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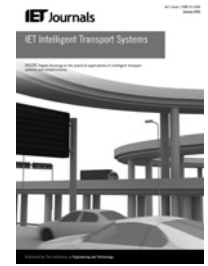
Personal security in travel by public transport: the role of traveller information and associated technologies

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Abstract: This study focuses on the role of traveller information and associated technologies in supporting personal security in travel by public transport. It reports research undertaken via a workshop involving SWOT analysis and scenario planning and a series of expert interviews. These research activities created a baseline understanding of how personal security issues are currently addressed, and identified potential future issues and how they might be tackled. Information is a major source of confidence and reassurance when travelling and can greatly support perceptions of personal security in travel. There have been significant advances in recent years in the quantity of information available and in delivery mechanisms. However, significant issues remain, particularly in terms of information quality, its representation in the public realm and its ability to support the needs of users. The differences in the relationship between information requirements and related commercial imperatives is shown to be perhaps the critical factor in determining the alternative pathways and associated services, technologies and personal security outcomes which emerge under the different scenarios.

1 Introduction

This paper reports findings from research focused on the role of traveller information and associated technologies (and its interaction with user needs and perceptions) in supporting personal security in travel on public transport (PT). Personal security is an under-appreciated factor in limiting uptake of PT [1, 2]. Information is a major source of confidence and reassurance when travelling and can greatly support perceptions of personal security in travel. As highlighted by Lyons [3], information has several important roles, from informing an individual intending to travel of the options available, enabling them to select which option best meets their requirements, to assisting in route-planning, journey stages and timing, ticket purchase and successfully completing the chosen journey. Information is found in various places and forms: printed route maps, timetables and ticketing information, on-line, by telephone or in person at ticket outlets, on electronic information boards, sometimes using real-time information (RTI), and in way-finding signage to help passengers move efficiently through interchanges. There have been significant advances in recent years in the quantity of information available, with increasing amounts of both static and RTI available via mobile channels. Relevant information is also provided by different agencies, public and private, with multiple channels offering different versions of the same underlying data. However, significant issues remain, in terms of the quality of information and its ability to support the needs of users.

2 Methodology

Qualitative methodologies have been deployed in this research consisting of literature review, participatory workshops using strengths, weaknesses, opportunities and threats (SWOT) analysis and scenario planning and expert interviews. This combination of approaches establishes the current picture building on the literature review through SWOT analysis with workshop participants. Scenario planning is a forward oriented approach to develop distinctive, divergent depictions of the future for a desired time horizon. Scenario planning is appropriate because of the complexity of the research context and the wide range of potential future developments. The approach used sits within the 'Intuitive Logics School' of scenario planning [4]. Our focus is on the insights and learning that arise from the process, and developing scenarios as qualitative narratives rather than quantifiable matrices of future conditions that could be retrospectively verified. Seven expert interviews add additional breadth and specialist knowledge to supplement the range of perspectives from the workshop. There were 14 participants in the workshop, drawn from transport authorities, operators, user groups, information and technology providers, academics and consultants.

3 Defining personal security

Personal security is usually interpreted as being related to crime and anti-social behaviour [5]. However, at the personal level, the affective nature of fear about potential crime clearly impacts on confidence to travel. Workshop participants were drawn from varied backgrounds and analysis of comments made by participants and expert interviewees clearly supports a more nuanced, but comprehensive conceptualisation that we could not find in the literature. Therefore, we developed a definition that

embraces the various connotations of the term 'personal security' conveyed in various sources, and is true to the empirical data from the workshop and interviews. It is apparent that the concept of 'personal security' ought to comprise a combination of three aspects: threat to individuals from other people (e.g. crime, including terrorism, violence and theft or intimidating antisocial behaviour), safety issues having an individual impact (e.g. from vehicle accidents, slips and trips), and personal affective issues (confidence and attitude). This is a more user-centric perspective which recognises the critical importance of confidence when considering personal security in travel. This recognition was a direct result of the focus upon traveller information as information has been recognised as having a vital role in providing confidence to travel by PT, alleviating nervousness, easing uncertainty, providing reassurance and reducing perception of risk [1, 5, 6].

