THE UNUSUAL SUSPECTS:
THE IMPACT OF NON-TRANSPORT TECHNOLOGIES ON SOCIAL PRACTICES AND TRAVEL DEMAND

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Abstract
Despite cases in which travel is undertaken purely for its own sake, travel is usually considered to be derived from a need or desire to participate in a wide range of activities – accessing people, goods, services and opportunities. People's schedules of activities in turn are derived from social practices (and the patterning of land use that affects where and when activities can take place). Travel demand, in part, is shaped directly and indirectly through the emergence of various kinds of technologies. Until now, discussion of emerging technologies in the transport literature has focussed on the impact of: (i) transport technologies (designed to assist traffic management and the movement of people through the transport system); and (ii) information and communication technologies (ICTs, that enable a substitution for or reorganisation of travel in time and space).

This paper introduces a third type of technologies labelled 'non-transport technologies' reflecting technologies that shape social practices causing indirect impacts on travel demand. The invention of refrigeration, for example, enabled storing food for longer periods both in shops and in homes. This facilitated weekly rather than daily shopping and was allied to economies of scale for retailers in the form of out of town supermarkets.

The paper briefly outlines the interpretation of travel demand within transport studies and then goes on to examine some selected examples of past, present and future non-transport technologies exposing the possible indirect influences they can have on travel demand. This exposes that travel demand is not so much derived as embedded within networks of objects and social practices. The paper concludes with discussion of how non-transport technologies may or may not be embraced in transport debates and the policy framework. In particular there is contemplation surrounding the question of how social practices, facilitated by non-transport technologies, might adapt in a setting where travel demand becomes more restricted.

1 Introduction

1.1   A brief history of the origins of the study of travel demand in transport studies
The transport profession continues to evolve (Lyons, 2011a). A simplistic depiction of how this evolution can be conceived of in terms of the (growing) importance of social science is shown in Figure 1. We have moved from needing to understand engineering principles to a greater need to understand human behaviour.

As mass motorisation unfolded the profession was rooted in engineering – the challenges lay in creating the infrastructure and the design of vehicles to run upon it. There was an appetite for creating physical connectivity between locations and enhancing the ease and speed with which one could access other places. Expansion of the infrastructure went hand in hand with a growth in people wishing to use it and having the resources to do so. The popularity of motorised travel fuelled further technical endeavours in the form of traffic management with

the aim of making the most of the asset and moving vehicles through the network with greatest efficiency and minimal delay. The profession was largely aligned with a 'transport is here to serve' mentality (Lyons, 2004). It was not considered the place of transport professionals to question or influence people's demand for travel. Their responsibility was to meet the demand as effectively as possible. Part of this responsibility became a need to have a sense of how travel demand would change in the future in order to be able to accommodate it. The approach was known as 'predict and provide'. This era was substantially undermined by the 1990s. Not only were there huge costs associated with trying to keep pace with demand but the, now not so startling, revelation emerged of a link between supply and demand (SACTRA, 1994). The provision of more road capacity in itself generates some new traffic, in other words by making it easier to get from A to B more people elect to travel from A to B. The profession has, latterly, turned its attention to notions of managing travel demand – attempting to stem the problem nearer its source as opposed to trying to deal with the consequences of unchecked demand.
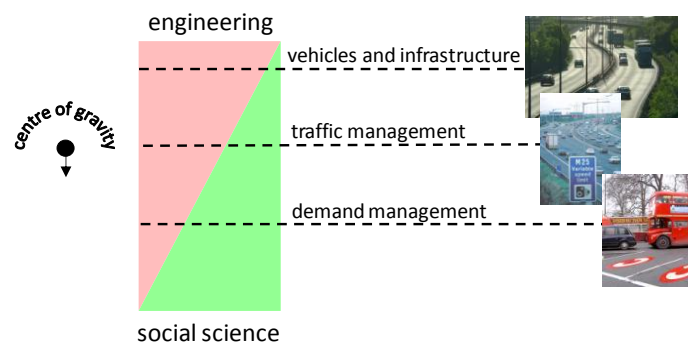

Figure 1. A depiction of the evolution of transport studies

1.2   Travel demand and its analysis

Understanding the demand for travel has become of increasing importance either in terms of informing policies to influence demand or justifying investment in transport measures to accommodate demand. Travel demand can be considered in terms of the volume of trips society seeks to make or more specifically in terms of where, when and how people travel – the destinations, times and transport modes of journeys. Understanding of demand comes from recognising its root causes.

