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Personal Security and Flexible Transport Services: Workshop 4 Report



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Contents

Cover picture	3
Acknowledgements.....	3
Introduction.....	4
About the Project	4
Objectives	4
The Five Application Areas	4
Project Work Programme.....	4
Workshop context: the relationship between automation in public transport and personal security.....	4
Report of the workshop	5
Workshop Programme	5
Findings from the workshop.....	5
SWOT analysis.....	6
Q1 What types of flexibility exist in public/shared transport at the moment?.....	6
Q2 What are the main reasons why flexibility is?	8
Q3 What is good and bad about existing flexible services?	9
Q4 What are the personal security issues with flexible services in different circumstances?.....	11
Q5 What are the opportunities and threats to the development of flexible services that support secure and confident journeys in next 3-5 years?	13
Summary of SWOT analysis.....	15
STEEP(L) analysis.....	16
The Scenarios Exercise	19
Questions for scenario development	19
World Markets	20
Global Responsibility.....	21
Local Stewardship.....	22
National Enterprise	23
References	24
Annex 1: Workshop Programme Timetable.....	27
Annex 2: Workshop Participants	28
Annex 3: Raw data from SWOT analysis	29
Annex 4: Raw Data from STEEP(L) Analysis.....	38
Annex 5: The Scenario Narratives from Work Package 1	42

Cover picture

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Workshop 4 Personal security and Flexible Transport Services

Introduction

The workshop reported on in this Workshop Package 3 Interim Report is part of the project “Enhancing transport technologies to support personal security in travel by public transport: Scenarios for 2040”, funded by the EPSRC.

About the Project

The project is focused on the role of technology and its interaction with user needs and perceptions in supporting personal security in travel on public transport. The aim is to develop fundamental understandings relating to this interaction and as a consequence to enable transport technologies to better support personal security (both perceived and actual) in travel by public transport.

Objectives

- 1 Assess the extent to which personal security issues are currently effectively addressed in a set of five specific application areas.
- 2 Identify potential future personal security issues and assess how they might be effectively addressed in a set of five specific application areas.
- 3 Examine how spatial, temporal and demographic factors influence the nature of both current and potential future personal security issues.
- 4 Develop policy recommendations to support decision makers regarding the application of transport technologies to support travel by public transport.

The Five Application Areas

- 1 Provision for public transport traveller information
- 2 Provision for contingency planning to support travel by public transport
- 3 Automated public transport services
- 4 Flexible transport services
- 5 Secondary, unintended effects of security (anti-terror, crime and antisocial behaviour prevention) technologies in the travel environment

Project Work Programme

The research programme is structured into 6 individual work packages, one for each of the five application areas, undertaken in sequence. The sixth work package will collate the individual reports from WPs 1-5 into a final project report, including policy recommendations and overall conclusions which will be presented at a Key Findings seminar.

Workshop context: the relationship between automation in public transport and personal security

Workshop 4 is focused on understanding how individual perceptions about personal security impact on the use and development of flexible transport services (FTS), and the role of technology in supporting personal technology. The workshop is the fourth in a series of five that are using a scenarios approach to explore issues and key drivers that influence how to enhance technologies to support personal security in travel by public transport. Each workshop is focused on a different application area. Participation in each workshop is intentionally diverse to ensure a wide range of perspectives are covered – bringing users, operators and service providers together to draw out new insights.

Flexible transport services, which are able to respond more dynamically to demand, could play an important future role in providing for secure travel. The Demand Responsive Transport (DRT) sector is reasonably mature in the UK, but has been driven by a rather narrow social exclusion agenda and its future viability depends upon its ability to expand into new markets. We are interested in the wider field of FTS, as technological advances could lead to convergence between currently separate types of publicly accessible transport, for example shared use of private cars or on-street access to hire cars could come to be perceived as part of the demand-responsive mobility mix. Personal security could provide a stimulus or a barrier to the expansion of flexibility into the mainstream public transport environment. Exactly how this might be undertaken and the likely effects of such a process are issues to be explored.

Report of the workshop

Workshop Programme

In the first part of the day participants explored how far personal security, safety and confidence are considered in the current provision of FTS, both to draw out problems and highlight good examples. Specific attention will be paid to identifying opportunities and threats to developing technological enhancements that enhance personal security and support the operation and expansion of flexible transport provision. For example, data sharing between operators and data storage online also raises security questions that might also affect individual attitudes towards FTS that require personal information.

In the second part of the day, participants considered the key driving forces that are influencing the future introduction of different types of flexibility in public transport. Finally, example future possibilities for the application area will be narrated within the framework of a set of pre-defined scenarios. A final report from the day will be developed with the help of expert interviewees and workshop participants.

The timetable for the programme and the list of participants are found in Annex 1 and 2 respectively. There were nine participants. Potential participants who were unable to attend the event will be invited to take part via a telephone interview.

Findings from the workshop

In this section we present the material more by theme than by the chronology of the workshop. The first thing the participants were asked was to scope out the nature of flexible service provision in the public transport environment. As the later SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) questions used the same thematic headings, we have presented the thematic SWOT tables with the material on the range of automation in public transport. We then present the participants views of the reasons why various types of flexibility are introduced and the relationship of automation and personal security in different temporal, spatial and demographic contexts, along with our expansion of this material. Throughout we use bold text to highlight examples mentioned by participants, and have done desk research around these examples to inform our interpretation of the implications of the technologies.

We then consider the data generated that can be fitted into in an overarching SWOT analysis for the near term (i.e. over a time horizon up to 5 years ahead). The raw data collected by the Innovation Space software can be found in Annexes, highlighted in the relevant section.

In the first part of the day participants considered how far personal security, safety and confidence are considered in the current provision of flexible transport services, both to draw out problems and highlight good examples. In the second part of the day, participants considered the key driving forces that are influencing the future introduction of different types of flexible transport service in the UK context. Finally, example future possibilities for the

application area will be narrated within the framework of a set of pre-defined scenarios. A final report from the day will be developed with the help of expert interviewees and workshop participants.

SWOT analysis

The SWOT analysis was organized into 5 parts. Broadly, the first 3 questions (see Annex 3) provided a number of ways of exploring strengths and weaknesses regarding flexible transport and personal security issues. Question 4 focused on the contextual factors that influenced whether personal security becomes an issue in relation to flexible transport services. Question 5 focused on uncovering Opportunities and Threats in flexible transport/personal security in the near future. This section ends with a summary table of the SWOT analysis. The raw data from the software can be found in Annex 3.

Q1 What types of flexibility exist in public/shared transport at the moment?

We asked this introductory question in order to elicit the participants' knowledge regarding existing flexible services in the public/shared transport sector. As an opening question it also helps to make all participants aware of the range of flexibility that we are interested in, as in the future automation and technological development will make the definition of 'public transport' quite different, introducing new possibilities. The raw data for this is found in Annex 3. Specific terms used by the participants are shown in **bold** in the text below to show how we have interpreted the significance of the item mentioned. Prior to the workshop we had scoped out that flexibility in transport services increasingly goes beyond traditional forms of public transport, incorporating modes that were previously regarded as private, thanks to technological developments, particularly utilizing the internet and mobile services. In relation to personal security, we scoped out that there might be issues arising across a range of factors, for example, the type of vehicles and mode, raises issues about where and when the service is accessed. Similarly, whilst new technology has facilitated greater flexibility, it also creates new cyber vulnerabilities, which may lead to differences in take up.

Flexibility in vehicle type

In relation to **vehicles in general**, a great deal of variety exists in public and social transport – it was noted that in principle any vehicle can be flexible. There are many specialist small vehicles, with the type of adaptation defined by the use. For example, high access vehicles for **medical trips**, other accessible or **adapted vehicles (taxis and hackney cabs, minibuses** and other Passenger Service Vehicles (**PSV**)) being **low floor/easy access**. It was noted that a process of change is going on in terms of fleet make up across these sectors, as there is greater accessibility, and many vehicles are getting larger.

Participants identified vehicle flexibility in relation to **cars**, through **adapted vehicles** for special needs (e.g. wheelchair accessible taxis). **Car clubs** facilitate flexibility for users to choose the vehicle type most appropriate for their journey purpose: van for moving house or going to IKEA, or an MPV for taking people in a group. Car clubs are inherently flexible, as are **privately owned shared vehicles** or **vehicles owned by an organisation**. Shared bicycle schemes, which are similar to car clubs, are also flexible (e.g. the London Cycle Scheme).

A key axis of difference in terms of types of flexibility was whether certain provision has exclusive access, or is open to all. On the demand side, users can be flexible about journey making, choosing to use a particular vehicle for a complete journey, or as part of a **multi-modal journey**.

Types of service

Participants mentioned a number of different types of service, including **accessible transport** services (both local authority and community provided), services organised to be appropriate for geography (e.g. **rural post buses**), **individually demand responsive** transport services oriented to users of particular public services or user groups with particular needs, e.g. accessing **healthcare** (patient transport), **education** (school transport services) or support for those needing **access to employment**. Part of the ethos of some of these services derives from the voluntary sector. Freed from the commercial tyranny of the bottom line, community provided services can be more flexible in terms of route and schedule, and sometimes also vehicle, particularly if they have **voluntary drivers**. However, there are other origins of non-fixed services that may be supported by commercial organisations, such as special purpose transport services, e.g. airport feeder services, or workplace services.

Greater flexibility of transport provision has been enabled by internet technologies. For example, **taxis** (whether minicabs and Hackney cabs) can now be accessed at taxi ranks/hailed/pre-booked on telephone/on demand through apps. Whatever the vehicle type, services can be designed with flexibility of access in terms of **pre booked services (web or interactive voice) or more ad-hoc on-demand services**. Similarly, technology has enabled new flexible services to emerge such as **city bicycle schemes, lift-sharing, car clubs** and **self-service car rental** (either the traditional 'back to base' model, or the newer, more flexible 'one-way rentals'). The internet has also facilitated the emergence of new models of transport provision, such as private **car sharing**, though one provider (**Whipcar**) announced that it would cease to operate only one month after the workshop. It would be interesting to know whether personal security concerns were a barrier to take up.

Flexible routing is also facilitated by technology, but low-tech solutions to providing more flexibility are also possible. For instance, there are examples of fixed route bus services that follow a timetable, but are freed from bus stops, hailable from anywhere on the route (**W7 route in North London**, or the **20 seater Chiltern Taxi Bus from Chiltern Railways**). High engineering/high tech solutions such as Personal or Group Rapid Transit systems (**PRT, GRT**) have been slower to emerge, with only a few examples worldwide. These systems are most effective in closed environments such as airports or campuses, where passengers have definable origins and destinations but variable schedules (these systems are dependent on high levels of automation, and were a focus on Workshop 3).

Participants also mentioned that real-time and near-time technologies are enabling the **transport of goods using 'spare capacity'** (e.g. **shiplly.com**). Whilst not focusing on passenger transport, there are long-standing examples of combining passenger and goods transport, such as post buses. New technology could enable new models of co-provision to emerge, which might be particularly useful in remote rural areas. No specific personal security concerns were mentioned in relation to this kind of service, but post-workshop consideration suggests that security of the goods in transit when 'accompanied' by unknown passengers, and the safety of passengers being co-transported with goods of unknown nature (which might be either hazardous in their own right or so valuable as to be targets for the unscrupulous) are two potential security-related issues that might arise.

Other

Brokerage of transport services and vehicles is a new flexibility service that can **maximise the use of specialist vehicles by sharing** between a large number of groups (though there are barriers in that groups can be reluctant to share, in case the vehicle is not available when they need it). There are also barriers to sharing created by different service eligibility criteria (e.g. by age, need, or disability). There could be more flexibility in fares – for example concessionary fares could be used on different modes (some discretionary schemes already allow this). Related to flexibility of fares, is flexibility in ticketing/purchase, particularly in enabling

Smartcard **interoperability** across different services, such as using **Oyster cards to access car club vehicles**.

Greater flexibility in terms of **service integration** could be beneficial. Participants spoke of a **hierarchy of transport services**, in which fixed route services are at the apex of a pyramid. Participants also raised the issue of the tendency for flexible services to be open to members or eligible groups only.

Q2 What are the main reasons why flexibility is?

We asked this question in order to explore how differences in expectations/objectives in introducing automation might influence decision-making. Although there were not many participants who might be regarded as good proxies for specific user groups what others say they think are user benefits is illuminating. Whilst different stakeholders have different reasons for introducing flexible services, there is likely to be synergy or convergence between technologies that strengthens business cases for introduction of further flexibility in the public/shared transport sector that will blur boundaries. If there are personal security benefits from this synergy, we are seeking to identify and highlight those benefits.

