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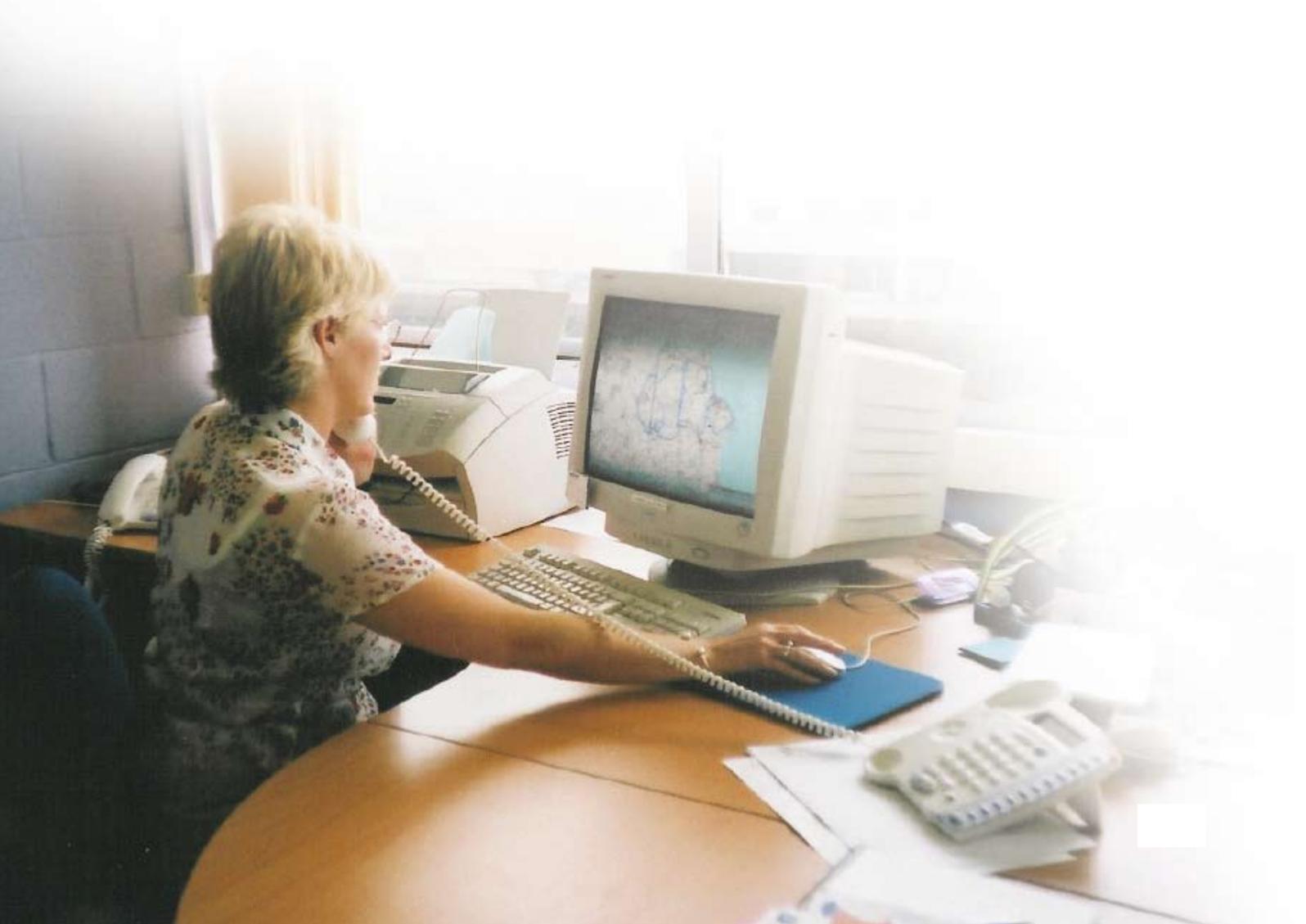


Good Practice Guide for Demand Responsive Transport Services using Telematics

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With support from:

Cumbria County Council
Countryside Agency
Cumbria Ambulance Service
Department for Transport
Economical Taxis
South Lakeland Community Transport
Stagecoach North West

April 2006

The Department for Transport has co-financed the production of this Guide

Published by the University of Newcastle upon Tyne NE1 7RU
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ISBN 0-7017-0209-5

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Brake, J F, Mulley, C and Nelson, J D: Good Practice Guide for Demand Responsive Transport Services using Telematics, published by the University of Newcastle upon Tyne, 2006

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Overview

Many local authorities and public transport operators are experimenting with or considering flexibly delivered public transport systems, mainly with a view to improving social inclusion in areas difficult to cover by conventional public transport. Many such initiatives have been in response to recent developments in transport telematics. It is anticipated that many more flexible transport services will be introduced in response to the DfT registration initiative (“The Flexible Future”, DfT, 2002) implemented in February 2004.

The overall objectives of this Good Practice Guide are:

- To assist local authorities in the provision of telematics based flexible transport schemes by providing an accessible and user friendly Good Practice Guide, showcasing recent practical experience in a UK context.
- To demonstrate how Demand Responsive Transport (DRT) services can contribute to the overall strategy and commitment of statutory authorities to provide citizen mobility within budgetary constraints.

The presumption of this Good Practice Guide is that the essence of what works well in one service can be distilled to provide recommendations to be applied elsewhere. For this reason, this Guide is divided into key areas which are relevant for the types of decision that need to be made in either setting up a DRT service for the first time, or to make improvements to an existing DRT service. This Guide gives recommendations of a general nature, based on actual examples of existing DRT schemes both in the UK and elsewhere in the world, alongside knowledge collected from experts, practitioners and operators in this area of public transport planning and operation.

The Guide is structured as follows: Chapter 1 places DRT in the context of the overall public transport offer and offers a summary of recent, current and future developments of this emerging domain. The main body of the Guide presents a set of key areas relevant to the provision of successful DRT services and illustrates each by reference to actual examples. These key areas, which are treated on a chapter by chapter basis, are:

- The Economic Framework
- Technologies
- Service Design
- Managing Multiple Services
- Marketing and Promotion
- Partnerships

At the end of each Chapter, this Guide offers a number of points ‘to be aware of’. These issues are important in any circumstance of potential or actual operation to ensure that well known practical issues have been carefully considered.



Demand Responsive Transport Service Vehicles, Angus Transport Forum

The Department for Transport has also published new guidance which complements the previously published “New Technology in Transport - Improving Network Management” resource pack and the Department’s Guidance on Transport Analysis. It provides specific advice on:

- the selection of ITS tools to meet policy objectives
- the benefits and costs of ITS deployment
- what others have done to incorporate ITS within transport plans
- lessons learnt from their experience

A free copy of this is available from DfT Publications.

1 Understanding the Concept of Demand Responsive Transport

1.1 The Concept of Good Practice

What does Good Practice mean?

Good practice is a concept which evolves out of recognising what works well in a particular situation. This can range from a recognition that a number of simple practices, put together in a particular way, provides a successful outcome. Or good practice can evolve from the implementation of a complex process. The essential element of good practice is that it is based on real experience,

How can Good Practice be applied as a practical tool for Public Transport Planning?

This Good Practice Guide is designed as a practical tool for local authorities considering the implementation of a Demand Responsive Transport (DRT) service. It gives recommendations of a general nature, based on actual examples of existing DRT schemes both in the UK and elsewhere in the world and knowledge collected from experts, practitioners and operators in this area of public transport planning and operation.

The presumption of this Good Practice Guide is that the essence of what works well in one service can be distilled to provide recommendations to be applied elsewhere. For this reason, this Guide is divided into key areas which are relevant for the types of decision that need to be made in either setting up a DRT service for the first time, or to make improvements to an existing DRT service.

The Transferability of Solutions

It is always worth remembering that what works well in practice will be the result of a collection of activities and that good practice in one area might be bad practice in another.

This Good Practice Guide illustrates issues by

reference to actual examples and offers pointers which have generally led to good practice. This allows the potential user of the Guide to identify whether the recommendation is likely to work in the particular circumstances under consideration.

At the end of each Chapter, this Guide offers a number of points 'to be aware of'. These issues are important in any circumstance of potential or actual operation to ensure that well known practical issues have been carefully considered.

1.2 Flexible Transport as part of the Public Transport Offer

What is Flexible Transport?

Flexible Transport Services (FTS) is an emerging term which covers services provided for passengers (and freight) that are flexible in terms of route, vehicle allocation, vehicle operator, type of payment and passenger category. The flexibility of each element can vary along a continuum of demand responsiveness (see Figure 1-1) from services where all variables are fixed a considerable time before operation (e.g. a conventional public transport bus route) to services whose constituent variables are determined close to the time of operation.

A typical registered DRT service can have several highly demand responsive elements. There are no restrictive passenger eligibility criteria; passengers are picked up and dropped off in accordance with their needs, the route being fixed 2 hours before the service journey. A discounted season ticket offers passengers flexibility in terms of convenience as well as reduced payment. A choice of vehicles may be available according to passenger needs and total demand. The operator would normally be selected by competitive tender prior to service commencement unless *de-minimis* provisions apply.



Figure 1-1: The Demand Responsiveness of Public Transport

The true potential of FTS as a contributor to sustainable mobility has not yet been fully exploited – partly because the necessary supporting frameworks required to deliver more effective and competitive transport solutions are not yet fully understood. The potential for FTS has important implications from the viewpoint of transport logistics and the environment. There are considerable opportunities to reduce road traffic, to save operating costs and to increase the level of service experienced by passengers.

Demand responsiveness can also vary within and between modes in terms of the type of service that is offered. Figure 1-2 gives examples of these variations based on the operation of distinctly recognisable standalone services – the way in which transport is generally viewed at present. The most responsive mode is the private car, if it is available, whilst the Post Bus could be considered the least responsive mode as its route is dependent not on passenger trip patterns but upon the need of the Post Office to deliver and collect mail as efficiently as possible. It should be noted that in Figure 1-2 the most responsive aspect of one option, e.g. registered bus services, is not as responsive as that of the most responsive taxi or car option. The overall level of responsiveness for all modes can be increased by brokering vehicles and operators. This will be discussed in Chapters 5 and 7.

1.3 Summary of DRT: Past, Present and Future

The Development of Diverse Flexible Transport Options as Solutions to Mobility Issues

Many local authorities and public transport operators are experimenting with or considering flexibly delivered public transport systems, mainly with a view to improving social inclusion in areas difficult to cover by conventional public transport. Many such initiatives have been in response to recent developments in transport telematics. More specifically for the rural context, guidance on what the law permitted for setting up flexible local transport services is provided in ‘Flexible Transport Services’ (DfT, 2002). It is anticipated that many more flexible transport services will be introduced in response to the DfT registration initiative (“The Flexible Future”, DfT, 2002) implemented in February 2004, whilst the more recent White Paper (“The Future of Transport”, DfT, 2004) has pledged to continue supporting the development of DRT services.