Transport planning orthodoxy is that travel is a *derived* demand – derived from the need or desire for people to participate in activities at an alternative location (though the absolute of the orthodoxy is contested (Mokhtarian and Salomon, 2001)). Accordingly the field of *activity-based analysis* has developed in which the emphasis is upon understanding and representing people's activity schedules and how time and space are negotiated as a means to in turn establish the derived outcomes in terms of travel demand (Kitamura, 1988). Travel demand analysis spans from approaches that address the individual traveller through to those which concern themselves with being able to represent and interpret overall patterns of travel demand – at the aggregate.

1.3   Towards improved or expanded understanding

Whether examining travel demand at the level of the individual or at some level of aggregation, the challenge for transport planning is *to improve our understanding* such that we are better able to interpret how travel demand has changed, is changing and may change (or could be changed) in the future and thereby support policymakers in making better informed decisions. A means to improving understanding lies in probing further the myriad of root causes and influences on demand. Travel derives from people's pursuit of *access* to people, goods, services and opportunities. This pursuit itself is embodied within and defines social practices – the way we lead our lives according to the means at our disposal and the norms of human behaviour as we operate together within the complex system of 'transport and society'.

Living, as we are, in the information age there has been considerable interest in how technologies are and can play a part in shaping our transport system and its use. The field of Intelligent Transport Systems (ITS) has principally concerned itself with how technologies

can assist in the collection of data, processing of data into information and the use of information in managing the transport system and supporting the decisions of travellers (Giannopoulos, 2004). Meanwhile information and communications technologies (ICTs) have proved an alluring area of study (principally regarding teleworking and teleshopping (Cairns et al., 2004; Mokhtarian et al., 2004; Farag et al., 2007; DfT 2009)) in terms of the prospects for them to influence social practice and travel demand in a number of ways, including (Lyons et al, 2008):

- *substituting* for the need for physical travel by providing electronic access to people, goods, services and opportunities;
- *supplementing* physical travel by increasing access and social participation electronically – in effect substituting for an increase in travel in the pursuit of greater access; and
- *redistributing* travel by relaxing temporal and spatial constraints for activities.

These are, themselves, areas that are far from fully understood, especially as the technological possibilities of ITS and ICTs continue to expand and intensify. Nevertheless they might be considered now the 'usual suspects' in relation to technology's influences on travel.

1.4   Introducing the unusual suspects
In terms of understanding how technologies and travel inter-relate, this paper brings forward an alternative genre of technologies for consideration – namely those technologies that are not (typically) intended (at their point of invention or of mainstreaming into society) for a role in influencing travel demand but which nevertheless affect travel demand (sometimes profoundly) in an indirect way through how they shape social practices. We refer to this genre as our 'unusual suspects'. We take these 'non-transport' technologies to encompass a broad scope including: electricity, radio, credit cards, photocopiers, broadband, pervasive computing, wireless networks, fast food, DVDs, localised household recycling, mobile telephony, pay-per-view TV and so on. Such a disparate list demonstrates that the term 'technologies' is being used to refer to all those 'designed material objects' which when combined with organised human activities intentionally or unintentionally enhance the powers of humans in and over their environment.

In this paper, we argue that travel is in fact a manifestation of the interplay of many technologies and related practices such that its true understanding stretches well beyond the bounds of what might be considered a 'transport studies' perspective. In this introduction we have referred to the notion of *derived travel demand*. Yet it could be argued that this may be too restrictive or simplifying – the term is economistic, individualistic and ignores the array of social practices within which 'travel' may come to be embedded. Travel demand is not always so much derived as embedded within networks of objects and social practices.

