Institution:
Liverpool Hope University

Unit of Assessment:
Geography, Environmental Studies and Archaeology (17)

Title of case study:
Transforming spatialities, cartographies and navigation: attitudes towards and engagements with satellite navigation technologies

1.Summary of the impact (indicative maximum 100 words)

The key impact of this case study is to identify and highlight, to geographic and cartographic communities and beyond, the effects that the attitudes of people towards, and engagements with, satellite navigation technologies have on their spatial and cartographic awareness. This work has shown how new navigation technologies influence choice and methods of wayfinding. They also affect attitudes towards more 'traditional' maps and their use. Key users and beneficiaries include: professional bodies in Geography and Cartography; GIS software producers such as the Environmental Systems Research Institute (USA) and Google (USA); and universities and other educational institutions.

2. Underpinning research (indicative maximum 500 words)

This case study presents the outcomes of an initial discovery phase of research on satellite navigation and its impacts on spatial awareness and graphicacy. The research team of Dr Janet Speake (project leader), Dr Kevin Crawford and Mr Stephen Axon, is based in the Geography Department. The work has developed swiftly since the initial idea was formulated in autumn 2010, and has been developed by committed individual researchers who have been supported by the university which has created an enabling framework (including funding), so facilitating impact with global reach.

The very fast, upward trajectory of the Sat Nav research reflects its uniqueness and currency. It developed over a very short time period and, as the substantial implications of the research findings became obvious, the team moved quickly to widen the reach of this emerging knowledge. The first paper on attitudes towards Sat Nav use (Axon, Speake & Crawford, 2012) was published in *Area*, profiled in Geography Directions (via the RGS web-site) and was presented at the Cognition, Behaviour and Representation session of the Cartographic Specialist Group at the Association of American Geographers international conference in New York (February 2012). The second phase of work on user engagements with Sat Nav technologies was presented at the Royal Geographical Society-Institute of British Geographers Conference in Edinburgh in 2012 and published in a special edition the *Cartographic Journal* later in the year (Speake & Axon 2012). Further work on engagement was presented in the invited paper "I've got my Sat Nav, it's alright": Users' attitudes towards, and engagements with, technologies of navigation' at the Association of American Geographers Conference in Los Angeles in April 2013. The paper is currently under review for publication in the *Cartographic Journal*. A reflective piece on *Sat Nav, Smartphones and Spatiality: Transforming Wayfinding* is under review at the Yale Centre for Globalization.

The distinctiveness of this research lies in its application of qualitative techniques, including ethno-methodological and engagement approaches to a largely quantitative domain (cartography).The critical outcome is that Sat Nav is not engaged with, or used, in the same way as more traditional wayfinding artefacts. Significantly, the digital spatial representations of Sat Nav are not viewed as 'maps' (in the same way that paper-based maps are) but as something different and distinctive. There is clear preference for the use of Sat Nav over 'traditional' maps and there are emerging issues about the potential negative effects that the use of Sat Nav has on spatial awareness and cartographic literacy. These will have major impacts within and beyond geography and cartography, and these have proved potent drivers for the research team's quest to widen awareness, to promote discussion and ultimately inform policy and practice.

3. References to the research (indicative maximum of six references)

Both articles are listed in REF2

Axon, S., Speake, J. and Crawford, K. (2012) "At the next junction turn left". Attitudes towards Sat Nav use. *Area* 44.2: 170-177.

This paper makes an original contribution in that it identifies and starts to remedy, the global lack of knowledge and understanding of the spatial and cartographical impacts of satellite navigation. It demonstrates, through the use of attitudinal approaches, that satellite navigation is y changing people's wayfinding behaviour and their understanding of what maps are and can do. Peer reviewers of the paper commented that: 1. "This is a well composed empirical investigation into a strangely under-published context" and 2. "it addresses an important blind spot in the geography literature".

Speake, J. and Axon, S. (2012) "I never use 'maps' anymore". Engaging with Sat Nav technologies. *The Cartographic Journal* 49: 326-336.

This paper presents an original application of engagement research approaches to satellite navigational use. It presents a novel conceptual and methodological direction, which promotes a qualitative approach in a traditionally quantitative cartographic domain. It provides an underpinning of ethno-methodologically informed studies of wayfinding practices and demonstrates the implications of the use of satellite navigation on spatial awareness and cartographic literacy. Peer reviewers of the paper commented that: 1. "a carefully organised qualitative study of real world perceptions of Sat Nav vis-à-vis mapping. The classification and coding of responses into cognitive, affective and behavioural factors works well. It's effective" and 2. "the authors' attempt to examine people's perception of traditional maps and advanced location-based systems is timely and should be praised".

