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Future mobility in an ageing society – Where are we heading?

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ABSTRACT

The demographic profile of UK society is changing as people live longer. Maintaining the wellbeing and quality of life of an ageing society is set to be extremely challenging. To what extent can the state afford to meet a potentially burgeoning demand for social care? What expectations will be placed upon informal carers to enable the system to cope? In what ways and to what extent might assistive technologies have a part to play in supporting people both in terms of active ageing and in relation to coping with failing health? Beyond these questions is one which is more explicitly pertinent to transport policy: how and where will older people live and how will this affect patterns of mobility and levels of travel demand? This paper reports on a scenario planning exercise which has examined four different futures for living in later life, defined by considering two critical uncertainties: the extent to which older people in society engage with new healthcare technologies; and the extent to which the state provides care for people living in later life. The scenarios, explored with transport, ageing and assistive technology experts, serve to highlight how social practices may be shaped in very different ways both for older people and for those with whom they interact. The paper goes on to examine the implications for future mobility – such as the role of the home as a trip attractor as well as a trip generator – as well as to explore the extent to which transport policymakers are equipped to address the uncertainties for the transport system of an ageing society.

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1. Introduction

There are technologies beyond the apparent realm of transport studies that can and do shape social practices which indirectly affect the nature and extent of travel. Assistive technologies, with the potential to prolong independent living in later life, may significantly affect where and how older people live. There could be substantial implications for patterns of travel. This is the subject of this paper.

There is a growing concern that innovations in 'non-transport technologies' are not considered in projections of future travel demand and formulation of transport policy (Hubers and Lyons, 2013a, 2013b). There are three domains of technology that influence travel: (i) 'transport technologies'—those which can improve the management and performance of transport systems or enhance guidance and support to travellers; (ii) 'substitution technologies'—those that enable practices such as teleworking and e-shopping (Lyons et al., 2008) that may replace travel or enhance economic and social activity without the need for (more) travel; and (iii) 'non-transport technologies'—those not necessarily intended to influence travel at all but which nevertheless, indirectly, can do and perhaps significantly. It is the third domain that receives least attention in transport policy or investment decisions. In order to examine this, the matter of how technologies could affect the future social practices of older people and with what travel consequences is considered.

Like many developed nations, the UK is ageing (UN, 2009). Whilst the population is forecast to grow from around 62 million in 2010 to over 71 million in 2030, those aged 60 and above will increase from 30% to 39% and those 75 and above from 16% to 23% of the total (ONS, 2011). This growth brings with it concerns over the cost of supporting people in later life, and a consequent interest in the role of 'assistive technologies'. Such technologies are 'any product or service designed to enable independence for disabled and older people' (<http://www.fastuk.org/about/definitionofat.php>). They can potentially support and prolong active ageing as well as helping to accommodate and address disability and illness. One can only speculate about the different manifestations of assistive technologies in the future, given the

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ever broadening array seen today, but in a review commissioned by the UK (Tele)communications regulator it was suggested that there were three likely areas of development over the coming decades (Plum Consulting, 2010). These were: (i) constant monitoring of health (physical and mental) as opposed to alert-based systems; (ii) extended 'virtual' engagement in networks, community and society; and (iii) tools which would facilitate continued employment for older people. There is also an enduring interest in home automation and robots (albeit against uncertain timescales for substantial realisation). Many of these technologies already exist, and will be further developed into the future. For example, telecare devices such as alarms and movement detectors that support personal safety and independence are already commonly available in the UK (Robinson et al., 2013). Telehealth solutions such as providing remote exchange of data between patients and healthcare professionals are also being successfully deployed through trials such as the UK Department of Health Whole System Demonstrator programme. This said, at present there are still seen to be barriers to wider adoption of these latter technologies (Goodwin, 2010). Over coming decades it seems likely that these barriers will be addressed, and that sensors and interconnectivity among people, devices and systems will be increasingly pervasive. Technologies will develop further to: monitor where older people are located, monitor their state of health (and mood); provide alerts and guidance; remotely administer medication; support movement indoors and outside the home; provide increasingly fulfilling remote/virtual interactions with others to enhance social contact; and enable remote access to goods, services and employment. The availability and take-up of such technologies are likely to play an important part in shaping where and how older people live and the support provided to them by other people. Through influence on these and other social practice (s), technologies will indirectly affect the nature and extent of travel—not just for older people, but also for those supporting their physical, mental and social wellbeing.