Fig. 1 illustrates our conceptualisation of personal security. This incorporates several distinct, but overlapping, aspects. Thus, we have crime (and antisocial behaviour) as one factor, which overlaps with physical safety, by generating actual risks to health and safety arising from the consequences of crime and antisocial behaviour, such as direct physical injury from violence or indirect risks, such as from broken glass caused through vandalism. Crime also intersects with the more subjective notion of confidence, as cognitive discomfort arises from transport and public environments affected by crime and antisocial behaviour. The impact on confidence is not only based on factual knowledge of actual risk, but combines with individual characteristics and vulnerabilities, thus the more subjective fear of crime will impact on a traveller's sense of personal security. Similarly, safety and confidence also overlap through the impact of concern for safety, that is, fear of having an accident impacts on a traveller's confidence to undertake a journey. In many circumstances, this can become a generalised fear of the unknown, leading to self-imposed limitations on mobility.

4 SWOT analysis

SWOT analysis is a tool to support strategic planning [7]. It is used to enable groups and organisations to identify important strategic factors, and structure them as the strengths and weaknesses of an organisation or sector, and the opportunities or threats in the environment [8]. We have used it to draw out information from participants about the current travel information environment, and to uncover recognised issues. Results from SWOT analysis are usually presented in four quadrants. For presentation and explanation we divide these across two figures, counter-posing strengths against weaknesses and opportunities against threats to discuss a selection of participants' views.

Fig. 2 summarises strengths and weaknesses. While participants agreed that there are many examples of operators providing high quality, innovative information, utilising technology to enable travellers to obtain RTI for journeys on single modes, and that this information does provide reassurance, they also highlighted that RTI to support inter-modal and complex journey planning is less well developed. This is reflected in an over-emphasis on modal, rather than journey information, focusing on times, departure and destination points when other types of information are also needed, such as how to find or navigate interchanges. Similarly, current information provision does not fully support journey adaptation after departure. Participants stated that current information provision is rarely simple or clear, whether delivered by high or low tech means. Incomplete/inconsistent information in a complex environment can leave users in a vulnerable position. Participants agreed that passengers derive more reassurance from RTI than more static forms of travel information, and this builds confidence in travel. Thus, RTI underpins an overall sense of personal security, or assurance, among PT users.

Provision of RTI in metropolitan areas is generally seen as good, although the travel experience can be unnecessarily uncertain as a result of the number of operators and complexity of fares, obscuring the clarity of the information that is provided. This impacts on convenience and confidence, interacting with a sense of personal security when confidence is low because of increased journey complexity. Participants did not feel that there is a direct correlation between information quality and population density or network size, but that variability in standards was the real problem. Users could not expect consistent standards and again this impacts on confidence to use PT where boundaries between providers are crossed, such as during long distance journeys. Participants also questioned the technological and cognitive accessibility of RTI for different societal groups, who have an uneven ability to access and understand information provided via the internet or on mobile devices. Participants stated that while we know that travellers want and value RTI, evaluation is not consistent, making it hard to prove a direct relationship between the information provision and patronage levels.

Some participants also highlighted the information campaigns aimed at crime prevention. While many of these are traditional poster-based campaigns, participants highlighted some innovations using SMS messages and social media, which appeared to be quite successful.

Fig. 3 summarises opportunities and threats discussed in the workshop. Participants identified significant opportunities to provide effective information and improve the physical design and layout to enhance way-finding in complex PT environments. More innovations and wider uptake of mobile way-finding applications, consistent and clear signage, well-designed pedestrian routes around

Fig. 1 *Conceptualising personal security issues in travel by PT*

Strengths	Weaknesses
• High quality, innovative RTI already exists	• A lack of cross-modal RTI
• RTI is reassuring	• Accessibility of RTI and other forms of travel information
• Cost-benefit of RTI is being demonstrated	• Geographic differences in provision and consistency of RTI
• Education and crime prevention initiatives do work	• Complex fares and networks makes RTI provision more difficult
• Successful innovations with social media	• Lack of integration/coordination between data sources
	• Responsive security technology feasible, but full enforcement is costly
	• Adapting journeys on the move

Fig. 2 *Strengths and weaknesses in information provision in relation to personal security*

interchanges and to PT access points, and balancing commercial/social interaction and operational efficiency in interchanges and public spaces linked to PT are all key aspects that need to be addressed.

