribution franchise to a single competitively selected information provider in return for a fee or share in the collected revenue (alternative is non-exclusive franchise involving two or more private information providers); iii) outsourcing model - public agency owns information service but contracts its operation out to a private firm; and iv) public-private partnership model - cooperative arrangement for joint operation of a service. The first model was considered favourable, with a need stressed for public agencies to focus their attention on improving the quality of the database and the private sector enhancing the content, marketing it and delivering the finished product.

Endemic problems for partnership

- 8.3 Many sources emphasise the importance of partnership (e.g. (22d) (59)). Stress is laid on the importance of transparency in roles and responsibilities for all organisations, establishing a complete information chain through a proper organisational structure in each nation, co-ordination in standards, and engagement with (private) service providers (81a). Of course partnership is not a straightforward matter to deal with, as is highlighted by the experience of the TravInfo project in the U.S. (36b). The TravInfo system has developed a network of professionals with interest and experience. It has stimulated a private sector alliance that has the potential to become a major traveller information industry. However, the system itself has failed to achieve its core objectives: stimulating product commercialisation, widening and simplifying dissemination of information, and improving travel. It is considered possible that an organisation created to integrate and centralise information has endemic problems: partnerships are slow to take decisions; centralisation divorces the information provider from the end user; and publicly funded projects are ineffective at anticipating consumer needs. Proposals for tackling these problems are set out, especially looking at contracts and responsibilities. This example raises the question of whether informal partnership with only commercial motivation can succeed or whether legislation has a role in making things happen.

U.K. specific partnerships

- 8.4 The nature of partnerships and their success is likely to be significantly influenced by institutional issues which can vary between countries and regions. In the U.S., for example (55e), each State has its own government structure, and a range of public bodies responsible for transport, in addition to commercial providers. Whilst partnerships can face difficult problems to resolve, they also present advantages. For example they can help to avoid conflict (without necessarily leading those involved into collaborative and expensive activities). They can also provide neutral territory for organisations and individuals to come together, enabling institutional and jurisdictional barriers to be crossed on a non-committal basis. A notable partnership achievement in the U.K. is that of traveline involving local authorities and the public

transport industry. Under the Transport Act 2000 there is an obligation concerning the provision of bus information. However, this obligation does not extend to information providers having to co-operate in the traveline initiative. Indeed, the initial traveline developments preceded the legislation. Nevertheless clear guidance to local authorities came from Government to consider the importance of information provision in their bids for capital funds (55c). The Greater Manchester Information Partnership has recently been established between the Greater Manchester Public Transport Executive (GMPTE) and public transport operators (147). Three call centres have been physically merged and the partnership also addresses ticketing. Whilst such examples specific to the U.K. provide encouragement, the detail of their formulation, operation and degree of success is poorly understood, or at least the public domain is not privy to such insight.

- 8.5 Effective partnership will be vital to the success of Transport Direct. Partnerships can take various forms and can face a range of problems as highlighted above. It is therefore essential that partnerships that might provide lessons for Transport Direct or indeed might play a part in Transport Direct are studied in detail. Only at the detailed level will key factors that are instrumental to either success or failure come to light. Partnerships develop and evolve. It is not therefore sufficient to consider snap-shots of existing partnerships at a given point in time. Instead their (continuing) development paths must also be considered. The need for retrospective assessment of existing partnerships in this way and indeed the ongoing monitoring of relevant partnerships as they continue to emerge and evolve means that the recommendation below should be urgently addressed.

RESEARCH RECOMMENDATION 7

Specific ongoing case studies of new and evolving partnerships in the U.K. covering both public transport information as well as highway information and their combination should be identified. These should be subject to monitoring and evaluation exercises to highlight key factors governing, and barriers to, success.

priority: **high**; timing: **immediate**

9 Making the Business Case

- 9.1 At the heart of the development of information services which involve private organisations, who are under limited or no legal obligation to commit, is the need to have a clear business case. Public transport operators, particularly in the bus industry, are operating to short financial horizons. Investment in information services as envisaged in Transport Direct is a long term commitment involving not insignificant risks. This is particularly the case where there is a limited availability of robust and relevant empirical evidence that such information services as are envisaged will generate sufficient demand and in turn a revenue stream to offset the costs.
- 9.2 Recent research in the U.K. has considered the potential for information services to generate extra revenue through increased ticket sales (4). An earlier 1996 article (112) highlighted that experiments to test the hypothesis concerning increased revenue are

found to be few and those which exist are now dated. However, the few that are cited point in the same direction - that a greater investment in information provision can show a positive return.

The context for a viable business case

- 9.3 Recent work considering developments outside the U.K. and their relevance to the U.K. (120) offers a helpful viewpoint on the context in which a successful or at least viable business case is likely to be drawn up. The mere presence of technology will not make PTI provision a success. Success in introducing it requires: political commitment; a healthy commercial environment for operators (including supportive trends in land-use planning, traffic management and economic growth); appropriate technological infrastructure, and regimes that stimulate take-up by consumers (and technological regulation is important); and market and regulatory stimuli so that it is in operators' commercial interests to introduce technological solutions for PTI wholeheartedly.

The information business case in the context of the wider transport system

- 9.4 The business case for information provision needs to be drawn up in conjunction with consideration of the transport system itself. A study of bus users (1b) rightly made the observation that investment in information systems is not a substitute for investment in other public transport improvements – “good information will not sell bad services”. A survey of public attitudes to transport in England revealed that for buses, local rail and long distance rail, access to timetable/route info is a lower priority than frequency, punctuality/reliability, cost of tickets, journey time and personal security in terms of what would have to improve to bring about more use (173).
- 9.5 Information should be considered as complementary to investment in public transport itself. In other words if investment is occurring in other parts of the transport system then the business case should not be based (solely) on the current transport system. It should instead be based on projections of changing demand for information as changes to transport systems occur over (perhaps) the period of the ten year plan. Indeed the infrastructure investment within the ten year plan is likely to introduce substantial periods of disruption to the transport system. This could stimulate a greater need for information in the face of unreliable and unpredictable travel conditions. In this context a business case for information provision might become founded on the basis of protecting rather than increasing revenue. However, the uncertainty of such long term projection coupled with the much shorter time horizons of many of the players involved makes this a less than straightforward proposition.

A need for substantial capital investment

- 9.6 Work within the European PROMISE project (22f) included the establishment of a business model but it was concluded that viable service provision needs very close co-operation with all service chain players both public and private. A number of studies point towards the need for public authorities to provide the substantial capital investment (or a part of it) required to establish (pump prime) the systems and the associated infrastructure. This comes with an expectation that private sector players will be in a position to operate the service on a commercial (and commercially successful) footing (90) (81a) (115a). With the vision for an integrated system this

would involve a number of such players. This in itself can introduce complex and additional cost implications. French work on intermodality has noted the need to define the rights and duties of each partner in a shared system. Where fare integration is concerned, the various operators (understandably so) and also the various public transport executive agencies involved seek precise ridership data to share the revenue and split the costs among them. This may involve some significant additional costs (such as shared smartcard ticketing systems) (114).

Learning from other business models

- 9.7 Two successful examples of established commercial information services relate to driver information, namely TrafficMaster in the U.K. and SmartRoute in the U.S. (19). These examples would seem to fly in the face of other research (32) which concluded that the market for personalised in-car travel services and systems appeared doubtful because most motorists do not apparently wish to pay. In both cases, revenue comes from gaining sufficient subscribers, and involves increasing market penetration in line with increasing investment in systems to provide increased services. Licensing use of technology, and gaining agreements with car manufacturers, motorists organisations and cellular telephone companies are important as part of this. Perhaps crucially neither rely on public data sources. TrafficMaster has built its own infrastructure for generating data. It would seem that in contrast to multi-modal services which rely on a partnership across organisations in terms of the information chain these organisations have full control over the information chain within themselves and partnership then becomes an issue for the *selling* of their service. Although these examples are some way removed from the arrangements that might be envisaged in association with Transport Direct, it may be advisable to consider closer inspection of such alternative business models and to assess their (partial) transferability into the inter-modal information service arena.

A business case not confined to travel information provision

- 9.8 In contemplating the business case issue it need not necessarily be assumed that the information service should operate in isolation or confine itself solely to travel information. A PTI system in Spain is combined with destination/activity centre information. Hence a user can, for example, stipulate that he wishes to visit a pharmacy and the system will then identify pharmacies which are currently open in the vicinity of the enquirer and then in turn provide the necessary travel itinerary to reach the selected pharmacy (109). This issue is also drawn out in an article concerning the U.S. (118). This notes that a key to ATIS deployment is self-sustainability. ATIS development committees and workgroups have sought to find a business model that supports itself, resulting in the conclusion that ATIS must be bundled with other data for added marketability - Arizona TripUSA is an example of self-sustaining deployment. Hotels, restaurants and other area businesses have made use of custom Internet page development services and are paying for banner advertising.
- 9.9 Extending this further, private sector information providers may be able to achieve greater financial gain by diversification from a starting point in travel information provision. Major transport companies who have or are investing in information provision have generally done so seeking to gain competitive advantage. Calls from initiatives such as Transport Direct are for such companies to bring their

developments into a shared common domain to work in a collective way to further develop integrated multi-modal information systems. Such calls may be met with at best a mute response. Not only might such co-operation be seen to entail giving a competitor who has invested relatively little a benefit, but it might also not represent the most effective way of generating more revenue. A successful traveller information service is likely to have built up a substantial customer base. Such a base could provide a lucrative opportunity to sell other services. These might not be related to traveller information or even travel.

