Exploiting Digital Technologies to Promote Sustainable Travel Behaviour in Rural Areas

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ABSTRACT
Passenger information is an important commodity to successful transport service provision. However, it is often operator-centric, incomplete, inaccurate or does not reflect real world situations. The Informed Rural Passenger1 (IRP) project aims to address this issue by creating an information ecosystem that integrates information from various transport related sources. In this context, this paper describes ongoing, parallel and associated research that aims to extend the IRP project by increasing the accessibility of the information ecosystem and orienting it towards the user needs, in order to encourage sustainable rural travel behaviour.

Keywords
digital technologies, travel behaviour, rural transportation, passenger information systems.

1. INTRODUCTION AND BACKGROUND
It has been argued that the substantial increase in private car use and pollution are repercussions of major cultural, sociological and politico-economic shifts in lifestyle [1]. Previous studies have suggested that these issues can be partially solved by altering travel behaviour. A number of projects have confirmed that high quality information about mode choice, time of travel and route choice have the potential to affect the travel behaviour of passengers (see the review in [2]). Various studies, have demonstrated that pre-trip and in-trip journey planning information can promote knowledge and confidence about the journey, cultivate positive attitudes towards the service provider, create favorable perceptions of efficiency and security, reduce the perceived waiting time and increase the willingness to pay (e.g. [3] [7]).

Indeed, information is such an important commodity that a plethora of authors have argued that informed travellers might be a key nexus to successful transport service provision. This notion has initiated several passenger information and journey planning projects with multiple purposes in diverse contexts (see the review in [6]). However, most of the journey planning scenarios cannot be adequately completed due to the operator data being incomplete, missing, inaccurate, or not reflecting real world situations.

Nevertheless, it has been suggested that supplementing the operator provided data with the knowledge held by the inhabitants of various communities regarding the performance of existing transport services, as well as suggestions of alternative transport options, has the potential to orient the transport information provision towards users needs, increasing the quality of the available information, helping to promote a more sustainable travel behaviour.

1.1 The Informed Rural Passenger project
The Informed Rural Passenger project is investigating issues relating to the provision and use of rural public transport information systems. Due to the limited availability of necessary transport data in rural areas (such as bus location and facilities), IRP is adopting a crowdsourcing approach to acquire transport data directly from the passengers via their mobile phones. This data is integrated using linked data principles [9] with other transport data, such as operator timetables, GIS roadmaps, and roadwork details, along with other data such as passenger profiles and social networks, within an information ecosystem. Overall, the aim of the IRP project is to utilise this information ecosystem in order to improve the rural passenger experience, influence rural travel behaviour, and provide business benefit to operators.

![Figure 1 – The IRP information ecosystem](image)

2. RESEARCH AIMS AND OBJECTIVES
Given the context described above, the present PhD project aims to increase the information accessibility of the IRP information ecosystem, and orient it towards user needs, in order to promote sustainable rural travel behavior. In order for the aforementioned to be achieved, the following three principal objectives will be addressed:

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1 http://www.dotrural.ac.uk/irp/
1. To explore the rural transport situation in relation to existing passengers and their related transport information needs.
2. To develop new system(s) that utilise the information ecosystem to provide customised rural travel information that promote sustainable rural travel behaviour.
3. To evaluate the potential of the system(s) to bring about sustainable rural travel behaviour change.

3. RESEARCH FRAMEWORK

The research approach is based on a combination of theoretical and practical research elements from a range of related disciplines (e.g. design, human computer interaction and transport studies) and includes theoretical research, collection of empirical data sets (e.g. arising from ethnographic studies and field studies), and prototype application development. Such an approach was introduced and formalised by Mackay and Fayard [5] and aims to relate the theoretical issues and understanding developed through reflection on empirical observations to the design, development and refinement of prototype systems (Figure 2).

Figure 2 – The research framework [5]

4. PLANNED RESEARCH ACTIVITIES

The planned research activities include (but are not limited to):

• A pilot study in collaboration with FirstGroup2 scheduled for October 2011 on bus route number 17 in Aberdeen. The study involves the ‘GetThere’ mobile application and a combination of observations, questionnaires, and focus groups in order to provide an initial understanding of the framework required to capture travel behaviour change.

• A study in the X95/95 rural bus route, scheduled for January 2012, which aims to provide a concrete understanding of the rural public transport situation in relation to passengers and their transport information needs in order to drive the design and development of a user-centered passenger information system.

• A study that aims to illustrate the variance of the available and the required information in several types of rural areas (e.g. accessible rural, remote rural).

• The design, development and evaluation of a system that promotes sustainable rural travel behaviour.

5. DISCUSSION AND CONCLUSION

Studies regarding factors that influence travel behaviour in rural areas are generally limited. This may be attributed partly to lack of funding from the relevant authorities due to low-population density. Drawbacks of previous studies include: I) a focus on the issues from an operator-centric or policy making point of view, II) an absence of developing a conceptual understanding of the rural transport situation in relation to passengers’ needs, and III) investigations were conducted through the desired end-state, rather than the process through which this is to be achieved.

The outcomes of this research are expected to address these issues, as well as initiate, a user-centered approach towards rural transport needs, which based on a information ecosystem, may act as ‘life shock’ triggers motivating changes towards more sustainable travel behavior.

Potential issues to this research relate to the digital literacy and the population density in rural areas. These might be mitigated by studying multiple localities with similar communities and characteristics [7], as well as providing different modes of interactions with the information ecosystem.

Overall, this research closely relates and extends the new wave of services that aim to promote sustainable change through information3 by introducing a new paradigm, in which digital technologies and information ecosystems have the potential to not only promote sustainable change but also to illustrate the relationships between change and information.

6. ACKNOWLEDGEMENTS

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7. REFERENCES


2 http://www.firstgroup.com/

3 http://www.opower.com