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The Future of Transport

The Global Challenge

Transport is the glue that binds the many elements of society together. It transcends distance to enable us as individuals and organisations to connect with people, goods, services and opportunities. As the world's population grows and pursuit of economic and social prosperity continues, the amount of glue that is needed increases. In an effort to enable prosperity, transport infrastructure has grown and significantly shaped and defined our built environments. Use of that infrastructure, as well as securing benefits, imposes significant social, environmental and economic costs on society.

The scope of transport is vast covering road, rail and air with movement at local, regional, national and international levels. Different parts of the world are at different stages in the evolution of their transport systems. Some countries face ageing and heavily used infrastructure. Others are seeking major expansion with the prospect of unlocking prosperity. Movement of people and goods has now been joined by movement of information as society connects through the possibilities brought about by the digital age. It is estimated that nearly two fifths of the world's population are now internet users and almost one quarter were smartphone users by 2014. This compares to the latest World Bank estimate (2011) putting the number of passenger cars per 1000 population globally at 123.

There are several major global challenges facing transport. If transport is key to economic prosperity then it is essential to accommodate demand for transport within the capacity of the infrastructure. In this context the challenge is to ensure relative ease of movement through improvements to the efficiency of operation of the transport system or by expanding its capacity. The transport system and its use lead to adverse environmental and social impacts including greenhouse gas emissions, damage to the natural environment, noise and poor air quality, social exclusion and intrusion into the built environments of our communities. There is therefore a challenge to look to technological advances and fiscal and regulatory measures to address adverse impacts of the transport system and its use. Investment in new infrastructure is expensive for example an estimate for the UK indicates an average cost for a km of new motorway at around £18 million or $29 million. As the infrastructure is expanded and as it ages, the cost of maintaining that infrastructure (and the services using it) also increases. In austere financial times there is a significant challenge for governments being able to fund the transport system.

Perhaps the greatest challenge of all is for decision makers responsible for transport systems to come to terms with the relationship between transport and society.

The Funding Challenge
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Transport and Society
The challenge for transport is to contribute to supporting and improving society rather than only serving it and risking unintended, unanticipated and unwelcome consequences.

Increased Proximity
Economic and social connectivity is increasingly being realised by proximity (brought about by urbanisation) and virtual mobility (brought about by rapidly growing consumption of information and communications technologies: and that the car is moving to become a background functional technology in society.

A transport system's development is not merely a response to societal need. Changing the transport system changes society – in terms of land use development, locational decisions, social and business practices and the behaviours of individuals and organisations. The challenge for transport is to contribute to supporting and improving society rather than only serving it and risking unintended, unanticipated and unwelcome consequences. This is far from easy when addressing a complex system involving multiple actors and when faced with short-term political and shareholder imperatives.

There is a need to understand why, in a number of countries with developed transport systems, the long run trend of growth in car use has come to a (temporary) halt (with population growth offsetting decline in average car travel per person) For example in New Zealand the amount of vehicle kilometres travelled per person (regardless of vehicle type) in 2013 was four percent lower than in 2003.There are several possible contributory factors beyond economic conditions including trends in urbanisation, the reduced propensity of young people to learn to drive and the increasing role of virtual mobility in society.

There is considerable uncertainty about the future of what has been a car-centric transport system and wider society. Professional opinion is divided. A case can be made for this 'automobilty regime' enduring and evolving with efforts principally targeted at reducing its adverse effects. Meanwhile, a case exists that society is undergoing a regime transition – driven by a number of factors including the digital age. This holds that economic and social connectivity is increasingly being realised by proximity (brought about by urbanisation) and virtual mobility (brought about by rapidly growing consumption of information and communications technologies (ICTs)); and that the car is moving to become a background functional technology in society.

In the face of demographic, technological, environmental, social and economic change, there are two questions that reflect critical uncertainties for the future (especially in the longer term):

(i) What will society want to do in terms of how it configures and connects?;

(ii) What will society be able to (afford to) do in terms of how it configures and connects?

Options and Possibilities

Driving Economic Growth
Transport infrastructure investment has strong appeal – the investment itself creates employment and economic flows.

Immediate imperatives are seen to relate to economic recovery for many countries. In this regard transport infrastructure investment has strong appeal – the investment itself creates employment and economic flows and the historic association between transport and the economy holds the promise of infrastructure enabling more movement and in turn more economic activity. European Union financing for transport connections has tripled for the period 2014-2020 compared to the preceding six year period. A key question is whether and how such investment should be made in order to support an appropriate society in the longer term.

In terms of road transport, for the decade ahead, we are set to see much attention being given to innovation in transport technology as a supposed key to cleaner, more efficient (and safer) transport. This concerns, in particular, the prospect for a growth in electric and hybrid-fuel vehicles as a share of the fleet alongside the introduction of self-driving vehicles. Meanwhile for countries with less advanced transport systems, motor manufacturers are likely to focus upon growth in sales of vehicles based on established technologies.