The case for public investment alongside the business case

- 9.10 In considering the business case issue it should not be forgotten that there is, or will have been, a public investment case to make. A symposium in the U.S. raised the question of whether public authorities have a sufficient case to justify investment given the potentially low overall impact of information services on behaviour (for predominantly driver information systems and route changing) (23). The public investment case is more complicated than the business case in the sense that it must deal not only with identifying the (scale of) financial benefits of providing an information service but also the economic, environmental and social benefits (16c). Economic and environmental benefits at a local and national level might be derived from reductions in traffic congestion brought about by better informed travel choices. Social benefits might include the support information provides in upholding an individual's right to freedom of choice. They might also enable would be travellers to become travellers and enhance social participation, reducing social exclusion. The public investment case is able to and more likely to assess the longer term consequences of investment. The Government's ten year spending plan for transport suggests a number of substantial changes to the U.K.'s transport system. These will in turn bring about changes in the relative merits for different travel choices thereby reinforcing the importance of information provision.

A need for joint working

- 9.11 In principle, the Government could subsidise the delivery of a Transport Direct service. However, at present the capacity of the Transport Direct Programme is to contribute to capital costs rather than maintenance and running costs. It is crucial that the need for Transport Direct be underpinned by at least the belief that a viable business case (with or without subsidy) exists. The industry has, understandably, a number of reservations concerning this. It seems unlikely that these reservations can be overcome solely by Government speaking to relevant parties individually. There needs to be a collective forum (an informal partnership) in which parties come together in a joint working arrangement to contemplate individual and collective goals for mutual benefit without relinquishing competitive edge. Such a forum should be established as soon as possible. Similar joint working is seen in the fields of smart cards (150) and real-time information (52). It is suggested that such a collective forum might then usefully address the constituent parts of Transport Direct (namely: multi-modal journey planning; booking and payment; and real-time updates) separately in terms of the business case for each. Research could also develop concepts for business success scenarios that can be tested on the wider industry.

RESEARCH RECOMMENDATION 8

A transport and technology stakeholders working group to address business planning associated with Transport Direct should be established. This group should then be the principal means to administer, as appropriate, research and the associated funding for this aspect of Transport Direct.

priority: **high**; timing: **immediate**

10 Media and Presentation Formats*Existing and projected used of media*

- 10.1 A study of the general public's requirements from traveller information systems (16b) determined the following proportions in terms of people who both had and used different media to obtain travel information: telephone – 70%; mobile phone - 24%; and Internet – 19%. The corresponding proportions in terms of people who did not have but would use different media were: telephone – 1%; mobile phone - 14%; and Internet – 36%. A similar issue was addressed in another survey which found that 30%, 5% and 2% of the general public had used telephone enquiry services, fixed Internet access and mobile Internet respectively to get travel information and advice in the past twelve months concerning local buses. 36%, 10% and 2% of the general public had used telephone enquiry services, fixed Internet access and mobile Internet respectively to get travel information and advice in the past twelve months concerning trains. The potential future demand for both fixed and mobile Internet access to travel information was indicated to be substantially higher (173). From this study it appears that a minority of the public currently use electronic kiosks (although kiosks provide a useful point of access to computer-based information services for those members of the public who do not have their own personal means to access similar services) but the use of the printed timetable and its anticipated use in the future remains high. After initial enthusiasm, there is more realism over the use of WAP enabled mobile phones to access information. However, the rapid growth in WAP phone use means it may well prove a sound basis for mobile Internet (50).

The Internet and web

- 10.2 The Internet (and notably the web as a communications protocol) in its relatively short existence has become a mainstream communications medium and one that has been exploited for traveller information provision. It has attributes that make it desirable over other media. It provides a suitable browsing environment for journey planning, is cost effective and is available 24 hours a day seven days a week (29c). Buckinghamshire was one of the first local authorities in the U.K. to make extensive use of the Internet for information provision. Slevin (106) saw it as a means to get information into places where it had been difficult to get information in the past – schools, colleges and workplaces. He also saw the web as a challenge to conventional wisdom. Printing timetables involves the pressures to keep costs down resulting in a compression of timetables into as small a space as possible. In contrast web page space does not hold the same costs, allowing information to be presented in a more usable way. Crucially the Internet is a means through which to potentially reach

sectors of the public who do not attempt to find information on public transport via other means. Testament to the Internet's potential are the over 400 web sites in the U.K. that now provide public transport information (62).

Information to mobile devices

- 10.3 Whilst the web accessed via a desktop PC provides tremendous versatility in information presentation, mobile devices that can be used to access information inherit a problem touched upon above concerning printed timetables – namely that the space in which to present information is at a premium. This problem is further compounded by the speed at which information can be obtained by such devices. Nevertheless, in spite of these impediments, mobile devices have the potential to provide a valuable complement to fixed Internet access allowing travellers to plan (or re-plan) journeys on the move or to obtain/receive real-time updates on their intended or current journey.
- 10.4 The European Webraska Askaroute system claims to offer to any European Wireless Application Protocol (WAP) phone user a service to find his way anywhere in his own language, through obtaining information on any mode of transport (165). This includes maps, traffic and transport information and personalised service. Personalisation is set to be a key feature of information services concerning mobile devices. A notable success for WAP services in the U.K. concerns the software company Kizoom (<http://www.kizoom.com/home.html>). Kizoom produces services to deliver “personalised information over the mobile internet via WAP, SMS and other relevant protocols”. Its first major success was a personalised, mobile version of Railtrack's web-based timetable information service for national passenger rail (<http://www.railtrack.co.uk>). This WAP service processed over 400,000 train lookups during its first three months of operation. A service in Korea is seeking to allow mobile (cellular) phone users in cities to send in a request for a public transport journey and receive directions for the route and next journey. Their location would be identified by the cell where their call originates (47). Work in Japan is developing ways to send maps to mobile devices via email enabling easy navigation on foot within a city (80).

Usability

- 10.5 Travellers want to be able to understand the information that is made available and they want it to be accurate, relevant and accessible. A perception can be drawn from some of the research literature that information technology is seen to be a panacea for previous failings to provide information adequately. Whilst technology-based solutions to information delivery have great potential to enhance information availability and access, information services must ultimately be usable if they are to be used (75). A comprehensive article on usability testing concerning traveller information systems (108) stresses that transportation engineers must recognise the differences between their views of system functionality and capability and the user's view of system usability. For PC-based Internet access a best practice guide for information presentation, content and structure has recently been developed for public transport information on the web (140). This too stresses the importance of usability and highlights the forthcoming need for information provision to comply with the Disability Discrimination Act. Work in Europe concerning the interface design of

public transport information systems across a variety of access media/devices has been spearheaded by the INFOPOLIS (124) and INFOPOLIS 2 (125a) projects.

Interface design in a changing world

- 10.6 Usable interfaces will be an important feature of any Transport Direct service. Design for all is a philosophy that has considerable merit in this regard (16a). It is important to recognise the needs of different (potential) users. Work as part of the European TABASCO project, whilst recognising the potential use of map information, highlighted that individual ability to interpret map based information varies greatly. It was decided in this case that further research would be required including the use of schematic diagrams and of Ordnance Survey based maps possessing differing levels of information (43d). Describe Online (<http://www.describe-online.com>) is a service that provides interchange layout and directional information in text form for the blind and partially sighted.
- 10.7 One of the problems with ensuring good interface design is the considerable change that technology continues to bring about both in terms of the types of information services that are provided and the increasing range and flexibility of interface designs that is possible. In some cases the pace of developments is at risk of precluding adequate user testing. Best practice in this context can struggle to even come into existence before the relevant formats of delivery are superseded. Nevertheless, there remain a number of fundamental principles of information presentation design. Overarching these is the importance of involving the end-user in the design process – *participative design*. The research recommendation below does not indicate an immediate urgency for interface design to be addressed. This is in part because other higher priority recommendations (notably recommendations 1 and 5) will have a bearing on, and need to also address, interface design.