For users

Participants considered that flexibility is introduced when it is perceived as better meeting **passenger requirements**, particularly for **'dependent'** groups with such as the **disabled** or the **socially excluded**. However, working and living patterns are changing which is leading to **dispersed demand** into times of day or spaces (for example **rural areas**) that are less easy to serve with fixed services because of poor commercial viability.

In the DRT sector, the original introduction of flexibility tended to be volunteer or **user-driven**, with a **small discrete group** (not necessarily the target users) identifying a need. Introduction and continuation has often been driven by **'champions'** rather than by more general public demand. Increasingly, **financial constraints in supporting rural bus services are driving more LAs to introduce flexibility** in order to maintain some kind of service (though this is **still not user-driven**, it is supported by users if it means retaining a service).

There is a change in attitudes in relation to service providers being **more willing to 'lease on demand rather than own vehicles outright'** – this makes it easier to react to changes in customer demand which improves the 'offer' from the user perspective, and new technologies **enable users to make or change plans closer to the time of travel**. Individuals are also beginning to demand **alternatives to car ownership in urban areas with low levels of on-street parking**, and to seek **lower travel costs**. A weakening of functional car dependence is also seen with the emergence of changes in other sectors, **e.g. online grocery shopping reduces the need to own a car for a weekly shop**.

However, **large transport operators have been reluctant to engage in flexible services either directly or in partnership with taxis**. They are now beginning to engage, as a flexible demand contract with a taxi operator can enable transport service operators to reduce fixed services at the ends of the day, but still provide transport in response to the increase in **24/7 living**.

For operators

Operator reasons for introducing flexibility include responding **to the terms of Local Authority tenders i.e. driven by need to utilise the fleet even at low margins**. This has been made easier by **new technology**, which has **changed what is possible**. Delivering greater flexibility also contributes to **long term cost savings** and **product differentiation**. **Taxi companies are able to expand their services** by engaging with DRT and **diversifying their work in services for local communities**. However, larger **commercial bus operators are not yet convinced** by the flexibility model.

Although not a feature in the UK, informal and often unregulated FTS can emerge, such as the **New York City dollar vans** or jitneys. These are an opportunistic response to unmet demand. In New York City they are often established by members of the immigrant population they serve, who come from countries with a tradition of this kind of provision. These types of provision can **'innovate' quickly in response to demand**, but are a grey area in terms of legality, and can have significant safety and security implications.

For Local Authorities

Local Authorities have pressing reasons to introduce greater flexibility. It **reduces bus subsidies**, as **costs are saved on fixed-route services**, whilst at the same time addressing their **duties to address accessibility** (though one participant asked if there should be a definition of **basic levels of access**), and **social inclusion**. For example, local authorities become able to provide transport services for those that do not have access to conventional public transport, **respond to network and service gaps** (i.e. spatial and temporal gaps) or **market failure**. FTS gives local authorities a **cost-effective** tool

- for **linking** particular populations and groups to **arterial routes or key interchanges** where more conventional services can then be accessed
- **to ensure access to health and adult care services which are preventative and designed to reduce other (more expensive) interventions**
- **develop integrated systems to support access and mobility policies**

Local authorities also have a **statutory requirement to provide school transport**, which is normally entirely separate from other forms of transport provision. It originated with legal obligations set up in the 1940s Access to Education Act and was complicated by 1980s changes with parental choice. Since that time, periods of school consolidation have changed how school travel can be provided.

Other reasons for introducing flexibility

Participants identified a number of other reasons to introduce flexibility in travel. For example, many areas are experiencing the **need to reduce congestion** (e.g. peak hour congestion, or around schools). There have been **location changes** for many 'destination' sectors, such as shopping centres and hospitals, which has resulted in a renewed need for local authorities to react in response to the creation of newly disadvantaged groups. **Employers or business owners** might also work together to create a non 'commercial' transport service to **counteract drops in business from congestion**. Large employers are also facing **parking restrictions** or locating in places without public transport services that are readily usable by their workers. This has driven the creation of **workplace services** by employers. **Major events** which generate travel will also work with transport providers to put on special targeted services (e.g. Glastonbury, Silverstone)

The availability of FTS can increase the product appeal of public transport to **attract new users (such as car drivers)**, or could be a **factor in decision-making for those considering giving up car ownership or forced to give up driving**. As DRT/FTS journey times can be longer, there is a delicate decision balance for those who have an alternative. For example, cost benefits need to be demonstrable. However, increasingly, **people are valuing time differently**. This has various effects. Time on public transport can be good quality for users of IT if WiFi is available, or if travelling with friends. However, people are also **less willing** to have 'dead time', such as a **20 minute wait at a bus stop**. This is not always because of personal security considerations, though that is clearly one element.

Q3 What is good and bad about existing flexible services?

This question directly elicits thoughts from the participants regarding strengths and weaknesses in the existing provision of flexible transport services.

Strengths

Participants were clear that FTS supports social inclusion, and a number of different benefits were identified:

- Although individual trip cost may be high, mobility and access benefits are usually far higher
- Enables travel for people who would otherwise be unable to leave their own home
- Enables more cost effective people with special transport needs than relying on adapted private transport
- Provides social contact with other people in the same group: it's a weekly 'trip out' or on school transport, children are able to travel with their friends
- Missed health appointments as a result of lack of mobility have major quality-of-life implications & costs to the public purse

Participants also discussed efficiency and effectiveness. In many cases, FTS can appear to be more **costly to provide per passenger mile than fixed-route services**, a figure cited was **25% higher unit costs**. However, the typical evaluation method does not really compare like with like – areas dependent on DRT for example have lower 'demand' for fixed route services by definition. So the costs appear to be inefficient, whilst the service from the user perspective is more effective (and quite possibly **cheaper for the user than any private transport alternatives**). The cost of providing DRT could also avoid heavy expenses in another budget area. One participant knew of an example in New York City, where the costs of retrofitting some subway stations with lifts for disabled access were much higher than providing DRT to the stations that could have lifts installed at a lower cost. As one item is a capital cost and the other a revenue cost, these kinds of trade-offs are not always apparent. One participant suggested that FTS is more environmentally efficient, but clear evidence to support this has not been found.

Providing FTS as **feeder links** beyond the fixed route network can expand the reach of the network into new areas (**increasing service penetration**), enabling journeys that were previously impossible, and also enabling the **retention of public transport**, and also **mobility, in areas of low or dispersed demand**.

Participants identified user choice factors as a strength of FTS. Some of the new flexible transport options, such as **car clubs** and **bicycle hire schemes** appeal to a **younger** demographic, who are not necessarily car owners already. These new business models offer **increased user choice** in transport, with either **whole journeys or parts of a trip chain** using FTS. Flexible access to cars particularly offers the opportunity **to use a well-maintained car for trip which 'need' a car and then existing PT/walk/cycling as appropriate for other trips**. However, deciding to use FTS instead of owning a car makes the **real costs of journey-making much more visible**. This is a strength if one's perspective is one of making well-informed rational decisions. However, it is also a weakness if one's perspective is that of a user who discounts the hidden costs of car ownership.

Another strength for users of FTS (including DRT) is that the higher level of information and less waiting potentially allows the **better use of time**, particularly if the provision is reliable. Participants noted that **continuing improvements in technology able to deliver service quality improvements and efficiencies**. However, the remote and rural areas that can potentially benefit most from FTS, are also the areas with the weakest high speed communications and mobile phone connectivity. FTS operators have a **higher awareness of the needs of niche groups** than conventional operators.

- Continental experience e.g. train-taxi shows that public transport patronage can be retained

Weaknesses

A particular weakness of FTS comes from its DRT origins – it has **low visibility** to the general population (and **marketing is poor**), and consequently it can be associated with some **negative perceptions**, including **lack of reliability**, but also one of identity - '**It's not for us, because we are not part of that group**'(i.e. people don't identify as a bus user, a car club member or a cyclist).This afflicts all forms of public transport to a greater or lesser extent, but the association of DRT with being a '**welfare service**' heightens the effect (i.e. we are **not poor people**). Clearly, not all forms of FTS carry this connotation, it depends on the types of users and the types of scheme. The regulations attached to DRT, and the definitions of **community services** have also restricted growth.

In addition to negative perceptions, there are some other user barriers to access. Firstly, many FTS offerings require users to **take positive action to become members**, and use of a service has to be booked in advance, requiring **pre-planning and commitment**. New technology is enabling FTS to become much more dynamic, shortening the pre-planning period, but spontaneity is still the exception. For shared FTS, **journeys tend to be longer**, and in relation to personal security, many potential users are put off by the possibility of **being seated next to objectionable co-riders**.For FTS for younger people (e.g. school transport), parents can be conservative about allowing their children to use the service because they are unfamiliar with it, and therefore magnify their safety concerns. For **open lift share systems**, which are unregulated, potential users often have personal security issues.Car owners are also put off by being **dependent** on someone else.

Concerns about **costs for operators and local authorities** were mentioned by participants. This relates to the regulatory requirements because many services are subsidised in order to meet public sector duties. Many of the special purpose FTS have **higher purchase and maintenance costs of adapted vehicles**, as well as **higher running costs for the** (typically) **smaller vehicles**. There is also a **lack of choice of suitable vehicles**. The reliance on **third sector providers and small operators mean that services can be geographically limited**, or **using old vehicles**, which further contributes to image problems. There is also **poor integration of services and providers, both with other FTS and with conventional PT**. This creates costly inefficiencies, with separate services for accessing healthcare, providing social inclusion, school travel, etc, potentially leaving vehicles under-utilised at certain times. Some of this lack of integration is **protectionism** on the part of both commercial providers who see themselves in competition with one another (even on different modes) and third sector providers who have been started by highly motivated individuals or groups, on a voluntary basis, who don't want to relinquish control.In other cases it is because local authorities don't see some of these services as part of a wider transport system. This is not helped by the **fragmented funding** of DRT or 'special purpose' transport provision coming from different policy silos. Similarly, local authority boundaries can create **anomalies in service provision and destinations served outside of the same local authority**. The **dependence on public money** also presents problems of continuity when funding sources are removed or reduced. **Continuity planning** is sometimes lacking. **Dependence on volunteers** is also a weakness in community transport provision, as a continued supply of voluntary effort cannot be assured.

Q4 What are the personal security issues with flexible services in different circumstances?

Having scoped out the range of flexible provision of transport services, we focused much more on personal security in relation to FTS by asking participants to consider whether temporal, spatial or demographic factors have an influence on the user experience of personal security in relation to different types of flexible transport. Other contextual factors may also impact on personal security, particularly disruption, and this factor is also examined in relation to how it affects FTS.

Temporal factors

As with other forms of public transport, there is an **increased awareness risk to security during evening hours or in darkness**. The need to pre-book FTS can **provide an extra element of personal security**, especially late at night. On shared services, pre-booking means that **other passengers are not anonymous**. However, **data security** then becomes a factor that must be considered by providers. **CCTV** can further enhance security. Similarly, the booked nature of the service (and the higher visual presence of the vehicle making a pick up) means that **more people will be aware that the service user's home is unoccupied**, and a **regular journey pattern can also create security risks**. However, this is not in principle much different from making regular journeys in one's own vehicle.

Waiting away from home (even for a pre-booked service) can increase **feelings of vulnerability**. However, **flexible service offer a solution to time of day travel concerns** for individuals or groups who might otherwise restrict their travel horizons. A reliable **door to door** service also enhances comfort and safety in bad weather.

Spatial factors

Participants identified a number of personal security concerns associated with spatial factors such as the type of area (whether it is populated or unpopulated, urban or rural). For instance, places with a lower footfall, and hence fewer people accessing and exiting public transport can have **fewer "eyes on the street" (Jane Jacobs)** which are an 'organic' source of confidence and for personal security. Similarly, **waiting in isolated areas can increase actual and perceived vulnerability**. Participants also identified risks associated with **walking on poor quality footpaths** or in **areas with bad lighting**, and noted that well-maintained streets engender more confidence than derelict areas.

FTS is particularly well-suited to addressing some of these concerns, as **many services are door to door, providing extra reassurance for vulnerable groups**. However, **users of car clubs and bicycle hire schemes may find themselves exposed to new sources of personal risk when they are accessing or leaving vehicles, using Smartcards or bank cards, in unfamiliar public places**. **Car club and bicycle hire vehicles could also be vandalized**, which could leave users stranded if no alternative to the booked vehicle is readily available. It was noted however, that car club vehicles are generally well-maintained.