The transport technologies domain may also see change. For example there is significant current interest in the potential for 'driverless' vehicles, with older people seen as a key markets (KPMG and CAR, 2012) as well as 'drivers' of demand for such vehicles (Zmud et al., 2013). Whilst such innovation could be seen to contribute to and overlap with the field of assistive technologies, it is primarily a transport innovation and thus not a direct focus of this current paper.

There are significant unknowns concerning the pathways of future technology development and uptake as well as the lifestyle choices and preferences of older people alongside uncertainty concerning what capability the state will have to financially support the needs of an ageing society. When examining areas of considerable future uncertainty a methodology which is increasingly used is that of scenario planning. This has been deployed on topics as diverse as post-apartheid South Africa (Rhydderch, 2009), developing nations and the effects of climate change (Addison and Ibrahim, 2013) and UK food security in a world subject to geo-political and environmental change (Steedman and Schultz, 2009). In all of these contexts scenario planning allowed uncertainty to be embraced. It enabled an appreciation to be developed of the need to consider and accommodate plausible yet divergent alternative futures when examining present day strategies, policies and investment plans.

A scenario planning approach was adopted involving the development of four future scenarios for living in later life. The next section of the paper briefly outlines some insights into living in older age and related issues of mobility. This is followed by an explanation of the scenario planning approach and an introduction to the four future scenarios. Implications for social practices and in turn travel are considered. The article concludes by outlining the implications for (transport) planning and policy.

2. Older age and mobility

The UK Government has regularly published two key reports reflecting data from surveys about UK society and its travel—*Social Trends* and *Transport Trends*. Recent editions (ONS, 2010; DfT, 2009) have highlighted a series of trends (set out in the paragraph below) which have helped to inform the scenario planning process.

There is a narrowing of the life-expectancy gap between men and women. This could reverse growth in older single-person households driven by women living longer (and perhaps by high divorce rates), offering more self-care and support between couples and less external dependency. An increasing number of women hold driving licences, which may make it more likely that at least one partner will remain able to drive (for longer). There is a convergence in employment rates between the sexes (although still biased towards part-time for women). Added to the gradual increase in the retirement age and gender alignment, older people will be working (and commuting) later in life with part-time employment potentially a significant element of their work. Work itself is also changing; manufacturing decline and growth in the service economy and knowledge working may make it easier for older people to extend their working lives. Health trends are also increasingly important, not least in respect of dementia. The Alzheimer's Society (2010, p. 1) suggests that "[o]ne in three people over 65 will end their lives with a form of dementia". There is a growth in obesity (in tandem with a decline in the number of walking trips on average undertaken) which portends potential health and mobility problems later in life for parts of our ageing population. Allied to such trends are advances in information age developments and challenges posed in looking to future scenarios of living in later life in terms of the lifestyles and technology engagement of future older people compared to older people today.

Further complexity arises from the fact that 'older people' are not a single homogeneous group, in fact they are 'extremely heterogeneous, only joined by their age' (GOAL, 2012, p. 2). Such heterogeneity is evidenced in the most recent (2011) population census of England and Wales, which identified some 9 million residents aged 65 and over in the population. Nearly 60% co-habited, whilst around a third lived alone and 4% in communal establishments. Importantly only 50% reported very good, or good health. Nine out of 10 were economically inactive, with 14% providing unpaid care (ONS, 2013). Finances are an issue for a significant minority of older people (Hill et al., 2011), with 16% living in poverty (DWP, 2011). There are also links between many of these factors, with for example income and wealth strongly correlated with health and well-being of the elderly (MEA, 2005).

This heterogeneity can be seen to be critically important in respect of influences on the mobility of older people. Levels of mobility have been linked with health and well being (Banister and Bowling, 2004), significantly in respect of physical health (Mollenkopf et al., 2005), with health changes over time seen as key (GOAL, 2012). Variation in social networks can play a role (Mollenkopf et al., 2005; Haustein, 2011), and there is evidence of period and cohort effects on mobility amongst older people, for example in respect of driving licence holding (Siren and Hakamies-Blomqvist, 2005; Hjorthol et al., 2010). Social (and financial) factors can contribute to the decision to stop driving (Rabbit et al., 1996), particularly for older women (Hakamies-Blomqvist and Wahlström, 1998), whilst variation in lifestyles (including the use of technology) and different expectations across cohorts can also play a crucial role in respect of mobility (GOAL, 2012).