RESEARCH RECOMMENDATION 9

Alternative interface designs and information structures should be identified for a Transport Direct service. Prospective end users of the service should be engaged in the design of the service through an iterative process of consultation and usability testing.

priority: **medium**; timing: **following**

11 Feasibility of Including Retailing with Information

Early days for retailing

- 11.1 There is some research concerning telesales retailing for public transport tickets. Research as part of the development of the national public transport information telephone service (traveline) found that “over three-quarters of likely users of the new service said they wanted to be able to book and buy their ticket in advance by telephone, as well as using the service for information” (3). However, such research does not address the Internet as a retail medium for ticket sales. The Internet as a

mainstream communications medium has only been in existence for a matter of a few years. Whilst it has been exploited as a means for exchange and provision of traveller information (with over 400 PTI web sites now in the U.K. (62)) it would appear that on-line retailing associated with travel information is still in its infancy particularly as far as local and regional trips are concerned. Any retailing service requires a supporting information service and few journey planners are currently mature enough to provide such support. A review of 600 transit web sites for metropolitan areas in the U.S. revealed that only 4% had online sale of fare media (117). Greatest progress with this issue is being made by the airline industry and more recently by the coach and passenger rail industry but public domain documentation is extremely limited. Early progress has effectively been made where either the retailing operation and the supporting information services are within the control of a single organisation (e.g. National Express – <http://www.gobycoach.com>) or where there are established institutional relationships between organisations.

An assessment of retailing in the rail industry

- 11.2 The Association of Train Operating Companies (ATOC) in the U.K. recently commissioned some research to investigate third party retailing for rail tickets (175). The research compared retailing via rail stations, telesales and the Internet and involved consultation with key organisations and the review of other industry-held literature of relevance. It was noted that with expectations of continued growth in ticket sales for rail that an increasing strain would be placed on station retailing capacity. Telesales and the Internet are a suitable means to enable growing demand to be accommodated. Ticket sales is a substantial business with ATOC year-end results for 1999/2000 showing £3.3billion of revenue. Other research cited by this study indicated a reasonable match between the profile of Internet users and rail users although it was noted that not all web users are web buyers. Two other surveys cited indicated that business and more frequent travellers are more likely to use both the Internet and telesales and that they are more likely to use the Internet than telesales. Whilst station retailing faces the fixed costs imposed by franchise obligations over opening hours, for telesales and Internet retailing the additional cost of fulfilment (the cost of getting the ticket to the customer) is introduced. Costs for Internet retailing can also be driven up by the need for manual intervention (either by telephone or e-mail correspondence) for a substantial proportion of customers.
- 11.3 The ATOC study noted that whilst there is a range of evidence available regarding the generative effect of telesales, there is currently no research data available on the generative effect of the Internet. It defines generation as “the proportion of customers who, in the absence of telesales or the Internet, would have travelled by another mode or not at all”. The recent Harris Research study for NRES (addressed in this ATOC report) suggested a generation value of 10% - 10% of those who travelled by train after calling NRES would have travelled on another mode (8%) or not at all (2%), if they had not called. The ATOC report suggests that generation in the range of 10-15% seems plausible and most probably towards the lower end of this range. It suggests that generation is very significantly skewed towards long distance journeys.

A paucity of research concerning retailing for multi-leg multi-modal journeys

- 11.4 The rail sector is already conducting research into retailing albeit with a recognition that to date coverage of the Internet as a delivery medium has been limited. To extend

this to retailing associated with multi-leg, multi-modal journeys (i.e. through ticketing) appears to reveal nothing as yet in the research literature. Indeed through tickets in themselves across public transport modes remain a rare option for the traveller in the U.K. As such the feasibility and benefits of including retailing with information remains unproven at least for some modes and for mode combinations. It is suggested that valid consideration for the Transport Direct Programme is the relative importance from the users' perspective of the traveller information and the associated retailing elements of Transport Direct. In turn an understanding is needed of the extent to which the associated retailing is necessary to secure a choice made by a user based solely on the information provision. In particular, will the associated retailing *secure the deal* for a user who is minded to make a journey partly or fully by public transport in place of the car based on the traveller information element of the service?

- 11.5 What is not clear at present is the financial point at which, for a given mode, on-line retailing becomes a viable proposition. As the price of a ticket increases, on-line retailing in principle becomes more viable to deliver as a service. Hence the existence of on-line retailing for air and rail travel but not for bus travel. The extent to which the high value component mode of a multi-modal journey can bear the cost of on-line retailing for the low value component mode is a matter to consider. On-line retailing holds the potential of being more commercially attractive if it can wholly replace the previous means of ticket selling. However, this is unlikely, at least in the short-term, to be possible in most cases. Transport Direct is, in effect, seeking to be at the forefront in this area of multi-modal ticketing and little existing research therefore exists to assist. It is further suggested, in light of the review, that the term *retailing* might not be altogether appropriate and that *associated booking and payment for tickets* might be less ambiguous. Air, rail and coach are already in the position of providing on-line retailing. Transport Direct has the possibility of interfacing with such retailing services. This may ultimately prove sufficient if integrated ticketing is found not to be viable in terms of on-line retailing. As such the recommended research below is not given a high priority in relative terms and is not considered urgent.

RESEARCH RECOMMENDATION 10

Provider and end-user stakeholders should be consulted to establish the extent to which there is a demand for on-line booking and payment as part of Transport Direct and to determine what form it might take.

priority: **low**; timing: **following**

12 Technical Standards and Technological Solutions

The importance of data exchange

- 12.1 At the heart of the technological dimension to Transport Direct is likely to be the issue of data exchange between distributed heterogeneous systems. This concerns a

need for separate databases and systems to be able to communicate with one another, if necessary through a technical *interpreter*.

Co-ordinated development

- 12.2 In this area of research more so perhaps than in any other there is a sequential process of development with successive projects building on the findings and progress of their predecessors. There is a recognition that reinventing the wheel is wasteful and that existing wheels can be improved (69). The most recent European project of relevance which subscribes to the philosophy is TRIDENT (66a) (66b) (66c). The project goal is to support multi-modal travel ITS services by establishing the common and reusable mechanisms that are required for sharing and exchanging data between transport operators of different modes (bus/tram/metro, rail and road).

Key elements concerning data exchange

- 12.3 The TRIDENT project documentation (66c) includes a very thorough review of preceding work which also clarifies the different elements that relate to data exchange. Key elements addressed are:
- i) Data Dictionaries - data dictionaries provide a mechanism to logically structure data within an application domain and a system. They also often provide an opportunity to define the terminology much as regular dictionaries do, enabling definition of what the data means. Two major data dictionaries developed in Europe are the DATEX dictionary (road traffic event and status information) and TransModel (addressing the data dictionary and data modelling requirements of public transport operations).
 - ii) Location referencing - an operator needs to use a location referencing system but at the same time has to understand the location referencing systems used by other operators in order to share/exchange data - Three types of solution are outlined to solve the problem of a multi-modal location referencing system, extending the existing system and/or defining the way to connect them.
 - iii) CGI + XML - CGI scripts are programs run on a web-server which allow retrieval of information stored on the server itself. HTML is concerned with the layout of a web page; XML is concerned with the requested information passed via the web. Latest development is a complete rewriting of HTML as an XML language to produce X-HTML - an X-HTML solution combines XML and HTML output into one, that is both Web queries and XML queries get answered with an X-HTML page containing both the requested information and layout information (X-HTML became an official W3C recommendation on 26 January 2000). XML developments are also discussed elsewhere (116).
 - iv) Distributed database architectures - three main categories of distributed database management systems are discussed (the third of which is seen to be the most advisable architecture in a transport operator network): distributed and homogeneous databases; multi-databases or heterogeneous databases; and federated databases.
 - v) Object oriented data access - CORBA is a standard for distributed objects - it provides a high degree of interoperability which ensures that distributed objects built on top of different CORBA products can communicate. JAVA is a programming language and a platform and is unusual in that each JAVA

program is both compiled and interpreted - a JAVA compiler produces bytecode not actual machine code.

U.K. data exchange projects

- 12.4 Key U.K. projects regarding data exchange that are of significance to Transport Direct are JourneyWeb and TransXChange. The JourneyWeb project (30a)(30b)(30c) has been seeking the development of a communications protocol between journey planners for different modes and areas (and makes use of XML). The protocol is a collection of standard methods for exchanging electronic data between heterogeneous systems. The aim of JourneyWeb is for an enquirer (ultimately) to be able to choose any place within the U.K. as an origin or destination and with a single enquiry obtain a journey itinerary or schedule covering multiple travel modes. TransXChange (174) is a project to develop an XML standard to facilitate electronic bus registration. It aims to define a national data standard for the interchange of bus route registration, route and timetable information between operators, the Traffic Area Network (TAN), Local Authorities and Passenger Transport Executives and the traveline national public transport information service. Other technical projects of relevance are the Rail Journey Information Service (which integrates a number of databases necessary to support passenger rail information services and ticketing) and the Highways Agency's Travel Information Highway (which offers a marketplace for the exchange of, and payment for, information across modes via the Internet using CORBA) (55c).