The roots of flexible transport services lie with Community Transport and Care Services provision in the form of dial-a-ride services, in which manual scheduling is used and there is no Travel Dispatch Centre (TDC) to vehicle communication. The

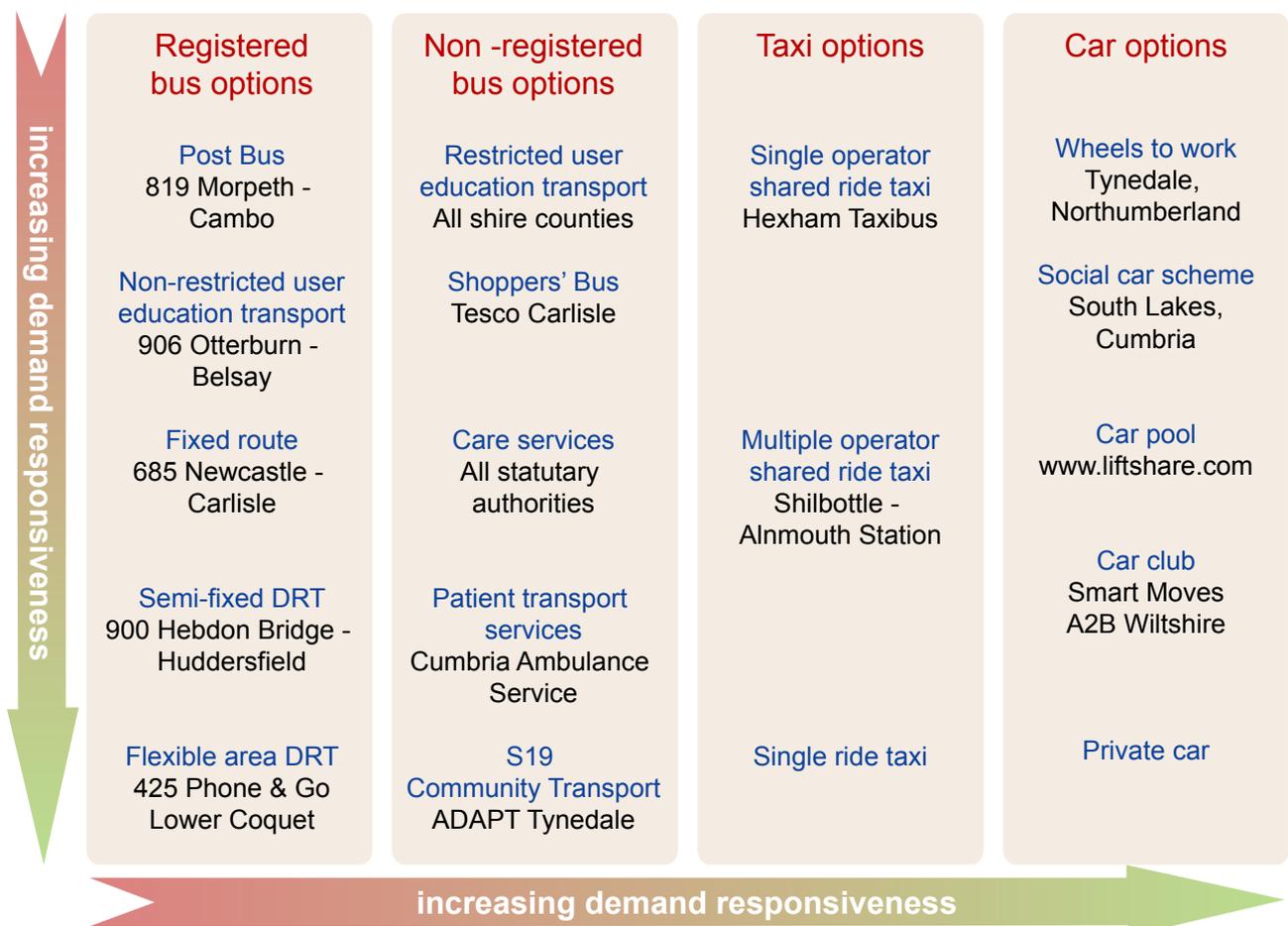


Figure 1-2: The Demand Responsiveness of Different Modal Options

customer has to ring the TDC to make a booking at least one day in advance of travel. Recently, more innovative solutions have been enabled by the development of Intelligent Transport Systems (ITS), which allow more flexible transport services in terms of when the booking can be made and the route taken by the vehicle (see Chapter 3). In addition, new ways of thinking about the provision of all types of what might be considered public transport has led to more flexible transport modes becoming available, such as a “bottom up” approach to meeting demand which responds directly to end user needs, permitting the general public on education contract services, the use of taxis for shared public transport and the provision of vehicles enabling access to work. Critically, these innovations are tending to operate independently leading to overlap, gaps and misunderstandings about the purpose, delivery and receipt of services. To address these issues, future public transport services will need wider area network planning, greater co-operation between service providers and a greater understanding of end user requirements. These are the questions which this Good Practice Guide is intended to progress.

The Institutional Context under which Flexible Transport Operates: Problems and Assistance

As a relatively new form of public transport the juridical status of DRT has been unclear, with applications being hampered by issues of how to register services successfully. The widespread successes of statutory authorities in winning substantial funding under the Rural and Urban Bus Challenge programmes for the implementation of DRT services have contributed to the establishment of many schemes which were ineligible for the Bus Service Operator’s Grant (BSOG) on any flexible route sections, leading in some cases to inappropriate DRT service design in order to receive BSOG and increases in the levels of subsidy required for the services.

In response to these developments the UK Government pledged in its Ten Year Plan for transport (DETR, 2000) to remove or (at least) relax constraints on the development of flexibly-routed bus services by clearly specifying the conditions for route registration of commercially operated and supported services, and to promote a greater role for community-based services. Subsequently, the publication of the Rural White Paper (2000) was followed by the Department for Transport Consultation Paper entitled “The Flexible Future” (August 2002) which put forward new proposals for the registration of flexible transport services (DfT, 2002). These proposals – implemented as of February 2004 – permit the registration according to a simple classification of service types while a variety of possible service designs are illustrated in Chapter 4. Crucially, BSOG has been extended to flexibly routed local bus services. However, some outstanding issues may deter new DRT registrations. In order to

protect consumers and to provide proper audit of public funding, operators are required to compile not only evidence of when it is planned that passengers will be picked up and dropped off – which is easy to extract from the scheduling software – but also the actual pick up and drop off times. Such information is not readily available from the software and places an additional burden on the drivers. With regard to the BSOG claim, this must be supported by full evidence of mileage on flexible route sections, which is also not readily available. Nonetheless, in response to these changes, there has been an acceleration in the registration of DRT services.

Throughout this document legislative references will apply to England and Wales unless otherwise stated.

The Importance of the Political Commitment of Members

One issue which is prominent in most current debates is the sustainability of DRT services and the (inevitable) comparison with fixed route services (the importance of a coherent economic framework for the implementation of DRT services is discussed in Chapter 2). Current implementations of DRT include the use of a larger service area compared to fixed routes and more frequent travel opportunities compared to fixed routes. Indirect savings vis à vis conventional services are widely reported, but a subsidy of around £4 - £5 or more per passenger journey may be required. Limited available experience (e.g. from Angus and Northumberland) suggests that whilst in its infancy, the full integration of services and pooling vehicles from all public transport sectors through brokerage at a single Agency will be an important step towards achieving sustainable DRT services (see Chapter 5). This will enable the provision of a more efficient public transport network. However, the need for strong local political commitment is vital.

Recent History of “Cart before the Horse” Application of DRT Services

The funding mechanism for conventional public transport services is well established: the most desirable option in the UK being the commercial operation of bus and taxi services. However, many services are not viewed as being economically viable by commercial operators, so it falls to the statutory authorities to subsidise these services for the general public, as well as providing special transport services, such as education and social services transport, as part of their legal obligations. It is often difficult to balance the demands of the consumer with the subsidy funds available, therefore new strategies are put in place to develop new ways of providing transport.

One such mechanism has been government-funded schemes such as the Rural Bus Challenge fund (1998 - 2003) which have enabled the introduction

of innovative services such as DRT for periods of up to 3 years. However, the consequences of this form of funding is that schemes are inaugurated that fit the objectives of the funding rather than the real objectives of the local community when there is no guarantee that follow-on funding will be forthcoming.

Another source of funding is the EC Framework Programmes – again providing useful set up funding but no long-term continuation strategy; the normal requirement is for pilot sites to be identified prior to application for funds – yet in reality full user requirements have not been conducted leading to misidentification of the pilot service design.

Future DRT services therefore need to be based on a long-term strategy for sustainability with an appropriate exit strategy following the cessation of pump-priming funds. This is in order to avoid general public disillusionment when a service that has become accepted is withdrawn due to lack of funds.

2 Economic Framework

2.1 Introduction

Mobility and access to life enhancing services is a citizen's expectation in the twenty-first century. For many, this is associated with the opportunities offered by the ownership and use of the private car. But many citizens do not have access to a private car and rely on public transport to ensure their mobility and social inclusion in society. Typically, in rural areas, the division between citizens with or without access to a private car is more accentuated than between similar urban dwellers.

The regulatory framework for public transport distinguishes between registered public transport services which are offered on a commercial basis and other services which are subsidised. In rural areas, commercial services offer a backbone of services which are augmented by local authority tendered services. But this may still leave areas – particularly those sparsely populated areas – without access to public transport. In rural areas, this has been addressed by a wide variety of solutions, many of which overlap, such as community transport, commercial taxis, social car schemes, Patient Transport Services, education transport and social services transport. This is where the flexible use of these flexible transport services, including registered DRT services can make a real contribution.

The provision of any public transport service requires decisions to be made over the operating characteristics (what vehicles to use or what technology should be embedded are just two examples). This chapter sets out a suggested economic framework which underpins the ultimate choice of operating characteristics of a DRT service. This Guide continues by looking at the issues of the specific elements of service provision.

2.2 Key Issues

In broad terms, an 'economically successful' or economically viable service is one where costs and revenues are at least in balance. Unless this is the case, the service will require on-going subsidy. Current experience in the provision of DRT services suggests that services are not sustainable without direct subsidy: whether or not such services should continue depends on the gap between revenues and costs and whether costs can be shrunk or revenues can be grown.

The key issues for this chapter are:

- Revenues
- Costs and the concept of 'avoidable' or escapable cost
- Viability

This chapter looks at costs and revenues from the

perspective of the local authority as the 'catalyst' in the provision of a DRT service and looks at the way in which consideration should be given in the setting up or cessation of a service as well as expansion or contraction of an existing service.

2.3 Revenues

For any public transport service, relevant revenues are the easiest to identify as these are the sums of money paid by the passengers together with any reimbursement of revenue foregone, such as concessionary fares or grants given on a per passenger basis (revenue grants) or lump sum grants such as Rural Bus Challenge grant. However, in practice, identifying revenues can be more complicated because the sums of money paid by the passengers will be strongly influenced by the fare. At the planning stage, it is important to recognise that if the fare is high, fewer journeys will be made than if the fare is low. So, especially at this planning stage, how is the fare fixed?

Fare setting is a delicate issue that in many cases is constrained by the need to make a certain level of revenue as the number of passengers multiplied by the fare will provide the fare-box revenue. Local authorities usually set a DRT fare as a distance-based fare, either as a fixed mileage rate (loosely related to the current mileage scale of registered public transport services) but more usually with a zonal fare system. However, some current DRT services do use a flat fare and this is likely to work well when the service area is relatively small. But DRT users are receiving a door to door service and perhaps should pay a higher fare as a result. Where implemented, a premium charge needs careful explanation to the travelling public as the available evidence suggests that users perceive DRT services as public transport where 'normal' fares should prevail. This is, of course, a policy decision for the local authority (if the service is to be subsidised) unless the service is being operated commercially where the operator would make this decision.

At the planning stage, a useful yardstick for identifying whether fares are too high or too low is to look at avoidable costs (see discussion below in Section 2.7) divided by the average fare. This identifies the target number of passengers that will be required to cover avoidable costs and this can be compared with the predicted patronage for the service.

2.4 Costs

The cost side of the equation can present more problems. It is necessary to first identify the cost elements of a DRT service. This will include all costs which, broadly defined, are those costs incurred through the addition of the DRT service to the public transport offer and which would not be incurred if the

service was not run. These divide into administrative costs (advertising and publicity etc) (Figure 2-1); capital costs (office equipment, computer hardware, software, etc); and operating costs (dispatchers' wages, drivers' wages etc) (Figure 2-2). In any one scheme, some of these costs will be relevant, in other schemes there may be additional items to be considered or items to be removed from the list. But for all schemes, it will be possible to allocate costs at least to:

- Administrative costs
- Capital costs
- Operating costs



Figure 2-1: Examples of Administrative Costs

In some cases, the costs that are identified may be shared between more than one activity. For example, a person preparing the adverts for a new DRT service may be employed for advertising generally and it might be argued that to include a portion of their salary in the administrative costs is not necessary since they are employed whether or not the DRT service is run. Many administrative or overhead costs suffer from this shared nature which makes simple economics very difficult to put into practice.