Demographic factors

Participants noted that **certain groups are known to have a heightened perception of risk by, e.g. parents, elderly, females travelling alone**. For example, when parents are **travelling with children**, they assess various aspects of personal security differently to solo travelers. Some groups, such as the **elderly, feel uncomfortable sharing their journeys with certain other groups** (such as school-children). They find **'closed services' more reassuring**. Parents also find **school transport provision** on 'closed services' more reassuring than allowing them to use public services, particularly at **younger ages**. In part this is because of the **door-to-door** nature of the service, but also because of the increasing prevalence of practices such as **screening drivers**.

Overall, participants noted that most groups over-estimate their exposure to risk outside the home, apart from 16-24 year olds, who tend to under-estimate their exposure to risk. Attitudes to risk have some common features with attitudes towards data security. Pre-booked FTS services tend to require **substantial amounts of personal data** (establishing eligibility for **disability transport** is particularly **personally intrusive**). In general, most users are happy to disclose only the **minimum amount of information required** to establish eligibility. Individuals and groups vary in their attitudes towards which personal information is sensitive. For example, **some may not wish to disclose their home address**. However, as data disclosure requirements become more normalized in everyday life, (e.g. through social media), people are becoming less concerned about sharing data. It is incumbent on data managers to take a responsible attitude towards the data which they have a duty to protect.

A particularly important personal security factor that was identified relates to the elderly. There have been cases where a pre-booked door to door service has arrived to find the passenger collapsed at home, and in need of medical attention. **Best practice** suggests that drivers therefore increasingly need new skills – they need to be **screened** for security reasons, but also need to be **trained in first aid**. This is beneficial for the passengers, but also for the drivers, who are then mentally equipped to deal with events which can be distressing. Operators must therefore have established procedures for drivers to follow.

During disruption

Few substantial personal security factors specific to FTS were raised by participants. It was noted that **FTS providers might not have the capacity, in terms of a pool of stand by vehicles, to cover unexpected events** such as breakdowns, thus deepening the impact of disruption on their passengers. As with all transport, the difficulty with disruption is the absence of timely information, and the need to make detours impacts on subsequent service reliability and on passenger onward arrangements. However, these issues are not unique to FTS.

Other factors

However, a number of other personal security factors associated with FTS were identified by participants. The dimensions of personal security should be viewed broadly, as a set of freedoms and safeguards: **freedom from crime, freedom from feeling vulnerable to crime, freedom from risk of major journey disruption, freedom from unsafe driving, being in a vehicle that is safer in a crash**. For example, PSV drivers of community transport, DRT and school transport are all in a particularly responsible position, as they are almost by definition serving more vulnerable individuals. Screening and training (such as MIDAS, first-aid, manual handling, people skills) are best practice, but not universal, and not fool-proof. New forms of FTS, such as lift-share in private cars, have created new ‘stranger danger’ type personal security issues, as neither drivers nor passengers undergo any security checks. There may also be **particular insurance issues with peer-to-peer systems** that have yet to be fully established.

Q5 What are the opportunities and threats to the development of flexible services that support secure and confident journeys in next 3-5 years?

At this point, we asked participants to focus on the near future, looking for the opportunities for technology/information to increase flexibility in ways that support secure and confident journeys? Participants were also asked to identify the major current and emerging barriers to improvement. Many of the factors identified are related more to the sustainability of the sector rather than to personal security *per se*, but unsustainable or unreliable FTS, including its data systems, would damage user perceptions of their personal security whilst using such services sufficiently to prevent them utilizing FTS.

Opportunities

Participants felt that **technological advances can solve many issues discussed** above, but that the **key to success is widespread adoption**. They noted that there are **many low-tech systems in FTS** at the moment, and that **small providers can be resistant to modernization**. One potential solution is to make **technology adoption a condition of funding**, and to **use LSTF** money to develop community transport services. However, good solutions that emerge by such a route could be short-lived if local authorities have other priorities after the end of funded periods. Better continuity planning is therefore essential to make services more sustainable. **Subsidy should be for jump-starting service expansion rather than life-support**.

Whilst the well-documented demographic change of an ageing population is often portrayed as threat, it also offers opportunities, particularly in relation to developing flexibility in transport provision. One reason for this is the increase in the number of ‘active old’, as

increasingly retired people are still drivers. Retirement is an event which offers an opportunity to make life changes that favour more FTS use, but still **enable individuals to retain a driving licence and a car as an alternative** when absolutely necessary.

New technology, particularly Smartphones and other mobile gadgets can support FTS in a number of different ways (subject to high speed network coverage). For passengers, the ability to use gadgets during journeys reduces sensitivity to journey times, as the time can be used for leisure or work. This gives public transport an advantage over self-driven options. Smartphone and location-aware technologies also assist operators with network design and operation, as they enable **greater situational awareness**, and the associated data gives **better knowledge of past patterns**, assisting forecasting and raising **service efficiency and quality**. Technology also **facilitates peer-to-peer models of car- and lift-share**, by reducing the pre-planning and supporting real-time spontaneity. The same facility can also support car clubs to offer one-way deals, increasing flexibility, as a return to base journey can be more easily offered for sale. Location-aware technology also enables parents to have **more confidence in shared-transport options for children**, as they can **track progress**.

The market for this kind of flexibility is supported by **Generation Y** which is less tied towards car ownership as a marker of 'identity', and quicker to see the benefits of on-demand car hire, particularly in **larger urban areas such as London**. However, younger generations **delay learning to drive** because of the cost (lessons, insurance, vehicles), suggesting that other kinds of FTS will more readily address their transport needs. For example, **reducing car ownership in London** might support car clubs, but it is also supporting **increased cycling levels**, a much lower cost form of travel for shorter journeys, which provides demand for bicycle hire. Pressures that are **reducing the parking supply** in urban areas also support the use of all types of FTS.

There is considerable scope for innovation in types of service and targeting different groups of users, including using **social media** to build **peer-to-peer services, trust and expand markets**. There are also opportunities to increase the **attractiveness of public transport to car owners** by making FTS more accessible and relevant to their needs.

There is increased pressure to make better use of all available fleet resources with technology that allows/encourages/supports this happening. Economies of scale are possible through the use of **central databases that facilitate booking**, and provide **data for research and targeted marketing** to direct both niche and mainstream users to the most appropriate transport services for their needs. Such databases will facilitate **service structures that are inherently secure and responsive to changing needs**, and will also need to support integration between services and collaboration between operators as funding support becomes more restricted. Evaluation of transport services should be extended to include the **social value of services**, though including this in **public procurement** would require an Act of Parliament, and FTS should be more accepted by local authorities as **part of the public transport mix**, particularly as changes in spatial delivery of public services, with further **centralization of medical and educational facilities** creating **problems of access** as distances increase.

Threats

Innovations face challenges from an inherently conservative insurance industry, particularly for peer-to-peer FTS. FTS will continue to face stiff challenges from funding cuts, as social provision of accessible mobility is easy to cut, and buying second-hand cars continues to get cheaper in real terms (though running costs are increasing). Many of the new service concepts have not yet shown **proof of profitability**.

Many transport providers and some passenger groups remain quite **averse to adopting new technology and to change in general**. Without technology, the benefits of integration cannot be achieved, and some FTS could become isolated and unsustainable. Participants noted that most of the required technology is well developed already (e.g. Ford/VW/Merc 16 seaters,

GPS, mobile phone, internet, tablet computers in the bus) but that they are ‘borrowed’ rather than built in on the production line.

Older people are likely to face **more stringent post-70 yrs driving licence renewal**, leaving **more people dependent on externally provided transport**. It could also reduce the pool of voluntary drivers. **Community and DRT providers could disappear**, as a result of **funding reductions**, and surviving providers could face **competition from in-house providers**. There will be considerable variation by administration, creating a **postcode lottery**. **Closure of day-care facilities** and other centralized social facilities (for example, bingo halls) also **reduces the demand for the shared DRT services** used by the elderly, **deepening social isolation**. This could force more joining up of services and sharing of resources.

There are a number of technological threats. One from **data hacking** affects operations and also the personal security of users. **Technology failure** can also affect user personal security, if they are left stranded. Operators need to have business continuity **back-up** systems if their operation is reliant on technology. Risk of failure is also derived from poor management, if providers do not develop **effective investment and capitalisation strategies**, e.g. for fleet replacement.

Access to services for groups who are not internet connected could be restricted if operators adopt more technology, creating further social exclusion through a **widening digital divide**. **Social needs assessments** also need to recognize the need for transport and mobility in setting **individual budgets**.

Regulation and consumer protection are behind the curve of many newer FTS concepts. **Less controlled and regulated services more open to abuse** and deliver a lower **quality of service**.

Summary of SWOT analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> • Enables social inclusion • Provides social contact • Can focus on and tailor for specific groups/needs • Maintains or enables mobility in areas hard to serve by traditional public transport • New types of FTS appeal to younger people, bypassing car ownership • FTS options can supplement fixed route services, providing flexible feeder services • DRT can provide lower cost access to fixed route services in contexts where capital costs of retrofitting for disabled access are high • New technologies have enabled much more flexibility, mode integration and cost control in DRT, benefiting users and operators • New technologies have enabled the emergence of new FTS business models 	<ul style="list-style-type: none"> • Costs for operators and local authorities <ul style="list-style-type: none"> ○ Price and durability of accessible vehicles ○ Lack of choice in cheap low floor vehicles ○ Modified vehicles have higher maintenance costs • Brokerage constrained by reluctance to share assets and restricted eligibility criteria • User awareness and perceptions a key issue <ul style="list-style-type: none"> ○ Generally low level ○ Perceptions of potential users about service quality and suitability are often negative • Shared FTS journeys tend to be longer • Requires pre-planning & commitment from users • Using ICT for integration is hard in areas with weak or non-existent high speed comms networks and many areas also have poor mobile phone connectivity (both rural and urban) • Regulations about defining community services rather than flexible services has restricted growth • Dependence on public money • Personal security concerns with some new FTS, such as liftshare

Opportunities	Threats
<ul style="list-style-type: none"> • New systems are needed for secure log-in to improve personal security • New scheduling software to improve experience of would-be passengers • Innovation in apps to support operators and passengers • keep costs down by utilising all available transport resource (by sharing, integrating) • Targeted marketing of different types of FTS • Embed FTS as part of the PT mix with local authorities • Continuity planning for post-public funding service retention • Tie future funding to technology adoption 	<ul style="list-style-type: none"> • Ongoing constraints on public funding • How much are people willing to pay for a flexible service - can sufficient revenue be raised to cover costs? • People have made decisions based on car access - can DRT sustain this? • Integration blocked by lack of trust between operators (e.g. taxis and commercial PT operators) • Community Transport DRT providers are often reliant on volunteers, which may not be found in future • Resistance to adoption of new ICT by small providers • Regulatory or insurance barriers

STEEP(L) analysis

In this exercise participants were asked to identify key driving forces that will affect the emergence of flexibility and types of flexible services and our adoption/resistance to it beyond a 5 year time horizon. The raw data collected from the software can be found in Annex 4. Here we have collated and summarized the data into two tables, Table 1 for Social, Technological and Environmental driving forces, and Table 2 for Economic, Political and Legislative/Regulatory driving forces.