We envisage within this paper the prospect that non-transport technologies – across their vast and varied scope – are far more important than previously recognised in influencing the scale and patterning of people's travel. There is a fascination and intellectual challenge associated with how non-transport technologies can be identified as playing a part in indirectly influencing travel demand. However, perhaps the key question in terms of relevance to transport planning, policy and practice is as follows: *are the effects of non-transport technologies (when taken in sum) able to be understood or represented in such a way so as to inform and influence the processes of decision making that continue to shape our transport systems and their use*? This is a difficult question to address but one that cannot be ignored. If policies are being developed to limit, change, or reduce people's travel then non-transport technologies may thwart those policy ambitions in serious ways or lead them to be realised in unexpected and surprising forms. So there is both an intellectual and policy interest in establishing just how important these non-transport technologies are and could be in general and within various domains of activity.

The next section examines the notion of non-transport technologies and how they associate with and influence social practices (and in turn travel). The following section explores what the implications might be of non-transport technologies for transport policymakers.

2 Influence of the use of technology on everyday life
Understanding of the meaning of travel and its place within everyday life is broadening within transport studies. Lyons and Urry (2005) have examined in depth how travel time is

experienced and valued, extending and exploring the recognised notion that travel can be more than only a means to an end but an end in itself. Nevertheless, travel, from at least a perspective taken in transport studies, is usually not valued in and of itself, but for the activities it allows people to partake in (Bamford, 2001).Therefore, if change occurs in either the activities people need or want to perform, or in the means they use to perform them, the demand for travel is likely to change accordingly. Technologies have the potential to influence the activities people need or want to perform.

2.1 Focus on the end user

It appears that much attention in the past has tended to focus upon a supply-side view of technologies and their relation with society. Fischer argues that more attention must be paid to the demand side of technologies and a "focus on the consumer if we are really to understand the social implications of technology" (Fischer, 1992: 17). Focusing on the demand side allows an exposure of the realities of how people use technologies that may be at odds with the supply-side view of how they were anticipated or intended to be using them. This exposure includes a realisation of the different ways different people can use a similar technology (Pinch and Bijker, 1984; Oudshoorn and Pinch, 2003). There are some notable exceptions to this paucity of demand-side examination such as studies by Cowan (1989), Fischer (1992) and Shove and Southerton (2000). Based on historical analyses of housework technologies (Cowan) and the telephone (Fischer), these scholars have shown how these technologies have changed the conduct of various everyday activities, often in unanticipated and/or unintended ways. In addition, Shove and Southerton's study of the domestic freezer strongly underlines the notion that the ways in which certain technologies are used are not fixed but often change over time as a result of changing needs. In the 1980s, for example, the freezer was mainly heralded for the economic efficiency provided by the bulk-buying it enabled, whereas in the busy 1990s the main convenience offered by the freezer was to help juggle and manage one's time (Shove and Southerton, 2000). In other words, *the context of technology matters tremendously to how it is used and this can be an evolving proposition that varies across different people*.

From Fischer's work it is observed that *a certain technology can have different and even contradictory consequences for different groups of people* (allied to being adopted for various needs and put to various ends (see also Shove and Southerton, 2000)). New or existing 'technologies' should also not be thought of as bounded and specific to certain sectors or domains. For example, the ubiquitous Polyprop chair designed by Robin Day and produced since 1962 by the millions found an unusual, but essential and widely adopted, purpose in traditional dugout canoes in Botswana (Votolato, 2007: 153). Thus, technologies do not develop in and of themselves. They operate within an environment, and components of that environment are drawn into and become part of a network. *The consequences of a certain technology can also change over time, often related to the level of adoption*. Fischer uses the example of the washing machine to clarify this issue by explaining how "early washing machines may have encouraged collective housework, drawing homemakers to Laundromats, but the later, cheaper machines probably encouraged privatization of housework by allowing homemakers to do the wash at home" (Fischer, 1992: 15). One could thus argue that in the early phases of the washing machine this technology may have increased travel demand by introducing trips to Laundromats, but this effect was reversed with the introduction of cheaper privately owned machines.

Although the above might give the impression that the choice of whether, how and to what end to use a certain technology is personal, it should be stressed that in this choice process individuals are influenced by cultural and social conditions.