A role for U.K. Government

- 12.5 Technical standards, if they are to be of value, must apply across international boundaries. It is therefore considered that development of technical standards is best carried out at an international level (or at a national level where reference upwards is made). There has already been considerable work done in developing European and worldwide standards through organisations such as CEN, the European Committee for Standardization, and ISO, the International Organisation for Standardization, and this work continues. Considerable work at a U.K. level is already taking place with Government backing as noted above.
- 12.6 Similarly, the amount of funding required to research new technological solutions requires that this is a task which properly belongs to large companies or to international consortia.
- 12.7 It would not be appropriate for the Transport Direct Programme to sponsor further specific research for its own needs at this stage. Projects such as TRIDENT, JourneyWeb and the Travel Information Highway may substantially address the technical needs of Transport Direct. Such needs depend in part upon the strategy adopted by the Programme. On the one hand it might elect to identify existing and emerging standards and technological solutions and formulate a schema for Transport Direct that can be delivered using these. On the other hand if the Programme defines what it desires as an ideal schema it may then discover that existing and emerging technical resources are insufficient. In practice the way forward may lie between the two. Given that the Transport Direct service has not yet been defined (and this is the subject of other recommendations) it is premature to consider specifying technical requirements and pursuing corresponding research. Rather, it is suggested that the Programme's proper role in this area should be to encourage the direction of ongoing

research and to provide support for collaboration activities involving U.K. organisations.

RESEARCH RECOMMENDATION 11

The ongoing research into technological standards and solutions should be encouraged and directed if appropriate but there is not a need for additional specific research concerning Transport Direct *at this stage*.

priority: **low**; timing: **following**

13 Integration of Real Time Systems into Travel Information Systems

Real-time information as a supplement to journey planning

- 13.1 The research literature contains a growing number of references to the provision of and effects of real-time information. However, with respect to Transport Direct the more specific consideration is the add-on of (personalised) real-time updates to a journey planning service. In this context there appears at present to be very little research that has been conducted. A notable exception is the European INFOTEN demonstration project (115b) which, as an add-on to a multi-modal journey planning facility, offered another service allowing users to receive on-line (via GSM SMS) any relevant information on a future part of their planned trip (this service was targeted at long distance users and regular professional travellers). It would appear that little in this area is taking place as yet in the U.S. – as cited earlier, a review of 600 metropolitan transit sites in the U.S. revealed that only 7 % offered current news, service updates or real-time information (117).

Real time information as a standalone service

- 13.2 In isolation real-time information provision particularly for bus services is currently seeing activity both in research and implementation. A showcase U.K. website (Superroute 66) was developed to provide real-time information on buses for a dedicated corridor in Ipswich (14a). The website was found to generate a number of new journeys and was considered to offer better value for money than purchasing new vehicles (although it did concern a route along a well-provided bus corridor) (14b). An experimental laboratory study in Japan of the effect of a bus location information system on the demand for buses found that real-time bus stop information enables passengers to schedule their arrival at the bus stop more closely, reducing waiting time. It reduces frustration with the bus service and so encourages increased bus use: it is suggested by perhaps up to 10% more without any change to actual services (48). Stated preference research in the U.S. considered the potential impacts of real-time transit information on mode preference. The research distinguished between strategic (monthly choice) and tactical (daily choice) scenarios. It concluded that real-time schedule information may be much more significant in causing changes in travel behaviour for daily decisions than for long-term decisions (33).

Current research

- 13.3 There is specific work being done in this field by the Research Project Real-Time Information in Transport: Sources and Applications Study, commissioned by the DTLR. This specifically involves helping DTLR to develop a strategy including a framework of actions. There is also already considerable work being done by the Real-Time Information Group (52), involving operators, local authorities and suppliers; whilst applications providers have developed services for delivering public transport travel information to mobile phones. The scope for this review to identify (further) specific research of relevance to Transport Direct is therefore very limited although a recommendation is put forward as a supplemental to recommendations from other sources, based on other areas within this report.

RESEARCH RECOMMENDATION 12

Depending on the results of a separate DTLR scoping study into real-time information provision at the time of writing, the following is recommended. Research to accelerate the understanding and delivery of real-time information to mobile devices is needed concerning user take-up, technical (including development of information sources such as AVL), costs and presentation of information.

priority: **low**; timing: **following**

14 Interpreting Integration and Distinguishing it from Coordination*Integration versus coordination*

- 14.1 The terms *integration* and *multi-modal* tend to be used within existing research literature in a rather loose and ill-defined manner where they concern information provision. With information systems, integration is often used in a misleading way to refer to systems which encompass information on more than one mode or from more than one region but which do so in such a way that there is little or no interaction between these information *sub-systems* (e.g. (78) (73) (99)). It can be the case that a service described as an integrated multi-modal traveller information system is in fact an assembly of discrete mode specific components within an umbrella system – i.e. components are coordinated rather than integrated. This emerges quite naturally from traffic control centre developments in which information across modal components is collated within the centre both for traffic management and control purposes and in turn for dissemination of traveller information. On the Internet such information services are referred to as portals in that they provide a single point of entry and access to a number of separate sources of information. The UKPTI site (<http://www.pti.org.uk>) offers a national portal for U.K. websites providing public transport information (62).

Integration equates to interaction

- 14.2 The (ab)use of the term integration in this way is unhelpful given that other developments exhibit approaches that are more in keeping with true integration – i.e.

where there is interaction between elements of the so-called integrated system. Key examples are journey planning software initiatives which enable a user to submit a journey request and the facility then automatically interrogates a number of distributed databases/journey planners spanning different geographical regions or modes to assemble (alternative) journey itineraries for the user as a response to request. The JourneyWeb/RAPID project is taking this forward in the U.K. (30a) (30b) (30c) and at a European level EU-SPIRIT is seeking in a similar way to provide door-to-door public transport and travel information across Europe by integrating long-distance railway, local transport systems and travel-related, non-transport information (127). In a similar vein the EUROSPIN project sought to acquire and disseminate seamless, multi-modal public transport travel information (122). The ongoing European INTERCEPT project is also looking at the interconnectivity of trip planners (74a).

A three-way categorisation of information provision

- 14.3 Recent research in the U.K. has led to a three-way categorisation of information provision, namely *uni-modal* information (UMI), *multi-modal* information (MMI – meaning co-ordinated rather than integrated information across modes), and *integrated multi-modal* information (IMMI) which refers to the Transport Direct vision (55b). This work contends that whilst provision of IMMI is more technically demanding than MMI the former is likely to be much more appealing to users and in turn holds much greater prospect of influencing travel choices and notably mode choice.

Visions equating to Transport Direct

- 14.4 If it is to be assumed that the ultimate goal for Transport Direct is to be a truly integrated system, then there are similar visions in Singapore (120) and in the Netherlands (113) with the latter further developed and as such providing greater insight into some of the challenges faced. For the Netherlands vision it is appropriately noted that “the traveller will no longer seek information solely about a specific mode of transport but about the journey itself, i.e. the most efficient, cost-effective and/or fastest way of travelling from A to B”. (The 1997 policy paper concerning the latter noted that innovative distribution channels, coupled to booking and payment systems, are matters for the more distant future.) The large scale European INFOTEN demonstration project also had similar aspirations to Transport Direct including provision of inter-modal trip planning which provides a fully automatic computation of an itinerary with respect to different modes of travel (in combination) (115b). The International Union of Public Transport (UITP), the worldwide association for providers of local and regional public transport, has now started to prepare a handbook on travel information, with the aim of publishing this in 2003: UITP has expressed interest in liaising with the Transport Direct Programme.
- 14.5 Given the scarcity of visions similar to Transport Direct at a global level it seems intuitively sensible that the Transport Direct Programme would benefit from consulting with those involved in similar ventures elsewhere in the world. Situations in other countries, reflecting the nature of their transport systems as well as social, political and institutional characteristics, might suggest that such consultation would prove fruitless. If this were wholly to be the case then that finding would at least curtail future consideration of best practice elsewhere in the world in terms of its

validity to the U.K. What is much more likely is that, given the different contexts, it would be possible to ascertain why certain aspects of the Transport Direct vision might work in some countries and not others. It is also likely that valuable lessons can be learnt across the many issues highlighted in this report which can aid in the efficacy and pace with which Transport Direct can be taken forward in the U.K.