Social	Technological	Economic
<ul style="list-style-type: none"> • Overall, an ageing society, particularly the proportion of over 80s with require an increased retirement age and changes working patterns, raising the demand for flexi-working, working from home, working anywhere. Transport requirements less predictable due to continuous changes in working patterns • Complex migration patterns: immigrants seem to drive less, use PT and potentially FTS more. Many economically active British people may emigrate for all or part of the year, changing transport patterns. More tech savvy young people either unable or unwilling to drive. • Bottom up community led service creation rather than top down funding of community services and much more local service provision. • Changing attitudes and behaviour - moving more towards collaborative consumption (car share, lift share), and more virtual social interaction. Trend to later age of learning to drive, and pool of drivers gradually reduces, potentially creating a skills shortage, and stimulating automation. • Phone app generation will get older and create a completely app competent population. As yet unknown technology will be used mainly by a yet unborn generation, leaving the iPhone generation behind. • Pressure on housing will lead to planning protests in rural areas, and a drive for higher density mixed use development in urban areas, fuelled by higher transport costs. Tendency towards single-person households may be partially countered by increased sharing in later life to reduce costs. Affluent and mobile workers will increasingly have second homes in rural areas, with longer but less frequent travel between the city and country. • Driving turns to a leisure pursuit for those interested, a hobby like skiing or horse riding, but single car occupancy becomes a social evil such as smoking. • Increasing levels of poverty and wider disparity between affluent and poor. 	<ul style="list-style-type: none"> • Market penetration of new demand responsive modes e.g. PRT/GRT Driverless DRT-type operating concepts and autonomous vehicles for personal or group travel open opportunities to those currently dependent on support to travel. Other adaptations support continued driving into old age, using assistive technology. Both assistive technology and autonomous vehicles fit with car club/rental services rather than private ownership. • Increased visibility and transparency of service type available real time through mobile applications. • Total transport solutions will happen through technological development and cost reductions, identifying gaps and eliminating duplication • More intelligent apps that adapt their responses to bandwidth availability: e.g. provide a historic rather than real time solution when dropping from 3G to 2G or 2G to GPRS. Ubiquitous information will encourage competition and increase markets. • The speed of substitution of oil based vehicles with electric ones is critical. The relationship between EV and FTS is unclear, but adopters of EVs may be more open to FTS for journeys where EV is not the best option. However, other non-fossil fuels may emerge which maintain the car's position as transport of choice for many. More sustainable small vehicles will emerge. • Low Earth Orbit tourism, and long distance travel to Australia via LEO the norm for wealthy people. Travel to other planets and living on other planets may start to develop towards the end of the period. • Changes to working practices change the use of buildings, meaning new mobility patterns. Technology significantly reduces need to travel - knowledge based economy enables greater home working, with telepresence much more like a 'real life' experience; more services, including education and medicine, and social activities delivered to the home; social interaction largely through technology. Flexible working and schooling arrangements increases need for flexible travel arrangements. • Through ticketing and combined ticketing or smart card solutions which can include flexible transport links in the journey chain 	<ul style="list-style-type: none"> • Longer-term effects of 10years of austerity/low growth, and potential realignment of world order with emergence of China etc and decline in western fortunes. • Transport costs have in general been reducing since 1950's - they are now turning and the prospects are we will have higher future costs - implications for mobility and land use. If wage rates grow DRT costs (like PT in general) will increase. Fuel costs/supply are also critical to transport, forging stronger links with energy policy as costs rise dramatically by 2020. • Better integration of commercial and community transport initiatives - less competitive and more about working together. Large transport groups can have major impact by entering flexible service provision themselves and forming partnerships with existing providers • Aging society, assuming pensions are paid, means increasing separation between those who create value & those who spend. Could affect mix of types of mobility demanded. Affluent retired people will be very important, and the combined spending power of groups requiring flexible transport solutions and links stimulates the market. However, the withdrawal of concessionary bus passes, replaced by half-fare scheme, alters the economic base of public transport. • An expanding community enterprise culture reproduces in transport what has been done for village pubs, shops etc. • Increased costs will encourage reduce silo mentality in the public sector, which will also have more more incentive to collaborate across policy sectors. • Universal road user charging - pence per mile - will be introduced, creating a more level playing field between public and private transport and will start to shape land use developments and relocation of services • Impact of developments within the taxi/private hire market • Individual incomes could decline in face of increasing costs (e.g. food and energy) - leaving less for transport-as volume of travel is income related could shrink volumes of travel.

Environmental	Political	Legislative/ Regulatory
<ul style="list-style-type: none"> • Climate change will keep carbon reduction on the agenda. As rural areas and affluent suburbs have the highest per capita carbon footprints, much from transport, targeting these areas for collective transport is important. • Pressure on infrastructure maintenance from damage from extreme weather events (flooding, snow and ice). • Abandonment of some coastal villages due to erosion. • Electric vehicles dominate and offer new opportunities for flexible services • Many areas of world affected by desertification. Global water and energy shortages change food production to more local sources. Shopping patterns change • Climate change increases payback from renewable energy - higher winds , larger flows in rivers for HEP, greater sunshine • Attention to 'green' issues could go up or down. Arguably in a period of economic instability government will pay less attention to environmental issues & more to economic ones. Could mean more building on Greenfield sites, more investment in fixed-location transp.infra., etc. • Health changes (e.g. malaria becomes a problem in southern England) alter transport requirements - concentrating some services into centres of excellence; dispersing other services into community settings - both of which increase travel. • 60% of Britain becomes flooded and flexible transport moves to boats instead of buses. Car Clubs move in with the local yacht club. 	<ul style="list-style-type: none"> • Community pressure to "restore" some services lost through austerity cuts. The concept of publicly funded social enterprise replaces the 'Big Society' vision of an army of volunteers. The agenda of local solutions and a reduction in central funding remains. Local community action in middle class areas thrives, but many more ghettos where social service provision has withered. • More local decision making, devolution, etc. enables local planning but with less money, leading to creative thinking but policy divergence, and less consistency of service provision across UK (even without Scottish and/or Welsh independence movements). • Public expectations of what public services can and should deliver are articulated due to the higher political engagement of an older society, demanding greater application of Equality legislation. Efforts will be needed to engage younger people with politics. • Local politicians have an increased awareness of issues and solutions as a result of funding pressures combined with greater public demand for equality of access. Political push to raise awareness in shared transport. • Costs could result in policies that support physical-mobility for socially-excluded groups may shift to supporting online-access instead, regardless of evidence base, or be added to Universal Credit as an individually controlled, taxable benefit. Providers of FTS would need to be proactive in attracting a customer base. 	<ul style="list-style-type: none"> • New types of directives coming from Brussels, or freedom from Brussels if we leave EU • More flexible fare legislation and ability to charge more for lift-share • Public procurement requirements increasingly consider social value • Equality legislation requirements - access to services • Carbon allowances for personal travel. The affluent purchase allowances from less affluent, but only slight reductions in overall travel distances. • If government required everyone to disclose their carbon footprint publicly, that could mean more social pressure to conform to low-carbon transport lifestyles. • England decides to become a really active member of the EU after Scotland , Northern Ireland, the Channel isles & Wales leave the UK. • Generic regulations • Competition law: currently prevents CT operators bidding against private operators for LA contracts as they have a public subsidy. How will this be resolved? • Levelling the playing field for community transport through access to concessionary travel support for all services bus support etc.

The Scenarios Exercise

Participants were given the framework for the scenarios exercise, which is based on those produced by Berkhout and Hertin (2002). The full rationale for the choice of this framework can be found in Work Package 1 report (Pangbourne and Beecroft, 2012a). The over-arching framework is illustrated in Figure 1 below.

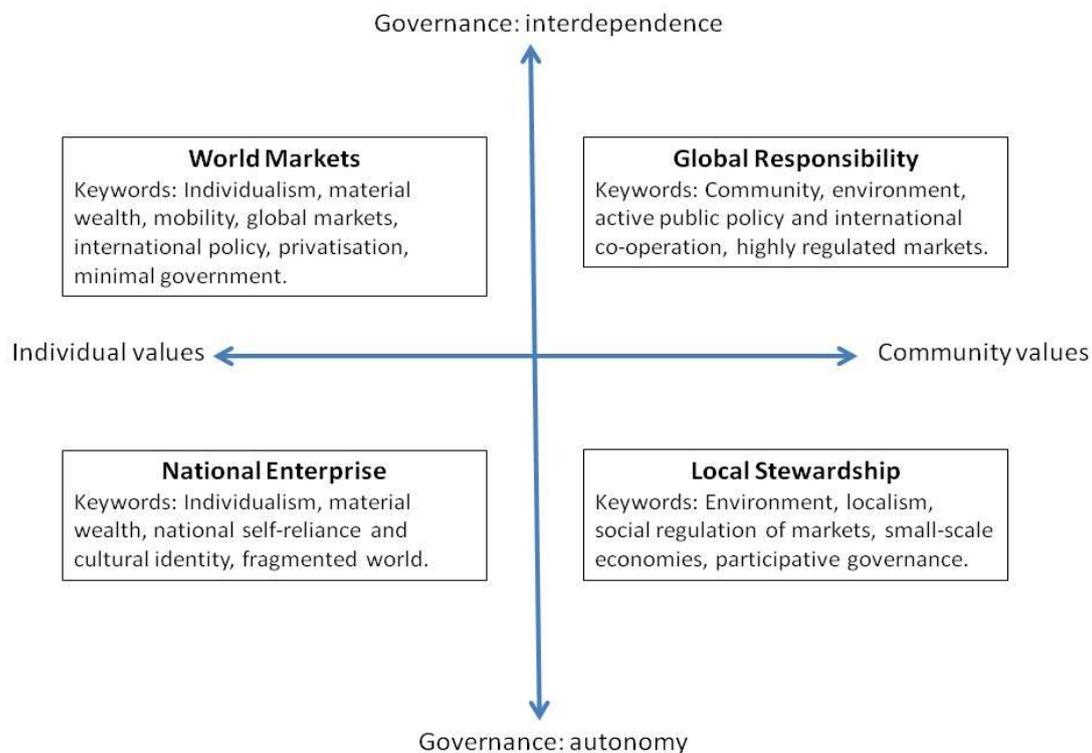


Figure 1 Scenarios Exercise Framework (Source: summarised from Berkhout and Hertin, 2002)

As with workshops 2 and 3 (see Pangbourne and Beecroft, 2012b; 2012c), the participants were given the scenario narratives about four plausible futures that were developed in the first workshop, which had sketched out quite fully the general features of the public transport landscape for each quadrant. These longer narratives from Workshop 1 are included in Annex 5. As with the first two workshops, the participants were divided into two groups, and each group considered a diagonally opposite pair of scenarios. Group 1 considered World Markets and Local Stewardship, and Group 2 considered Global Responsibility and National Enterprise. Mark Beecroft facilitated World Markets and National Enterprise and Kate Pangbourne facilitated Global Responsibility and Local Stewardship (i.e. swapping groups at the mid-point of the session).

Questions for scenario development

The development of flexible transport services is dependent on a number of different factors which will affect operators and authorities as well as passenger expectations. The task undertaken in the workshop scenario planning activity was to consider how flexibility in public transport provision will develop within the context of the four alternative scenarios, with particular reference to issues of personal security.

Each group considered the questions below in light of their mornings initial discussions, and thenarratives and summary presentation they were given about the type of world envisaged

under each scenario. Discussions were captured using whiteboards (which were photographed to record them), and used to develop the scenario narratives to include flexible transport services.

Questions considered by the groups for each scenario narrative were:

1. Under this scenario, what types of flexibility will be most prevalent, and over what scale will the different services develop?
2. From a passenger perspective – how comfortable will travellers be with flexible transport services, and what will be their expectations of service and support (e.g. in terms of information provision or experiences of journey seamlessness)?
3. From the operator perspective – what kind of business models will operators of flexible transport services develop (e.g. will there be system convergence or modal obsolescence?), and how will passenger confidence and customer service be prioritised?
4. From the local/transport authority perspective – what role will authorities have in governance and resourcing of flexible services (e.g. assurance of privacy and personal data protection, infrastructure management or provision, service brokerage)?
5. What will be the threats to personal security related to flexible transport services under this scenario?
6. What will be the solutions to these threats generated under this scenario?

World Markets

Under the world markets scenario the types of flexible transport services will be many and varied. There will be a high degree of differentiation in services mediated by willingness and ability to pay. In a society where the car remains king, at the high end there will be very exclusive flexible services developed from the niche Uber car model (<https://www.uber.com/>). This will involve private hire taxi services at high service standards (top range vehicles with chauffeur style service) available on demand with integrated online booking and payment. Demand for such services emerges in response to problems of congestion and parking (particularly in urban areas) and the related stressful nature of driving. The high value nature of the car and associated running costs make hire schemes including self service car rental increasingly popular services.

In a world oriented around highly networked global cities there will be a greater emphasis upon high density living and securing efficient mobility in metropolitan areas whilst maintaining a quality environment. This will result in significant investment by multi-national corporations (MNCs) in high quality fixed mass rapid transit networks. These services will replace traditional local public transport services in these areas.

Flexible services will be primarily oriented around commercial imperatives with activities which require travel increasingly viewing provision of travel services to access their activities/good/services as part of the overall offer. In a highly competitive commercial environment, provision of transport is often viewed as marker of difference. This leads to the transport component often being seen as a loss-leading component of a wider offer. This integrated approach to provision of and access to services will be of increasing importance within the transport sector. Companies running airports and major transport networks and services will view interchange/access to their services as critical and will invest in flexible services to get the customers to the product. Many specialist services which develop in this environment will find it difficult to survive in such a competitive market place. This will lead to a rapid turnover of flexible services until the dominant business model emerges based on MNCs 'franchising out' specialist services which in turn benefit from access to vehicle fleets and management software (e.g. routing algorithms) owned by the MNCs.