As a consequence, research into mobility and older people is increasingly acknowledging the heterogeneity of the older population and using a segmentation approach for studies of older citizens and their mobility (Hildebrand, 2003; Haustein, 2011) extending this to include the coming generation of older people—the ‘baby boomers’ (Siren and Haustein, 2013).

In respect of older people and transport policy and planning, there are concerns that traditional representations of travel used by planners fail to provide a sufficient basis to consider them (Banister and Bowling, 2004). Travel is recognised as a contributory factor to achieve a satisfactory quality of life for older people (Farquhar, 1995; Metz, 2000; Gabriel and Bowling, 2004), but some consider that older people in the UK have suffered ‘disproportionately’ from transport issues (SEU and ODPM, 2006), and that those charged with planning and delivering transport have failed to deliver an ‘inclusive’ transport system which older people would like to travel on (Marsden et al., 2010). Transport (deficits) can be a barrier to social inclusion (SEU, 2003; Church et al., 2000; Preston and Raje, 2007), particularly in restricting ‘independence’ (Aldridge et al., 2011). Mobility-deficits can reduce both ‘discretionary travel’ (travel for enjoyment or socialising (Davey, 2007)) and travel to essential destinations such as healthcare (Deauville, 2001; Shergold and Parkhurst, 2010). An inability to ‘get out of the house’ and a lack of mobility can lead to feelings of isolation, loneliness and depression (Andrews, 2012). Shortfalls in alternatives to the car are seen to have particular consequences for wellbeing (Musselwhite and Haddad, 2010) and depression for some (Marottoli et al., 1997). It is the older-old who are most likely to have problems travelling (be it walking, driving or using public transport), and they have greater concerns about ‘immobility’, being housebound and having reduced social contacts (Farquhar, 1995). As a consequence of such issues, it is important for transport planning authorities to understand the travel needs and travel patterns of these different groups of older people (Hjorthol, 2012).

3. Scenario planning

3.1. Methodology

Scenarios can be seen as future narratives, imagining “how the world might look”, which can be used to test plans and policy options (Government Office for Science, 2009, 5). They embrace uncertainty and by identifying the principal drivers of change, they allow different (and potentially contrasting) possibilities to be mapped out. Aligica (2005) notes how scenarios make it possible to counter tendencies to presume that some developments are more likely than others (overconfidence), to focus on things that are easy to imagine (availability), or futures that are related to or based on past experience (anchoring).

There are multiple unknowns or drivers of change when defining possible futures, but commonly two ‘axes of uncertainty’ are used in scenario planning to create a ‘double uncertainty matrix’, creating four divergent futures (see Fig. 1). Axes reflect key considerations or ‘critical uncertainties’ for the exercise concerned, in this case: (i) the extent and importance of assistive technology use by older people; and (ii) the extent to which the state would be able to provide care for this group. Importantly, the resultant scenarios are only illustrative of the diversity of possible futures of which, ultimately infinite alternatives exist. 2030 was chosen as a time horizon—intended to be far enough away to allow the drivers of change to play out sufficiently to highlight divergence (i.e. uncertainty). Two further tools were also used to enrich insights, the ‘Ethnographic Futures Framework’ (Verge) developed by Kaipo Lum and Michele Bowman, and the ‘Three Horizons Model’ (Curry and Hodgson, 2008).

The scenarios were developed by the research team, and explored in detail at a workshop attended by 17 invited experts (in ageing, assistive technologies and transport), mostly academic but some practitioners. This examination tested and confirmed the plausibility of the scenarios. The workshop allowed the participants to explore the scenario narratives and, importantly, to illuminate some of the travel and transport implications that were then further examined and developed by the research team. A subsequent workshop was hosted by the UK Department for Transport and attended by around 30 transport academics and civil servants as well as ageing and technology experts to reflect on the scenarios and critically consider issues for, and approaches to, transport policy response to such future developments. A more detailed account of the scenario workshop and the application of these techniques is available (Cook et al., 2012).