2.2 Unintended consequences of technology use

The seemingly simple observation (Fischer, 1992, page 18) that "the consequences of a technology are, initially and most simply, the ends that users seek" is complicated by the fact that people tend to pursue multiple and often conflicting purposes. As a result of this, technologies can have what he terms 'nonobvious' consequences, for example, when they affect the trade-off between people's various goals leading to contradictory outcomes, or even a lack of any obvious outcomes whatsoever. A telling example of this can be found in Cowan's (1989) study of the mechanization of housework which showed how American housewives used the time saved by washing machines and the like to achieve ever higher

levels of cleanliness, leaving the total time spent on housework unchanged. Where technologies are concerned it seems unintended consequences abound as illustrated in Tenner (1997). He observes that "whenever we try to take advantage of some new technology we may discover that it induces a behaviour which appears to cancel out the very reason for using it" (Tenner, 1997: 7) – low tar cigarettes that compel smokers to smoke more, driving to health clubs to use treadmills.

Alongside intended and unintended 'individual' consequences, Fischer discerns a third type of *collective* consequences which are also unintended but result from *other* people's use of technologies. For example, when many people switched from using film cameras to digital cameras, it became less attractive for manufacturers to produce film cameras as a result of which the choices for committed film camera users have become more restricted.

2.3 Some central questions and considered examples of technologies and travel
According to Fischer there are three basic questions that can be asked if one wants to assess the influence of technology use on people's daily life (1992: 20):
1. Why and how did/do individuals use the technology?
2. How did/does using it alter other, less immediate aspects of their lives?
3. How did/does the collective use of a technology and the collective responses to it alter social structure and culture?

These questions strongly align with the focus of our paper. With the questions in mind, some selected examples of past, present and possible future technologies expose the possible indirect influences they can have on travel demand.

The first example is that of the freezer. The freezer redefined food storage for retailers and consumers and has seen a dramatic co-evolution of consequence in terms of land use, shopping practices and car dependence. As people were afforded the means of, and increasingly adopted the habit of, stocking freezers to capacity in weekly rather than daily trips, the mass ownership of home freezers and cars combined in terms of consequence. Companies developed supermarkets in "low-rent districts or on well-traveled automobile highways" using "abandoned factory buildings, garages, or other low-value structures, with inexpensive fixtures" thus "appealing to motorists by providing free parking facilities" as well as warehouses full of canned and frozen food (Hecht et al, 1941: 21). The home too came to resemble a technicolour warehouse: "larder shelves display an array of canned foods; freezer compartments offer you a selection of instant meals" (Bowlby, 1997: 102). Freezers offered a "'Supermarket' right in your kitchen" (Life, 1948: 2). By the 1980s the novelty of frozen and packaged food had become part of an inter-dependent web, a 'regime', of technologies and practices oriented around the freezer, the warehouse store, and automobility (Shove and Southerton, 2000: 314).

In relation to travel demand, the *freezer* has, indirectly, brought about changes in the social practice of shopping but it has also contributed to a car dependence and shaping of land use patterns that have reinforced this dependence. In supporting the viability of large scale (out-of-town) supermarket development, the freezer has played a part in the demise of local shops and facilities in neighbourhoods (Wrigley, 1998). Allied to this we have increasingly been afforded the availability of exotic and 'out of season' foods from far-flung places. Once seen as commercial warehouses supplying domestic warehouses, bulk buying of food has been associated with a greater proportion of shopping trips by car but arguably fewer (food) shopping trips overall. However, supermarkets have become more than (only) warehouses. They are our source of fresh produce, with chillers as opposed to freezers able to satisfy what might be more frequent whimsical food purchases. This said, it seems an age of austerity may, for the moment, be returning attention to demand for more cost-conscious frozen food purchases (The Guardian, 2008; Thisismoney.co.uk, 2008).

We can then briefly answer Fischer's questions as follows:

Why and how did/do individuals use the technology? - The technology has afforded the bulk buying and/or longer-term storage of food.

How did/does using it alter other, less immediate aspects of their lives? - This has fuelled the attraction towards car ownership and use which in turn has made more readily available the car as a travel option for other activities and trips, contributing to lifestyle fashioned around the car.