RESEARCH RECOMMENDATION 13

A fact finding mission encompassing initiatives in other countries and regions which intend to or are in the process of pursuing a Transport Direct-like vision should be undertaken to draw insight and guidance for the U.K. Programme. Liaison with an appropriate international body, perhaps UITP, should also be included. Contacts established through this might subsequently enable ongoing dialogue or facilitate subsequent visits as appropriate.

priority: **medium**; timing: **immediate**

15 Concluding Commentary

- 15.1 The review of material identified within the Research Compendium has served to highlight a series of issues across a number of topic areas. For each topic area research needs have been identified and are listed at the front of this report. The review has been extensive in its coverage and serves to expose the many and diverse challenges and obstacles that the Transport Direct Programme will need to overcome if it is to enjoy eventual success.
- 15.2 Key issues are summarised or restated below:
- i. When considering consumer demand for information there is a need to identify *for what* demand is being assessed – demand will vary where the information relates to different modes of (public transport) and in turn is likely to be different again where an information service represents more than one mode.
 - ii. Demand for an information service concerning journey planning for a pre-determined mode should not be confused with demand for a service that offers mode choice information/guidance.
 - iii. The level of demand for an information service is a fundamental consideration both in terms of the business case for the provision of the service and in terms of the scale of effect on travel choices and behaviour at an aggregate level that the service might achieve. However, the issue of what level of demand would be deemed acceptable in these contexts remains outstanding.
 - iv. A strong modal allegiance exists across journey purposes rendering demand for information to assist in mode choice decisions limited. The time and effort to seek such information reinforces this position.
 - v. It appears difficult to entice car users onto local bus services and in turn for car users to be persuaded that information on bus services is worthwhile. This may be true in the context of local trips. However, it may not be the case for longer distance trips for which the bus forms part of a multi-modal multi-stage

- journey. Nevertheless a substantial proportion of journeys made in the U.K. are local.
- vi. It is important for Transport Direct to distinguish between two measures of demand. The first is the demand for a service such as Transport Direct *in the absence of* any other similar or alternative services. The second is *in the explicitly recognised presence of* other similar or alternative services.
 - vii. The public may struggle to accurately envisage what Transport Direct might offer. In this context it will be difficult to accurately assess potential future demand.
 - viii. What Transport Direct is and how that is conveyed must embody a unique selling point to attract public use.
 - ix. In assessing information requirements from a service the needs of both *potential* and *actual* customers need to be taken into account. Potential customers can become actual customers whilst actual customers can become *former* customers.
 - x. User reactions to an actual information system cannot be equated to user requirements from a preferred system design.
 - xi. Reliability is a facet of travel that individuals consider important. Yet its meaning, particularly in terms of the *degree* to which a transport service is reliable, is poorly understood. Information conveying (comparative) reliability levels of travel options has not yet been addressed.
 - xii. Walking, cycling and driving as modes between or at the ends of stages of longer distance journeys can facilitate alternative travel options to a door-to-door journey by car.
 - xiii. There is clear evidence that within elements of the population there exists a distinct lack of awareness of information sources. This is a barrier to information service use and in turn to transport service use.
 - xiv. Market research is required both to identify those individuals who constitute the target market for a particular type of information service and in turn to devise an advertising strategy to secure them as information service customers.
 - xv. Awareness or lack of it should be gauged according to whether or not an individual is familiar enough with an advertised information service to know how and when it might serve a useful purpose to that individual.
 - xvi. Major bus groups and rail operators will have marketing initiatives directly concerning their services. In many cases these will include information on service availability. The relationship between services, information, marketing and awareness is poorly understood.
 - xvii. Pre-implementation market research might underestimate the consequences and scale of effects of an information system on behaviour – users need prolonged exposure to evolve their reactions.
 - xviii. Information systems will only be effective as part of an overall policy aimed at improving the quality and performance of public transport services. In this context evaluating an information system in isolation of external contributory factors might not indicate the degree of effect on behaviour that could occur in practice as external factors change.
 - xix. Willingness to pay for information has seldom, if at all, been given detailed and thorough consideration within research to date. Findings to date convey mixed messages over willingness to pay.

- xx. The information chain from collection of raw data through its conversion into meaningful information to its delivery to end users will usually involve a number of organisations spanning the public and private sector. A common division of responsibilities seen in partnerships is as follows. The public authority has the role of data provision and maintenance of data quality. Meanwhile the private organisations have the role of using that data to deliver (commercial) information services to the public.
- xxi. Partnerships can have endemic problems. They can be slow to take decisions. Centralisation divorces the information provider from the end user. Publicly funded projects can be ineffective at anticipating consumer needs. Such problems raise the question of whether informal partnership with only commercial motivation can succeed or whether legislation has a role in making things happen.
- xxii. Recent and evolving partnerships in the U.K. provide encouragement. However, the detail of their formulation, operation and degree of success is poorly understood, or at least the public domain is not privy to such insight.
- xxiii. Public transport operators, particularly in the bus industry, are operating to short financial horizons. Investment in information services as envisaged in Transport Direct is a long term commitment involving not insignificant risks. This is particularly the case where there is a limited availability of robust and relevant empirical evidence that such information services as are envisaged will generate sufficient demand and in turn a revenue stream to offset the costs.
- xxiv. A number of studies point towards the need for public authorities to provide the substantial capital investment (or a part of it) required to establish (pump prime) the systems and the associated infrastructure. This comes with an expectation that private sector players will be in a position to operate the service on a commercial (and commercially successful) footing.
- xxv. Multi-modal information services rely on a partnership across organizations in terms of the information chain. In contrast organisations such as TrafficMaster have full control over the information chain within themselves and partnership then becomes an issue for the *selling* of their service.
- xxvi. Rather than investing further in co-operative development of integrated information services, private sector information providers may be able to achieve greater financial gain by business diversification from a starting point in travel information provision.
- xxvii. The Internet (and notably the web as a main communications protocol) is set to increase in its prominence as a medium for the provision of, and access to, traveller information services. Its versatility is contrasted by the current limitations being faced by mobile Internet service developments in terms of information display area and information download overheads.
- xxviii. Technological opportunities both in terms of the types of information service that can be provided and the devices and media by which they can be accessed render information interface design an ever changing area but one which remains a vital element of successful information delivery.
- xxix. Examples of on-line booking and payment facilities to accompany traveller information services are limited, particularly where journeys are across modes or operators. The case for booking and payment as part of Transport Direct has not been proven, partly because of the lack of maturity in this area of development.

- xxx. Within the area of technical standards and solutions there appears to be a successful sequential process of development with successive projects building on the findings and progress of their predecessors.
- xxxi. Developments with real-time information provision remain largely embryonic particularly where such information is used in a personalised way as a direct supplement/complement to journey planning services.
- xxxii. Integration, which should signify an interaction at a system level between two or more databases or services (across modes), should not be confused with co-ordination, where any interaction between databases or modes is only achieved through the efforts of the user.

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ANNEX A - Transport Direct

The following documents are reproductions of those available (as at 26/07/01) from <http://www.detr.gov.uk/itwp/transdirect/>.

Department for Transport, Local Government and the Regions

Transport Direct: What is it?

Transport Direct will allow people to plan their journeys and to compare routes and prices. We intend that it will cover all types of transport within the U.K. – air, rail, coach, bus and car. We may also be able to extend it to include information for cyclists and walkers.

Transport Direct will do three things:

tell the traveller what choices they have when they are **planning** their journey;

allow the traveller to **book** and pay for their journey at the time of making their enquiry, and receive their travel authority/ ticket(s); and

advise the traveller about how their chosen travel option is performing in **real-time** before they set off.

We see Transport Direct as a comprehensive national service for the travelling public, available in a variety of ways. The internet would provide the most flexible means of access, followed by:

kiosks in the high street; mobile phones/ hand-held devices; interactive digital TV.

Whilst the core service is likely to be available at the cost of a call or connection, there is scope for added-value services that develop and tailor the basic material to particular markets.

The 10 year transport plan [Transport 2010](#), published in July 2000 said that by 2003 we expect Transport Direct to include:

real-time train operating information (that is actual rather than timetabled);

real-time information on many local bus services;

internet travel information, covering road journeys as well as all forms of public transport at a single point of contact;

internet booking of long-distance journeys involving different forms of transport; and

development of internet based maps that allow travellers to examine public transport options both for visiting a specific venue and for general travel around an area.

Transport operators, technology providers, local and national government and others will need to work together to turn Transport Direct into a reality.

If you think that you might have something to contribute, or would like to be kept informed of further developments, please e-mail DTLR at transportdirect@dtlr.gov.uk.

Department for Transport, Local Government and the Regions

Transport Direct The Vision

The vision

1. The Transport Direct programme aims to provide the traveller with all the information they need before and during a journey anywhere in the U.K. and with the ability to buy the associated tickets. The vision covers travel by all modes - air, car, train, tram, tube, taxi, bus, coach, ferry, bike and on foot - plus, importantly, mixtures of these modes. The centrepiece of Transport Direct will be a one-stop information point for all forms of travel information. In addition to schedules and details of any disruption on the chosen route, travellers will be able to look at maps of the area they are intending to visit. There will also be information for disabled travellers. Further services may also be incorporated, such as information on places of interest, hotels or restaurants. Transport Direct aims to exploit new forms of communication technology. Ultimately, it will be possible to access travel information via the Internet, digital TV, mobile and WAP phones, other handheld devices and kiosks in the High Street and places like Public Libraries.

2. Here are some examples to illustrate how the Transport Direct vision might help travellers:

You are visiting a friend who has just moved to a new area - you type in the postcode of your home, and the postcode of your friend. The Website tells you how to get from A to B - which bus to catch, where the bus stop is, where to get off, where to get on the train and where to get a taxi at the other end. You then select at which on-line agency to buy the tickets you need for the entire journey, then the link to a taxi firm to arrange for a vehicle to be waiting for you at the station.