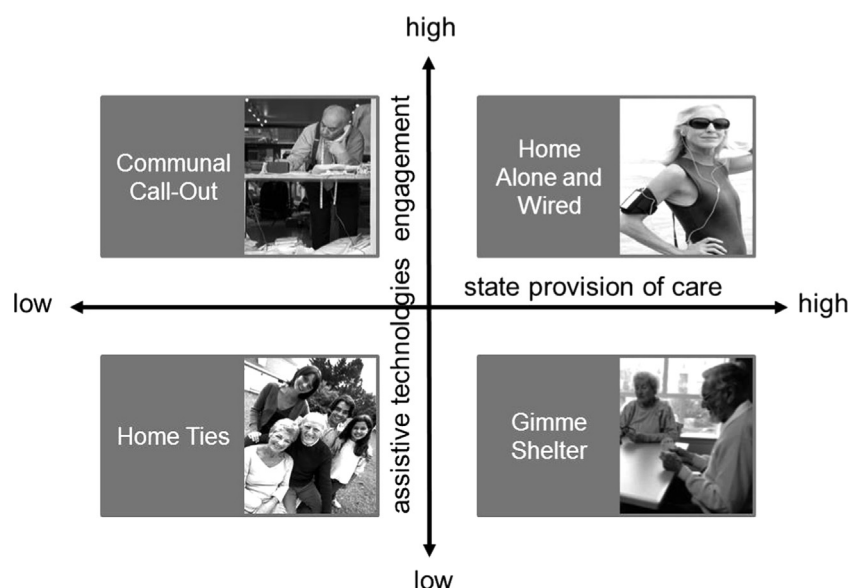


Fig. 1. Scenarios for living in later life.

3.2. The future scenarios

The scenarios developed by the exercise are depicted in Fig. 1 with the horizontal axis representing the extent of state provision of care and the vertical axis the extent of engagement with assistive technologies.

At one extreme of the 'technology' axis, developers have succeeded in dealing with issues such as privacy (in respect of monitoring and surveillance), affordability, user friendliness and personalisation. Appropriate response systems are in place for the automated alarms, and the huge amounts of data being generated can be managed. Solutions support the needs of a very heterogeneous population of older people (and their carers). As a result, engagement with healthcare technologies is high. At the other end of the continuum there is much less use of assistive technology and a greater reliance on personal care provision (formal or informal). The 'care' axis considers the extent to which people are expected to fund care, which will affect the provision and amount of both formal and informal responses. Low state provision will imply people have to pay for services themselves, with homes becoming assets to be sold when such needs (and costs) increase. State funding will also impact on the availability and capabilities of assistive technologies, with for example a more limited selection available from the public purse compared to those on offer in the commercial marketplace.

These two axes then lead to four scenarios which reflect how these two key uncertainties play out. Summary narratives developed by the research team of each scenario are detailed below.

3.2.1. Scenario A: 'communal call-out'

This scenario is characterised by low state provision of care and high assistive technologies engagement. Emphasis on individual choice and responsibilities continues, encouraged by more extensive 'means-tested' provision of health and social care. Individual care is increasingly insurance based, with availability and premiums driven by lifestyle behaviours. There are greater expectations of healthy ageing (partly facilitated by healthcare development), meaning increased demand for, and costs of healthcare services. As a consequence many people now work into older age to afford such services, helped by ICTs and greater part-time working. Most older people choose to live at home rather than in residential care than is the norm currently, with location more likely to be driven by the services and facilities that older people need—unlike past trends of urban to rural migration. There is a high level of assistive technology development and take-up, offering a means to deal with time-consuming tasks, and allowing numbers of formal care workers to stay stable whilst demand for care grows (significantly). Technology is used extensively to monitor how people are (and their behaviours), for supporting social interaction and to help combat loneliness. Other uses include distance learning and to prolong older people's employability. One area that has underperformed against predictions is use of 'care-robots'. Although they exist, most people would rather fund 'human support'.

3.2.2. Scenario B: 'home alone and wired'

This scenario is characterised by high state provision of care and high assistive technologies engagement. With increasing numbers of older people needing care, and a shortage of care-workers, human-delivered care has become unaffordable. Single households are the most common, meaning informal care provided by spouses has been replaced by technology-enabled self-care in many cases. High divorce rates and increases in second marriages have created complex families, also reducing informal care by children. Technology has provided alternatives, with 'smart' homes the norm and 'care-robots' common (in part state-funded now). Monitoring technologies, including for mental health, mean that most support can now be provided remotely, and it is likely that a home device (your phone or perhaps a fridge) now reminds you to take medication. Whilst differences exist between people's homes the state provides everyone with a base level of technology—sometimes driven by other policies, for example smart metres in response to emissions targets. The increased emphasis on self-care (through monitoring) has enabled a shift from treatment to prevention. This has resulted in a healthier population, but not the reduction in healthcare costs expected, as the strong emphasis on prevention and active ageing has raised expectations of staying active and feeling good into old age. This has increased demand for health services; as people no longer accept the infirmities of old age.