Whether or not they receive as much attention as those above, other important considerations concern how notions of vehicle ownership and transport service provision may be changing as well as the role of movement of information as an alternative

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to movement of people as we continue further into the digital age. Sharing and hiring of vehicles may progressively replace conventional ownership of vehicles. New models of ridesharing services are emerging with prospects for hybridization of what we have previously known as public and private transport. For example, Uber, a ridesharing service that uses smartphones to connect passengers to drivers, was launched in 2010 and is now reportedly available in some 200 cities worldwide with the company valued at around $18 billion. As e-commerce grows globally, there are consequences emanating from developments in the retail sector for demand for shopping trips as well as the movement of goods from seller to buyer.

Fundamentally, society has two options. The first is to accommodate current and perceived future demand. The second is to shape the demand for travel by particular means through both push and pull measures that encourage behaviour change towards travel by different modes, at different times and between different locations; and which may also encourage less travel and greater reliance on proximity and digital connectivity. The first option has proved to be more politically palatable but tends to be more exposed to feedback effects arising from supply affecting rather than only accommodating demand. The two options can be seen respectively as 'predict and provide' (responding to presumed need) and 'decide and provide' (taking the opportunity to shape change in the face of uncertain (future) need).

Solutions that the establishment is likely to give most attention to over the next ten years will be driven by lock-in effects and vested interests of the incumbents within the current regime. They will tend to be seen as transport solutions for transport problems. Meanwhile, digital connectivity is giving much more possibility to 'bottom-up' innovation with a plethora of new ideas and fledgling products, services and practices in support of physical and virtual mobility. Not all such ideas will gain traction and see diffusion and widespread adoption. However, the scale of collective possibility and the greater agility of development may see some startling developments over the next ten years with new trends in behaviour emerging. Consider that ten years ago Facebook and Twitter did not exist and Skype had only just been founded.

Proposed Way Forward

We now recognise that the provision of new transport capacity on the supply side does not simply better accommodate demand. It can generate additional demand (indeed it has also been shown that when transport supply is reduced so too does demand reduce – traffic can 'disappear'). Predicting the demand for new travel and providing for it can amount to a self-fulfilling prophecy, i.e. the predicted demand arises through the very act of providing the capacity. This underlines that while it may be politically sensitive to suggest 'social engineering', we have a tremendous opportunity to shape the future rather than reactively respond to it in terms of transport.

Data from different parts of the world has revealed a change in the correlation between economic activity (measured by Gross Domestic Product) and transport activity (measured by road traffic). Against a previous trend of 'traffic intensity' of economic activity increasing (i.e. more traffic needed per unit of economic output), in more recent years this has reversed: the traffic intensity of the economy is reducing. While this is not fully understood, it may relate to the changing makeup of the economies of the countries concerned (decline in manufacturing and growth in services), urban agglomeration effects and the growth in digital connectivity following the advent of the internet and world wide web; growth in domestic aviation

Different Pathways
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Future Options
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New Behaviours
The scale of collective possibility and the greater agility of development may see some startling developments over the next ten years with new trends in behaviour emerging.

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Transformation Ahead
The move into the motor age was, over a period of decades, transformative for society and for transport. Further transformation is all but inevitable.

Triple-Access Solutions
We should therefore focus upon developing a balanced triple-access system and, accordingly, a balance of investment and policy support across this system that may transcend the traditional remits of government departments.

may also be a factor. This suggests that it may be possible increasingly to realise economic prosperity through effective land use planning and urban development alongside investment digital infrastructure and services as an alternative to or complement to the role of the transport system.

Change can sometimes be dramatic. The closure of European air space in 2010 as a result of a volcanic ash cloud from Iceland is an example; the 2011 earthquake and tsunami in Japan, is another. However, change is often much more of a process than an event and one that is gradual yet powerfully cumulative over the passage of time. The world wide web is 25 years old this year. A growing proportion of the world's population has been absorbing the succession of developments in ICTs over its lifetime to date into their lifestyles and behaviours. When we look back over time we can observe how such change can become transformative. The move into the motor age was, over a period of decades, transformative for society and for transport. Further transformation is all but inevitable.

Given such lessons from the past, we need to consider developments in transport that are aligned to shaping the type of future society that is desired (by current and also for future generations). It is important to give more attention to anticipating the indirect and longer-term effects of policy and investment decisions, recognising that effects can take some time to emerge as individuals and organisations adapt their behaviours to evolving conditions. Fundamentally, we should not be addressing the future of transport but the future of access. In turn we should focus strongly on the importance of what might be termed a triple-access system of transport, physical proximity and digital connectivity. We do not know what future society will want to do or be able to (afford to) do in relation to access though we do know people can adapt. We should therefore focus upon developing a balanced triple-access system and, accordingly, a balance of investment and policy support across this system that may transcend the traditional remits of government departments.

