



# Intelligent Infrastructure Futures

## The social impacts of intelligent infrastructure on transport

**The social impacts of technologies reflect the interaction between the 'drivers,' the possibilities that those technologies can deliver and 'user pulls,' the needs that we would, knowingly or otherwise, like them to fulfil. Social science can bring insights to these impacts and can guide the design and development of technologies to minimise unanticipated outcomes.**

Social scientists deploy a range of methods to monitor and understand the development of evolving technologies such as intelligent infrastructure systems (IIS). For example, technology companies such as Intel already invest time and resources in understanding how we use technology at the micro level. Intel has deployed anthropologists to look at physical movement around retail outlets, and to look at the use of mobile IT by rural professionals such as veterinary surgeons, for whom connectivity and efficient travel are critical.

### Social learning from early pioneers

The concept of social learning helps us to understand a key aspect of user pull – the ways in which end users 'jury rig' technologies to do things that are beyond the scope of standard, mainstream products. We can expect an intelligent infrastructure to give rise to comparable unanticipated uses. In the same way that the fashion industry monitors 'street fashion,' the social sciences can help to identify emerging trends by observing these and similar ad-hoc innovations.

Information technology has transformed such techniques as 'transport diaries,' presenting data sets in a variety of ways. 'Mobility biographies' for individuals or groups can show how life choices and mobility vary over time, as conditions change and new technical opportunities for travel arise.

Detailed monitoring of the use of mobile telephony has allowed the development of 'reality mining,' gathered proximity, location and activity data in real-time as a resource to examine individual and social behaviour. Researchers have also conducted network traffic analysis to understand the impact of the Internet on collaborative working and on the functioning of distributed scientific communities.

### Cultural variations

Regional and cultural variations can influence our willingness to innovate. For example, in parts of Asia, availability of fast broadband is producing new paradigms for the combination of movement, physical goods and services. However, the combination of broadband penetration and, in the case of Hong Kong, excellent public transport reflects the very high densities at which people are prepared to live. These are very different from urban environment that is acceptable in Europe or North America.

The technology paths in transport and communications in the UK over the past 50 years indicate the potential scale of what could happen to mobility for people and data over the next 50. Modal shifts and consequent social adjustments have transformed expectations of mobility and communication. In physical movement

*While the Office of Science and Technology commissioned the work, the findings are independent of Government and do not constitute Government policy.*

there has been a substantial switch from public transport to individualised private transport. The consequent dispersal of residence and employment makes any reversal of this trend extremely challenging, and a major issue for IIS.

In telecommunications, the shift from landline to cell phone has seen a critical shift from calling a location to contacting an individual. We can see the consequences of this shift in the road-warrior phenomenon with which time in transit changes from a cost to a potential resource. This manifests itself in the rapid diffusion of wireless Internet technologies to train operators and airlines who offer connectivity during journeys to attract higher value business customers.

## **Sustainability and exclusion**

There will be inevitable issues of sustainability and exclusion around access to a pervasive digital environment. Information ubiquity requires us to deal with both an information divide and a knowledge divide. The former reflects access to technical services, but the latter requires the development of capacity and capability and implies social learning.

The development of the intelligent home and the processing of information within the home or home office leads to the concept of an 'ambient workplace'. This not only blurs the distinction between private household and public workspace, but also between travel for leisure and for work.

As the elements of IIS begin to deliver identifiable benefits, there could well be questions about the acceptability of real-time feedback from monitoring individual behaviour and performance. For example, if central or local government were to mandate switches in the mode of transport, perhaps shaping individual choice against a personal carbon account monitored in real time, it would be important to investigate the social implications at every level.

Evidence from emergent practice in local governance shows that robust, low-cost engagement between communities, local government and service providers is possible with existing resources. The development of IIS will offer opportunities to engage in forms of action research which inform decisions, promote buy-in of stakeholders and provide the basis of social marketing campaigns.

Social learning can be supported as a collective, networked activity through the extension of a range of established practices within social research. The rapid feedback of end-user experience to policy makers goes well beyond current notions of 'cyber democracy' as a pattern of real-time referenda. Such a system can develop alongside Intelligent Infrastructure Systems.

This Research Brief is based on the Research Review written by Dr Stephen Little of the Open University for the Foresight Project on Intelligent Infrastructure Systems. Series editors Professors Phil Blythe, Glenn Lyons, Will Stewart and John Urry. Editor Michael Kenward.

**The full version of this review is at [www.foresight.gov.uk](http://www.foresight.gov.uk)**