3.2.3. Scenario C: 'gimme shelter'

This scenario is characterised by high state provision of care and low assistive technologies engagement. The scarcity of informal carers and ever-growing demand make ageing in one's own house unrealistic for many older people. Yet decades of ideological imperative towards individualism mean older people do not wish to be a burden to friends and families. Moving in with the family is also not practical for the vast majority, as families are dispersed and in houses that barely have enough space for their offspring—and smaller families mean fewer children to provide support anyway. Assistive technologies have failed to meet the increased demand for care as they relied too heavily on the availability of (too few) informal carers to respond to alarms. A middle ground between living in your own home and residential care has developed in the form of 'sheltered housing'. Here older people live independently in purpose built accommodation, close to one another. Single carers can now 'service' many older people, and in some instances communal buildings host assistive technologies as opposed to deployment in each home. This means less personalisation and less likelihood of satisfying all people. Formal care is strongly skewed in favour of high-need households. Financial stringency means that the focus is on cure rather than prevention. The shortfall in monitoring technologies means that whilst older people are encouraged to live active lifestyles they may well lack the technical resources to monitor their progress.

3.2.4. Scenario D: 'home ties'

This scenario is characterised by low state provision of care and low assistive technologies engagement. Residential homes cannot cope with numbers of older people needing care, so state care is targeted at high-need physical needs. Others must provide for themselves. Assistive technologies have failed to match demand, with many judged too expensive, too invasive, or unable to meet the varied needs of older consumers. Thus most older people rely on informal care through their social networks. For those with family or friends living nearby, it is often possible to remain at home, supported by frequent informal carer visits. Others remote from (potential) regular support have been forced to re-locate. Where possible, people move closer to their social networks while they are still fit and healthy enough to help out friends and family who might be future carers. Doing so facilitates building new friendships after moving sometimes over considerable distances to go and live with their children. Multigenerational homes are more popular for those with families, whilst shared

ownership has become the preferred option for the many without family or friends to help with care (or who do not want to be a burden), but who do have some financial means. Shared schemes pool resources to develop collective housing (co-housing), offering economies of scale and a 'community feeling'. For people without social networks or sufficient finance there are still some care homes, but the quality of life in those homes is often rated low.

4. Consequences for social practices

The indirect (and unintended) effects of assistive technologies on transport and travel in these four different futures will be mediated through effects on social practices. Drawing on the scenarios and the workshops, four dimensions of social practice are identified.

- i. Living choices—how will older people live?
- ii. Location—where will older people live?
- iii. Employment—what will older people do to support themselves and others?
- iv. Interaction with significant others—how will older people socially engage?

4.1. Living choices

The two dominant paradigms emerging from the scenarios are sustaining today's aspirations of living in one's own home (supported by assistive technologies), or a much greater emphasis on communal forms of habitation such as multi-generational, sheltered or co-housing. Communal options may be less desirable for some, but potentially an economic necessity. The solutions adopted will have consequences for the provision of services, the nature of community, and the involvement of older people therein. It also raises wider questions around energy use and the availability of housing stock.

4.2. Location

In some scenarios the importance of services (including care) might alter flows of urban–rural migration. More affordable communal solutions (residential and sheltered) in some areas may encourage 'residential mobility' away from more expensive parts of the UK. Older people may also move to areas that favour their families (and children) or concentrate in locations favourable to their demographic (e.g. southern coastal towns). These choices will influence the age-mix of communities, making some more polarised.

4.3. Employment

Older people will remain in work for: the sense of purpose in life that it provides; and/or to provide income to support living practices and care needs (including assistive technologies perhaps). Some may need to continue working later in life than intended. Where older people move to be with family, they may extend their offspring's employment options by taking on childcare duties, reducing time and travel restraints. Employment will depend on jobs available and an individual's abilities, but will be facilitated to an extent by home working and technology solutions. In respect of the latter, 'digital divides' may still be an issue to contend with.

4.4. Interaction with significant others

In some instances there will be less need for physical interaction (such as family visits), as technology provides remote monitoring and increasingly lifelike tele-presence (at least for those that can afford it). This reduced dependence on the need for (but not necessarily desire for) physical interaction could lead to more familial dispersal, supporting life choices around education or employment. Remote working might reduce physical interaction with work colleagues but be balanced by greater localisation of non-work activity. Communal living offers the potential for more interaction with social networks (family and friends), through the greater reliance on such groups to provide informal care, perhaps also through others in the 'community' (if so minded). Communal living also offers opportunities for communal access to assistive technologies.