Figure 2-2: Examples of Capital and Operating costs

Proportional allocation of costs is often difficult. In practice, it is better to recognise the fundamental role

that cost plays in identifying the viability of a service. The key concept of avoidable cost or escapable costs must be clearly understood because at the time that a decision is made, it is the relationship between revenues and avoidable costs which is important – whether this decision is to start or cease a DRT service or whether it is to expand or contract a DRT service. Avoidable costs are:

‘those costs which can be properly attributed to a service, and are outlays which could be avoided if the service or activity is to be withdrawn’.

To consider whether ‘avoidable’ costs can be covered appears to be a simple rule but it is often complex to apply in practice since some costs are avoidable in the long run but not in the short run; some costs are shared or are joint between a number of activities, some costs are avoidable with small but not large changes in activity and so on. In practice this means that the degree of avoidability can vary with the time period under consideration and also whether the change in service provision under consideration is large or small.

The idea of avoidable cost is sometimes confused with the concept of fixed and variable costs. Whilst there is some connection, there is no direct relationship. For example, taking the case of a vehicle – typically thought of as a fixed cost. If a DRT scheme is operated as a brokerage scheme, so that vehicles are only ‘hired’ when there is a demand for a journey, then this cost is avoidable immediately if the service is terminated. If instead a vehicle is leased (rather than purchased outright) to provide for a DRT service, this is a cost that is avoidable on cessation of the service if the vehicle can be returned without penalty to the owner. If on the other hand, the leased vehicle is subject to a penalty clause for early return, this would only give rise to partial avoidable costs when a service is ended unless the vehicle can be used on another service until the end of its lease.

A further complication comes from the way in which the total avoidable costs for any service is likely to be less than the total system costs (where ‘system’ relates to the DRT service in its entirety) because of the presence of shared costs between activities. These costs, whilst not attributable to any specific activity still have to be met either from passenger revenues or from some external grant.

For practical purposes, this chapter considers how avoidable costs can be considered under different planning horizons: starting a new service, changing the level of service (either increasing or decreasing) and overall viability. The previous discussion will have made clear that the relevant costs will also depend on whether the DRT service under consideration is part of an operator’s wider portfolio and this will be illustrated by examples below.

2.5 The Planning Horizon

The choice of vehicle, the choice of dispatching service and the method chosen for the vehicle operation will have cost implications. For many local authorities, the decision can be separated into whether the dispatching service should be in-house or contracted out and similarly with the vehicle operation. Taking these in turn:

For Dispatching:

- If a local authority plans to host an in-house dispatch centre and to contract out the vehicle operation, the avoidable costs will be those of purchasing dispatching equipment, the staffing of the dispatch centre and its likely annual costs (Figure 2-3).
- If a local authority plans to contract out the dispatching service; the avoidable cost is the cost of the contract for the service (Figure 2-4). It is unimportant for the local authority to know how the contract is compiled by the tenderer in cost terms as their commitment is to pay the full amount.

For operating the service

- If the vehicle operation is to be tendered, the avoidable cost to the local authority is the price of the accepted tender.

- For the operator, the avoidable cost will depend on whether a new vehicle will be required (whether the vehicle is purchased outright or is leased) or whether an existing vehicle is free to be used to provide the service.
- If the service is to be operated using an agency/ brokerage process, whereby the vehicle is requested only at the time of an accepted booking, the avoidable cost is close to zero.

In all cases, there are likely to be some costs for the local authority which cannot be allocated strictly to the potential service. These joint or shared costs could be quite minimal depending on how the DRT service is organised.

For example, in the Rural Wheels service, based in Cumbria, the avoidable costs are low for vehicle operation as a vehicle is employed only after a request for a journey is made. But on the dispatching of the service, the avoidable costs are more complicated to ascertain as there are shared costs since the dispatching is undertaken manually by a member of staff who carries out this task as part of their overall duties and was required before Rural Wheels was implemented.

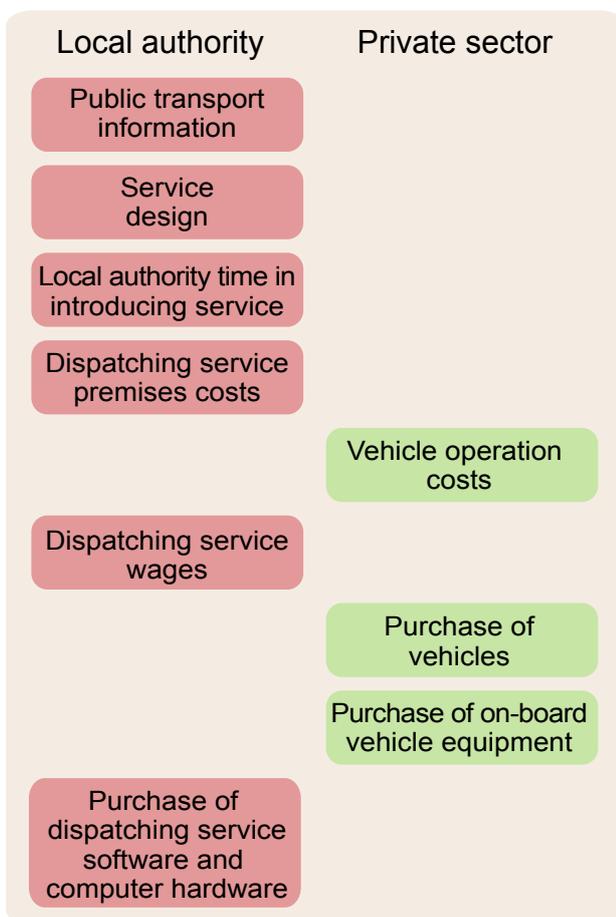


Figure 2-3: Planning Horizon: TDC In-house Operation Contracted Out

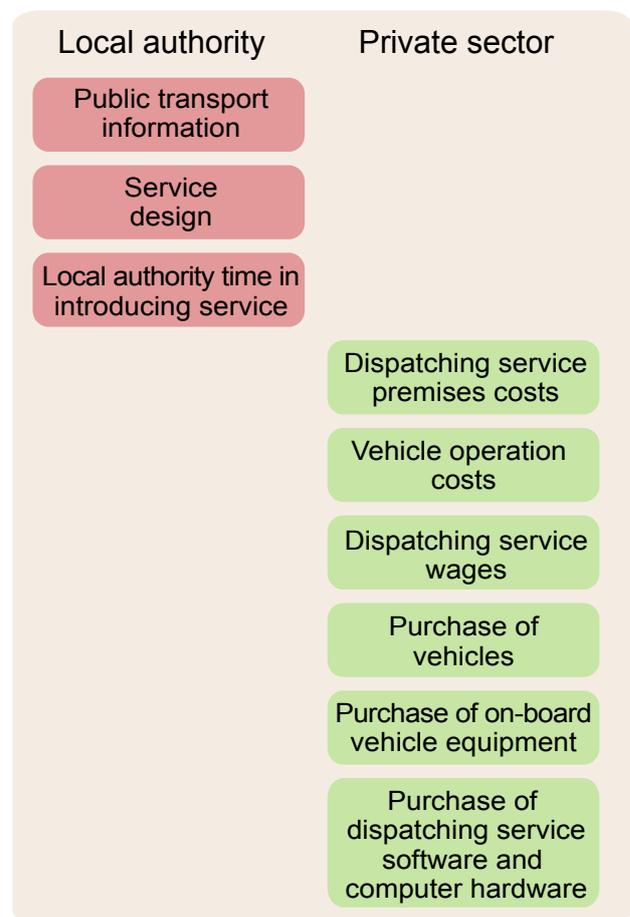


Figure 2-4: Planning Horizon: TDC and Vehicle and Vehicle Operation Contracted Out

2.6 Planned Expansion or Contraction of the Service

In the case of an expansion or contraction, the concept of avoidable costs must be tied to a decision criteria.

- For example, if passengers are currently entitled to two journeys a week and this is proposed to increase to three journeys a week, what are the additional costs? These additional costs must be identified as the specific additional costs which cannot be avoided in providing this extra journey per week.
- For example, if the dispatching service is to be open to the public for one extra hour each day but otherwise the service is to be unchanged, the additional costs of dispatchers' salaries together with any additional office costs would form the basis of the costs which cannot be avoided in this planned expansion.
- Another example might be where patronage is less than anticipated. Should the service level be reduced? Again the avoidable costs must be identified and this will depend on the way in which the DRT service has been set up. For example, if the service is run entirely by local authority contract (both the dispatching service and the vehicle operation) then the avoidable costs will depend on whether the contract has termination or variation costs. However, if the dispatching service is an in-house operation for the local authority but the vehicle operates under tender, then many of the costs attributable to the dispatching service will not be avoidable in the short term. Computing hardware and software, for example, are already purchased and can only be sold if the DRT service is stopped (many elements of the dispatching function, for example) and the equipment is still serviceable.

2.7 Overall Viability

The assessment of viability can be undertaken with these cost and revenue concepts.

- For example, if a DRT service is up and running and an examination of revenues and costs shows that the service is covering more than its avoidable costs then it should continue to operate. Even if the total revenue does not cover the total system costs, a service which makes some contribution to the joint or shared costs by more than covering its avoidable costs is beneficial. Why? Because these joint or shared costs have to be paid somehow and any surplus on the avoidable cost basis will be helping to do this.
- If a DRT service is in operation and has only been just covering its avoidable costs and it is time to replace significant investment e.g. dispatching software, then the service is not long-term viable.

To be viable into the long term, a service must not only cover its avoidable costs but make a sufficient surplus to replace elements of cost that are not avoidable in the short term.

Clearly the overall concept of viability is affected by the relationship of costs to revenues. In this context, costs are relatively straightforward, but the revenues received will be significantly affected by the level at which the fare is fixed.

More pragmatic approaches to fare setting are to look at the avoidable costs of the service and to divide these by the anticipated number of passengers, so as to ensure that the avoidable costs of the service are covered. If the DRT service is to be viable into the long term, fares must be sufficiently high to build a surplus over the avoidable costs to allow replacement investment to take place unless on-going subsidy is available to bridge the gap between revenues and costs.

2.8 Be Aware Of...

Appropriate economic provision will entail:

- Understanding and applying the avoidable cost principle in the decision framework.
- At the planning stage, it is better to lease capital items or contract out elements of a DRT service when its on-going economic viability is unknown (for example, the dispatching and vehicle operating functions), since this increases the proportion of avoidable costs in the event of cessation. This may make the provision of the DRT service more expensive in the short-term as the risk is being transferred from the local authority to the private sector providing the capital items or the services and this will be reflected in their tenders.

Inappropriate economic provision will ensue if:

- Costs are classified simply as fixed costs and variable costs, with resulting decisions based on this classification.
- Fares are set without reference to the need to cover avoidable costs.
- Comparisons are made between different services (whether between different DRT services or between DRT services and other tendered services) on the basis of cost per passenger unless it is absolutely clear that costs in all cases are calculated on a comparable basis.