From a passenger perspective those who cannot afford to travel will move to city living. Transport services will generally be more costly, but passengers will expect high quality services. Travel within cities will generally be of good quality (particularly on mass transit networks), but service provision in suburban and rural areas will be highly variable and usually poor. The poorest 25% of society will need to adapt their travel behaviour significantly. Informal sharing and active travel offer pragmatic means of maintaining mobility, but also unlicensed and unregulated services will emerge. All of these services will offer clear costs savings, but will raise safety and security issues which will be prominent public concerns. The majority of the population will be risk averse and will aspire to higher quality services within the highly differentiated market.

The role of public authorities in flexible services and indeed all transport services will be very limited as the market holds sway. There is pressure to regulate disruptive unlicensed flexible services on safety, security and efficiency grounds, but there is a great deal of resistance from users who have limited alternatives and enforcement proves costly and difficult.

The major threats to emerge in this scenario relate to the consequences of a market dominated environment. Monopolistic services actually serve to limit individual choice and increase vulnerability of individuals and services with the withdrawal of public subsidy to maintain socially necessary public transport services. The exclusive, socially divisive nature of service provision leads to growth in crime (particularly theft and vandalism) and anti-social behaviour. Investment in target hardening makes some headway in tackling the frequency of crime, but increases the severity as the human becomes the point of vulnerability – car-jacking is a major issue. These trends are exacerbated by urbanization and wider social pressures associated with servicing metropolitan areas. This is manifested in ‘ghetto-isation’ in suburban areas of the working poor (often migrant labour) who cannot afford to live in the city centres in which they work. The investment in high quality mass rapid transit networks is in part a response to these conditions.

The commercial imperatives which govern flexible services also pertain in the management of road infrastructure. Road user charging is commonplace, although not universal. Private ownership and management of roads has replaced government ownership for all but the most minor roads. This ownership is largely in the hands of the MNCs operating the flexible and public transport services. Revenues from road user charging are used to cross-subsidise investment in flexible and public transport services.

Global Responsibility

In this globally connected and socially and environmentally aware world the acceptance of public subsidy ensures that public transport provides good accessibility for all, through large inclusive projects. The country is administered through a network of city-regions, co-operating across fuzzy boundaries. Transport is constantly monitored through ICT, with good uses made of good data about travel and requirements. Many vehicles use alternative fuels vehicles, including EV where appropriate. Core fixed bus routes and services still exist, but flexible services are critical to supporting access to the core network for the harder to serve times, areas and groups. Good coverage, with no low accessibility areas, has been achieved, though the ‘last mile’ becomes the ‘last 2 or more miles’, and some of the services are provided by peer2peer mechanisms. Passengers find this acceptable, as there are high levels of societal trust, reliable IT systems and a variety of vehicle types providing flexibility, ensuring that a door2door journey chain is the norm. There is no social stigma attached to any form of transport and a universal ‘One Pass’ entitlement and charge card is carried on a mobile device, enabling seamless access to transport for any purpose, whether education, healthcare, social care or private leisure. Correct budgets are automatically deducted in real time, bookings can be made and changed on the move, and the data is analysed to ensure that service provision is optimized.

The tendency towards big integrated projects creates great success but also some high profile failures due to congestion, IT problems or extreme weather events, resulting in periods of disruption. Community orientation means that support is always available from one another

as well as transport operators and authorities at these times. How hubs can be used becomes really important, as passengers may find themselves waiting for longer periods at time at interchanges, or are unable to travel away from home. Interchange hubs that have comfortable amenities and facilities such as leisure, catering and public service access points, are more popular and efficient, and develop further. Passengers expect support and customer service, and the Big Data that is available also enables personalised information and advice to be made available across multiple media types, to ensure that passengers can receive support tailored to their preferences. This courteous and personal approach is also found in face to face interaction with staff and with other passengers.

Operators have many incentives to deliver more flexible services to support mainstream and niche groups. Many new business models emerge that prioritise customer service. The design of transport systems becomes a little easier as security and petty crime are less prevalent. There is a lot of collaboration between providers, leading to more efficient resource use. Greater levels of automation mean that staff are redeployed to customer support, and are retrained in soft skills. Employees will be kept informed about performance, internal education, team oriented- knowledge maintenance supported by a regulatory environment that promotes these good practices. Operators that do not do this risk having a demotivated staff and dissatisfied customers. Operators also put a lot of resources into analysing Open Data and develop flexible services by devising social marketing and sales techniques to fill vehicles once an initial A-B booking is established. Cooperation with other service providers, including taxi companies, ensures that vehicles are rarely over-sized for the number of passengers making particular journeys outside the core fixed network. Community transport is still a good business model for niche groups, and fits with the community-oriented society. A lot of this flexibility has become commercial viable as modal shift away from cars has been steady, and public subsidy initiatives have a longer project life before services are expected to have become self-sustaining.

In this world, car manufacturers have suffered, but some have adjusted to building adaptable vehicles, or change their business model to one of leasing vehicles to flexible transport operators. Motorways have become key corridors for bus convoys, and service stations have increasingly become hubs acting as interchange points with feeder services, and providing additional services for passengers to make good use of time, with healthcare or flexible working facilities increasingly standard. Town centres become more destinations for leisure and social interaction, with an emphasis on high quality public spaces, coffee shops, concert venues, civic centres, and niche/boutique retail.

The role for transport authorities has changed – a single body for each city-region (that could be either public or private) emerges to facilitate integration and collaboration (brokering) to make the network appear seamless at the point of use. Integration is underpinned by informed and strategy procurement processes. Local authorities are responsible for ensuring that gaps in the service get filled, and undertake coordination of back room activities such as (integrated ticketing and One Pass administration). They also licence operators, ensuring services are operated to a high and common standard, including support for personal security. Authorities need good management information and planning tools, and share information with one another on a routine basis for monitoring and evaluation. They have been awarded new capabilities to manage this, paid for through public money raised by comprehensive road user and parking charges, and the introduction of a Land Value Tax.

Local Stewardship

The rather inward looking nature of this world has resulted in lots of local distinctiveness, accompanied by considerable fragmentation in land use and service provision. Some places could have decided to have no public transport as we currently know it. From the operator perspective there are no large profits to be made, as achieving economies of scale is hampered by the localism. Niche groups, such as home-schoolers or leisure interest groups sometimes want special trips, providing business for the successors of today's coach operators. New business models emerge, as this is quite a socially-oriented society at the local level. Community

Interest Companies, social enterprises and not-for-profit membership based organisations all emerge to provide transport services, though the socially excluded may feel ill-equipped to participate in group management. It is common for communities to have their own minibus or coach.

Travel horizons have become narrower, with many people expecting services and goods to be delivered to them, but flexible services still emerge through grassroots action to ensure particular groups can access health and education if they are off the core corridors. Commercial flexible services are also available at either end of the day, and out of hours for shift workers. The greater numbers of local journeys provide a market for electric bike hire. Passengers who do make longer journeys expect a certain amount of difficulty and time spent interchanging, as services are not as reliable. Slow tourism becomes the dominant form of leisure travel, but it creates information gaps for visitors, providing a market for local apps that combine local guides with travel information and booking. Rural stations become tourist and community hubs, with bike hire schemes jostling for space with delivery depots, leisure and catering facilities

Local transport authorities are focused on supporting localism, encouraging urban regeneration, local lifestyles, and supporting local opportunities to maintain vehicles and infrastructure through procurement practices. A key role is pump-priming social enterprises, but taking an overview and developing strategies for identifying which groups could work together, acting as advocates if necessary for lower income excluded individuals to ensure they are eligible to access community provided services where there is a tendency for loud narrow interest groups attempt to dominate and exclude certain interests. Local authorities struggle to reduce duplication, which continuously emerges due to fragmentation and over-reliance on the goodwill of community volunteers, which also increases the risk of transport failure. Authorities react by developing standards inspectorates, a training body for community activists and best practice guides, but the fragmentation of governance also increases costs as local authorities do not cooperate or share best practice with one another. Transport becomes a political interest, with the emergence of local elected Transport Commissioners. Many community groups decide to employ managers or professional drivers. App developers create social apps for transparent passenger feedback.

National Enterprise

Under the *National Enterprise* scenario the prevailing social values of individualism and self-reliance are reflected in travel, particularly in the continued dominance of the car as the mode of choice. The emphasis on critical national infrastructure is reflected in the strong demand management applied to the strategic road network. This is regulated by highly graduated and temporally variable pricing for access to the network. Users can slot-book access to the major networks. Premium services, including private roads and exclusive lanes are part of the offer to avoid the inconveniences of travelling in a congested road network for those with the ability to pay. Alongside private ownership there is high uptake of car hire services and a thriving taxi market.

Flexible transport services are run primarily on a commercial basis rather than social need. There are fine gradations in service quality mediated by ability to pay. There is a key role for integrating flexible transport to provide feeder services to access key national infrastructure such as mass transit systems and high speed and conventional rail networks. The underlying priority is to support access to key (urban) centres as the engines of national economic growth.

For passengers geography really matters in this society. If where you live is within easy access of national infrastructure networks or you live in a major city then transport is unlikely to be a limiting factor in pursuing your lifestyle. However beyond these areas the provision is transport services is very inconsistent and often of poor quality. Travel which involves moving between these contrasting environments can be confusing and insecure. This places a premium on quality information to guide decision-making when travelling by public transport. As a consequence travel is a high cognition task where people can feel vulnerable and exposed. They have to engage with multiple operators, multiple services with highly varied quality and cost

and inconsistent standards of provision. This leads those who can afford it towards car dependence or highly bespoke journey planning services which are finely tuned to support user needs and hence come at a premium. For those unable to afford such services there is a high degree of reliance upon 'trusted others' such as family and friends and a narrowing of travel horizons. Teleservices provide an increasingly viable alternative to travel and are very popular for work and leisure purposes.

From an operator perspective there are two tiers of operation. Key national infrastructure such as national networks and networks within key centres of economic activity are characterised by service provision which is high quality, consistent and integrated across modes. These services are dominated by large national operators (MNCs are not welcome in this insular economy and society). Beyond the key national infrastructure there is a highly volatile, fragmented and small scale market of transport services. Flexible services are highly bespoke and identified to clear revenue streams. Conventional public transport is in decline with reduced service frequency and limited information on less commercially viable services.

The role of public authorities in transport services is limited. The majority of public effort and resources is concentrated on ensuring the efficient operation of key national infrastructure and services. Local authorities lack the resources to invest in local infrastructure and are limited to a minor regulatory role. Planning for car parking and congestion management are the highest priorities at the local level. High density living in major urban centres is essential for the workforce to access (via mass rapid transit) jobs and social services increasingly concentrated in these areas.

Threats in this scenario relate to the spatial divides which emerge between the secure core networks and services and the highly variable, often insecure travel environments beyond the core and particularly in peripheral areas. Lack of information and coordination outside the core networks compounds problems of failing services, gaps in provision and neglect of infrastructure which severely affects confidence and security in travel. The absence of standardised data and lack of communication between operators makes it difficult for individuals to plan journeys and account for service disruption. Again, this promotes car use and bespoke flexible services for those who can afford them. Identity is critical to safely navigating travel environments and access core infrastructure and services. This renders identity theft a key concern and drives a thriving black market in identity information and technologies.

The main transport security investment reflects the national priorities and hence is concentrated on maintaining and enhancing the resilience of the major transport infrastructure and services. Travel in these environments is characterised by a high degree of surveillance (both using technology and staffing) and by stringent access control mediated by identity. Identity technologies such as wave and pay RFID are used to regulate the safety of travel environments, profiling and monitoring travellers as they enter and depart the core networks. At the periphery, where possible local solutions are developed where possible, but with diminishing public resources these solutions are largely developed by bespoke service providers to ensure the integrity and quality of their services rather than in any holistic manner which supports a safe and secure wider travel environment. Parking security is a high priority which is reflected in associated investment and planning. Residential relocation, primarily to urban centres and trusted communities are common response to the dangers of peripherality, with teleservices offering a viable coping strategy for those who cannot relocate.

References

Berkhout, F. and Hertin, J., (2002). Foresight Futures Scenarios: Developing and Applying a Participative Strategic Planning Tool. *Greener Management International*, 37, Greenleaf Publishing, pp 37- 52.

Jacobs, J. (1961/2002) *The Death and Life of Great American Cities*. Random House.