5. Implications for transport and travel

The social practices discussed above have implications for travel behaviours and demand; in particular:

- (i) Individualised versus collective transport—what motorised modal preferences will older people have?
- (ii) Engagement in active travel—will walking and cycling resonate with active aging?
- (iii) Types of journey being made—why will older people be travelling?
- (iv) Journey substitution through technology —will older people embrace forms of social participation other than those reliant on personal mobility?

5.1. Individualised versus collective travel

It is likely that the car will remain important if people remain in their own home (particularly those living alone). However, choice may be needed between spending on the car and on assistive technologies, unless the latter help prolong (safe) driving and are deemed central

for independence. For those living communally, journeys may be made jointly, and in some cases (e.g. co-housing) lead to shared ownership of vehicles. This may offer companionship and 'inclusion', as well as financial benefits for older people. Similar solutions may also be realised under multi-generational living, although priority is likely to remain with those engaged in employment. Some of these 'communal' responses may help reduce levels of car use.

Opportunities for public transport use range from re-localisation of living enabled by ICTs to assistive planning tools for using public transport. Where people remain in their own homes (potential) passenger demand for traditional public transport may be too dispersed. Conversely, the relative concentration of older people in sheltered or co-housing developments could encourage provision (notwithstanding the discussion above about shared journeys by private car). Looking more widely, there must be a substantial degree of uncertainty about future car dependence, as those who will be 'older' in 2030 will have grown up with the car as both an aspiration, and then a primary mode of transport—unlike the current older-old. Intriguingly if one goes further into the future it is conceivable that the reverse might apply as fewer younger people are acquiring driving licences (Dft, 2010) and in some instances seem more wedded to mobile ICTs than cars. Another significant area of uncertainty derives from the impact of the ongoing development and deployment of advanced driver assistance systems (ADAS) and fully driverless vehicles. Driverless vehicles could be (technically at least) viable within a few years, whilst ADAS functions (for example collision avoidance, lane control and self-parking functionality) are increasingly in vehicles now, and may have greater impact for older drivers in the timescales of these scenarios (Reimer, 2013). How these technologies develop and diffuse into vehicle fleets may have important consequences for the personal and shared mobility choices made by older people—albeit subject to all the same caveats of access and cost seen with assistive technologies.

5.2. Engagement in active travel

Cycling and walking symbiotically relate to active ageing. Here assistive technology could be important (monitoring and reporting on health benefits for example), providing it is widely available. There will still be a degree of physiological decline, even with technical assistance, and as the number of older-old increases so the impact on active travel will be of interest. Three scenarios offered more explicit opportunities for greater active travel. These were shorter journeys facilitated by the re-localisation of activities into the community, the sharing of tasks across families in multi-generational households, or neighbours in co-housing, and the fact that use of such modes is seen to be beneficial to health and to successful ageing. Again the potential cohort effect must be noted, and obesity levels, in the future, are likely to significantly influence engagement in active travel.

5.3. Types of journey being made

'Necessary' journeys may decline as a result of location decisions on where to live and work (e.g. remote working). Conversely the numbers of commute trips made by older people may (substantially) increase as they work later in life to fund assistive technologies or care. Locating near services, and avoiding healthcare journeys through extensive use of monitoring technologies will also impact on travel. Significant others may travel less as technologies replace benefits previously obtained through physical co-presence. Any reduction in travel may lead to rebound or replacement journeys for leisure purposes, either as a way of escaping from the more communal living arrangements, or merely fulfilling a need to travel. In the scenarios suggesting multi-generational homes, or cohousing schemes then there is scope for greater joint trip making, or for trips being made for communal purposes (necessary or discretionary). Where household tasks are shared, this offers the opportunity for the use of (more) sustainable modes of transport, as parents no longer need to chain trips to work, the shops and their children's schools (something for which the car tends to offer appeal because of its flexibility).

There will also be impacts on the journeys made by those providing care. For example, more people living in their own homes might generate more 'care miles' than if they lived in residential homes—necessitating fewer journeys. This raises questions about how much an older person's dwelling may shift from being a source of trip generation to a greater source of trip attraction, not just for care visits, but also for services such as meals-on-wheels or the home delivery of shopping from the internet (including food).