How did/does the collective use of a technology and the collective responses to it alter social structure and culture? - Collective capacity to store frozen foods at home has changed the retail model which has established a norm of out-of-town retail shopping allied to the neglect of local shops thereby reinforcing a reliance on motorised mobility.

A second example is the *birth control pill*, addressed through these questions as follows:

Why and how did/do individuals use the technology? – Women's use of the pill has given them greater control over the course of their life roles through greater control over childbearing.

How did/does using it alter other, less immediate aspects of their lives? - The results from a study by Bailey (2006: 317) show "that changing career trajectories, resulting from delay in childbearing, constitute the primary mechanism connecting early access to the pill to increases in labor-force participation".

How did/does the collective use of a technology and the collective responses to it alter social structure and culture? – Widespread use of the pill and consequences in individual women's lives have accumulated to change norms of family planning and contributed towards a trend in women having children later in life. Increased participation in the workforce has changed household activities and fuelled greater reliance on others (nurseries, grandparents etc) outside the household for childcare, leading to mobility pressure and changed patterns of car dependence. When women combine mothering with paid employment, they are even more likely to use a car for their commutes as this is in general judged to be the best equipped option for making multi-purpose trips which make up a lot of working mothers' travel patterns (Dowling, 2000).

A third – perhaps more obscure and certainly more recent - example is *illegal music downloading*. The technologies of the Internet and home computing allied to the digitising of music have in turn lead to the 'technology service' of illegal music downloading. Its appeal, one assumes, is the convenience of being able to locate, sample and obtain music of one's preference with the bonus of being able to do so for free. This has impacted upon music sales and it seems, as a result, that live concerts are becoming more important for artists to be a success and for the music industry in general to make a profit (Black et al, 2007). Krueger (2005) refers to this as the 'Bowie effect' after the artist David Bowie who once in an interview said that artists "better be prepared for doing a lot of touring because that's really the only unique situation that's going to be left" (quoted in Krueger). Exact statistics on concert ticket sales for the UK are hard to find, and those for the USA seem to be inconclusive regarding whether ticket sales have increased or decreased over the past years (Krueger, 2005; Mortimer and Sorensen, 2005). Traffic jams related to music concerts are nevertheless an often heard news item. As shows become bigger and the costs of transporting them rise accordingly, concerts are more likely to be held in fewer but larger venues instead of doing small clubtours across a country. Such centralisation often implies that more people choose to travel by car as public transportation is often no longer available by the time the concert finishes. So here too we see an indirect consequence of a technology, in this case illegal music downloading, on travel demand through changes in the activity of attending live concerts.

A final example tests the boundaries of definition of 'non-transport technologies'. We have referred to such technologies earlier as 'designed material objects'. While the freezer and birth control pill fit this material definition, illegal music downloading is not of itself a technology but a technology service or a practice afforded by a set of multiple material technologies. Our last example stretches definition still further – *temporary ownership of goods and products* facilitated by information systems. Such an example underlines that one cannot look at technologies and social practices as separated entities. The sum of their parts is not as great as the whole that together they create as a technology-enabled social practice.

The use of peer-to-peer networks and the sharing and streaming of music files has been a form of temporary ownership that has exposed an interesting loophole in terms of the music industry (relating to the earlier example of illegal downloads). With regard to transport technologies, temporary ownership is reflected in the emergence of car clubs and car sharing schemes (Cairns et al., 2004; Prettenthaler and Steininger, 1999). Dennis and Urry