Pangbourne, K. and Beecroft, M. (2012a) *Enhancing transport technologies to support personal security in travel by public transport: Scenarios for 2040*. Workpackage 1 Report of Research Project “Enhancing transport technologies to support personal security in travel by public transport: scenarios for 2040”, funded by EPSRC. Centre for Transport Research, University of Aberdeen, Aberdeen, UK.

Pangbourne, K. and Beecroft, M. (2012b). *Coping with uncertainty and disruption in travel by public transport*. Workpackage 2 Report of Research Project “Enhancing transport technologies to support personal security in travel by public transport: scenarios for 2040”, funded by EPSRC. Centre for Transport Research, University of Aberdeen, Aberdeen, UK.

Pangbourne, K. and Beecroft, M. (2012c). *Personal security barriers to implementing automation in public transport*. Workpackage 3 Report of Research Project “Enhancing transport technologies to support personal security in travel by public transport: scenarios for 2040”, funded by EPSRC. Centre for Transport Research, University of Aberdeen, Aberdeen, UK.

Annexes

Annex 1: Workshop Programme Timetable

0930 – 1000 Registration

1000 – 1015 Welcome and introduction to the day

1015 – 1020 Tour de Table

1020 – 1130 Scoping of current issues

1130 – 1145 Refreshments

1145 – 1215 Identification of future key driving forces

1215 – 1230 Introduction to scenario planning activity

1230 – 1315 Lunch

1315 – 1520 Scenario planning breakout groups (5 minute break at 1415)

1520 – 1550 Plenary feedback and discussion

1550 – 1600 Wrap up/next steps/thanks

Annex 3: Raw data from SWOT analysis

Q1 What types of flexibility exist in public/shared transport at the moment?

Types of vehicles

- Car club users can choose an appropriate vehicle for their journey purpose: van for moving house or going to IKEA, or an MPV for taking people in a group
- Adapted vehicles for special needs
- Accessible - low floor, easy access/egress
 - Cost of vehicles is an issue (lack of cheap low floor vehicle)
- Often minibuses
- Any vehicle can be flexible, but some are more suited
 - I'd like a bit more on this...
- A large range of specialist small vehicles - type defined by user e.g. high access for medical trips etc.,
- Car-sized solutions for car-sized problems!
- Privately owned shared vehicles or vehicles owned by an organisation
- Bicycles
- Vehicle for whole journey or part of a multi-modal journey
- Taxis - Hackneys and PSVs - nature of these fleets changing; more accessible, larger
- Price and durability of vehicles an issue - lack of cheap low floor vehicles
 - brokerage a solutions - but reluctance to share assets
 - Reluctance because need vehicle to be responsive to demand!
- Modified vehicles have high maintenance costs
- Integration with fixed route systems (buses, trains, trams) is important, hierarchy from individual provision to fully collective
- Exclusive access or generally open

Types of service

- Accessible transport enabling all to use it
- Geographic organisation
 - services appropriate for urban or rural locations
- Individually responsive
- Service oriented (e.g. health, education)
 - Access to employment
- Pre booked services or more ad-hoc on demand services
 - web booking; interactive voice booking
- Taxi services
 - Accessed at taxi ranks/hailed/pre-booked on telephone/on demand through apps
 - Minicabs and Hackney Cabs
- Community provided services
- School transport services
- Commercial services - but need subsidy (except taxis)
 - but why not subsidise taxis if most appropriate solution
- Airport feeder services
- Lift sharing
- Car clubs
 - traditional 'back to base' or one way rentals
- self-service car rental
- Car sharing (e.g. Whipcar)
- PRT/GRT?
- City bicycle schemes
- Transport of goods using 'spare capacity' e.g. shiplly.com

- Brokerage of transport services and vehicles is a service
 - #Services for particular user groups
- Workplace services
- Voluntary drivers
- Bus services with no fixed bus stops, e.g. W7 route in North London
- Chiltern Railways 20 seater: Chiltern Taxi Bus... known route and timetable, just hail from anywhere on the route.
- Eligibility for services
 - Membership based schemes
 - Age-based
 - Need based
 - Based on driving history
 - Based on credit rating
- Post bus in rural locations

Other

- Method for booking services - by phone, online, booking not required.
- Fares charged -
- Hierarchy of transport services, and how they are integrated (fixed route 'downward').
- Brokerage - maximise use of specialist vehicles by sharing between a large number of groups.
 - Barrier - groups are reluctant to share with other groups
- Closed/members only or open access services
- Concessionary fares could be more flexible than they are. Some discretionary schemes allow people to use their passes on other modes
- Interoperability with other services, e.g. Oyster card used to access car club vehicle
- How much are people willing to pay for a flexible service? Can sufficient revenue be raised to cover costs?
 - keep costs down by utilising all available transport resource (by sharing, integrating)

Q2 What are the main reasons why flexibility is introduced?

For users

- To better meet passenger requirements
- Dispersed demand
 - rural issues
- Introduction of flexibility is user-driven
 - a small discrete group who think it is a good idea - not necessarily the users who will use the group.
 - Driven by 'champions' not general public demand?
 - May be true previously, but financial problems in supporting rural bus services are driving more LAs to introduce flexibility (though still not user-driven)
 - Initially probably true that user doesn't want flexibility, they want a bus, but if that is taken away, they think differently
- Dependent because of disability or social exclusion
- Change in attitudes - there are now people who are more willing to 'lease on demand' rather than own (vehicles)
 - Change of plans at last minute - i.e. no need for pre booked long distance rail tickets
- Why are large transport operators often reluctant to engage in flexible services either directly or in partnership with taxis etc.
- Beginning to engage - can reduce services at ends of day
- Lack of urban on-street parking lead to demand for alternatives to car ownership.

- More 24/7 living
- Traditional working and living patterns changing
- People have made decisions based on car access - can DRT sustain this?
- e.g. where they live or send their children to school (in some cases)
- To reduce costs of travel
- Change in supply or services, e.g. online grocery shopping reduces the need to own a car for a weekly shop.

For operators

- Responding to Local Authority tenders i.e. driven by need to utilise the fleet even at low margins
- New technology has changed what is possible for operators
- Long term costs saving and product differentiation
- Taxi Companies wanting expand services
- Broaden service base to local communities and diversification of work
- Diversification?
- The large commercial bus operators are not yet convinced by flexibility

For Local Authorities

- Reduce bus subsidies
- To meet accessibility requirements
- Provide basic levels of access- should these be defined?
- Save costs on fixed route bus services
- To meet needs unserved by conventional PT - social inclusion
- Response to market failure and network gaps
- To link people to arterial routes/key interchanges
- To support the 24/7 economy - fill service gaps
- Social obligations on LAs
- To ensure access to health and adult care services which are preventative and designed to reduce other (more expensive) interventions
- More cost effective area coverage than can be achieved through subsidised conventional public transport
- Statutory requirement to provide School transport (originated 1940s Access to Education, 1980s changes with parental choice)
- legal obligations - access to education
- Develop integrated systems to support access and mobility policies
- School consolidation has changed how school travel can be provided
- Hospital consolidation has changed as well

Other

- Need to reduce congestion (e.g. peak hour congestion, or around schools)
- Changing locations of destinations like hospitals.
- Large employers with parking restrictions and/or no pt. services to link workers to workplace put on services
- Economic driver
- Non-users who may be future users, car users, etc.
- Cohesive action by groups of employers who notice the degradation in business from congestion.
- Major travel generators - events-based e.g. Glastonbury, Silverstone
- can this be regular - e.g. repeated events

- Changes to the way people value time and the quality of that time at different times
 - Major factor in rural areas for people considering giving up car and finding alternative solution.
 - Esp. for rural dwellers - journey times extended with DRT but other costs are significant e.g. car ownership
 - A CT flexible service will be perceived as taking longer, but people now looking at other costs alongside the value of time (such as having/insuring a second car)
 - Standing 20 minutes at a bus stop is perceived differently now.
- Awareness a key issue
 - generally low level, plus users have to do something

Q3 What is good and bad about existing flexible services?

Strengths

- Social inclusion
- Consider real cost of trips rather than 'hidden' costs of car ownership
- Increased user choice
- Enables complete journeys or journey chains to be made
- Although individual trip cost may be high, mobility and access benefits are usually far higher
- Expands opportunities for service penetration
- Enables people to travel who would otherwise be unable to leave their own home
- Provides social contact with other people in the same group.
 - it's a weekly 'trip out'
 - children like travelling with their friends for social reasons
- Opportunity to use a well-maintained car for trip which 'need' a car and then existing PT/walk/cycling as appropriate for other trips.
- More efficient than conventional PT once awareness is raised
 - "Effective" rather than economically efficient? Real costs are often understated.
 - Unit costs per passenger mile are about 25% higher...
 - Often not a like for like comparison - as 'demand' on which cost per passenger mile is calculated is lower for areas dependent on DRT as fixed route services would have lower overall passenger numbers
 - New York City subway elevator installation example - not all stations were retrofitted, so some DRT was provided to get people to stations with lifts (expensive, but cheaper than putting in the lifts)
- Enables journeys to be made that couldn't be otherwise and expands network - feeder links etc.
- Can tailor for specific groups/needs?
- Retains some form of public transport service in areas of low demand
- Potentially allows better use of time - less waiting, better information
- New flexible services (car clubs, bicycle hire schemes) appeal to younger people
- missed health appointments, etc. due to lack of mobility capital have major quality-of-life implications & costs to the public purse
- Continuing improvements in technology able to deliver service quality improvements and efficiencies
- If reliable offers better use of time and potentially cost effective at end of journey as compared to car usage
- Operators can be more aware of public demand than conventional operators
 - Is that public demand or the demand from specific groups within the larger public?
- Enables some mobility to be provided in remote/rural areas which are harder to serve by traditional public transport
- Lower cost for user than private travel

- Serve markets that public-sector public-transport services do not (e.g. dollar vans in New York City)
 - Can innovate quickly and fill new market gaps
- Advanced ICT can enable better integration : some areas have weak or non-existent high speed comms networks however
 - Many areas also have poor mobile phone connectivity (rural and urban)
- provides an opportunity for social interaction on the vehicle
 - Continental experience e.g. train-taxi shows that public transport patronage can be retained
- Can focus on a specific group or problem area
- Environmental efficiency

Weaknesses

- Perception may not be reliable (not visible/fixed route)
- 'It's not for us, because we are not part of that group'
 - This is an issue for most transport services, e.g. bus, train, cycle.
 - Not true for all types of transport and all users - varies by user and scheme
- Requires action to join
- Perception as "welfare service"
- With joint use journeys will tend to be longer
- Requires pre-planning & commitment
- Can't be spontaneous/flexible as pre-booked - should become possible with more dynamic booking thru IT advances
- Parents not confident - unfamiliarity a barrier - people are conservative and this is 'new'
- Regulation - what is a community service, what is a public flexible service, has restricted growth (this is changing).
- Possibility of seating next to objectionable co-riders
- Costs for operators and local authorities
- Small operators on small patches means a geographically limited service
- Old and tatty vehicles
- Not integrated between services/providers both within flexible arena and with conventional PT
- Perception only for poor people
 - Or the urban elite (car clubs and cycle hire)
- Protectionism from different providers - barrier to integration
- Still seen as separate systems not part of "total Transport"
 - Often even by local authorities
- With use of smaller vehicles the costs per passenger mile increase compared to conventional bus services
- Un-regulation safety issues of open lift share schemes.
- Fragmented funding key - prevents integration/effective service operation
- If you have a car, the feeling of depending on another driver is a barrier
- Highly dependent on financial support from the public purse
- Local authority boundaries can create anomalies in service provision and destinations served outside of the same local authority.
- Marketing is poor
- Lack of right kind of vehicles - gaps in market
- Low load factors (at times)
- Lack of trust between providers - seen as threat to existing services (taxis, commercial fixed route PT)
- Need new systems to provide better trust-between-users (e.g. Facebook login, etc.)

- Poor quality schedulers giving would be passengers a difficult experience that puts them off using the service.
- CT/DRT service provision is very dependent on government money - when money is available there is growth in unconventional services, when money stops, they decline.
 - Because LAs don't follow through by putting in a strategy to maintain services when initial money gone.
 - this is not always the case and the benefit of working with local authorities mean that it may be possible for these developments to become part of 'business as usual'
 - i.e. no continuity planning
- There is a real need for proper targeted marketing of the different types of flexible service (i.e. car clubs are for people who can drive and want to occasionally, DRT/CT is for people who need more help with fulfilling their mobility needs)
- Big Society - doesn't have the pool of people to support CT any more

Q4 What are the personal security issues with flexible services in different circumstances?