5.4. Journey substitution through technology

With technology being used to maintain social networks, the extensive use of monitoring tools, and the widespread use of tele-presence facilities, it is possible to see a range of impacts on travel needs emerging. However, as already noted, reduced travel in one context may simply be replaced by other choices (a 'rebound' effect), and leisure travel is one area where this may occur. The idea of greater use of virtual travel emerges as one opportunity to satisfy such needs, whilst the notion of replacing travel in some instances by accessing memories of past journeys or destinations is also seen as a factor to consider.

6. Implications for (transport) planning and policy

This final section of the paper highlights seven implications or considerations for (transport) planning and policy arising from this examination of the relationships between a non-transport technology, social practice and travel, here focussed upon living in later life.

These issues arose from the workshop with transport academics and civil servants. Their importance is also being played out in broader territories regarding the uncertain future of travel demand and in particular per capita car travel (Lyons and Goodwin, 2014). Against a long run trend in growth in car travel (per capita), such demand from around 2004 onwards has been observed in a number of countries to have stopped growing or even to have shown decline—and this, in part, pre-dates the global economic downturn. Empirical evidence (for the UK) shows that below the aggregate data, younger men and people in urban areas are travelling by car less (largely associated with reduced company car use), while women and people in less-densely populated areas are travelling by car more (Le Vine and Jones, 2012; Headicar, 2013; Stokes, 2013; Goodwin and Van Dender, 2013). Le Vine and Jones (2012, p. 19) also note that "there is a strong inverse relationship between age and change in car mileage". This is posing serious questions for policy and investment decisions in a number of countries. Technologies (in particular ICTs) are also considered a contributory factor to changing demand. Lyons (2015) has taken this

further to examine the hypothesis that something even more fundamental is happening—namely that society is transitioning from the regime of automobility into something else as the ‘motor age and the digital age collide’. He suggests that this transition is being brought about by the permeation of an increasing number of digital age technology advances and capabilities into social practices and everyday lives and norms. This acknowledges that there is much empirical research that has sought to examine how ICTs and related practices are directly affecting tripmaking. However, it is also acknowledged that being able to ascertain the overall influence of digital age advances and practices on travel is very challenging because of the complex mix of different types of technologies—travel relationships that exist and how the first and second order effects of such relationships accumulate (Mokhtarian, 2003, 2009; Aguilera et al., 2012).

6.1. *Where are we heading?*

The paper's title raised a false expectation. The intention was never to offer anything approaching a definitive judgement on the likely future pathway for the nature and extent of travel in an ageing society. Indeed even within each scenario we have refrained from trying to assimilate the net consequences for travel (in numerical or percentage change terms)—a practice sometimes applied in scenario planning and one which has a legitimacy in the sense that it cannot be deemed ‘wrong’ provided it preserves the internal consistency of the scenario. However, the danger of such assimilation is to give a false sense of precision and indeed temptation to believe the pathways to the future are reduced to only four possibilities. Scenario planning is intended to expose uncertainty, and is itself limited in its ability to reflect the greater extent of uncertainty that faces society. Some of the uncertainty of the interplay between the information age and the motor age has been considered here, but the scenarios might have equally reflected debates around climate change, the crisis of capitalism or how governance of society is being reshaped by people-power and social-media.

6.2. *How far do travel demand forecasts take us?*

Forecasting appears to still be central to accommodating future mobility needs. In particular, road transport forecasts (in the National Transport Model) are based on three ‘scenarios’ using assumptions about key drivers of demand: population, demography, economic growth and cost of travel. All three scenarios creating the latest forecasts result in substantial forecast growth in road traffic from the present day to 2030 (DfT, 2013). The DfT acknowledges that “*uncertainty around the outturn values of key drivers...forecasts...should therefore be read as the projected trends...given the most likely path of the input variables*” (DfT, 2011, p. 30). Yet as Warren Buffet has quoted, “[in] the business world, the rearview mirror is always clearer than the windshield”. There is a concern that such forecasting, even with its own acknowledgement of uncertainty, engenders a very conservative approach to policymaking and a mentality of rather reinforcing the current regime of thinking. In relation to recently emerging debates regarding ‘peak car’ and the uncertainty now apparent in terms of future (per capita) demand, Goodwin and Van Dender (2013, p. 253) quoted that “[t]he policy issue is of appraisal under conditions of contested futures, not just statistical uncertainty”. Examining future travel demand goes beyond only high level projections. There is a need to understand how patterning of travel might evolve at more localised levels and the extent to which it is in accordance or not with the needs from the population arising from prevailing social practices.