(2009: 97) also see signs of a "general shift in contemporary societies from economies of ownership to economies of access". According to MacKenzie and Wajcman (1985: 21) communal or shared ownership of domestic technologies "has persistently failed even though ownership by individual households is in many cases patently uneconomic in cost terms. The bias towards the individual household and individual housewife has had important design consequences." However, as Dennis and Urry (2009: 98) point out the "spreading of the notion of 'access' via the routine practices of the internet may help to facilitate this major shift in contemporary economies with potentially important consequences for future transport and travel patterns." Notions and norms of individualised ownership may be challenged if, in light of the escalated priority of sustainability, the mass production of products that are hardly ever used becomes unpopular (see for example Garcilaso et al., 2007). Shared ownership can have multiple indirect consequences for travel demand. The specific form this will take will depend on whether the shared technologies will be located at a certain location for people to use there and then, or whether the technologies will be distributed among the users according to demand. The website http://www.fractionallife.com is aimed at the shared, or fractional, ownership of luxury products. Of the various items that are on offer the currently most popular categories include fractional property, fractional aircraft and jets, fractional classic and supercar clubs, and fractional boats and yachts. Fashion is another category which offers designer handbags to those wanting to "live like a millionaire on a rather more modest budget" (see http://www.fractionallife.com/fractional_handbags.asp). In the UK alone, there are already up to six different companies that offer this service which deliver and collect the handbags to individual homes, similar to teleshopping.

The example of temporary and shared ownership of goods highlights how the technologies, though powerful, are merely enablers of the prospect of changed social practice. The extent of uptake of, and the prospect of an era of, shared ownership practices would largely be governed by social acceptances, shaped in turn by economic prosperity and environmental concerns. The washing machine is a reminder that shared ownership and use as a principle is a very old concept – the Laundromat versus the domestic washing machine.

2.4   Indirect impacts – some considerations

It has become apparent from earlier points raised that attempts to examine non-transport technologies and their implications for travel demand could go beyond the point of being challenging to being unwieldy. There is a vast and diverse range of individual technologies and technology-enabled practices. More pertinent still to the matter of travel demand is that there is also a myriad of indirect effects on travel of technologies and enabled practices. Indirect effects are distinguished in terms of *direction*, *extent* and *timescale*.

Unintended or unanticipated effects can often be taken to be undesirable (negative rather than positive in terms of *direction* of effect) but this need not always be the case (Goodwin, 2006) and as such indirect effects may be as much an opportunity as a threat. Furthermore, unintended consequences can be marginal or substantial in *extent*. An important distinction here is between the individual and the collective. An individual may be subject to a substantial effect. Different individuals may be subject to substantial effects in different directions. The net result across all individuals of interest may be that only a marginal change brought about by such individual effects results. Dargay and Hanly (2007), for example, compared car ownership levels between two consecutive years finding a very marginal increase of only 0.2% at the aggregate. This apparently negligible increase, however, was the result of a change in car ownership in almost 16% of households with 8.2% increasing and 7.6% reducing the number of cars in the household.

There is a need to acknowledge *timescale* of effects and distinguish between short-term and long-term effects. In a discussion of the process of adaptation to new policies, Goodwin (1999: 668) describes how "demographic and lifestyle constraints mean that it is likely to take between five and ten years before the adjustment is near enough to completion to get lost in other even longer term processes." Processes of adaptation to new technologies are likely to follow similar paths. Moreover, short-term impacts may vary from long-term impacts. Whereas the introduction of time-saving domestic appliances initially failed to result in a reduction of the time spent on domestic tasks, "the rise of two-career families in the 1970s and 1980s sent housework down again" (Tenner, 1997: 8). As social frameworks change, so do the impacts of technologies.

2.5   Elusive empirical evidence

Taking the points above we can also observe the challenge of establishing an empirical base for examining and attributing effects. The working of the transport system in isolation is already highly complex. As this system is expanded to include the possible relations with everyday life activities that underlie mobility and in turn the technological systems that impact those, levels of complexity multiply. Complexity arises from: a single technology being potentially related to various different kinds of social practices; and different technologies themselves interacting (Arthur, 2009) in the course of a certain activity being performed. There appears precious little (quantitative) evidence of data that captures the relations between technologies, practices and travel. Kenyon and Lyons (2007) undertook a panel study with c100 individuals in an attempt to examine links between internet use, social participation and travel over 18 months. This is a rare example of attempts to establish an evidence base, especially in terms of its longitudinal nature. However, the study proved highly challenging with regard to being able to reveal understandings of cause and effect and exposed methodological difficulties in terms of the measurement of people's time use in the context of multi-tasking. Data collection of the right sort for meaningful analysis is a big challenge in travel behaviour research even before contemplating accounting for the relations and processes associated with the roles of non-transport technologies.