You live 40 minutes drive outside York and are meeting an old school friend travelling from Edinburgh to York by train. You have a lot of things to do before they arrive and so you don't want to waste time by arriving early at the station. So you look at your WAP phone before leaving home to make sure that the train is running on time.

You are thinking of going to Cumbria on holiday. You might hire a car, but you'd like to see what public transport options are available first. You look at the Cumbria's Internet web site for visitors to see the key local attractions and it shows them on a map alongside the closest public transport options. You can see that for the things that you want to visit, it'll be possible to go by bus and you print off the timetable to keep in your pocket.

You are going to be travelling from the south of England to a small town in the Northeast. You are intending to drive, but a friend suggests that it might be quicker to go by public transport. You are sceptical, but look on the Internet to see how long it would take door to door by both a mixture of bus and train, and by car. You can see that on the day you intend to travel there are extensive roadworks. The information suggests that you'll save a couple of hours if you go by public transport.

You are planning on spending a fortnight travelling around England. You are going to make some of the longer journeys by coach, and some by rail. You look on the web site to find out the timetables and compare the coach and rail fares for each leg of the journey and are then seamlessly transferred to a Website allowing you to book.

You are standing at the bus stop waiting to catch the bus to the airport. You are reassured by the display showing how many minutes you have to spare before the bus arrives. You can see that you have time to tap on to the nearby kiosk and see that there are no delays to the plane and also buy a newspaper to read during your journey.

3. Part of Transport Direct will include a wholesale information exchange, to enable behind-the-scenes exchange of travel data between transport operators. For example, this would allow highway authorities, bus and train companies and media specialists to exchange information. This will encourage the growth of information services from a variety of sources.

4. We believe that the Transport Direct programme will take several years to implement, perhaps seven to ten years. Some intermediate objectives were set out in the 10-Year Transport Plan, published in July 2000. This said that by 2003 Transport Direct is expected to include:

real-time (that is, actual rather than recorded or timetable) train operating information;

real-time information on many local bus services;

multi-modal travel information on the Internet, covering road journeys as well as all public transport modes at a single point of contact;

booking of long-distance multi-modal journeys on the Internet;

development of Internet-based maps, which allow travellers to examine public transport options both for visiting a specific venue and for general travel around an area they are considering visiting.

5. Before the 10-Year Plan was published, the Government appointed Cap Gemini to evaluate proposals for Transport Direct. They concluded that the programme was challenging but achievable, and should be taken forward as a partnership between Government and the private sector rather than by either side acting on its own.

The building blocks

6. Many aspects of Transport Direct are already available, and a number are provided by the private sector and by local authorities. For example several Website already allow one or more of the following:

display air, coach or train schedules and go on to sell a ticket;

allow you to plot a route for a journey by car;

offer directions for going on foot;

give timetables and suggest routes for journeys by public transport within a particular region of the U.K.;

enable you to download a map of the area you are intending to visit.

7. It is also already possible for you to arrange for your mobile or WAP phone to:

warn you of traffic congestion ahead and suggest an alternative route;

access the Railtrack timetable database;

tell you when the next Docklands Light Railway train will depart.

8. It is possible to telephone a number of travel services, including Traveline, a national telephone service giving route and timetable information for public transport. Out on the street, displays showing when the next bus will arrive are becoming increasingly common at bus stops.

9. Transport Direct is not aiming to compete with any of these services. Rather, the Government sees Transport Direct as providing the glue that will enable these different services to stick together, so that the traveller can easily examine all the options and make mixing modes much more straightforward. We are not therefore proposing that something be built from scratch, but that existing services are better linked and integrated and that gaps are filled. If others develop services that meet some or all of the Transport Direct vision, then Government will point to those - if others are very active, it is possible that Transport Direct will merely be a single WebPages pointing consumers to the Website of the key parties.

10. There are a number of technical projects that will help to underpin the development of traveller information systems. Some examples, although there are many more, are:

the work that the Highways Agency has done to develop the Travel Information Highway, which allows different systems to talk to each other;

work underway in the rail industry to improve real time information;

TransXChange, which allows bus timetable data to be transferred between the bus company scheduling system, the local authority electronic map of roads and stops, and the Traffic Commissioners' registration system.

11. In addition to setting out the vision, Government can also contribute to Transport Direct by commissioning research, issuing guidance (such as that to local authorities on their Local Transport Plans) and ensuring that relevant regulations don't get in the way, but provide the incentive to co-operate.

Relationship with others

12. Government does not intend to take forward Transport Direct on its own. We see the need to work in partnership with transport operators, information specialists and technology providers. There are several existing services and others that are near to being launched. But we do see Transport Direct being of benefit to transport operators, both in terms of a better relationship with their customers and in increased patronage and therefore higher ticket sales. Technology providers will also benefit through increased use of their services and products. We are confident that a partnership approach will be successful for all players and help to grow the overall market. It was the model used to develop Traveline, a partnership of transport operators, local authorities and central government and also the development of common standards in smartcards for transport applications. We want Transport Direct to build on these successful relationships.

13. We have already met a number of potential partners and their reaction has generally been enthusiastic. To cement the partnership we held a Forum in July 2001 to bring together representatives of local authorities, transport operators including the major rail and bus operators, technology providers including the mobile communications providers, and those in the transport information and retailing field. Their fields of expertise will encompass technology, business, finance and the transport sector.

Finance

14. The money required to develop and maintain Transport Direct is likely to be generated from a number of sources:

Transport operators are likely to see increased patronage for their services, leading to revenue gain - the carrier benefit.

Commission can be earned for ticket sales - the retailer benefit.

Some services, particularly those tailored to an individual's needs, could be charged for (e.g. a service which warned a commuter that their train was running late before leaving home in the morning) - value-added service income.

Additional mobile communications traffic and the opportunity to target non-transport services may lead to further income.

15. We will provide public funding in areas where there is a social rather than commercial need to develop information services or where some research is needed to enable a truly comprehensive service to be available to the public. For example, we:

have offered funds, via local authorities, to enable the geocoding of bus stops. This means that a bus stop can be accurately pinpointed on a map - essential for both real time information systems and for good journey planning facilities.

may consider funding research to develop an enquiry tool that can interrogate a number of different databases;

will work with industry, where it would be helpful, to define and agree technical standards, as we have done with smart cards and electronic bus registration.

16. Public funding is likely to be directed to development costs, rather than to providing continuing revenue once a service is running.

17. We are aware that retailing is a particularly sensitive aspect of the Transport Direct vision and it may help to define roles. Government does not intend to get involved in selling tickets as it considers this to be a role for service providers who are mainly in the private sector. But Transport Direct should help consumers find the right ticket at the right price. Once they have the information and choices available, the enquiry would be transferred electronically to the retailer selected by the customer. We expect many information providers and retailers to continue to have their own Website, independent of any services brought together by Transport Direct.

18. Transport Direct can be looked at as a form of shopping mall: a way of providing the common roof, the warmth, the security, the map pointing the consumer in the right direction etc. The mall leads to a number of individual shops, each of which might sell the necessary ticket, and because they are all in the same place it is easy to drift between them, and it is

straightforward for the consumer to compare prices and the services offered. If the consumer would prefer not to use the mall, the shops also have a doorway directly on the street, allowing the consumer to walk straight in and purchase a ticket immediately.

19. A decision has not yet been made as to the form of institutional and financial arrangements that would be most appropriate - for example a limited company, a joint venture company etc. Cap Gemini recommended a joint venture company and we will investigate this and other options further.

Conclusion

20. Transport Direct is a travel information and retailing programme aiming to bring together the many disparate services already provided and to plug the gaps where no service is currently provided. Government intends to act mainly as a catalyst - accelerating and stimulating the development of travel information services and encouraging existing services to cover more than one mode - e.g. coach and air, train and taxi etc. Government will also play a key role in bringing the various parties together and will provide some funding, but we believe that much of the work will be taken forward by other partners - transport operators, local authorities, and technology providers. The Forum held in July 2001 developed the partnership between Government and other key stakeholders and explored who will play a key role in taking the programme forward.

ANNEX B - Authors' Biographical details

Glenn Lyons is a research lecturer in transportation planning at the Transportation Research Group, University of Southampton. His involvement in research concerning traveller information and the Internet stems back to 1995 when he initiated and subsequently designed, implemented and evaluated a prototype multi-modal traveller information web site for the ROMANSE project in Southampton. He has been a member of The Institute of Logistics and Transport's E-Travel Information Group since its early beginnings in 1998 and was the principal writer for the Group's 'Netting More Passengers' workshop report. He has subsequently led the development of a Best Practice Guide for the provision of public transport information on the web. Complementary to his knowledge and experience of technical and usability issues concerning the web as a medium for traveller information provision, is Glenn's research expertise in user requirements from, and behavioural response to, traveller information systems and in particular public transport information systems. He led recently concluded research sponsored by the Engineering and Physical Sciences Research Council in this area. He has been responsible for a Highways Agency project investigating the potential for progressing towards integrated traveller information systems for highway and public transport information. This has involved a review of the public transport industry and information systems developments and consultation with both provider and end-user stakeholders in future information systems.