6.3. *Serving or shaping society?*

Building upon the observation of conservatism above, there is a need to challenge the very implication of asking ‘where are we heading?’. It has been suggested (Lyons, 2004) that the dominant mentality in the transport profession and transport policy has been one of ‘transport is here to serve society’—this was epitomised by the era of ‘predict and provide’. In this context the logic is that through estimating the nature and extent of travel demand one can then consider how to formulate policy and investment that is able to meet such societal requirements. However, this overlooks the fact that in practice transport shapes society—where people live and work and forms of social practice and economic activity are influenced by transport availability. What this can imply, which can come across as politically troublesome, is that government policy becomes a form of social engineering. This is in fact unavoidable—the question is whether or not government embraces this capacity. The question then changes from ‘where are we heading?’ to ‘where would we like to head?’ Intriguingly while this is inherently more politically challenging it may offer the prospect of better negotiating the considerable number of unknowns set out above.

6.4. *An inactive, reactive or proactive policy response*

When it comes to influences on social practice, planners and policymakers consideration of non-transport technologies and the role that they might play can perhaps be categorised three ways—inactive, reactive or proactive. As already noted, there has been little consideration of wider technological developments in society when framing transport policy. This suggests that Government gravitates towards being inactive in response—perhaps because of complexity or it is seen to be outside of transport policy, in spite of the evidence above of how many ways technology can influence travel through social practice. It is perhaps tempting to assume that the very complexity of the future precludes trying to make too much sense of it, reinforcing a leaning instead towards assumptions and forecasting. Indeed it could be asserted that a convenient consequence arises from society's heterogeneity—namely that so many different changes at the level of individuals are going on in terms of social practice and travel demands that the effects on aggregate travel are smoothed or even cancel out. There is the option of policy taking a reactive stance to the ‘non-transport’ and ‘substitution’ technologies affecting travel. However, to be reactive and effective is likely to require lead times before policies and measures are implemented and in the meantime changes in social practice and travel demands may continue to take place. What remains is the bold option of taking a proactive policy stance.

6.5. Whose responsibility in government?

The ageing society and its implications may ultimately converge upon the transport system in the form of travel demand but this has many determinants, which span government departments. Policies on trade and industry, employment, healthcare, energy and so on all have a relevance to travel demand. This prompts the perennial question—should government be seeking a more integrated approach to its policy formulation in seeking to understand and accommodate the needs of an ageing society? Attempts at such integration are, however, notoriously difficult. However, one key advantage of scenario planning is that it is possible to set out depictions of future society in a way that can prompt debate and consideration of implications across policy areas.

6.6. Influence and equity

Older people will represent a growing share of the population and hence future travel demands. This warrants much greater policy concern than currently appears to be the case. Older people will also make up an increasing proportion of the electorate and are likely to exercise increasing influence over government. There is of course considerable heterogeneity across this group—defined by health, location, values and affordances, and we should be alert to ‘blunt’ policy formulation which assumes homogeneity. Equity considerations are and will continue to also be important here.

6.7. The challenge of being visionary

If policymakers are to assume a more engaged role in the examination of futures and decision making on how to accommodate uncertainty while shaping a better society, there is a collective challenge faced in our capacity to be visionary. There can be a strong tendency to be blinkered in looking at present days norms, values, practices and opportunities and seeking to project these forward into the future. We should remember that the older people of tomorrow will very likely be different to those of today and will be equipped in different ways and with different pools of social practice in their pursuit of wellbeing in later life. The fiction writer William Gibson has quoted that “[t]he future is already here – it's just not evenly distributed”. In other words there are pockets of future living which may exist today—the challenge is to identify them since they are unlikely to be dominant behaviours. One approach to achieving this is to look across countries and cultures to policies and practices that already exist and consider how they may translate into a future for our own country.

In conclusion, it is important to underline that preparing ourselves for the future has perhaps never been more challenging. We would certainly not presume to suggest that policymakers are naive in their current approaches or indeed that alternatives are straightforward. One of the challenges at present is that policymaking faces an air of urgency on many fronts allied to significant resource constraints and depleted skillbases with which to thoroughly explore response options. It was a sociologist in the 1930s who coined the phrase unanticipated consequences (Merton, 1936). A key reason he identified for such consequences resulting from policy was what he referred to as ‘imperious immediacy of interest’. In other words policy action is taken in response to an over-riding imperative which precludes closer consideration of wider ramifications. It would seem we are currently in a period in which we are especially vulnerable to this imperious immediacy of interest. Yet policymakers should be urged to recognise the value of substantive exercises that seek to better equip us for living in an uncertain world.

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