3 Technologies for Flexible Transport

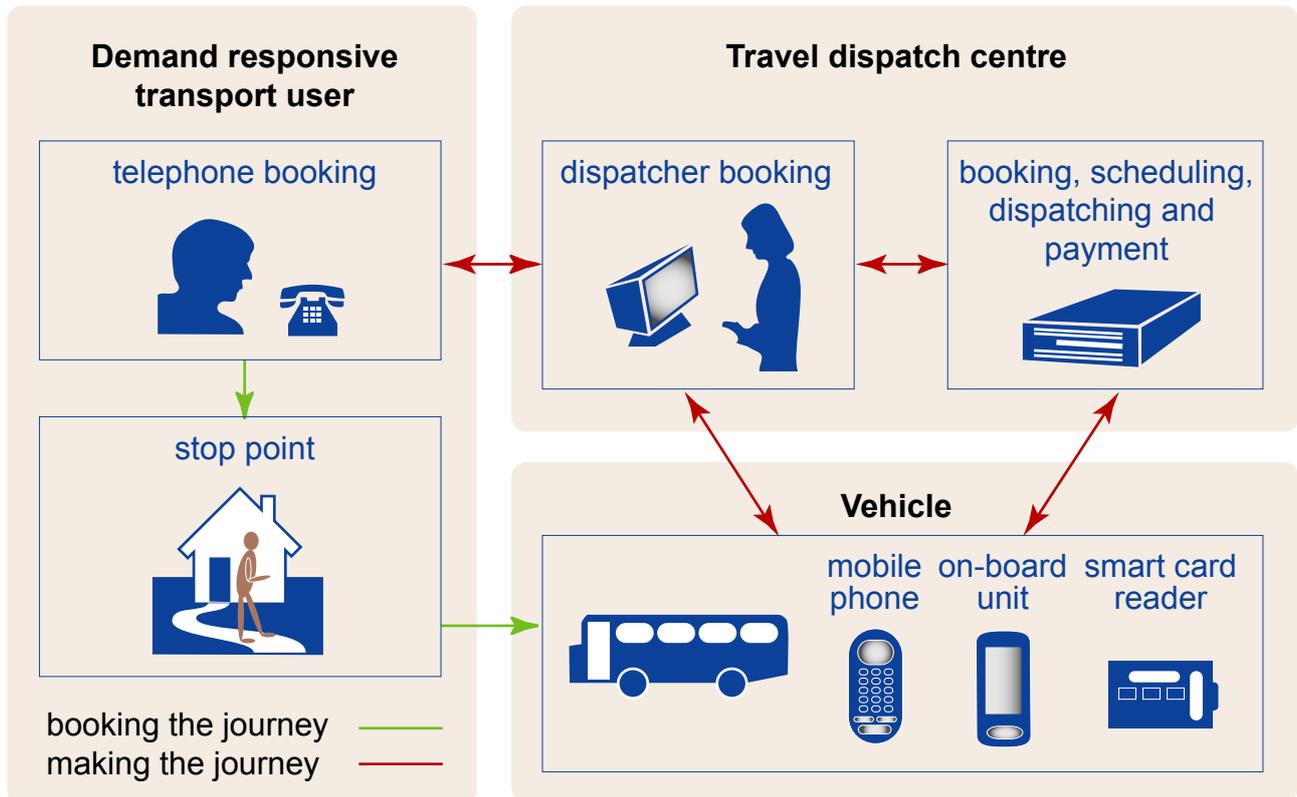


Figure 3-1: Schematic Representation of Telematics-based DRT

3.1 Introduction

Modern Information and Communication Technologies (ICT) offer a wide range of possible technological options for the development of DRT system modules. Telematics-based DRT systems are organised via TDCs using booking and reservation systems which have the capacity to dynamically assign passengers to vehicles and to optimise the routes. Automated Vehicle Locationing (AVL) systems are used to provide real-time information on the status and location of the fleet for the route optimising software. Early European examples of standalone telematics-based DRT services include the SAMPLUS demonstrations in Belgium, Finland, Italy and Sweden developed from the mid-1990s.

Figure 3-1 depicts the main architectural components of a telematics-based DRT system which can be identified as follows:

- The DRT system control centre [usually known as the TDC].
- Devices for users (i.e. customers) to access the DRT system.
- On-Board Units.
- The communication network.

3.2 Key Issues

The key decision for potential operators of DRT

services is to make the appropriate choice between levels of technology that are available and appropriate for the case in question. Areas where key technology decisions are required are discussed in Sections 3.3 – 3.6 below.

3.3 Scheduling and Dispatching

The main DRT service functionalities are managed by the Travel Dispatch Centre and include:

- Order management (trip reservation, service offer acceptance/refusal/modification).
- Travel planning (optimal routes search).
- Vehicle assignment.
- Stop time delay.
- Trip time estimate.
- Scheduling and service planning.
- Service monitoring.

Customers access the TDC to request travel booking, trip cancellation, for service related enquiries or to request an automatic trip notification. The two most widely used packages in UK are MobiRouter (from Mobisoft UK) and Pass and Flex (from Trapeze Software UK).

3.4 Customer Devices

The customer devices available to support interactive automated trip booking and service information are telephone, automated voice responding devices (Interactive Voice Response System (IVRS)) and web-based services.

A magnetic card reader terminal can be used for booking of return trips from the main destination points such as shopping centres and hospitals. It is connected to the TDC via a standard telephone line. The customer swipes his/her magnetic card and uses the terminal keyboard to book the trip with the next available bus. The booking is confirmed and printed. The SAMPLUS project in Gothenburg adopted this solution (Figure 3-2).

3.5 Vehicle Locationing and Communication

Vehicles may be equipped with location systems to automatically and continuously check their position during the service. Vehicle position is obtained by a variety of methods including:

- Global Positioning System (GPS) data.
- Dead reckoning, using gyroscope and odometer technologies.
- Map-matching procedure with comparison between collected data and network topological data and service data (current trip).
- Stop recognition by interaction of the open/close door sensors and the odometer indicating the stop status.

If the vehicle is not equipped with a locationing system a manual operational procedure should be employed to identify the stop points.



Figure 3-2: Passenger using a Magnetic Card to Book a Return Trip



Figure 3-3: IPAQ On-Board Unit Equipment

In-vehicle units include the following components:

- On-board computer (In-Vehicle Terminal) (see Figure 3-3).
- Location system.
- Communication system.
- Fare collection devices.
- On-board communication network.

3.6 Payment

Fare collection devices are used for service payment. They allow automated management of payment operations and additional functions such as customer validation or passenger counting. Smart Card technology represents the most interesting ICT option for fare collection functionalities within DRT architectures (see Figure 3-4). Multi-function cards also allow the development of integrated payment services and different zone fares.

The Integrated Transport Smartcard Organisation (ITSO) specification for Smart Cards was published in March 2004. As of the end of 2005 numerous card suppliers, the predominant ticket machine suppliers and two back office suppliers are in the process of achieving certification. It is hoped that the standardisation of ITSO will encourage manufacturers to produce ITSO compliant readers. The use of ITSO compliant technologies, such as contactless Smart Cards, provides a range of benefits. Most importantly they enable interoperability within transport systems and between transport and non-transport applications – the latter being of particular value when developing the business case for use of technologies. Thus, if standards are interoperable, a citizen's card could be issued for use with various services, which would minimise the shared cost for participating organisations. The Smart Card can be used as a tool for creating loyalty, e.g. if direct debit payments or standing orders are enabled, saving the customer time; it also has built-in security up to banking

standards in order to minimise fraud. However, many participants are required to make such technologies worthwhile. It is important that the Smart Card reader is linked to an appropriate back office system, in order to reduce problems saving data and creating reports. Depending on user requirements, ITSO can be simple or complicated. For example, they can include stored travel rights which identify concession entitlements; they can record multi-modal journeys so that a rebate or refund is given if an interchange is made; or there



Figure 3-4: Smart Card and Reader, Rural Wheels, Cumbria

can be a fare capping scheme for different times of day.

3.7 The Agency (Brokerage) Approach

More mature DRT systems are likely to involve interacting Agencies (or TDCs) which would enable the optimisation of modes and services between several Agencies, allowing access to an even greater range of vehicles and more opportunities for passengers to travel where and when it is most convenient for them

Case Study: Rural Wheels, Cumbria

A joint Rural Bus Challenge-funded scheme by Cumbria County Council and Lancashire County Council implemented Smart Card technology for concessionary fare schemes as part of the Rural Wheels scheme. The objective is to check what is actually spent (i.e. produce an auditable trail) leading to a fair distribution of funds between operators. The card is topped up at a retailer (e.g. local Post Office) by the user. Upon boarding the bus, the card is passed across the reader and the driver keys in the mileage at the beginning and end of the journey to work out the distance covered and the appropriate fare is taken off. Periodically, the retailer downloads sales back to the council and the driver downloads mileages. By the end of summer 2005 ITSO compliant cards will be in use.

Case Study: Phone and Go, Northumberland

Technologies deployed

Travel Dispatch Centre Software: MobiRouter is the logistics package used in Phone and Go for the design and management of DRT services. With MobiRouter, the routes and schedules are planned on a map in real-time as orders are received. When planning a route the software primarily considers time limitations, passengers' special requirements and vehicle capacities. The planned routes are in a state of flux but remain up-to-date at all times such that the vehicle is designated to reach all booked customers on time. Information is stored in a database. Reports and statistics, which are customised to meet the requirements of the project, are produced using a separate reporting tool.

On-Board Vehicle Units: Aplicom Units consisting of a Siemens C35 modem fitted with mobile SIM card for transmission of data with the TDC, a small CPU device for processing the data, display screen and keypad were used. GPS transmitter/receivers have also been fitted to the vehicles enabling vehicle positions to be located on the TDC maps. Alternatively hand-held PDAs enable easy transfer of route data in the event of a main vehicle not being available and make it possible to establish off-vehicle contact with the driver

Communication between Travel Dispatch Centre and Vehicle: In Phone and Go data are sent from the TDC to the vehicle terminals using GSM communication over the mobile phone network. The vehicle terminals are connected to a GPS receiver, therefore the dispatchers can poll for the vehicle's location which can be seen on the TDC terminals' screen maps. Mobile phones were employed as a communication backup.

in a larger geographical network (see Chapter 5).

3.8 Travel Information Systems - keeping service information up to date

It is also crucial to ensure that potential customers of DRT are made aware of the services available (see Chapter 6 for more detail). In order to take full advantage of existing information services, such as Traveline and Transport Direct, DRT services should be carefully described using agreed data standards.

Many users of DRT services will need to make connections to and from conventional scheduled public transport services - with the combination of DRT and scheduled services offering the opportunity for travel over a much wider area. It is important, therefore, that details of DRT services are made available to travel information systems such as Traveline and Transport Direct.

The National Public Transport Access Nodes (NaPTAN) database provides a way in which locations served by DRT services can be referenced in a

standardised way. Fixed stops (whether always served or only served on demand), Hail-and-Ride routes and “service areas” can all be included in NaPTAN. These location references can then be used as part of the description of the service available in a way that journey planners can understand. This will allow them to incorporate the DRT service within itineraries that may also use other public transport services in the area to meet a traveller’s requirements.

The quality of journey itineraries available from journey planners, however, is very dependent on the way that the DRT service is described. The ideal would be to link the journey planner to the TDC system, and for each relevant journey request to seek a provisional booking on the DRT. In this way the itinerary offered will show what the DRT system could offer a passenger to meet their specific needs (in terms of journey at a particular time) - if they booked immediately. Ideally, therefore, such a link between the journey planner and the TDC would also provide an immediate opportunity for the prospective passenger to book the offered journey.

In the absence of sophisticated links between journey planners and TDC booking systems, however, the key to relevant information about DRT being available on journey planners is to ensure that the DRT is described with a realistic ‘provisional timetable’ - with a clear note that times are approximate and can only be confirmed at the time of making a booking, and with clear information about the necessity of booking (and the relevant contact details for this purpose). The realism of the description is particularly important for journeys to and from the points where interchange with other services can take place.

It is also important to remember that DRT service details need to be kept up to date as the nature of a DRT service may evolve over time - perhaps changing the NaPTAN locations that are served, or the ‘provisional timetable’ that has been given to journey planners as a guide to the service that they can show within the itineraries they supply to enquirers.

3.9 Be Aware Of...

Issues to be aware of include:

- The need to identify the most appropriate type of scheduling system (e.g. between manual and software scheduling). This should be part of a user requirements exercise.
- The selection of Internet or a telephone IVRS will have an implication for savings on staff costs at TDCs.
- The length of time needed to test the software and other applications before going live.
- Institutional factors may impact on the eventual solution adopted (e.g. factors underpinning the achievement of multi-operator / multi-authority co-operation).

- A fair distribution of funds between operators and local authorities can be made easier using a technological solution such as smart cards.
- The benefits of using ITSO compliant equipment will enable greater interoperability both within transport services and between transport and non-transport services.

4 Service Design

4.1 Introduction

Service design is a critical stage in the development of DRT services. Ideally service design should be completed in collaboration with key stakeholders who will normally include the travelling public, bus (and other) operators, the local authority and the despatch centre manager.

4.2 Key Issues

Key issues include the willingness to be flexible amongst key actors involved, the need to carry out comprehensive user requirements and an awareness of the constraints involved which include: available capacity; time; type of vehicle.

