Evaluating a concept design of a crowd-sourced 'mashup' providing ease-of-access information for people with limited mobility

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A B S T R A C T

This study investigates the impact of using a concept map-based 'mashup' (www.accessadvisr.net) to provide volunteered (i.e. user contributed) ease of access information to travellers with limited mobility. A scenario-based user trial, centred around journey planning, was undertaken with 20 participants, divided equally between (1) those who have physical restrictions on their mobility, due to disability, illness or injury, and (2) those with practical mobility constraints due to being parents with young children who have to use a child's pushchair when using public transport. Both user groups found the concept useful, but its potential impact was less for the pushchair user group. There were mixed views in relation to the ability of the mashup to convey the trustworthiness, credibility and reliability of information necessary for journey planning. The study identified a number of key information-related user requirements which help enable effective design of user contributed web-based resources for travellers with mobility-related issues.

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1. Introduction

1.1. Lack of support for travellers with limited mobility

Physical mobility plays a key role in social inclusion (Lucas, 2012). This applies to individuals with a physical disability, as well as those with other constraints on using the transport network. There still exists a problem of providing effective, easy to use travel information for public transport users with limited mobility. Nearly 20% of the UK population experience a disability, defined as 'long standing illness, disability or impairment which causes substantial difficulties with day-to-day activities' (Dept. Work and Pensions, 2013). Over half of this group experience some form of mobility impairment, which represents approximately 6.7 million of the UK population who have find using the public transport network difficult to some degree. Information is critical for supporting independent travel for this group. Waara (2009) has highlighted the need for information supporting journey planning, and how 'targeted traveller information for older and disabled travellers should enable assessment [by the passenger] of the usability of the public transport environment'. In relation to a user group with

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specific mobility limitations, Ray and Ryder (2003) describe how active and considered evaluation of the travel risks is undertaken by even the most outgoing and risk-taking of the wheelchair user community, before they start a journey.

Despite equality legislation (Equality Act, 2010) there is still believed to be a lack of reliable and up to date information on accessible transport networks (Commons Select Committee, 2013). Those with mobility impairments have reported that they find it difficult to obtain information that enables them to undertake independent travel. When studying the barriers to travel by older/disabled passengers, Waara (2009) found that 24% of their sample stated poor accessibility, and 21% stated difficulties in obtaining the information needed to plan a journey. Research commissioned by the UK Dept. for Transport (2004) showed that disabled peoples' experience of public transport is that it is often inaccessible and of poor quality, and that difficulties in obtaining information about the accessibility of services tend to add to their problems when travelling and make them less inclined to use public transport.

The majority of previous research on accessibility of transport (e.g. Waara, 2009; Ray and Ryder, 2003; Dept. for Transport, 2004; Lucas, 2012) has focused on older passengers, travellers with permanent or temporary disability, or other forms of social exclusion. However, a recent large-scale EU funded project (ISEMOA, 2013) has highlighted that 'people with limited mobility' includes a broad range of potential travellers, amongst others, those with physical and practical barriers to using public transport successfully, such as those pushing pushchairs. For this reason, this study included both travellers with physical disability, and adults with young children who needed to travel with pushchairs (termed 'pushchair user' in this study), and compared and contrasted these two user groups.

1.2. The phenomena of user contributed data

A relatively recent phenomena has been the emergence of volunteered geographic information (Goodchild, 2007) and neogeography – described by Das and Kraak (2011, p.1) as 'the domain where users make use of geographic information using web 2.0 applications'. These have resulted in the emergence of information products where volunteered data (including geographic topology and location-referenced information) is combined with professionally produced geographic data to form a 'mashup'. Mashups are defined by Flanagin and Metzger (2008) as 'web applications that combine data from multiple sources to form a new integrated resource'. An example is provided by Knight and Bichard (2012) where the locations of public toilets are identified by members of the public, and are located onto a base layer map to provide an online map of facilities. Cardonha et al. (2013) describe development of a crowdsourcing platform to enable creation of accessibility maps. Hara et al. (2013) demonstrate that even untrained volunteers can identify the presence of accessibility problems with relatively high degrees of accuracy.

One advantage of user-contributed data is that it can be very current. Goodchild (2008) stated that 'perhaps the most significant area of geospatial data qualities for VGI [volunteered geographic information] is currency, or the degree to which the database is up-to-date' and Parker et al. (2014) found that judgements of currency were influenced positively by including VGI within mashups. Mashups incorporating VGI can easily reflect changes in the environment, for example temporary closure of facilities or the accessibility of facilities during construction works. They can also provide a personal perspective on the potential facilitators and barriers for those with mobility limitations using the transport network.

Since information can be provided by any member of the public, map mashups can capitalize on the capabilities of 'citizens as sensors' as described by Goodchild (2007). In particular, information can be provided *by* those with mobility limitations, *for* those with mobility limitations. However there are also several potential limitations to volunteered information (Parker et al., 2012; Zielstra and Zipf, 2010). For example, coverage may be patchy, and information incomplete with a lack of quality control. Web-based Wiki style sites are often cited as needing large user-bases in order to generate any sizeable quantity of content due to the '1% rule of thumb', or '90-9-1 principle', which suggest that only around 1% of users of a website contribute the vast majority of new content, with a further 9% contributing sparingly (e.g. editing or rating content). The majority of individuals will *use* but not *contribute* content. In one of the few published empirical studies of this phenomenon, this general observation was supported within the digital health social network context (Mierlo, 2014).

For map mashups incorporating user-contributed data to be successful, they need to meet the needs of target users. It is currently unclear how some user groups (who may have some specific needs and varying internet experience) react to these forms of data aggregation, and how volunteered, geographic-referenced information might be best presented to end users.

1.3. Aims

Based on the ongoing information needs of travellers with limited mobility, and the emergence of map mashups, there are opportunities for web-based resources that provide user generated information on transport accessibility. The aims of this research were to better understand (1) users' attitudes towards these integrated information products and (2) how they may be designed. The specific objectives of the study were to:

- Assess reaction to a crowd-sourced travel information mashup using theoretically robust constructs.
- Compare the responses of two distinct user groups with mobility limitations.
- Identify key user requirements for presenting this kind of data to end-users.