Reg Harman is a senior visiting research fellow at the Transportation Research Group. He has substantial experience in transport policy and practice, as well as in urban and regional planning. As a consultant he has carried out several studies on transport practice across Europe, including public transport development and service provision. His European studies have been presented inter alia in the 1995 published report 'New Directions: a manual of European best practice in transport planning'. He was responsible, as Director of Policies, for establishment of the CIT-UK (now ILT) E-Travel Information Group, and for developing its research programme, supported by DETR, into Web based traveller information systems; this included organisation of the workshop and editing its report 'Netting More Passengers'. He also developed and supervised the Institutes' work programme, also supported by DETR, to produce a report and manual on best practice in passenger interchange. In 2000 he supported Glenn Lyons on the HA sub project concerning the links between public transport and highways traveller information.

John Austin of Austin Analytics worked for several years as a data and literature researcher in diverse fields including the bus industry, local government finance and telecoms industry strategy, before becoming a transport consultant. He was one of the first in the U.K. to recognise the potential value of the web for promoting public transport, and launched the U.K. Public Transport Information web site, on his own initiative, in March 1996. This has subsequently been renamed the PTI web site and has since been extensively redesigned; being re-launched by a DETR Minister in October 1998. He has worked on European projects relating to multi-modality, including being the U.K. partner in INFOPOLIS 2, an EC 4th Framework TAP project (DG XIII) to examine the presentation of advanced electronic information for public transport users. He carried out a synthesis of research project results relating to user needs for travel information, for the EC Information Society Directorate. He also advised the Scottish National Timetable Working Group on the implementation of the National Public Transport Information Strategy (traveline) in Scotland. John Austin has recently undertaken a study tour of Hong Kong, Australia and Singapore, as a Winston

Churchill Memorial Trust Travelling Fellow, examining these countries' approaches to providing electronic public transport travel information, including in the context of multi-modal information generally. Since his return he has contributed to the ILT report 'Public Transport Information Websites - How to Get it Right: A Best Practice Guide', and has led the evaluation of Journey Planner products for the North-East, Yorkshire and Cumbria traveline consortia.

Alastair Duff joined BAA having read Law at London. He has over 30 years experience in airport and transport management, his appointments including Managing Director Aberdeen Airport and, at Heathrow, General Manager Terminal 4, General Manager Heathrow Express and General Manager Ground Operations. His last post was as General Manager Transport Strategy, where he was responsible for developing surface access strategies for Heathrow that would increase the use of public transport by air passengers and staff whilst reducing car dependency. He is now an independent consultant advising organisations on transport strategy, telematic applications and commuter travel planning. He acts as Transport Strategy Adviser to BAA and chairs the Heathrow Area Transport Forum Steering Group, the Association for Commuter Transport, the West London Transport Group and the E-Travel Information Group set up by DETR. He is a Fellow of the Chartered Institute of Transport and the Institute of Logistics, and a member of the Institute of Directors and the Institute of Highways and Transportation. He is a Lt. Colonel in the Engineering and Logistics Staff Corps, a group of specialists in engineering, transport and logistics that advises the MoD as required on relevant issues.

ANNEX C - Review Methodology

Introduction

The aim of the review was to identify ongoing and planned research alongside completed research (the latter providing the majority of the Research Compendium entries). Coverage was not limited to academic research nor to research concerning only the U.K. although both of these dimensions contribute to the overall makeup of the Compendium. The number of documents that exist concerning traveller information and traveller information systems research and development considerably exceeds the number contained within the Compendium. The intention was to identify the sub-set of documents which had some degree of relevance to Transport Direct specifically. The review project has comprised three elements, namely: assembling material for the Compendium; compiling the Compendium contents; and reviewing the Compendium material. These elements are described below.

Assembling material for the Compendium

Two main avenues of enquiry were pursued to identify candidate Compendium entries: contact with a large number of individuals and organisations; and a literature search.

Contact with individuals and organisations

A letter was prepared and was issued on behalf of the project team by the Department for Transport, Local Government and the Regions (DTLR) setting out the study and inviting submissions of information about relevant research work (Figure 1). This was sent to a wide range of people in many organisations, almost all in the U.K., including local authorities, transport operators, consultants and suppliers, and others with a known interest. In all some 500 letters were sent. The database for this exercise was provided by the Transport Direct team in DTLR and modified by the project team. The letter was accompanied by a response form (Figure 2). To complement this circulation, an email was sent from the Transportation Research Group (TRG) to the Universities Transport Study Group (UTSG) announcements list, in very similar terms to the circular letter. The response form was also replicated as an on-line form and placed on the TRG website. To seek a response from any transport organisation that might have been omitted from the circulations and contacts, the TRG also issued a press release to the specialist press. This resulted in articles in *Transit* (21 June 2001), *Local Transport Today* (28 June 2001) and latterly *Logistics and Transport Focus* (August, 2001).

The project team subsequently contacted directly a number of those to whom the letter or email were addressed. This principally covered those people and organisations known to have potentially useful experience and material. In addition, members of the project team also contacted some other potential contributors thought to have useful material to offer: this particularly covered modes other than surface transport (mainly airlines), specialist suppliers and organisations abroad, in mainland Europe and in North America. Much of this follow-up and contact work was based on personal knowledge and experience of the organisations concerned.

In order to keep within the project schedule, the circular letter and the email to UTSG asked for a response within a week. In practice this notice period was too short for many organisations. Responses continued to arrive during the period of the project, and a few further contacts were also suggested. Overall more than 100 responses were secured. About two-thirds of respondents provided information on relevant work completed or in hand, and most of them supplied reports and papers; one third of respondents advised that they had no relevant work. Of the majority who did not respond within the timescale, a high proportion were local authorities who were not thought to have any work in hand of (substantial) relevance to Transport Direct.

The international contacts included the International Public Transport Union (UITP), based in Brussels, who expressed interest in further co-operation over the topic, on which they are currently working. Within the DTLR, meetings were arranged with the Transport Direct team itself, the Head of the Transport Technology and Telematics Division, and with professional officers in the Bus team, Urban Traffic Management and Control (UTMC) team and Mobility & Social Inclusion Unit. These contacts offered useful guidance and supplied reports on relevant work within their own areas.

Literature search

The project team, in particular the TRG, has its own existing collections of research literature including those relating to traveller information provision. These provided an initial base of candidate Compendium entries. The TRG has access to the bibliographic database *Transport* which catalogues at an international level research concerning transport. At the time of its review, the database covered research published between 1988 and February 2001. This database was thoroughly searched and potentially relevant documents identified within the database located and copies obtained. Recent conference proceedings and journals not covered by the current version of the database were also searched for relevant material. Increasingly the web provides direct access to research documents and this was also used as a search resource. In particular the Community Research & Development Information Service (CORDIS) website (<http://www.cordis.lu/en/home.html>) provides a gateway to the many European Union funded research projects in transport.

Compiling the Compendium contents

A substantial collection of reports, papers and other articles was assembled from the contacts and searches. Given the rapidly developing nature of the field of traveller information provision (particularly where technology is concerned – the web only came into public domain existence in 1993 (<http://www.w3.org/History.html>)) it was decided that only documents produced from 1995 onwards would be included in the Compendium. A degree of selection was applied: for example, where papers covering both interim and complete stages of a large project came to hand, the interim one would be included only if it provided extra insights; and one or two pre-1995 documents were included where these offered insights and findings of significance which have not been repeated or overtaken.

The selected reports and papers were catalogued in the Compendium using the proforma shown in Figure 3. The design of the Compendium sought to be comprehensive, both as a record and as an analytical tool. For the latter function, it includes five elements allowing categorisation:

- Indication of its place within the research landscape: supply – demand; advance information – retailing – real time information
- An entry for status: complete – in progress – in preparation
- One or more entries to indicate mode(s) covered
- Indication of relevance to Transport Direct: substantial – reasonable - limited
- Space for keyword(s)

Reviewing the Compendium material

Once the Compendium included a substantive number of entries, these were reviewed, alongside key issues highlighted in the original project specification, to identify what themes and coverage were emerging. This enabled a list of main topics to be drawn up (which now form the main structure of this report). Under these topic headings salient points from across the Compendium entries were collated for assessment and interpretation. An interim report was prepared for the DTLR based on some 150 entries. The project requirement was not only to review research related to Transport Direct but to make recommendations on research that the Transport Direct Programme itself might commission to assist in achieving its goals. The concluding stage of the project activity was therefore a full-day discussion involving all project team members. This was based on the interim report and subsequent Compendium entries and was structured around the list of main topics. For each topic consideration was given to future research needs and their relative priority and timing concerning the Transport Direct Programme. A series of research recommendations was then formulated.

Conclusions on methodology

Ultimately the methodology for the project had to provide a sound basis for a thorough review of the field in order to offer guidance to the Transport Direct Programme. It is believed that the approach has been successful in this aim.