Impacts and Implications

Future Proofing
Greater attention therefore needs to be given to how infrastructure can be 'future proofed' and made ready to accommodate the needs of a changing society.

There is arguably an unprecedented level of uncertainty facing the future of transport with the prospect that the glue that binds society's elements together may be mutating. In the face of such uncertainty and associated change there is a need for flexibility. This is especially true of infrastructure development both in terms of the transport system itself but also in terms of the associated land uses that give rise to demand placed upon the transport system. There are many examples of stranded assets, underutilised or abandoned facilities as well as legacy infrastructure that obstruct adaptive development. For example the limitations or legacy of a railway system's design (its bridge heights, track gauge, station lengths, stability of carriages etc.) might mean that there are limits on being able to increase how many people or how much goods can be carried by trains, without building an entirely new infrastructure. Greater attention therefore needs to be given to how infrastructure can be 'future proofed' and made ready to accommodate the needs of a changing society. This is particularly pertinent to our cities and to the connections between cities. We need to be able to reallocate transport system capacity for different uses. This may include use by different modes or transfer of transport system capacity for use by new building stock or for recreational 'dwell' spaces that enhance interaction in urban environments. Major examples of pedestrianisation of formerly congested roadspace include Times Square in New York and Trafalgar Square in London.

In practice the implications of the issues raised in this article are that a number of different future outlooks for transport are

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likely to come into conflict as options for the way forward are examined and pursued:

(i) predicted – an extrapolated outlook for the future (typically of growth in transport demand) giving a (misguided) sense of confidence;

(ii) plausible – an outlook for a future who's potential emergence cannot be denied based on current knowledge (e.g. the demise of the motor age);

(iii) presumed – an outlook for the future on the basis of probability and instinct but without proof (e.g. the emergence of electric and self-driving cars);

(iv) preferred – an outlook for a future that is desirable (so therefore value laden – e.g. growth in aviation to support global business or growth in cycling and walking to support healthy urban environments); and

(v) practical – an outlook for the future that aligns best with immediate interests and imperatives (e.g. the need for expanded transport infrastructure to support economic recovery).

Lead Expert – Professor Glenn Lyons

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Glenn Lyons was the founding Director of the Centre for Transport & Society at the University of the West of England, Bristol where he is now Associate Dean for research in his Faculty. His research career has focused upon improving and promoting understanding of the inherent links between lifestyles, behaviour and personal travel in the context of continuing social and technological change. He has held secondment positions with the UK Department for Transport and the New Zealand Ministry of Transport and been involved in a number of high profile exercises examining the future of transport. Glenn has led major research studies addressing traveller information, internet use, flexible working, travel time use, public and business attitudes to transport, public perceptions of road pricing, user innovation, travel demand and futures.

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About Future Agenda

Context – Why Foresight?

In an increasingly interconnected, complex and uncertain world, many organisations are looking for a better understanding of how the future may unfold. To do this successfully, many companies, institutions and governments are working to improve their use of strategic foresight in order to anticipate emerging issues and prepare for new opportunities.

Experience shows that change often occurs at the intersection of different disciplines, industries or challenges. This means that views of the future that focus on one sector alone have limited relevance in today's world. In order to have real value, foresight needs to bring together multiple informed and credible views of emerging change to form a coherent picture of the world ahead. The Future Agenda programme aims to do this by providing a global platform for collective thought and innovation discussions.

Get Involved

To discuss the future agenda programme and potential participation please contact:

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Future Agenda 1.0

The Future Agenda is the world's largest open foresight initiative. It was created in 2009 to bring together views on the future from many leading organizations. Building on expert perspectives that addressed everything from the future of health to the future of money, over 1500 organizations debated the big issues and emerging challenges for the next decade. Sponsored globally by Vodafone Group, this groundbreaking programme looked out ten years to the world in 2020 and connected CEOs and mayors with academics and students across 25 countries. Additional online interaction connected over 50,000 people from more than 145 countries who added their views to the mix. All output from these discussions was shared via the futureagenda.org website.

Future Agenda 2.0

The success of the first Future Agenda Programme stimulated several organizations to ask that it should be repeated. Therefore this second programme is running throughout 2015 looking at key changes in the world by 2025. Following a similar approach to the first project, Future Agenda 2.0 builds on the initial success and adds extra features, such as providing more workshops in more countries to gain an even wider input and enable regional differences to be explored. There is also a specific focus on the next generation including collaborating with educational organizations to engage future leaders. There is a more refined use of social networks to share insights and earlier link-ups with global media organizations to ensure wider engagement on the pivotal topics. In addition, rather than having a single global sponsor, this time multiple hosts are owning specific topics wither globally or in their regions of interest. Run as a not for profit project, Future Agenda 2.0 is a major collaboration involving many leading, forward-thinking organisations around the world.