3 Discussion of key issues, questions and directions

3.1   Summary observation

This paper makes the case for enriching understanding of the shaping of travel demand through examination of the indirect part played by non-transport technologies in enabling or shaping social practices and in turn affecting travel. Figure 2 depicts a schema. The diagram illustrates at one level that there is a principal direction of influence from technologies through social practices to travel. At this level the dashed line highlights the indirect influence that is of greatest ultimate interest. Conceptually this is coherent. However, in moving in a direction from the abstract towards the specific – specific technologies, specific social practices and specific features of travel – greater complexity is at work as illustrated by the smaller shapes in Figure 2. Different individual technologies are used in combination creating different influences on given social practices. Individual social practices in turn may inter-relate or overlap. For specific technology-enabled practices influence is exerted on one or more of the factors that characterise travel. This is not a complete systems diagram and is highly simplified but it already begins to highlight the challenges in developing understandings of cause and effect. The diagram can also be conceived of at the level of the individual or at the level of the population as a whole.
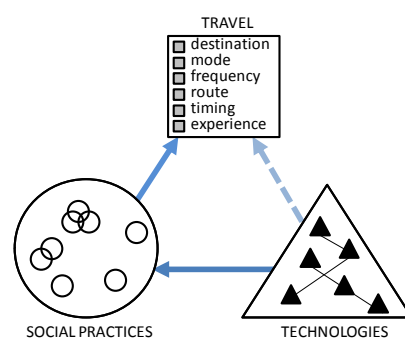

Figure 2. Interactions and influences between technologies, social practices and travel

The challenge is to derive more understanding of this schema in terms of the processes involved and the extent of consequences for travel demand. Key points from the preceding sections are as follows:

- Travel demand is not so much derived as embedded within networks of objects and social practices. The linearity of our schema could therefore be misleading.
- There is a question over whether and how we can take such an 'embedded perspective' and use it to better understand travel demand and policy decisions to influence or respond to demand.
- In pursuit of understanding, one needs to recognise that technologies can be used in

different contexts, be used differently depending on context and see their use differ for different people and over time.
- Technologies can bring about unintended and/or unanticipated consequences in terms of social practices and in turn travel. The challenge may be to anticipate the unintended.
- Indirect effects are characterised by their direction, extent and timescale.
- Better understanding is likely to remain elusive if we look to (existing, quantitative) datasets. This points to a need for potentially different approaches.

3.2   Positioning our proposition in the wider context of transport debates

Transport policy has never appeared to seriously court the prospects that technologies have to offer, at least in terms of technologies other than transport technologies. In 2000 (looking ahead for the next ten years) the UK Government observed that "social and technological changes will also alter patterns of [travel] behaviour in unforeseen ways" and "the likely effects of increasing Internet use on transport and work patterns are still uncertain, but potentially profound, and will need to be monitored closely" (DETR, 2000). This suggested at least an awareness and possible acknowledgement of (though not a willingness or commitment to act upon) the potential impacts of substitution technologies in particular. There were no signs at all of reference to non-transport technologies. Lyons et al (2008) bemoan the fact that in a later transport White Paper (DfT, 2004) not a single direct reference is made to telecommunications, teleworking or e-shopping.

The only strongly evident appetite from policymakers in terms of technology and travel is where technologies can assist travel choices (traveller information) or where they can improve the energy and environmental efficiency of transport (HM Treasury, 2008). Likewise while "quantum leaps" "trend-breaking events" and "surprising innovations" are commonly addressed in a semantic sense at least, general forecasting is predominantly restricted to the domains of new energy technology or new transport infrastructure (IFMO, 2002: 54; also FANTASIE, 2000). It could be suggested that such 'usual suspects' are seen as tractable and able to be examined within the existing sets of policy analysis tools. Perhaps such tools are ill-equipped or unequipped to examine our 'unusual suspects' for which a socio-technical approach is called for.