Participants linked way-finding to personal security through passenger confidence: knowledge of location and route or confidence in signage in unfamiliar areas reduces uncertainty about both the journey and personal security, making it more likely that passengers will be confident to make journeys on unfamiliar modes or routes. Part of an individual's perception of their personal security comes from confidence about their physical safety, which can extend to fear of slips or trips in public spaces or within vehicles, particularly for the elderly or disabled. Participants

Opportunities	Threats
• Improved wayfinding with mobile apps	• High tech innovation could undermine provision of low tech information measures, when many customer groups will continue to need them.
• Learn from existing good practice and from other sectors, such as tourism	
• Think of the whole journey from the customer perspective	• Uncertainty in payment for and ownership of data
• Open data	• Staff and training costs for operators to embrace social media
• Social media and crowd-sourcing	
• Integrate RTI with higher design standards for interchange and public spaces	• Intrusive securitisation of transport as a result of extreme incidents
	• Unfundable higher expectations of RTI
• Improve management and provision of information during disruption	• More expensive PT increases social inequity and reduces personal security
• Education about acceptable standards of behaviour on PT.	• Failure to address erroneous perceptions of risk
	• Impact of increased disruption

Fig. 3 *Opportunities and threats in information provision in relation to personal security*

strongly supported the idea that a well-maintained, clean and bright travel environment supports perceptions that anti-social and criminal behaviour is unlikely.

Access to data is key for RTI and there are a number of technology-fuelled developments from beyond ITS that could make a major contribution. These include the move towards making governmental data open access and the rapid growth in social media.

Information provision is already an important element in the regulatory framework for PT, but this can slow down some innovations. While the local transport authority has the legal responsibility, private providers and other stakeholders also produce information about the same services, often in different ways, which links back to the complexity discussion above. The increasing availability of Open Data raises new questions about who pays for the provision of data, develops applications based on it and benefits from new services based on it. There are other sources of data where ownership issues are unclear, such as personal data about individuals, their locations and activities. Users of social media are largely willing for the service provider to utilise information about them in return for a free service. However, as this field develops, attitudes may harden.

Social media has also increased opportunities for peer-to-peer and peer-to-operator information exchange about service problems in real time. This development is potentially disruptive, but offers exciting opportunities for innovation [9]. However, it requires new ways of thinking and a willingness to experiment. A number of examples of operators and information providers using social media can be found, giving opportunities for rapid detection and response to problems. However, all participants recognised that social media needs to be properly supported in terms of staffing and training to avoid poorly designed innovations becoming a threat to confidence in information and services, and to enable the information services to respond in a timely manner to inputs from the public. Participants highlighted a lack of practical and theoretical knowledge in this area.

Any increase in airport-style securitisation of PT environments in response to extreme incidents could have a negative impact on customer confidence. The impact of disruptive events on travel habits suggests passenger confidence quickly returns to normal levels, there was some suggestion that increasing security information messages causes groups to regard the environment as more, rather than less, risky.

Reflecting on the SWOT analysis, it is interesting to consider issues not raised by the participants. The ongoing rise of electromobility does have significant consequences for PT traveller information. In particular, the provision of information on location and availability of charging infrastructure will become an increasingly important concern and matching supply and demand effectively will determine whether this issue is an opportunity or becomes a threat.

The participants did not explicitly discuss some emerging ways of accessing information that are becoming increasingly important such as near field communication (although this is raised in the expert interviews), radio frequency identification and the concept of the 'Internet of Things'. However, issues regarding access to information through mobile platforms were discussed in a more generic way in the SWOT analysis. It is possible that participants considered that some of these technologies were really in the domain of a parallel workshop to be held within the overarching project which was focused upon automation in transport. The scenario development which follows envisages a range of technological developments which relate to this broad area including biometrics and augmented reality.

It is surprising that the participants did not explicitly discuss the concept of 'big data' and its implications for traveller information. Certainly, data management, ownership, privacy and use were implicit themes underlying discussion in the SWOT analysis. These issues alongside the broader social and political consequences of ubiquitous data were given full coverage in the scenario planning activities that followed the SWOT analysis. This may suggest that participants viewed 'big data' as a nascent issue suited to more speculative forward thinking analytical approaches, rather than something which impacts on current practice.