4.3 Establishing User Requirements

In a typical application this exercise is intended to identify the needs of potential users based on investigation rather than preconception. This may involve:

- Definition of appropriate routes, service levels and booking characteristics.
- Provision of guidance on fares and ticketing.
- Advice on appropriate vehicles for the services.
- Production of a consultation leaflet promoting the DRT concept.

User Requirements may be approached by making site visits, one-to-one interviews and holding focus groups.

4.4 Planning Requirements

The following factors should be considered:

- How do political factors affect service design?
- How are plans made to implement new services?
- What are the objectives? More than just plugging the gaps?
- What resources are available – human (local authority management, TDC), vehicle (local authority, commercial operator, Community Transport, voluntary car drivers, car clubs, taxi), software (planning, scheduling and dispatching, Smart Card for handling payments) hardware (TDC, on-board unit), infrastructure?
- What is the level of co-operation between departments within the local authority?
 - Co-operation takes a long time to achieve.
 - The different organisational structures of local authorities make generalised recommendations difficult.

- When planning for integration, the practical issues of where it is to be managed from, where vehicles are to be based and protecting/making money may dominate the task of setting realistic objectives.
- Co-operation with community transport: hampered by perception of competition and concerns about volunteers' attitude to technology.
- Staff issues
 - Training.
 - As many schemes are funded by time limited grants, this leads to short term contracts for staff. This gives rise to a lack of continuity between projects as new staff are appointed each time and staff turnover tends to be more rapid.

4.5 Costs that Drive Service Design

It is important to determine the budgetary constraints on service design. Relevant factors include:

- Integration of social services, education transport and public transport is desirable. Public transport planning is being driven towards this as a way of providing some kind of service – although it is recognised that this is not necessarily the best solution for the general public. Such an approach is environmentally and strategically more sound in terms of use of vehicles.
- Practical aspects of service design:
 - Accommodating vehicle multi-tasking with education/social services during one part of day and general public during another.
 - Accommodating all types of users at all times of day (if desired): this is hard to administer but can be a key role for the TDC and it may have “social” implications.
- Operators' contracts which may be:
 - Subsidised registered with / without vehicle.
 - Combination of stand by fee / call out fee / fixed rate per mile.

4.6 Principles of Service Design

A wide range of different concepts are possible, starting from a fully predefined route and timetable – the fixed service option – to a fully flexible service for which stops are fully determined in a period just before operation or even during the course of the service journey. Between these extremes, a semi-fixed route may be operated, in which some stop points are obligatory whilst others requiring vehicle deviation from the core route are not. Additional

- end point = route terminus
- fixed intermediate point = stop always passed by vehicle e.g. bus stop
- predefined stop point = vehicle deviates to here from fixed route only when requested by passenger
- non-predefined stop point = vehicle goes to doorstep as a result of passenger request
- pre-arranged destination
- starting point for vehicle journey

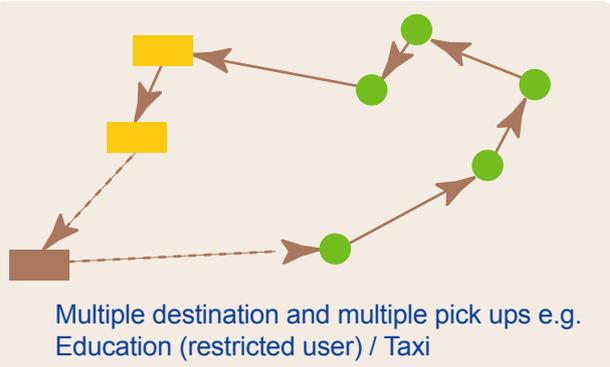
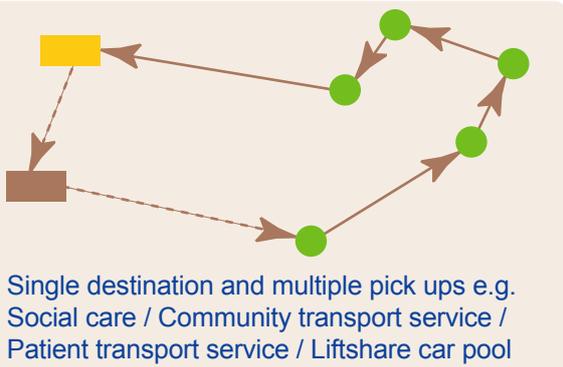
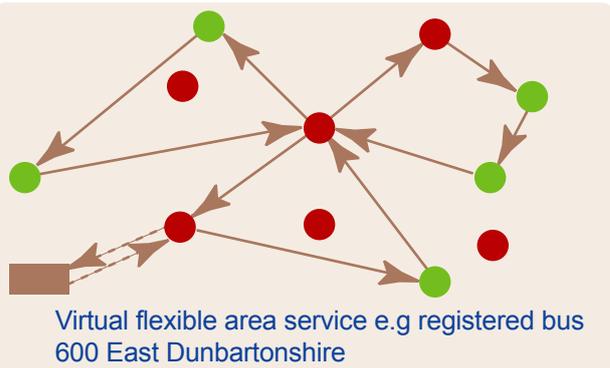
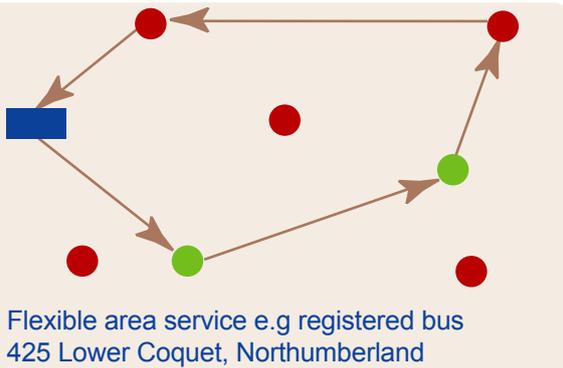
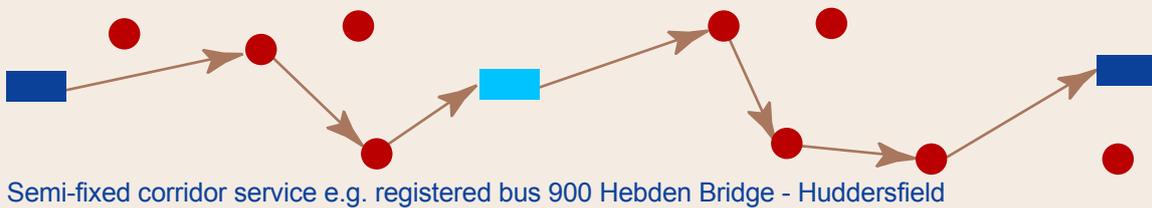


Figure 4-1: Examples of DRT Service Route Concepts

dimensions include the geographical coverage of the service – either as a corridor or area service – and the proximity of the passenger to the pick up and drop off points – which could be the door step (a non-predefined stop point) or a short walk to or from predefined stop points. Furthermore, services can be integrated between different modes, such as the use of feeder services to fixed bus routes and the rail network, or they can remain free-standing. The use of telematics-based technologies permits rapid calculation of routes according to the typology defined for each service.

Booking criteria are also important. If all passengers must pre-book their journeys (even if they use the fixed timed stop points) the vehicle only needs to travel if a booking is made and the pick-up and drop-off times given to passengers can be more easily adhered to as the unknown element of non pre-booked passengers is not present. However, negative outcomes are that casual pick-ups cannot be made, which necessarily restricts revenue opportunities.

Figure 4-1 shows a range of DRT service route concepts, ranging from those generally found in the registered bus service sector to non-registered options, with varying types of stop and beginning and end points for passengers and vehicles. Each diagram includes an example of a location which has adopted this particular configuration. It should be noted however that it is not uncommon for a variety of service concepts to be implemented by any one DRT scheme.

4.7 Be Aware Of...

Appropriate service and system design must take the following into account:

- The objectives of the service must be clear and placed in the context of external constraints, such as political, legal, geographical and communication restrictions.
- It is only then that the most efficient route design for the predicted demand levels can be considered.
- The costs of service design and implementation may be positively influenced by closer integration between multiple service providers.
- Since a wide range of different service design concepts are possible, they should reflect the outcome of a comprehensive user requirements exercise.

Case Study: Limbourg, West and East Flanders, Belgium

These provinces of Belgium have a moderate population density (400 - 500 persons/km²). Prior to the introduction of DRT services, many fixed route services had low – and at times zero – patronage. This lowest level of public transport could not be supplied by regular lines running expensive full-sized vehicles via twisting routes through all the villages and urban areas. DRT was introduced as feeder services into main inter-regional routes. Over a period of 18 months trip patterns were established leading to the re-fixing of some services at peak periods, leaving the remainder of the day as DRT services. Therefore DRT can be used as a way of determining the true transport demand of an area and be used as a planning tool. In this way, DRT services fulfil a major role in the restructured public transport network in each of the three provinces, where the regular city services, the fast, inter-regional connection services and the functional service routes need to be supported in areas with low population, errand travel patterns and dispersed service centres.

5 Managing Multiple Services

5.1 Introduction

The decision to move from conventional fixed route services to DRT services adds a new level of management as the final route – and in some cases the vehicle, operator and type of passenger as well – is selected much closer to the time of travel than with fixed routes, making them more demand responsive. This necessitates the inclusion of:

- A route scheduling and dispatching system.
- An organisation to carry out these tasks at a Travel Dispatch Centre (TDC).

5.2 Key Issues/Options

The general expectation is that as the management of DRT services becomes more complex, then the level of telematics used will increase in order to cope with these demands. The level of complexity is determined by a range of interacting management decisions.

The management of telematics-based DRT services is determined by a number of inter-related factors. As a starting point for making this decision, three factors are critical:

- Existing management resources.
- The long term strategy for developing DRT services.
- The level of co-operation between stakeholder.

5.3 Existing Management Resources

There already exists a variety of management options for services that offer varying degrees of demand responsiveness in terms of route taken, vehicle selected (see Figure 5-1) and passengers carried.

Statutory authorities have an obligation to provide special transport services. These include education transport and social services trips, each of which has historically been scheduled independently, usually in-house. Education trips are re-scheduled annually, whilst the review of social services trips is less well defined. Unlike DRT services, day-to-day trip patterns are fairly constant. Software programmes are now being used to schedule education trips, whilst social services trips are largely manually scheduled, many of which are dial-a-ride trips. Patient Transport Services are scheduled by the regional Ambulance Services, using software to manage the process. These trips are less complex than those required by registered DRT services as they bring patients to hospitals before clinics start and return them after the afternoon sessions, rather than, say, bringing people in at their appointment time and returning them soon after (which would be the case with a DRT service).



Figure 5-1: Sources of DRT Vehicles: Local Authority Subsidised, Community Transport, Taxi

For the last 30 years dial-a-ride services have also been provided by the **Community Transport** sector. These are operated on a filling-the-gap basis for special needs transport that is not provided by the statutory authority (or more frequently now in co-operation with the statutory authority). The level of telematics used for dial-a-ride is low or non-existent: however, a strong management function is required in order to ensure efficient manual scheduling and dispatching in order to maximise the number of shared trips, which has led to many locally managed Community Transport services throughout the country.

An even longer history of scheduling and dispatching has been made in the **taxi and private hire** sector. These are often more locally organised than the Community Transport sector, i.e. a single vehicle; more recently fleet management of loosely affiliated operators has become more prevalent as it offers a greater potential number of trips over a larger area whilst reducing the need for each operator to manage all its own bookings. Scheduling software has been used for a number of years, but as the chief characteristic of the taxi and private hire sector is single or group bookings with small vehicles, the scheduling requirements are relatively simple compared to DRT services which maximise the number of shared trips with fewer, larger vehicles.

5.4 The Long Term Strategy for Developing DRT Services

The previous section identified a range of transport functions that can be described as demand responsive which are already scheduled and dispatched in a variety of ways at diverse locations. The long term strategy for developing DRT services could – but does not have to – make use of them.