Time of day/year;

- Increased perception of security during evening hours or in darkness
- Need for pre-booking provides extra element of security especially late at night
 - Means other pax. are not anonymous
 - subject to privacy issues means that all users can be identified: may be enhanced by CCTV etc.
- Waiting away-from-home for either classic-PT or DRT can mean feeling vulnerable
- Flexible service offer a solution to time of day travel concerns
- Door-2-door great in bad weather
 - Unless vehicle delayed!

Type of area (e.g. rural/urban);

- Lower-demand places can have fewer "eyes on the street" (Jane Jacobs) to organically provide for personal security
- Risks associated with walking along streets with poor footways or bad lighting
- Waiting in isolated areas can increase vulnerability (if not door-2-door)
- Well maintained streets more comforting than derelict areas

Demographic (e.g. age/gender)

- How tight are eligibility criteria for service use - self assessed use (if it's icy, dark, etc) or linked to some 'objective' measure
- Heightened perception of risk by certain groups, e.g. parents, elderly, females travelling alone
- When have children in tow, will value the various aspects of personal security differently than single-party travellers.
- Travelling at night - including issue of people knowing you have left your home because the DRT vehicle has been to pick up
 - Regular trips, e.g. every week at 10am on a Tuesday may be a security risk, potential for burglaries.
- In comparison with a scheduled bus, where you don't disclose any personal information, pre-booking asks for more and more personal data (disability transport is very personally intrusive). Users only feel happy to disclose the minimum information to make them eligible for the service.
 - Certain groups may not want to disclose home address

- Increasingly individuals are less concerned about data sharing e.g. increased social media sharing of personal info.
- CT for elderly: it has been proposed that drivers should be screened, and maybe trained to provide first aid in a medical emergency.
 - Best practice.
 - For instance: this has happened - driver goes to collect passenger, who has collapsed at home, procedures do need to be in place
- Closed services add feeling of security for particular groups - e.g. elderly not sharing with school kids
 - This also provides reassurance for parents putting their children on school transport. Drivers are now required to be screened (but not by regulation)
- Knowledge that younger and/or more vulnerable children are transported to the right location
- Young people (16-24) may underestimate their exposure to risk
 - Everyone else over-estimates their exposure to risk!

During disruption

- depending on dimensions of flexibility, can provide useful svcs during PT strikes, etc.
- The trouble with disruption is the slow feed of information from the trouble spot back to the system and then making a logical decision that affects the travellers. How often have we passed speed restrictions on the motorway that had no meaning at all?
- Weather?
- Pool of stand by vehicles- to cover breakdown - may be small
- Flexible routing can avoid congestion/disruption
- Need to make unplanned detours, alternative arrangements, different timescales

Other

- Car clubs: issue is at the point you access or leave the car - you have a smart card to open the car and get its keys (which are in the vehicle), and you are in a place that is less familiar to you than your home.
- Car club vehicles are on street - they could be vandalised but are generally well-maintained.
 - with car club vehicles...when nearby cars are booked, you could be required to travel a bit further to unknown environs to pick a car up
- Door to door pick-up/drop-off more secure than waiting at side of road - especially for vulnerable groups
 - If more buses come into service how the passenger does know which bus to get on?
- Fear of attack at interchanges or on public transport
- Lack of security checks on drivers and other passengers on certain lift share schemes
- Perception of stranger danger with lift sharing
- Security should be viewed broadly: freedom from crime, freedom from feeling of vulnerability to crime, freedom from risk of major journey disruption, freedom from unsafe vehicle driver, being in a vehicle that is safer in a crash
- Need for effective staff training - MIDAS, manual handling, etc
- Data security issues
- Risks can be overstated - transport mode irrelevant
- Personal security 'risks' might be overstated by individuals (i.e. perceptions) - this is not specific to flexible transport.
- Insurance issues, in all types of flexible systems but esp. for peer-to-peer systems(51)
- Data security - e.g. downloading schedule to driver device needs to be encrypted in event of theft
- Driver relationship more personal = reassurance

Q5 What are the opportunities and threats to the development of flexible services that support secure and confident journeys in next 3-5 years?

Opportunities

- Technological advances can solve many issues already discussed, adoption will be key
 - lots of resistance - many low tech systems
 - need to tie funding to adoption of technology
- Use of additional funding (LSTF) to develop community transport services - local authority
 - but this is temporal: again there is the risk of good solutions being developed but short lived because LSTF expires and LA has other priorities
- Smartphones mean much greater situational awareness (and knowledge of past patterns & likely future ones), so networks can be designed & operated more efficiently
 - Gadgets may make us less sensitive to longer journey times (relative to driving ourselves)
 - but where mobile network coverage is slow or non-existent advanced apps may not function
 - Potential for app developments to build flexible transport market and service support
- Technology facilitating real time dynamic lift sharing opportunities
- Car clubs - one way car clubs and peer to peer car clubs (using privately owned vehicles) provides more flexibility services.
- Potential expansion of services as long as sufficient subsidy is available to jump start a service
- Demographic change - elderly larger proportion of society, and often in rural areas (retiring to the country). This is often viewed as a 'threat', but it is an 'opportunity' for developing flexibility in transport provision
 - We are becoming 'aged' later, so we are often still drivers when we retire.
 - but many would like to relinquish the driving "chore" whilst retaining car and license as insurance against lack of alternatives
- Further improvements in efficiency and service quality as a result of technological enhancements
- Embed flexible transport solutions as more accepted part of the PT mix - local authority
- Generation Y is less tied to attitudes-towards-car-ownership
 - Delayed/postponed learning to drive due to costs/perceived cost(42)
- For children - Technology providing individual tracking so parents know where their child are, when they boarded and where they got off a vehicle - encourages use of shared transport.
- Reduced car ownership in London and increased cycling levels. Provides a lesser need for car ownership and therefore opportunity/demand for flexible services (car clubs, cycle hire)
- Use of central databases for bookings and as a research and marketing resource offers opportunities for service structures that are inherently secure and responsive to changing needs
- Changes in spatial delivery of public services - distances to medical and educational facilities increasing putting more pressure on problems of access
- Increased pressure to make better use of all available fleet resources with technology that allows/encourages/supports this happening
- Car ownership/fuel costs may stimulate uptake of flexible services
- To increase usage of flexible services by mainstream users
- Reduced funding encourage change shared resources
- Increased use of technology will encourage modal shift
- New types of services, new markets, new interest groups
- Trend to later age of learning to drive: gradually people will be less inclined to learn to drive. Pool of drivers will reduce (probably not 3-5 years).

- Threat to car clubs!
- Further pressure on provision for private-car parking
 - other parking availability is also reducing
- Social media - basis to build services/expand markets - face book profiles etc. = lots of trust
- More attractive options for private car users and greater scope for real competition between providers
- Social value requirement in public procurement (new Act)

Threats

- Insurance companies are an inherently conservative lot. it's served them well over time, but means innovations face challenges
 - A good example of this might be the 'failed' experiment with 'pay as you drive' insurance, with in car black boxes. Though may be it was user conservatism that scuppered that.
- Greatest threat is stability of funding from government (la/op)
 - Age if austerity -- pub-sector provision of niche transp. svcs. may seem an easy cut
- Despite the rhetoric, buying a car (esp. second-hand) keeps getting cheaper every year
 - But running it is getting more expensive.
- Aversion to adopting new technology by current providers and certain passenger groups
 - Even though most of the technology is in place (Ford/VW/Merc 16seaters, GPS, mobile phone, internet, tablet computers in the bus) these are still being borrowed from other sources and production line delivery of the best possible kit seems some way off.
- Older people and driving: there will probably be tighter criteria for renewing licence to drive. Personal threat, but increases pool of people needing transport services by other means.
- Transport groups may disappear
 - Current CT providers are under threat right now, due to funding contraction. Post-code lottery - some LAs take services in-house.
- Entrenched views - some providers reluctant to change
- Benefits of integration depend to techno adoption, some services will be isolated/left behind if unwilling/unable to adopt
- Demand for DRT services for the elderly being reduced by closure of day-care and public bingo (replaced by online/TV and smoking ban reduced the social aspect)
- Competition from in house providers
 - reduced funding may force joined up services and encourage shared resources
- Data hacking
- Profitability net yet proven for new sorts of operating concepts
- Technology failure - no back-up if become reliant on technology solutions
- Fuel cost escalation increases cost gaps between collective and individual transport - long term forecasts of oil based fuel costs show rapid increases after 2020
- Less controlled and regulated services more open to abuse and poor quality of service
- Inability of providers to develop effective investment and capitalisation strategies - e.g. for fleet replacement
- Digital divide, if new techs. are the only way of access flexible svcs
- Process of public finance withdrawal is likely to be with us for a considerable time - dependency in this sector on public payment likely to mean that will have to search other sources of finance to survive
- Individual budgets which do not recognise the need for transport and mobility costs to be included in needs assessments

Annex 4: Raw Data from STEEP(L) Analysis

What will be the key future driving forces influencing the development of flexible services beyond 5 years?

Social

- Ageing society
 - particularly the proportion of over 80s
- Immigration
 - migrants seem to drive less, use PT (DRT?) more
 - Emigration too - if fortunes overseas are greater than in UK(24)
- Massive increase in local provision of services
- Change in attitudes and behaviour - moving more towards collaborative consumption (car share, lift share)
- Phone app generation will get older and create a completely app competent population
 - As yet unknown technology will be used mainly by a yet unborn generation, leaving the iPhone generation behind.
 - Older demographic more accepting of technologies that are currently contentious, but technology advancement will still mean 'older luddites'
- More tech savvy young people unable to drive
 - Or want to drive - the need to drive is less with increased virtual social interaction
- Individual incomes could decline in face of increasing costs (e.g. food and energy) - leaving less for transport- as volume of travel is income related could shrink volumes of travel.
- More people, more houses, less room, more resistance to building on the countryside, more pressure to build upwards in the cities.
 - Or green belt planning restrictions relax.
- Higher transport costs force high densities of development to minimise need for travel
- Proportion of single person households increasing
 - May be partly countered by the 'bedroom tax'?
- Increased retirement age, working for longer, changes working pattern, as raises demand for flexi-working, working from home, working anywhere
- Increased numbers of second homes with more affluent and mobile workers. Implications for longer but less frequently travels between the city and country.
- Transport requirements less predictable due to continuous changes in working patterns
- Bottom up community led service creation rather than top down funding of community services

Technological

- Driverless DRT-type operating concepts
 - autonomous vehicles for personal or group travel open opportunities to those currently dependent on support to travel
- Increased visibility and transparency of type of service available on a real time basis through mobile applications.
 - Total transport solutions will happen
 - More intelligent apps that adapt their responses to bandwidth availability: e.g. provide a historic rather than real time solution when dropping from 3G to 2G or 2G to GPRS
- The existing technology ticks the boxes but it will deliver more when faster and prettier.
- Development and cost reduction of it hopefully will expose / identify duplication/gaps
- The speed of substitution of oil based vehicles with electric ones
 - Fit b/w EVs and DRT-system-needs is unclear, but people who buy EVs may be more open to using flexible methods for certain types of journeys where EVs don't work well

- Travel to other planets and living on other planets reduces world population but has impacts for inter-planetary airport requirements
- The motor car will remain desirable as it loses the internal combustion (petrol/diesel) for more sustainable fuel/alternative drive in the next 25 years.
 - But shared use of cars can be even more desirable!
- Availability of information will encourage competition and increase market
- Low Earth Orbit tourism, and long distance travel to Australia via LEO the norm for wealthy people
 - Types of uses may change (e.g. working practices enabled by new tech) therefore existing physical plant of buildings may be used in new ways, meaning new mobility patterns even with fixed land use.
- Driving turns to a leisure pursuit for those interested, a hobby like skiing or horse riding.
- Substitutes for Petrol and diesel found.
- Will car technology adapt to support ageing drivers - assistive technologies thru to automation/autonomous vehicles - fits with car club/rental services
- More intelligent apps that adapt their responses to bandwidth availability: e.g. provide a historic rather than real time solution when dropping from 3G to 2G or 2G to GPRS
- Technology significantly reduces need to travel - knowledge based economy enables greater home working; social interaction largely through technology
- Medical advances - bionic limbs and organs - you could control parts of your body from across the room!
- Flexible working and schooling arrangements increase needs for flexible travel arrangements
- Through ticketing and combined ticketing or smart card solutions which can include flexible transport links in the journey chain
- Market penetration of new (demand responsive modes) e.g. PRT/GRT
- Technology reduces the need for travel - more services and social activities delivered to the home
- More sustainable accessible smaller vehicles
- Will telemedicine /tele-education/ teleconferencing becomes effective as a substitute for real travel - a 'real life experience'

Economic

- Longer-term effects of 10years of austerity/low growth
- Potential realignment of world order with emergence of China etc and decline in western fortunes.
- If wage rates grow DRT costs (like PT in general) will increase
- Transport costs have in general been reducing since 1950's - they are now turning and the prospects are we will have higher future costs - implications for mobility and land use
- Fuel costs/supply - energy policy
- Better integration of commercial and community transport initiatives - less competitive and more about working together
 - large transport groups can have major impact by entering flexible service provision themselves and forming partnerships with existing providers
- Spending power of groups requiring flexible transport solutions and links
 - affluent retired people very important
- Expanding community enterprise culture: what has been done for village pubs, shops etc can be reproduced in transport
- Increased costs will encourage reduce silo mentality
 - more incentive to collaborate
- Land use developments and relocation of services
- Someone will want to turn the whole country into a museum.