5 Scenario planning

A wide range of existing scenarios were reviewed and the generic framework developed by Berkhout and Hertin [10] for the UK Foresight Programme was selected, as this was intended to be adaptable to different sectors and areas of application. Four outline scenarios developed in this framework result from alternative assumptions regarding the interplay of key driving forces relating to societal values and governance, see Fig. 4. The scenario descriptions were derived from the generic framework, and keep the distinctive names from the source (World Markets, Global Responsibility, Local Stewardship and National Enterprise). They were given to participants as a starting point. For brevity, we have summarised the short descriptions as keywords in Fig. 4. The participants worked in two groups to consider how provision for PT traveller information (with particular reference to issues of personal security) might develop in these four alternative scenarios generating material from which the following transport-focused narratives were developed.

5.1 World markets

Individuals ignore national and regional barriers as they strive for material wealth and mobility. International and long distance domestic travel increases. 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 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 flexible transport
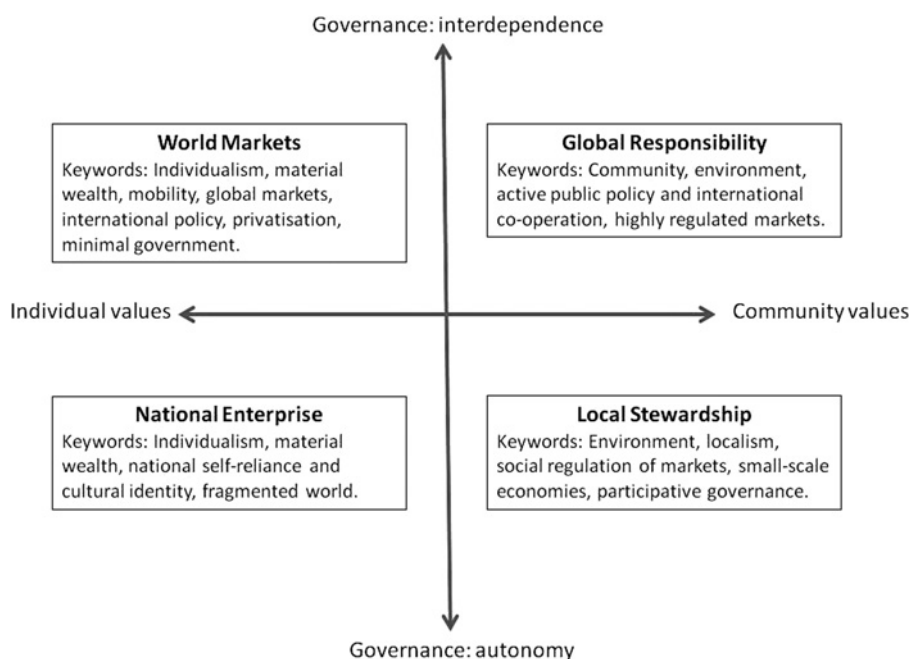
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Fig. 4 *Alternative future scenarios condensed from Berkhout and Hertin (2002)*

services (FTS) to bridge the gap. These services are commercially driven, facilitating access to key travel generators such as business parks, industrial estates, airports and 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 a 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. 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.

5.2 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 because of 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 support 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 are not deserted so people can gain comfort from not being alone. Direct information about the immediate travel environment is available through community-led social media, for example, people at one end of a train use mobile devices to tell others where there are empty seats.

5.3 National enterprise

Society is motivated by national and individual self-reliance, with 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 motorway and national rail networks and major interchanges, designed to link metropolitan centres. There is an emphasis on protecting international borders and gateways such as ports and airports. There is great disparity in investment and service quality between priority and peripheral areas.

Traveller information services are developed at the national level and the absence of global players in the market means that competition does not drive forward innovation and economies of scale. 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, for example, to support ticketing or advertising. Fragmented service provision creates a market for systems and services that join-up and co-ordinate to support travellers. A high degree of differentiation in services is available, regulated by pricing. Brokering systems and services play a key role in supporting travel and commercial FTS 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 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 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. Although predicated on the importance of maintaining homeland security, it also provides reassurance for local travel and day-to-day living.