Typically, the impetus to introduce telematics-based DRT services for the general public has come from statutory authorities in response to the obligation to ensure accessibility for all members of the community. The most widely used strategy for ensuring accessibility for the general public is to examine the network of commercially provided services in the statutory area and identify where “holes have to be plugged” by supported services, which may be fixed or DRT services. Long term strategy issues include the following, all of which impact on each other:

- The use of centralised or dispersed management
 - Geographical
 - Organisational
- The level of telematics to be used
 - The number and patronage of services to be managed
 - The type of services to be managed
 - The level of integration of the services
- Capital available

Is the Management to be Centralised or Dispersed?

The risk and investment required for telematics-based DRT services ensures that commercial operators have hitherto been unable to finance the management of such services, leaving this function to fall in the first instance to the statutory authority. An example of a short lived commercial service was operated by Stagecoach between Edinburgh and Dundee.

Given this outcome the natural way of managing DRT services is to match the boundaries of that authority, i.e. to define coverage geographically. However, this can impede desired journeys by passengers; therefore cross-border consultation should be considered when establishing the management of DRT services, which will also require consideration of any technologies to be used and where cross-border services are to be dispatched from.

From a cost and organisational perspective there is a strong case for regional TDCs rather than numerous local TDCs. However, this is at the potential loss of personal dispatcher knowledge which even the most detailed of maps cannot provide. In Finland, a TDC was established at a location over 200 km from where the services were being operated. A contributing factor to its lack of success from the user perspective was the lack of personal knowledge by the dispatchers.

In the same way that the geographical area tends to fall to that of the statutory authority, so does the organisation of the services. Thus, the great majority of DRT services are managed in-house. However, there are a number of alternatives for hosting a TDC:

- Another statutory entity
 - Within the statutory authority, e.g. education or social services
 - Within a different statutory authority, e.g. Ambulance Service, another transport authority
- A taxi call centre
- A Community Transport organisation
- A commercial bus operator
- A research organisation (see Figure 5-2)
- A call centre providing transport and non-transport dispatching functions.
- A regional transport-related call centre, e.g. Traveline



Figure 5-2: Northumberland County Council TDC at University of Newcastle

Important considerations include:

- The type of software – if any – already used.
- Whether to integrate with existing software or introduce new software.
- The technical competencies of dispatching staff and the level of training required.
- Pre-existing lines of communication – both personal and administratively – with the potential dispatching organisation.
- The proposed management structure for the DRT services.
- Plans for expansion of services provided by the call centre. This could be in the form of more public transport services; more specialised passenger carrying services such as Patient Transport Services; expansion to more remote parts of the country (possibly with the distant user taking books via a managed server at the central TDC); the dispatching of small parcels; or scheduling of other services provided by the statutory authority.
- The method used to describe the service. Adherence to recognised data standards (such as NaPTAN) allows the route to be more easily understood by non-local customer service managers and for the service to be widely promoted through services such as Transport Direct and Traveline.

Level of Telematics to be Applied

Figure 5-3 is a model that demonstrates how DRT services can be provided and how they may link with the key factors affecting the level of telematics supplied, starting with the *Basic layer* having a single TDC scheduling and dispatching service for one operator. It is likely that the number of services and/or the level of patronage is low, enabling manual booking and dispatching. Where demand increases and/or it becomes more complex, at least previous day booking is needed to manage that demand. The time of booking is also linked to the presence of on-board units, which enable on-day bookings. The type of services will be similar, or at least highly compatible, such as those offered by Community Transport operators (mostly for special needs, individual trips are booked well in advance, group travel is arranged by one person and the vehicle is not open to use by others when being used by groups). Simple spread sheets are used for reporting.

The *Standalone layer* chiefly differs in the level of telematics offered, i.e. services are scheduled and dispatched by software, thereby enabling on-day booking. Software is likely to include reporting functions to assist with planning and financial arrangements; it is able to deal with higher demand levels on individual services and more services in total. These functions may be conducted at a TDC or more simply a booking is made directly with the driver using a mobile phone – a typical low-cost solution for registered semi-fixed services.

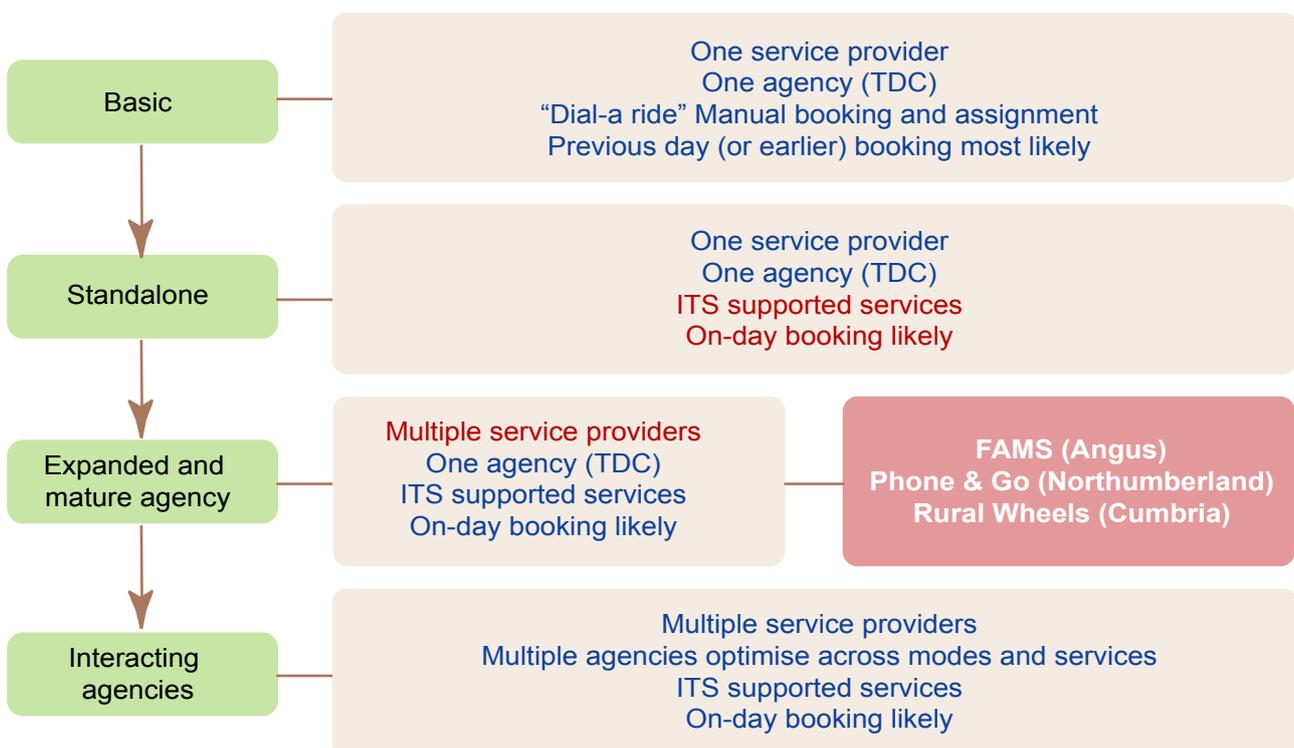


Figure 5-3: The Layered Model of Service Provision (adapted from FAMS, 2005)

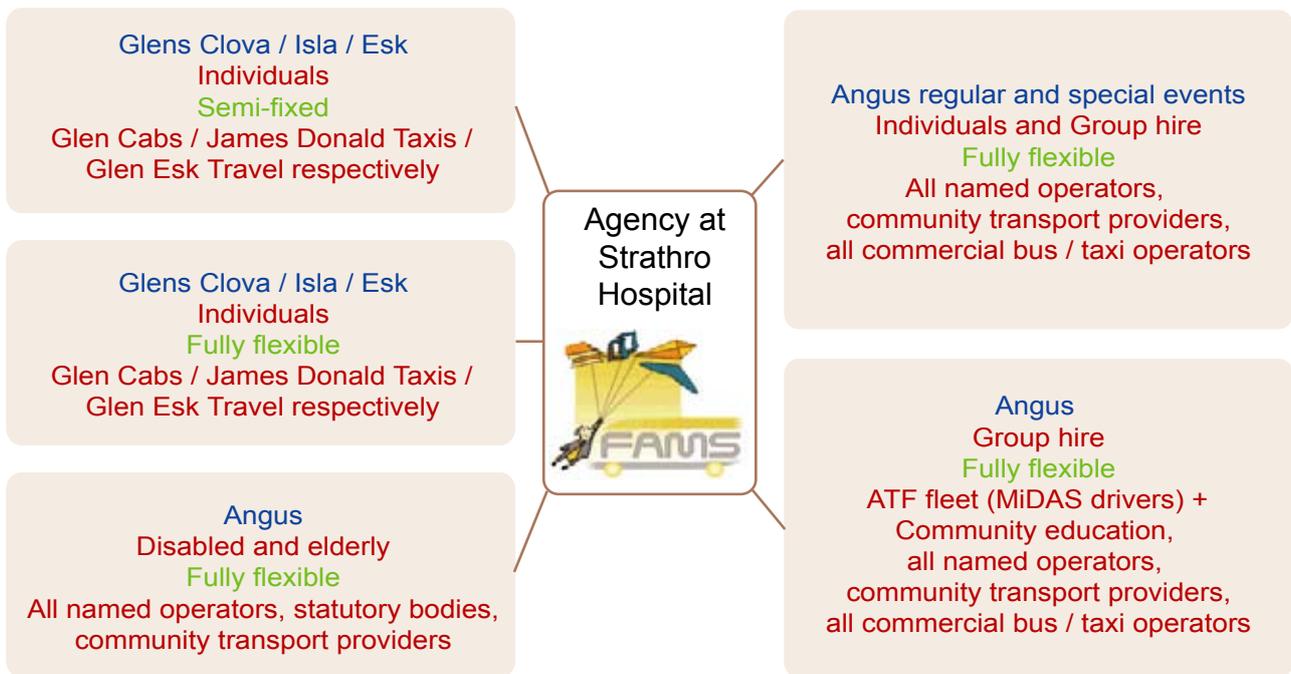


Figure 5-4: A Mature Agency: DARTS, Angus

The *Expanded and Mature Agency layer* moves into the management of multiple service providers, such as a combination of supported services, voluntary services, taxis, statutory special transport services and voluntary car schemes. These may be managed as a set of independent services, economies of scale deriving from the use of a single TDC or there may be some integration of services, such as the transportation of the general public and education contract passengers on the same service journey.

This layer can take a variety of forms. Thus, the scheduling and dispatching function can still be made manually, but another aspect, such as the use of Smart Cards for payment and reporting using a linked software package can be used, thereby enabling a more precise distribution of revenues from multi-operator passenger journeys.

At this level there are opportunities for non-transport functions to be integrated, such as the use of Smart Cards to pay for the use of leisure facilities. Alternatively, Value Added Services can be provided, such as the use of web searches to give information about public transport access to work and training opportunities – with the option to make a booking for a DRT trip where relevant. This also provides a service planning tool, as requests for access to work or training that cannot be met with existing public transport services will be logged. A UK example of this (www.emiresscotland.org) has been piloted in the Highland Region (Wright et al, 2004).

At this level the use of vehicular resources from different modes could be integrated, but would require information on:

- Availability of vehicle types
- Periods of vehicle availability
- Periods of driver availability
- Operators' prices for providing the transport services
- Institutional/regulatory conditions of each mode that may affect the management and scheduling functions

Figure 5-4 is an example of a Mature Agency.

At the final layer of *Interacting Agencies*, many resources are integrated, including the pooling and optimisation of investment capital, vehicles and human resources. It is unlikely that the Agencies can operate without telematics-based scheduling and dispatching functions – and telematics-based revenue management systems are probably essential.

The highest level of interaction between Agencies involves the use of software that freely enables both geographical and organisational cross-border management, either through a single regional TDC or through a set of TDCs whose software “talks” to each other.

The scheduling, dispatching and revenue management functions of the following case studies illustrate many of the issues discussed in this chapter.

Figure 5-5 shows the range of services dispatched for Phone and Go.

Figure 5-6 shows the range of services dispatched for Rural Wheels.