The key objective was to seek out relevant research projects, wherever they originated. The circulations and contacts produced a thorough coverage of English language documents from within the U.K., across the rest of Europe, and for North America and Japan; a few documents from elsewhere have also emerged. There will have been some omissions. The most probable concern studies and development trials by major operators, including airlines, and system suppliers which have not been advised because they contain commercially sensitive results; there could be several. There may be local trials and studies in the U.K. which have not been identified; although contact was made with appropriate local authority organisations as well as individual authorities. Material available in foreign languages has not been included, and relatively little direct contact was made with organisations on the European mainland; although much of the most suitable material will have been picked up through papers to international conferences and links to EU projects. A Compendium could not hope to provide exhaustive coverage of what is a vast and diverse field of research and development. Neither can the Compendium in its current form hope to provide a longstanding comprehensive account of relevant research – as progress in the field continues, future update(s) of the Compendium are recommended.

A response was obtained late in the project from the UITP, which is particularly important because of its central role within the world's public transport. UITP expressed interest in co-operation over the topic, since it is currently developing a handbook on travel information, which is likely to be published in 2003.

Figure 1. DTLR Letter Soliciting Information on Research Activities



JESSICA MATTHEW
TRANSPORT TECHNOLOGIES AND TELEMATICS
DIVISION

DEPARTMENT FOR TRANSPORT,
LOCAL GOVERNMENT AND THE REGIONS
ZONE 5/19
GREAT MINSTER HOUSE
76 MARSHAM STREET
LONDON
SW1P 4DR

DIRECT LINE: 020 7944 3747
FAX: 020 7944 3086
E-MAIL: JESSICA_MATTHEW@detr.gsi.gov.uk

WEB SITE: www.dtlr.gov.uk

15 JUNE 2001

Dear ****,

Transport Direct - Assembly of Research Compendium

Transport Direct is a major Government initiative announced in the ten year spending plan for transport. It will take forward the development of an integrated multi-modal (highway and public transport) traveller information service. This will be very widely available with notable use of the Internet. The service is intended to cover journey planning, booking, payment and real-time updates across all modes.

We anticipate that specific research will need to be commissioned as part of Transport Direct. As a precursor to defining research requirements, the Department is preparing a research compendium identifying relevant and related research and key organisations involved. The compendium will encompass issues from both the user and provider perspectives and will cover, amongst others: behavioural, technical, institutional, marketing and associated retailing issues.

I am writing to request the support of your organisation in preparing the compendium. If you have been, are or plan to be conducting research relating to traveller information and associated retailing or you are aware of such research elsewhere please could you complete the attached reply form and **return it to the University of Southampton**. If necessary, please indicate if you wish information you provide to be treated as commercial in confidence.

A reply by Friday 22 June would be greatly appreciated to feed initial findings into the Transport Direct Forum on 2 July. A research review report will be produced based on the compendium and will be publicly available.

We look forward to hearing from you. Thank you.

Yours sincerely,

JESSICA MATTHEW
TRANSPORT DIRECT TEAM



INVESTOR IN PEOPLE

Figure 2. Research Activities Feedback Form

TRANSPORT DIRECT RESEARCH COMPENDIUM
Suggested research/research documentation for inclusion

Please copy this form and complete a copy for each relevant research project.
Please provide as much detail as you are able to although key details will suffice.

Research project title/topic: _____

Organisation: _____

Contact name: _____ Position: _____

Address: _____

Telephone: _____ Email: _____

Available document(s) (with web address where appropriate) from project:

Copy/copies attached/enclosed(please delete as applicable)? Yes/No

Project Status (please delete as applicable): Completed/Ongoing/Forthcoming

Project Sponsor: _____

Brief description of project:

Please return this form by post to: Dr Glenn Lyons, Transportation Research Group, University of Southampton, Highfield, SOUTHAMPTON SO17 1BJ. UK or by Fax to +44 (0) 23 8059 3152. Alternatively reply electronically to G.Lyons@soton.ac.uk or use the online version of this form at <http://www.trg.soton.ac.uk/transport-direct>.

Research compendium project team:

Glenn Lyons, Reg Harman, John Austin of Austin Analytics and Alastair Duff

Figure 3. Format of Research Compendium Entries

transport direct		RESEARCH COMPENDIUM	
Entry No.	Date of Entry	Restricted? (1=yes)	
Project Title			
Document Title			
Reference			
Web Address			
Lead Organisation			
Contact Name			
Address			
Telephone	Fax	Email	
Research Sponsors			
Country/Region			
Research Status			
Relevance to Transport Direct			
Keyword(s)			
Research Areas		Demand (user)	Supply (provider)
	Choice and Journey Planning	*	*
	Booking and Payment	*	*
	Real-time Information	*	*
Objectives			
Description			
Key Findings			
Mode(s)			
all:	public transport general:		
car:	m/cycle:	bike:	foot:
taxi:	plane:	metro:	light rail:
bus:	coach:	train:	ferry:

ANNEX D - Terminology

The way in which people refer to a topic often guides their approach to it. Two principles arise. First, words may be used because they are conventional / central to policy but the actions that follow do not reflect the intention of the original. Second, the same word may have different meaning for different groups in society, hence the actions that follow conflict rather than complement. Examples are set out in the following paragraphs.

The body of research literature which relates to traveller information is vast yet much of it has little substantive relevance to Transport Direct. However, ambiguous use of terminology within this broad research field hampers attempts both to identify relevant research and to draw conclusions from it. The term *traveller* is the most poignant case in point. Searching a major international transport bibliographic database with the phrase *traveller information* yields some 250 related articles. A repeat search with the phrase *traveler information* results in well over 1000 articles. Most notably in the U.S. (though in other countries as well) the term *traveler* is treated synonymously with the term *driver*. Upon closer scrutiny it thus transpires that much of the research in the U.S. regarding Advanced Travel(ler) Information Systems is concerned solely or predominantly with driver information only. *Transit information* more appropriately is used to separate out the *other* research which does not concern drivers.

Another frustration is the use of the term *public transport* to represent one or more modes of public transport and particularly to represent bus and/or train. Provided that the subtext within research documentation makes clear to which specific modes *public transport* refers this frustration is minimised. Without this clarification, findings across different research studies are prone to be contradictory and misinterpreted. Indeed, research which itself fails to specify when consulting travellers on their views concerning modes of transport risks becoming invalidated. European research is generally much better in focusing on modes in terms of the distinction between car users and public transport users but it often fails in this need to disaggregate public transport into its constituent sub-modes. Bus and train are very different modes in terms of their operating environments, pricing structures and payment mechanisms and clientele. They also typically serve different spatial markets, with bus concerned predominantly with local journeys and addressing both urban and rural areas, and train concerned with longer distance (trunk leg) journeys which generally begin and end in urban locations. As such, research and the issues associated with Transport Direct should distinguish between public transport modes. Indeed distinction should ideally extend to cover different types and levels of service within particular modes - for example the contrast between high-quality branded bus or coach services aimed at the car-driver and ordinary bus services, or the difference between premium rail services such as airport express trains and normal passenger rail services.

The term *integration* (in the context of information provision as opposed to physical integration of transport services) is also used far too loosely at present to allow the deliberations necessary as part of Transport Direct to progress unambiguously. This is discussed further in the main report but in essence *integration* should not be, but often is, used synonymously with *coordination*. With regard to information systems, *integration* should imply an *interaction* between different components of a system or between different systems. *Coordination* should be used to distinguish the less sophisticated assembly of

different components under an umbrella interface with any interaction only achieved (indirectly) through the manual efforts of the system(s) user.

The term *multi-modal* introduces further sometimes subtle variations in interpretation. In the domain of public transport information (PTI) multi-modal often refers to different modes within public transport with the implicit if not explicit exclusion of the car. The need to disaggregate collective terms highlighted above also applies here. The term 'multi-modal' should be qualified in terms of the set of specific modes to which it refers within a given project or study. Multi-modal also relates to the issue above concerning integration. Multi-modal can imply an interplay between the different modes themselves or their respective information provision or may refer only to the coexistence of such modes and information services.

Lastly, the term *retail/retailing* has more than one associated meaning in different contexts. For Transport Direct *retailing* more specifically is the retailing *associated with* a traveller information service, in other words it is the follow-through within a service from planning a journey to the booking of and payment for tickets for that journey. In contrast the incidence of the term *retailing* in existing transport research literature is predominantly concerned with shopping and either the location of retailing outlets (notably out-of-town shopping development issues) or the delivery of goods associated with e-tailing (i.e. home deliveries arising from teleshopping).

In reviewing existing research literature, little can be done to address the multiple meanings associated with key terms and the ambiguity that can arise as a result. However, it is strongly recommended that the Transport Direct Programme seek, at an early stage, to dispel such ambiguity by establishing a clarity of definition across all terms which are central to its developments. This should serve to focus the dialogue, development of partnership and resolution of issues amongst the stakeholders in Transport Direct and will also ensure that any research commissioned is appropriately targeted on the specific issues associated with Transport Direct.