5.4   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, although 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, although 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 number 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 RTI about travel conditions in the locality, and digital audio broadcasting (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, although there is an increase in cycle theft.

6   Expert interviews

The empirical material from the workshop is triangulated by seven expert interviews. Two were academics with direct experience working with the transport sector, two work on information provision (one mode-based, one metropolitan transport authority), one works at government level, and two at local authority level. Expert interviews are a technique for accessing specialist technical, process and explanatory knowledge. However, there are few literature sources on the methodological aspects of expert interviewing [11]. Rather than attempt to brief interviewees on the scenario elements of workshops, the approach was to generate further insights around current issues and future drivers, reflecting the first parts of the workshop, to fill gaps and elaborate on the workshop findings. Space allows a brief snapshot of our analysis. We focus on findings relating to the purpose of travel information and technology in relation to our broad definition of personal security. Interview extracts are labelled by work package and interviewee number.

The role of information in providing assurance came out strongly from the interviews, with several participants using the word 'assurance' rather than the more subjective 'reassurance'. Assurance carries connotations that resonate with our concept of personal security as a complex notion, as illustrated by the following interview excerpt, which comes from the transport authority/operator perspective:

> you've also got visitors and infrequent users [who] generally pre-plan what they are trying to do but when they get to the stop or location, [by] whatever means of transport they are using, that information gives them assurance, confidence that actually it is working. So that is the personal security, personal safety, in the fact that we do not want people … waiting for a bus at two

o' clock in the morning when it is never arriving … that gives an assurance that if they have not pre-planned they get to a bus and it is not working or something is happening, they know what is happening. (WP1EP4)

From the perspective of a rural transport authority, the focus is on the information challenge posed by bus stops, more than personal security and how new technology is opening up some possibilities that contribute to convenience at least for some:

we maybe do not look at putting in new technology or new information streams for security purposes, but certainly for assurance purposes so [QR codes and NFC] is something we have put in for that. You do not have to be at the stop to use it, once you have used it at the stop you store it in your phone but also there is only so much you can conceivably do on a bit of paper inside of a publicity case … if you want to make it clear and legible … As soon as you get it onto the Smartphone, you can expand … obviously it is not accessible to everybody … Smartphone ownership is on the increase and hopefully that continues. (WP1EP6)

Nevertheless, how this improved quality or focus on assurance might support increasing patronage to embrace those who are not currently PT users is less clear, although it provides a focus for understanding how marketing and travel information are different, but related. Understanding the nature of this relationship clearly becomes more important as the power of the technology develops:

When we get real-time in [name of county], … we can look at fares information and [Smartphones] are also an ideal platform to sell tickets on as well. So your mobile phone is your one-stop shop so we are quite keen to look at that. (WP1EP7)

However, an academic expert was keen to highlight his view that travel information is not a marketing tool for PT, as without a pre-existing intention to use or consider PT, the information has no persuasive power, although a relationship can be established if the search for information is followed through by a purchase, as revealed by this information provider, who implicitly assumes that confidence is confirmed by purchase:

how we … help achieve our objectives for driving up confidence in rail, driving up rail patronage; it is key to continuously monitor how people actually use our services and how that changes and people's level of satisfaction or dissatisfaction … We do not attempt to measure confidence … our objective in terms of a thing that we measure are increasing ticket sales. Even though we do not sell tickets ourselves there was still £250 million of tickets last year sold through our website. (WP1EP3)

However, the technologies used by operators and passengers alike to deliver, access and feedback into travel information systems are not a foregone conclusion, as rapid innovation in mobile internet and social media is proving. The expert interviewees all stressed that this increases the complexity of information delivery in terms of channels, as there is deepening differentiation between social groups in ability and capacity to access information in different forms. Providing information via new information technologies will not, initially, be cost saving, as adopting new media does not make the older channels obsolete overnight and

the peer-to-operator-to-peer (POP) developments need staff and resource commitments. However, it is clear from interviewees that the new technologies, and the digital data they rely on, enable true innovations, particularly in terms of personalisation. Personalisation of information is identified in the workshops as a key development for an increasingly heterogeneous society, and one which is likely to support confident travel. Individuals accessing travel information and purchasing tickets via the Internet creates opportunities for personalisation through intelligent market analysis of the digital data that is so generated. However, the role of such analysis based on digital data generated by passengers was not specifically mentioned in either the workshops or interviews, although the usefulness of segmentation more generally was understood:

if you were carrying out any segmentation, age would be really significant and within that, somewhere around 35–60 age group, there probably is a lot of variation depending on uptake of technology. (WP1EP5)