Case Study: Phone and Go, Northumberland

This was a DfT Rural Bus Challenge (RBC) funded project to introduce DRT services in two rural areas of Northumberland, with a view to expanding the number of services.

Management: uniquely organised as a research project, the management of the project was achieved in several ways. A Management Board was composed of the following stakeholders: the public transport section of Northumberland County Council, Rural Transport Partnership officers, the University of Newcastle (Transport Operations Research Group), North East Ambulance Service, a Borough Surveyor, a district councillor, and representatives of the Primary Care Trust and Nexus (the Tyne and Wear PTE). The Board met monthly initially and then bi-monthly, offering an advisory role; however, final management decisions were held by Northumberland County Council, the named fund holder. Exit strategy: towards the end of the RBC funding discussion of the exit strategy led to the management of the services being transferred to the integrated transport section and the establishment of a new advisory board for health transport issues.

Service management: registered services (including S19), special transport and shared taxi service. Integration between types of services was achieved with education and general public trips on one service, together with a short experiment carrying social services

and general public trips together. Exit strategy: it was expected that a similar variety of services would continue to be operated.

Centralisation of management: day-to-day management of the service was carried out by the University of Newcastle where the TDC was located in order to maximise the opportunity for research and evaluation of the services. The area covered by the services included south and east Northumberland. Exit strategy: once the project ceased to be a research pilot, the TDC was transferred to Nexus rather than moving in-house at Northumberland County Council. Services already dispatched by Nexus cover Tyne and Wear. Dispatching staff were transferred as well, giving continuity for passengers whilst Nexus staff were trained to the new services.

Level of telematics: all services were scheduled using a software package. Most services were dispatched with this package directly to on-board units together with fax back-ups the day before travel. The remaining services including shared taxi trips were dispatched by phone and fax. Exit strategy: the services were transferred to a different software package at Nexus, continuing with the same dispatching procedures. This transfer means that – from the scheduling perspective – cross-border services will be simple to introduce.



Figure 5-5: Multiple Service Provision: Phone and Go, Northumberland

Case Study: Rural Wheels 1, Cumbria

This project is funded by the former Countryside Agency, through the Rural Bus Grant and by Help the Aged in order to introduce DRT services in the south west of Cumbria, with a view to rolling the service out across the county. The associated NOWCARD project is funded by the Rural Bus Challenge. The area covered by Rural Wheels 1 was in South Lakeland serving the rural areas surrounding Ulverston.

Management: the Steering Group is composed of Cumbria County Council, the Countryside Agency (now ceased), Morecambe Bay Primary Care Trust and Help the Aged, meeting monthly initially to plan the service. Management decisions are made by Cumbria County Council, the fund holder, who is also responsible for the interface with operators and users and reporting on Rural Wheels to the NOWCARD Smart Card project.

Service management: registered services (including S19), special transport and shared taxi service are covered by the management structure. Integration between types of services has been achieved with education and general public trips on one service,

together with a short experiment carrying social services and general public trips together.

Centralisation of management: day-to-day management of the service was initially carried out by the Cumbria Ambulance Service. This function was later transferred to be in-house at Cumbria County Council offices in Carlisle, alongside education, statutory and mandatory transport contracts, educational assessment and procurement.

Level of telematics: Cumbria Ambulance Service already dispatched Patient Transport Services users. Cumbria County Council dispatches services manually, whilst payments by passengers are made using a pre-paid contact/contactless Smart Card – removing the requirement for drivers to handle money; this is being superseded by an ITSO compliant contactless card (the NOWCARD project) with stored seamless travel rights thereby enabling a fair distribution of revenues between operators on multi-operator trips and the potential to detect passenger fraud.

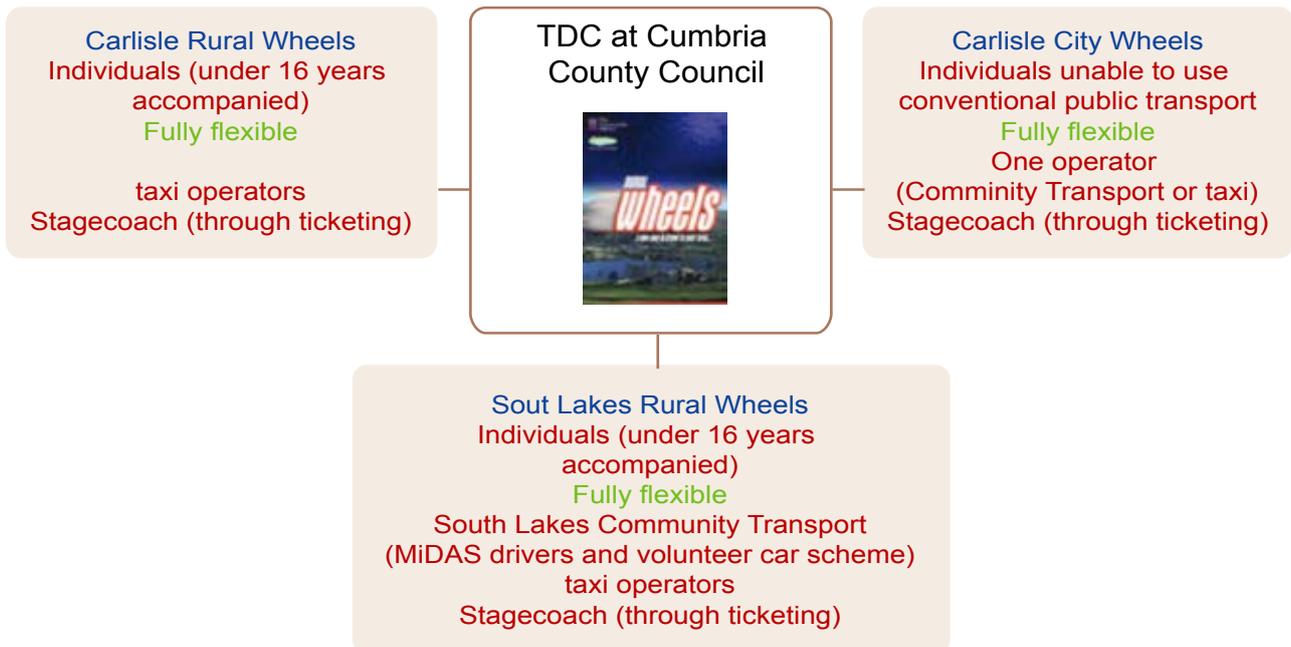


Figure 5-6: Multiple Service Provision: Rural Wheels, Cumbria

5.5 Be Aware Of...

Existing Management Resources

- May not be appropriate for the objectives of the planned services. E.g. software may be inappropriate to the new demand patterns

Centralised or Dispersed Management

- Statutory boundaries for management are not necessarily geographically advantageous. Cross-border co-operation may be necessary.
- The costs and benefits of local knowledge at local TDCs as opposed to economies of scale and brokerage potential at a regional TDC.
- Integration of statutory transport provision with registered services limits travel opportunities, particularly for the general public, e.g. limited space and route choice at peak education periods.
- When planning integration the practical issues of where the TDC is to be based and protecting/making money can dominate the task of setting realistic objectives.
- The exit strategy needs to be planned before the service commences (see Chapter 2).

Level of Telematics

- Think big or think small – but be appropriate to the objectives of the service and to the long-term strategy for DRT services.
- Technological barriers
 - Software may only offer manual selection of the operator and/or vehicle from the database, thereby lengthening the pre-booking period required.
 - Sporadic mobile phone network coverage can prevent on-day bookings if using on-board units.
 - Does software recognise different regulations affecting each mode? E.g. concessions may not be available on some modes.
 - Does the software give passenger choice? E.g. convenience at greater cost and vice versa. If yes – is that an efficient objective?
- What means of communication for end users are available if the DRT service is operational outside TDC hours? E.g. remote support at a 24 hour TDC; or on-call duties for dispatchers.

6 Marketing and Promotion: Awareness Raising

6.1 Background

The presentation of new initiatives to stakeholders is a key factor in the success of a service from the delivery and patronage aspects. The importance of awareness raising is even more critical with new forms of public transport services, such as DRT, as they require an understanding of how their operational principles differ from conventional services.

6.2 Key Issues

Awareness raising is a continuous activity – starting with the assembly of a partnership, followed by pre- and post service installation promotion, together with maintaining the co-operation of the partnership. The target of the awareness raising will therefore change over time. A number of critical factors have been identified:

- The visibility of DRT services.
- The options available for promotion to service providers and service enablers.
- The options available for promotion to end users.

6.3 The Visibility of DRT Services

The more flexible the service becomes the less visible it is to the end user. For example, a sign placed on a bus stop where a DRT service does not necessarily stop can give regular public transport users erroneous assumptions about the service – whilst the very people it is seeking to carry (those who are unable to reach conventional bus stops) will not be aware of its availability. Thus, whilst conventional marketing techniques are important, they need to be carefully targeted. Nevertheless, careful adherence to recognised data standards when defining the service will ensure that established national and regional transport information services such as Transport Direct and Traveline can support DRT services. Having information displayed in the correct context of other public and private transport options can help to demonstrate the benefits of the service as well as reaching a much wider customer base.

6.4 The Options: Service Providers and Other Stakeholders

These include potential and actual members of partnerships (if used) – service providers include vehicle and the TDC operators, whilst enablers include local political representatives, community groups and regional organisations such as Development Agencies.

One objective is to ensure that all these stakeholders are aware of the service, how it operates and how

they may benefit from it. Specific issues may need to be addressed such as:

- Explaining operator contracts and encouraging them to think beyond the financial security of off-road tendering.
- Removing fears of commercial operators about the viability of their services and giving information to the TDC database.
- In the case of brokered services, the impact of brokerage on competition and the encouragement of co-operation.

Another objective is to promote the image of the statutory authority that is supporting the service which is accomplished by having high profile press conferences accompanied by a prepared set of materials that comprise a press kit.

The solutions are to conduct regular meetings at which genuine consultation and decision making takes place. In between e-mail and telephone contact must be maintained.

6.5 The Options: End Users

The end users may be direct users, i.e. passengers, or indirect users, i.e. organisations such as SMEs and public services – such as leisure centres – who can identify potential users of the service. Most marketing is directed to the actual or potential passengers.

Public recognition of DRT services is, as noted earlier, difficult to achieve due to their transparent character. A range of options can overcome this problem.

Leaflets and posters prior to the introduction of a service can achieve several objectives:

- Inform the public about the forthcoming service.
- Explain how the service works and how to use it.
- Motivate people to use the service.
- Provide a registration form (if relevant).
- Offer an opportunity to learn more about the service, e.g. attend a public meeting.

Leaflets, posters and timetables after the service commences (see Figure 6-1) will:

- Ensure that up-to-date details are available.
- Remind people about the service and motivate the loyalty of existing users by focussing on its advantages.
- Promote the service to increase the number of new users.
- Offer opportunities to provide feedback about the service.

Case study: Campi Bisenzio, Firenze, Italy

This highly successful DRT service has been developed by ATAF, the public transport authority for Firenze. It has been highly promoted to the general public.

- *Ticketing: special tickets issued solely for use on DRT services enforces the service identity. DRT is promoted as a premier service concept. Reduced fares offered for a 6 month period support the introduction of the service.*
- *Publicity leaflets give the service a visual identity, e.g. Personalbus is evocative of the service; characteristic colours and fonts are used for DRT services. The service logo contains the name of the service and the company or the area covered. The logo is placed at DRT bus stops, on vehicles and in all communication materials. The TDC number is on all promotional literature. A consistent format is used for leaflet design, e.g. a map shows interconnections with other bus services and trains and it shows places of interest. The leaflet includes the area served, service hours, price, information needed to make the booking, the phone number and TDC opening hours. Current leaflets are always available at schools, shopping centres, libraries and gyms.*
- *Dispatchers are trained in all aspects of the service and how to manage customers. At first contact a customer profile is gathered and this information is used for targeted promotional activity.*
- *Promotional events are important. Representatives of the municipality (the mayor, the local transport councillor) and the service provider (the president of ATAF) talk to the public – several times a week in the early stages of operation. Events are targeted towards different types of users. These events commence with*

presentations from the authority and are followed by questions from attendees.