Lyons et al (2008) highlight three policy response options in relation to technologies (referring to substitution technologies but of equal relevance to non-transport technologies): *inactive* ("deciding that telecommunications use is outside the purview of transport policy, whether or not it may be impacting upon travel"); *reactive* ("responding to trends being brought about through market forces so as to accentuate trends concerning telecommunications use substituting for travel"); and *proactive* ("recognising or believing in the possibility that telecommunications can reduce travel and taking steps to bring this about"). The impression is rather that the current (and long established standpoint) is one of policy inactivity. This might be explained by the intractable nature of developing robust empirical evidence of how technologies are shaping travel.

There has been interest in and indeed appetite (though fluctuating in conviction) for the importance of non-transport *policies* (as opposed to technologies) influencing mobility (see Stead and Banister, 2001) – land use planning is a prime example and more recently the links between public health and sustainable transport have become of interest with increased walking and cycling offering a potential win-win solution. A recent report by the European Environment Agency (EEA) on the external drivers of transport demand highlights how developments in key sectors such as retail, leisure/tourism, business, education, and industry form key drivers of transport demand and therefore should be included in policy discussions on the development of a sustainable transport system (EEA, 2008). Likewise, Mortimer and Sorensen (2005: 2) state "that public policy aimed at promoting innovation should not ignore the impact of an innovation on goods or assets that are complementary to it." The EEA report (page 9) states that "the long term and wider implications of non-transport policies need to be considered."

Despite the lack of appetite to date to address (non-transport) technologies in transport policy, we are in unprecedented times in terms of the challenges of climate change and pressures on our economic system. There may, therefore, be a greater appetite to examine the possibilities than seen previously. Indeed it might be worthwhile to consider a different question to "how could technologies influence travel demand?" (that might point towards a

modelling response) and instead ask *"if (motorised) travel demand were restricted for reasons of scarce resource or its environmental impacts, would social practices be able to adapt based upon the underlying flexibility made possible through non-transport technologies?"* (which might point towards responses driven by expert opinion and different techniques such as scenario planning and Delphi study approaches).

One important question is whether the effects of non-transport technologies on travel (at the aggregate) are incidental or instrumental. We can conceive of how non-transport technologies may or may not accumulate meaningful effect through the lens of the transition perspective (Geels et al, 2011). The transition perspective conceives of a *landscape*, a *regime* and of *niche developments*. The landscape is the backdrop or context to a regime which reflects the essence of the current way of things operating and being understood. Niche developments may run contrary to the regime or may be subsumed within or complementary to it. Sufficient moment of and coalescing between niche developments can accumulate to bring about a change in regime – a transition. Geels et al (2011) have looked at the regime of automobility and how this is defined and entrenched in terms of systems of governance, stakeholder interests, technological development, social practices and legacy systems. We are all familiar with the essence of a car dependent society founded upon collectively high levels of motorised mobility. There are many niche developments such as car clubs, car sharing, teleworking, car-free living and so on but it remains an open question as to whether any of these niche developments are doing anything to suggest we are in a process of regime transition.

Earlier reference to the example of the freezer and its effects on travel, it could be argued, evolved in parallel with the transition *into* automobility. In such a case then, the non-transport technologies may have indeed exerted a substantial degree of indirect effect on travel within a 'receptive setting'. The question for the present day is perhaps whether or not the automobility regime is vulnerable to transition under the pressures of changing values and priorities in society – this may dictate whether or not our examination of present and upcoming non-transport technologies is timely and worthwhile in terms of the impacts of understanding we seek to achieve.

Technology fix (in the sense of transport technologies) has continued to remain the first port of call for policymakers and industry (with its own vested interests) with behaviour change (i.e. influencing travel demand) being an 'also ran' (Lyons, 2011b). However, the real prospects may well lie in considering how 'technology fix' and 'behaviour change' work in unison, especially in the case of non-transport technologies. Mainstream wisdom concerning the principal ways policymakers can influence travel behaviour (ESRC, 2008: 11) point towards regulation, enforcement, taxing, pricing and information. In various ways these are direct measures and seen to be so by the public which is why policymakers can be hesitant to pursue them too vigorously. Meanwhile giving more attention to non-transport technologies may see indirect routeways to technology-assisted/influenced behaviour change. As Winner (1985: 37) notes: "[i]n our times people are often willing to make drastic changes in the way they live to accord with technological innovation at the same time they would resist similar kinds of changes justified on political grounds."

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