More than one interviewee stressed how rapid technological development is shaping behaviour, increasing differences in ability and driving how information is delivered:

When we were first developing Transport Direct the notion of portal was very strong in web parlance, it was pre-Google really, it was making it much easier by putting everything in one place whereas … people are now their own integrators, they take a bit from this website, solve that problem, there is another site that they prefer to solve another problem and they join the bits together. (WP1EP2)

my [16 years old] daughter really does not know how to use timetables very well because she looks up train times online and … she specifies when she is going to go and when she wants to arrive and she obtains a tailored response, it is a timetable but it is a tiny part of a larger timetable … although there are lots of gains with new technology, there are also some losses. (WP1EP5)

These quotations highlight a key contrast between those who have the knowledge to successfully integrate information from different sources to create their own personalisation, and those who skim the surface of the available information without understanding its underlying structure. This latter group could be vulnerable during disruption. Related to these changing skill sets, another expert interviewee highlighted how information might need to be supported through education:

one of the things we have picked up on is travel training. Initially aimed at people with disabilities but it goes wider than that. There are lots of travel training schemes out there. However, we want to encourage more of those … How can you give people confidence to travel, how can you build up their travel horizons? (WP1EP1)

Overall, the interviews give a picture of information provision as an area filled with technological promise, but which is entangled with many other aspects of transport: accessibility, assurance, protection, operations, marketing and so on, demonstrated in the breadth of coverage in each circa one hour interview.

7   Conclusions

PT traveller information has a critical role to play in supporting passengers to make journeys. Our research findings reinforce the message that personal security considerations tacitly influence passenger decision-making and are intrinsically linked with notions of confidence and assurance, but supporting personal security is not at present a major element in the design of information provision. In the absence of a clear definition of personal security in the literature, we have grounded our conceptualisation of personal security in our empirical material, and link these aspects together more explicitly, enabling better analysis of the issues.

The benefits of traveller information are not being fully realised at present because of a high degree of variation in the quality, quantity and range of services offered. The inherent tension between the provision of traveller information and marketing of services driven by commercial imperatives, results in confusing and incomplete services, for example, mode or operator specific information which frustrates integrated journey planning and holistic solutions. This can also be reflected in complex travel environments, such as interchanges, where advertising and other commercial considerations can make way-finding and other information signage more complicated than is necessary. These conditions create cognitive uncertainty, by feeding a sense of unease, reducing traveller confidence and thus negatively impacting on personal security, as we conceive it, in PT.

There are existing strong examples where the role of information is clearly understood as providing assurance, a term that we would like to promote as the practical embodiment of our conceptualisation of personal security as a portmanteau concept in which objective issues and perceptions about them are inextricably woven together at the individual level in driving passenger behaviours. The more fragmented parts of the transport environment, such as the multiplicity of train and bus operators, are less well developed in innovative information provision, although are clearly aware of developments and understand the implications and are experimenting.

The role of social media in enabling peer-to-peer and peer-to-operator information exchange has been identified as a key driver in the field of travel information. What is particularly interesting about social media in this context is the immediacy with which some passengers convey information about their current travel experience, to each other (potentially influencing the decisions of other passengers) and to operators (offering the potential to change perceptions or resolve problems more quickly). Clearly, this field is most meaningful to supporting personal security if the information exchange loop is closed (i.e. POP). However, complex and pressing issues of trust, provenance, information overload and expectation management are generated by these ways of exchanging information. The extent to which these issues can be addressed will be central to developing effective strategies for the provision of PT traveller information going forward.

The scenarios which have been developed offer alternative visions of how some of these issues may play out under different socio-governmental models. In relation to social media, the scenarios offer different visions of its future role in information provision resulting mainly from contrasting social and political attitudes to the medium. The differences in the relationship between information requirements and related commercial imperatives is shown to be perhaps the critical factor determining alternative pathways and associated services, technologies and personal security outcomes which emerge under the different scenarios.

8   Acknowledgment

9   References

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