- *Students and workers have regular, well defined trip patterns therefore services can be planned around them. They are targeted by the education department, parents, the school manager, transport managers.*
- *Co-marketing of promotional information has been set up with commercial entities, such as a shopping centre, shops and swimming pools. The entity obtains publicity in exchange for sharing the costs of production.*

Promotion of the company image through the press office, institutional brochures and conferences has been directed towards the mass media, the company's own employees, institutions, local administrators, investors, competitors and stakeholders.

The mass media is involved at every stage in the service – launch, territorial expansion, the implementation of new technologies and promotional activities. This may take the form of a press conference when there is important news or special events. Other mechanisms include a press kit (photos, brochures, maps, contacts for interviews, additional explanations); short, simple press releases with news value are sent to press agencies and the mass media; and press tours are held so that journalists can try the service.

Company personnel and trade unions are targeted in order to inform and involve them in company activities. News relating to DRT services is delivered through a newsletter, which is also e-mailed to external organisations, such as project collaborators.

6.6 Be Aware Of...

Visibility of Services

- Visibility must be maintained aggressively since the more flexible the service, the less obvious it is to the general public in terms of route and vehicle used

Service Providers and Other Stakeholders

- For brokered services, there are regulatory and institutional issues to be overcome.
- Deregulation has not encouraged co-operation between transport providers.
- Operators are suspicious about revealing company information – even to a trusted third party.
- Operators prefer the status quo of subsidised services with off-road tendering.

It is easy to *lose the confidence of stakeholders* if they are not consulted and kept fully informed.

End Users

Suspicious about new services need to be overcome.

- Customers like the familiarity of bus type and route branding offered by standalone services as opposed to brokerage schemes.
- Due to the history of short lived services, customers are wary of new pilot services.

Poorly Targeted Awareness Raising Materials

- Too little, too late and not encouraging in tone.

7 Partnerships: the Future

7.1 Types of Partnership

Co-operation between Stakeholders

Experience suggests that the most successful DRT services are those where there are strong links between the stakeholders, who hold regular management and strategy meetings, such as through a Steering Committee. Each member will have clearly defined responsibilities.

The purpose of developing a partnership is to ensure that the needs of stakeholders are understood and met, such as ensuring that commercial services are not jeopardised or that the differing functions/ethos of Community Transport and commercial operations are recognised. For instance, volunteer drivers may be highly local community focused and may not wish to become part of a wider transport provision remit; they may also prefer to have minimal technological applications.

Partnerships are also an opportunity to break down suspicions about new forms of transport services, whether from the provider or end user perspective, as discussed further in Chapter 6.

Partnership extends to co-operation within organisations as well as between them. Even then, it takes a long time to set up new services, partly due to the different organisational structure of the entities involved.

Brokerage Partnerships

The principles of partnerships to manage a standalone service can be extended to the brokerage of vehicles and staff. Well structured partnerships offer the opportunity to save marginal and operating costs, e.g. through the pooling of education, social services and public transport passengers. The opportunities for reducing total operating costs for the partnership as a whole are very high but can be difficult to achieve if initial effort is not put into the creation of a stable partnership.

In a true partnership, all funds would go into one central pot and this would be used to commission all services including education, health transport, social services transport so that when 'savings' are made, these become the partnership's savings and not a saving to any one budget holder. However, in order for this to work, governance issues need to be sorted out well and be based on outcomes and not inputs. A partnership may take time to set up and require many meetings at the outset to address problems and find solutions. Once established, it would need to meet less often.

The impediments to setting up a true partnership are usually jointly fear and power – to run a true

partnership members need to be prepared to give 'my power' to the partnership and also be unconcerned that when the partnership carries out activities the contribution of the individual is lost. Equally, issues that look simple, for example, how a vehicle should be branded may take much time and co-operation to resolve if it is of overriding sensitivity to one partner.

7.2 Be Aware Of...

Management partnerships

- The needs of all stakeholders must be considered.
- Commercial services should not be jeopardised.
- Availability of volunteer drivers cannot be guaranteed or indeed expected, particularly close to the time of travel.
- The partnership should work towards a sustainable outcome.
- The partnership should ensure that there is long-term provision for continuity of day-to-day management in order to attract high calibre managers.

Brokerage partnerships as above, but also.....

- Ensure enough time is spent on resolving governance issues to the satisfaction of all partners in order to achieve long term stability.
- A sensitive issue to one partner must be taken seriously by all if the partnership is to gain maturity.

8 Overview of Key Issues and Solutions

The presumption of this Good Practice Guide is that the essence of what works well in one service can be distilled to provide recommendations to be applied elsewhere. For this reason, this Guide is divided into key areas which are relevant for the types of decision that need to be made in either setting up a DRT service for the first time, or to make improvements to an existing DRT service. This may be summarised as:

- The Economic Framework
- Technologies
- Service Design
- Managing Multiple Services
- Marketing and Promotion
- Partnerships

The recommendations presented here are of a general nature, based on actual examples of existing DRT schemes both in the UK and elsewhere in the world, may be summarised as follows.

Monitoring and Evaluation

Setting up a DRT service, as discussed in this Good Practice Guide, should be considered in conjunction with the statutory requirements of the local authority, as set out in the Local Transport Plan. In order to meet these needs, an on-going process of monitoring and evaluation is necessary, starting by conducting user requirements prior to setting up the service (as noted in Sections 1.3, 3.6 and 4.3). The purpose behind monitoring and evaluation is to find out whether the service is performing as well as expected and identify where improvements can be made. Consultation with all stakeholders is required – passengers (and non-passengers); the operator; drivers; local authority personnel; the TDC managers and dispatchers; community groups; and SMEs whose businesses may benefit from the service. If a partnership is established, all its members should be involved in the initial stages of user requirements in its management and as a set of stakeholders to be consulted: these roles will continue with monitoring and evaluation once the service is operational.

Chapter 2: The Economic Framework

Appropriate economic provision will entail:

- Understanding and applying the avoidable cost principle in the decision framework.
- At the planning stage, it is better to lease capital items or contract out elements of a DRT service when its on-going economic viability is unknown (for example, the dispatching and vehicle operating functions), since this increases the proportion of avoidable costs in the event of cessation. This

may make the provision of the DRT service more expensive in the short-term as the risk is being transferred from the local authority to the private sector providing the capital items or the services and this will be reflected in their tenders.

Inappropriate economic provision will ensue if:

- Costs are classified simply as fixed costs and variable costs, with resulting decisions based on this classification.
- Fares are set without reference to the need to cover avoidable costs.
- Comparisons are made between different services (whether between different DRT services or between DRT services and other tendered services) on the basis of cost per passenger unless it is absolutely clear that costs in all cases are calculated on a comparable basis.

Chapter 3: Technologies for Flexible Transport

Technological issues to be aware of include:

- The need to identify the most appropriate type of scheduling system (e.g. between manual and software scheduling).
- The selection of Internet or a telephone IVRS will have an implication for savings on staff costs at TDCs.
- The length of time needed to test the software and other applications before going live.
- Institutional factors may impact on the eventual solution adopted (e.g. factors underpinning the achievement of multi-operator / multi-authority co-operation).
- The benefits of using ITSO compliant equipment will enable greater interoperability both within transport and services and between transport and non-transport services.
- A fair distribution of funds between operators and local authorities can be made easier using a technological solution such as Smart Cards.

Chapter 4: Service Design

Appropriate service and system design must take the following into account:

- The objectives of the service must be clear and placed in the context of external constraints, such as political, legal, geographical and communication restrictions.
- It is only then that the most efficient route design for the predicted demand levels can be considered.
- The costs of service design and implementation

may be positively influenced by closer integration between multiple service providers.

- Since a wide range of different service design concepts are possible, they should reflect the outcome of a comprehensive user requirements exercise.

Chapter 5: Managing Multiple Services

Existing Management Resources

- May not be appropriate for the objectives of the planned services. E.g. software may be inappropriate to the new demand patterns.

Centralised or Dispersed Management

- Statutory boundaries for management are not necessarily geographically sound. Cross-border co-operation may be necessary.
- The costs and benefits of local knowledge at local TDCs as opposed to economies of scale and brokerage potential at a regional TDC.
- Integration of statutory transport provision with registered services limits travel opportunities, particularly for the general public, e.g. limited space and route choice at peak education periods.
- When planning integration the practical issues of where it is to be based and protecting/making money can dominate the task of setting realistic objectives.
- The exit strategy needs to be planned before the service commences.

Level of Telematics

- Think big or think small – but be appropriate to the objectives of the service and to the long-term strategy for DRT services.
- Technological barriers
- Software may only offer manual selection of the operator and/or vehicle from the database, thereby lengthening the pre-booking period required.
- Sporadic mobile phone network coverage can prevent on-day bookings if using on-board units.
- Does software recognise different regulations affecting each mode? E.g. concessions may not be available on some modes.
- Does the software give passenger choice? E.g. convenience at greater cost and vice versa. If yes – is that an efficient objective?
- What means of communication for end users are available if the DRT service is operational outside TDC hours? E.g. remote support at a 24 hour TDC; or on-call duties for dispatchers.

Chapter 6: Marketing and Promotion

Visibility of Services

- Visibility must be maintained aggressively since the more flexible the service, the less obvious it is to the general public in terms of route and vehicle used

Service Providers and Other Stakeholders

- For brokered services, there are regulatory and institutional issues to be overcome.
- Deregulation has not encouraged co-operation between transport providers.
- Operators are suspicious about revealing company information – even to a trusted third party.
- Operators prefer the status quo of subsidised services with off-road tendering.

It is *easy to lose the confidence* of stakeholders if they are not consulted and kept fully informed.

End Users

Suspensions about new services need to be overcome:

- Customers like the familiarity of bus type and route branding offered by standalone services as opposed to brokerage schemes.
- Due to the history of short lived services, customers are wary of new pilot services.

Poorly Targeted Awareness Raising Materials

- Too little, too late and not encouraging in tone.

Chapter 7: Partnerships

Management partnerships

- The needs of all stakeholders must be considered.
 - Commercial services should not be jeopardised.
 - Availability of volunteer drivers cannot be guaranteed or indeed expected, particularly close to the time of travel.
- The partnership should work towards a sustainable outcome.
- The partnership should ensure that there is long-term provision for continuity of day-to-day management in order to attract high calibre managers.

Brokerage partnerships as above, but also...

- Ensure enough time is spent on resolving governance issues to the satisfaction of all partners in order to achieve long term stability.
- A sensitive issue to one partner must be taken seriously by all if the partnership is to gain maturity.

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10 Annex 1: Abbreviations

Abbreviation	Description
BSOG	Bus Service Operator's Grant
DfT	Department for Transport
DRT	Demand Responsive Transport
FTS	Flexible Transport Services
GPS	Global Positioning System
ICT	Information and Communication Technologies
ITSO	Integrated Transport Smart Card Organisation
IVRS	Interactive Voice Response System
RBC	Rural Bus Challenge
TDC	Travel Dispatch Centre (also Call Centre)

11 Annex 2: Useful DRT Contacts

Community Transport Association, High Bank, Halton Street, Hyde, Cheshire, SK14 2 NY
www.communitytransport.com

Co-ordination of CONcepts for NEw Collective Transport (CONNECT) EU FP6 Project, Co-ordinated by School of Civil Engineering and Geosciences, University of Newcastle, Cassie Building, Claremont Road, Newcastle upon Tyne, NE1 7RU
www.flexibletransport.com/

Department for Regional Development (Northern Ireland), River House, 48 High Street, Belfast, BT1 2AR
www.drni.gov.uk/DRDwww_TransportationPlanning/

Department for Transport, Zone 3/13, Great Minster House, 76 Marsham Street, London, SW1P 4DR
www.dft.gov.uk/stellent/groups/dft_control/documents/homepage/dft_home_page.hcsp

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www.scotland.gov.uk/

Transport Direct
www.transportdirect.info/TransportDirect/en/

Transport for London Taxi and Private Hire, Public Carriage Office, 15 Penton Street, London, N1 4PU
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ISBN 0-7017-0209-5

£25.00