4. Details of the impact (indicative maximum 750 words)

The principal aim of this research is to raise awareness and to highlight the nature of the attitudes of people towards, and engagements with, Sat Nav technologies and their impacts on wayfinding behaviour, spatial awareness and graphicacy. This is especially the case for the geographic and cartographic academies, who to-date have hardly been engaged at all with the implications of such technologies both in people's changing preferences of ways of navigating and their implications for subjects which are centred on 'maps'. Additionally the work has resonance for organisations whose core interests lie with navigational technologies, their production and/or use.

Satellite Navigation (Sat Nav) technologies have become the subject of intense worldwide, comment. Profiled in the media for navigation blunders, Sat Nav provokes reaction from virtually everyone who encounters it. Yet there has been little attention given to other major facets of Sat Nav. At a time of fast and widespread adoption of Sat Nav and Sat Nav enabled smartphones (in 2013 there are an estimated two billion units worldwide), there is an imperative to develop an understanding of the effects of such radical change on: wayfinding behaviour; attitudes towards and engagements with Sat Nav; and the consequential impacts on spatial and cartographic awareness. Sat Nav research at Liverpool Hope has started to address these issues and to fill, what peer-reviewers on several occasions, have called a 'blind spot' and a 'surprising gap' in geographical knowledge. The work has made original contributions to the body of knowledge as demonstrated in Axon, *et al.* (2011) and Speake & Axon (2012). In novel ways it applies qualitative approaches to the inherently quantitative science of cartography. This features in Axon *et al*. (2011) but more especially in Speake & Axon (2012) in the exploration of user engagements with Sat Nav. In drawing on research participants' real words and life experiences, these studies consider the implications for the geographical dimensions of the relationships between people, their spatial awareness and places.

Up until now dissemination has involved show-case research to professional bodies, including the Royal Geographical Society, Cartographic Society and to international academic audiences. There has been engagement with research units working in the areas of cognition, spatiality and wayfinding in US universities (e.g. Cornell and Pittsburgh) and Saskachewan (Canada).

Responses from some institutions, with distinctive technological and applied remits (particularly the Australian Defence Force Academy/University of New South Wales), has been significant in encouraging the application of qualitative methodologies. The research team have been informed that quantitative researchers in navigation and GPS-based technologies knew that qualitative work was needed, but did not previously see how it could happen

A direct intersection occurs between the research and GPS/software producers, a common ground where academic research meets the wider cartographic world of map creation and production. Here this work has direct application and relevance. These users e.g. The Ordnance Survey, UK and the Education team at The Environmental Systems Research Institute, USA, have commented on its value in developing qualitative approaches for addressing cartographic and navigational issues and observed that this research theme is "critically necessary", and is "filling a very important gap" because "we don't fully understand how people use maps, even after all these years". It was also recommended that "The NACIS "[North American Cartographic Information Society] should be told about this too and ICA [International Cartographic Association] even more so". Similar observations have made by representatives from Google, from whom the reaction on reading the work was, 'that's original' with the encouragement to apply to Google research funds.

The work (particularly, its potential impact on young people's engagement with wayfinding and cartographic awareness) has caught the attention of the Geographical Association. There are curriculum implications for cartography in the classroom and for fieldwork. These dimensions have also been raised as an issue with the 'Discipline Lead', Geography, Earth and Environmental Sciences, Higher Education Academy. The paper 'Navigating our way through the research-teaching nexus' on the 'co-production' of new knowledge is in preparation. In terms of wider impact, Janet Speake was contacted directly by the *New York Times* on 11 January 2013 for insights into the impacts of satellite navigation on spatial awareness and was interviewed on 18 January 2013 for a piece on satellite navigation and 'The Knowledge' (London cab drivers) to be published in the *New Yorker* Magazine.

This case study demonstrates how the synergetic interconnectivities between the work and commitment of a small team of researchers may generate impacts with reach and significance.

5. Sources to corroborate the impact (indicative maximum of 10 references)

Source 1. Department of Education, Industry Curriculum Development Manager, Environmental Systems Research Institute, Broomfield, Colorado, USA

Source 2. School of Physical, Environmental and Mathematical Sciences, University of New South Wales/Australian Defence Force Academy, Canberra, Australia

Source 3. Journalist, New York Times