- A rich nutcase?
- Universal road user charging - pence per mile
 - real costs (internalising the external costs) to create a more level playing field
- Aging society, assuming Pensions are paid, means increasing separation between who creates value & who spends £££. Could affect mix of types of mobility demanded.
- Attention to 'green' issues could go up or down. Arguably in a period of economic instability government will pay less attention to environmental issues & more to economic ones. Could mean more building on Greenfield sites, more investment in fixed-location transp.infra., etc.
- Increased number of people work abroad for part of the year.
- Retirement age increased to 75
- Necessary response to increasing levels of poverty
- Impact of developments within the taxi/private hire market

Environmental

- Carbon reduction - climate change
 - Carbon footprint per head is highest in rural areas and affluent suburbs. Much of this is transport related and collective transport can reduce load significantly.
- Pressure on infrastructure maintenance from damage from extreme weather events (flooding, snow and ice)
- Abandonment of some coastal villages due to erosion
- Electric vehicles dominate
 - dominate - new opportunities for flexible services
- Global water and energy shortages change food production to more local sources. Shopping patterns change
 - Many areas of world affected by desertification
- Climate change increases payback from renewable energy - higher winds , larger flows in rivers for HEP, greater sunshine
 - health changes - concentrating some services into centres of excellence; dispersing other services into community settings - both of which increase travel requirements(
- Malaria becomes a problem in southern England.
- 60% of Britain becomes flooded and flexible transport moves to boats instead of buses. Car Clubs move in with the local yacht club.

Political

- Community pressure to "restore" some services lost through austerity cuts. "Big Society" appears to have failed but publicly funded social enterprise is an opportunity.
- Big society agenda endures - local solutions/reduction in funding from central government
 - Big society turns into increased local community action, middle class areas prosper and increased number of ghettos where service provision has declined.
- More local decision making, devolution, etc. enables local planning
 - But with less money - more creative thinking?(
 - Less consistency of service provision across UK (assuming we don't have an independent Celtic fringe!)
- Public expectations of what public services can and should deliver - plus the application of Equality legislation, - plus the political engagement of older people (more likely to vote)(
 - but need to engage younger people and make them more politically aware(106)
- Policies that support physical-mobility for socially-excluded groups may shift to supporting online-access instead, regardless of evidence base
- Single car occupancy becomes social evil such as smoking.
- If the "Free Market" thinking gets it's way the subsidy for transport will go to individuals (taxed of course) and not channelled through Local Authorities.

- Meaning a big open question would be whether they would choose flexible svcs or other types.
- Local politicians increased awareness of issues and solutions as a result of funding pressures more accountability?
- Political push to raise awareness in shared transport
- Withdrawal of concessionary bus pass as it is too expensive as it is currently devised
 - Replaced by half-fare scheme and alter the economic base of public transport

Legislative/ Regulatory

- New types of directives coming from Brussels?
 - or freedom from Brussels if we leave EU
- More flexible fare legislation and ability to charge more for lift share
- Public procurement requirements - social value
- Equality legislation requirements - access to services
- Carbon allowances for personal travel. Affluent purchase allowances from less affluent, but only slight reductions in overall travel distances.
- If government required everyone to disclose their carbon footprint publicly, that could mean more pressure to conform to low-carbon transport lifestyles
- England decides to become a really active member of the EU after Scotland , Northern Ireland, the Channel isles & Wales leave the UK.
- Generic regulations
- Competition law: currently prevents CT operators bidding against private operators for LA contracts as they have a public subsidy. How will this be resolved?
- Levelling the playing field for community transport through access to concessionary travel support for all services bus support etc.

Annex 5: The Scenario Narratives from Work Package 1

Scenario 1: World Markets

Individuals ignore national and regional barriers as they strive for material wealth and mobility. International and long distance domestic travel increases for those who can afford it. There is growth in demand for complex journey planning services. People value high quality services such as multi-lingual automatic translation for way-finding in unfamiliar environments. Innovation is initially spurred by the sharing of international best practice, but commercial imperatives lead to a small number of multi-national global corporations dominating provision of these services. The car is the mode of choice for local journeys, and to access long distance travel by PT, for those who can afford it. This leads to increasing emphasis on infrastructure, facilities and services, including traveller information, which support car access to PT interchanges. Quality information is only provided where there is clear commercial benefit, resulting in fragmented information provision.

Those wishing to travel beyond the locale depend on service providers to join-up this fragmented picture at a cost. For those who cannot afford such services there will be decreasing confidence in travel and narrower travel horizons as people place their faith in familiar environments and trusted services. As PT services reduce in scale and quality there is an increasing role for Demand Responsive Travel services to bridge the gap. These services are commercially driven, with trusted service providers facilitating access to key travel generators such as business parks, industrial estates, airports, or shopping malls. The desire to maintain independent travel drives growth in alternative models of car ownership and use such as car clubs, car sharing and on-street car hire. However, car clubs and car sharing are less 'open' than in the past, with membership oriented around rigorous profiling and/or pragmatic relationships between trusted peers with shared interests.

Target hardening is an issue of increasing concern. Cars and mobile phones are increasingly secure with access and use controlled by PIN systems and biometric data. Remote device shut down will deter theft, but this shifts the vulnerability from the technology to the owner, increasing violence and intimidation to access their biometric and PIN data. The bespoke information and journey planning services which emerge in this scenario require the collection of sensitive personal data. Secure data storage is also major concern and individuals are reluctant to share information reducing the role of open data. Social media is limited to closed communities of interest managed by trusted service providers, who tightly control access. The high monetary value of traveller information means that commercial imperatives prevail over open access to data, reflected in the role played by multi-national corporations in data ownership.

Scenario 2: Global Responsibility

Society is highly cohesive and conformist, with a bias towards achieving community-oriented consensus. The population is highly educated, feels secure and trusting of one another. Citizens and businesses are highly taxed, as the social value of public goods, including PT, is recognised and well-supported. The cost of providing services and information is shared between parties to give economies of scale.

Disruptive radicals are rare, but more dangerous due to lower levels of social 'alertness'. Extreme criminality or terrorist acts are deeply shocking to society, but the response is not to impose draconian security controls. The openness of society and its reliance on open data raises the threat from cyber attacks, and physical attacks on infrastructure, as there are few barriers to information for the determinedly disruptive. However, policing functions are highly computerised and ubiquitous, with technologies such as CCTV and facial recognition developing to a level at which the cost has reduced. Antisocial behaviour and crime is reported immediately using social media, enabling fast and accurate response and reporting, enabling accurate public perceptions about safety and security in the travel environment.

Public authorities and commercial data holders are committed to making their data available, and work collaboratively, utilising public feedback and government-sponsored standardisation. There is a high level of cooperation between universities and industry, and across sectors, in sharing intellectual property. The use of open data and the cooperative nature of society supports the development of shared travel services. The interests of minorities or groups who tend to feel more vulnerable at present are well-provided for in service and information provision, and they feel safe and confident in using PT. There is very little emphasis on the use of cars for local journeys because of community preferences for high air quality standards and low noise, healthy environments, with active travel and/or PT used for work and leisure travel. The well-integrated and multi-modal transport networks are very data heavy, to support operations and traveller information. Social openness leads to innovations in Augmented Reality Technology to find fellow passengers with common interests, to find empty seats on crowded trains, or find carriages that aren't deserted so people can gain comfort from not being alone. Direct information about the immediate travel environment is available through community-led social media, e.g. people at one end of a train use mobile devices to tell others where there are empty seats.

Scenario 3: National Enterprise

Society is motivated by national and individual self-reliance, with the operation of PT and related information services characterised by fragmentation. Infrastructure and service priorities are oriented around 'homeland' security. Major investment priorities are key national infrastructure such as the motorway and national rail networks and major interchanges, designed to link the major metropolitan centres as engines of economic growth. There is an emphasis on protecting borders and international gateways such as ports and airports. These priorities result in clear disparity in the level of investment and services between priority areas and peripheral places.

The technologies which underpin traveller information services are developed at the national level, an insular approach retarding innovation by ignoring international best practice. The absence of global players in the market means that competition does not drive forward innovation and economies of scale. In the absence of economies of scale, an alternative economic model emerges for information services. PT and related information services that are not economically viable decline and even disappear. Those that remain only provide information beyond minimal standards when there is clear commercial benefit e.g. to support ticketing or advertising. The fragmentation of service provision creates a market for systems and services that join-up and coordinate to support travellers. A high degree of differentiation in services is available, regulated by pricing and privilege passes to first class PT facilities are popular. Brokering systems and services play a key role in supporting travel and commercial DRT services fill gaps caused by the decline in PT provision. However, the private car remains the travel option of choice for those who can afford it. Infrastructure, services and information to support access to PT by car are investment priorities.

A stark digital divide contributes to wider social polarity. Access to information and services is unequal and the highly prioritised uneven investment in infrastructure and services leaves those at the geographical margins most vulnerable. De-regulated service provision affords very limited protection for the vulnerable. Information provides a critical role in supporting personal security, but quality information is costly because RTI has become valuable as services deploy dynamic fare systems to regulate access. The lack of community support makes information systems particularly important. Mobile technologies act as 'travel buddies' and systems and services become increasingly sophisticated and bespoke. Lack of trust in notions of community and data-sharing cause a decline in social media and open data. Trust is placed in national political and cultural institutions, reflected in the small number of official providers of traveller information. Citizens carry a National Identity SmartCard incorporating biometric and location tracking data as well as banking and ticketing functions. The high degree of surveillance is the main source of security in travel and in the urban public realm. Though predicated on the importance of maintaining homeland security, it also provides reassurance for local travel and day-to-day living.

Scenario 4: Local Stewardship

Most powers are devolved to local and regional authorities, leading to fragmentation of approaches across national space. Although there is a high level of environmental awareness, it is locally or regionally oriented. Most journeys are highly localised and active travel prevails for health and environmental reasons. This has changed the nature of PT provision, which adapts around a fitter, though older, general population, who have different journey patterns based on using a mix of owned and shared bikes. There is a growth in local bike hire schemes integrated with PT access points. Travel environments are more age-friendly, with better pedestrian routing and lighting, supporting confidence in independent travel. Information provision makes realistic allowances for the walking and cycling segments of journeys. The resultant network is simpler and easier to understand, making the provision of RTI easier. However, the model of a mix of commercial and subsidised services is much the same as in the present, though substantially based on contracts between the operator and the funder. The services are differentiated to cater for diversity of need, and information provision is similarly fragmented. The significant growth in the numbers of extremely aged increases the number of mobility-impaired citizens who cannot cycle or walk, and are disadvantaged by the shrinking of local bus networks, making them reliant on bespoke services to access healthcare. Similarly, distinct communities such as students are more dependent on PT for specific activities, such as accessing leisure and returning safely from nights out.

Technology is increasingly used to support home-working, reducing the need for face-to-face meetings, and for commuting. There is a reduction in longer, non-routine trips, but those that are undertaken are supported with good information provision that enables people to cross local and regional boundaries between services and standards with confidence. Local broadcast media increasingly provide real-time information about travel conditions in the locality, and DAB pushes localised travel information to geo-located mobile devices, enabling travellers to remain up to date and able to adapt journeys, regardless of mode. PT provision provides plenty of space for bicycles on vehicles, and better bike storage at interchanges. The local and community-oriented lifestyles reduce threats to personal security, though there is an increase in cycle theft.