



Developing the End-User Case for Integrated Transport

September 2013

Foreword

Transport is essential in every aspect of our daily lives, playing a key role in supporting the UK economy through the movement of people and goods, getting people to work and food to the supermarkets. However, the impact of the growing demand for transport is clearly reaching saturation. Congestion (the symptom and not the cause) plagues every global country with impacts to the environment, health, economy and energy; this now demands a step change in system performance to deliver sustainable transport.

In the UK alone road traffic congestion is set to increase by 25% by 2022 with transport contributing up to 30% of the carbon emissions, of which 40% is from cars. Mega users of transport such as healthcare, tourism, retail and logistics account for 30% of GDP and over £600bn revenue for the UK. If congestion amounts to 2% lost GDP then removing this barrier can save over £12bn annually in these four sectors alone.

The Department for Transport (DfT) states that in certain places the current capacity of transport networks cannot meet the demand that is, or will be, placed upon them. This results in delays and, more importantly for business, adds cost to their operations because of the inability to predict journey times reliably. Congestion across all modes of transport is not just an inconvenience in terms of lost time. It also costs the UK economy billions of pounds a year, which the Eddington Transport Study estimated could be £7-8bn of GDP per annum for road congestion alone. Air traffic delays are also a significant problem.

The DfT also shows that average speeds during the weekday morning peak on locally managed 'A' roads in England were slower in January 2013 (down 4.4 per cent), February 2013 (down 1.8 per cent) and March 2013 (down 1.9 per cent) compared to the same months in 2012, notwithstanding the environmental impacts. Queues of passengers on the ground and aircraft in the air also have an economic cost and recently the US Federal Aviation Authority estimated 'air traffic delays cost the US economy up to US\$41bn in 2007.

Today's transport networks are fragmented, and work in silos rather than being overall effective and usable systems. This fragmentation and isolation has confused the customer, increased CO2 emissions thus losing the original aim and benefit of these technologies. A potential solution is to integrate them through systems engineering, thus increasing overall performance of the network and the vehicles and infrastructure that operate within it.

The UK, therefore, is well placed to take an innovative approach to transport at a macro level through transport systems and the integration of those systems (the integration of transport systems and networks – modes, and infrastructure, virtual, digitally and or physically) to provide an easier interchange thus supporting the more efficient movement of people and goods.

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1. An Introduction to the Technology Strategy Board

1.1 Key Facts

The Technology Strategy Board (TSB) is the UK's innovation agency. Its role is to accelerate economic growth by stimulating and supporting business led innovation. With a budget of approximately £440m for the year 2013-2014, it is responsible for the establishment and implementation of national technologies strategies in priority areas.

With partner and business contributions it has invested around £3bn in innovation during its first six years of existence. Over 60% of its R&D investment was directed towards small and medium sized enterprises over the last year.

In the year 2012-2013 the TSB ran more than 70 competitions for R&D funding and offered grants to over 1,000 organisations. In 2013-2014 it plans to launch around 75 more competitions across its priority themes, committing almost £300m.

Since launch in April 2009 the TSB has run 124 Small Business Research Initiative (SBRI) competitions with 40 public sector organisations and over £100m of contracts have been issued.

In two years since the relaunch of Smart, it has offered over 930 grants, committing over £90m to SME R&D projects. The TSB continues to work with more than 4,900 companies and 150 research organisations, including 110 universities across the country.

During 2012-2013 the TSB ran over 100 events and participated in many more, engaging with thousands of businesses face-to-face and online. The TSB's innovation networks already have over 60,000 members, and a further seven new Catapult centres will be operational in 2013.

Evidence so far suggests that TSB can expect different returns (Gross Value Add) for different types of support programme - £1 grant showing a return from around £3 for short-term feasibility studies through to £9 for Smart awards. Business participants in some of the larger longer-term programmes, such as low carbon vehicles, estimate returns of over 30 times.

1.2 The Concept to Commercialisation Strategy

In May 2011 the Technology Strategy Board launched its four-year strategy, *Concept to Commercialisation*. This explained how the TSB sets out to stimulate and encourage innovation and drive economic growth.

The strategic direction set out then remains equally valid today. The economic situation is largely unchanged and growth generation is more of a priority than ever, both in the UK and globally.

Summary

The world faces major challenges, not only from economic turmoil but also from societal challenges such as climate change and an ageing population. These challenges are creating global market opportunities for novel solutions. The countries that continue to invest in innovation and can innovate most rapidly will be most likely to benefit from these shifts in markets.

In December 2011, the Department for Business, Innovation and Skills (BIS) published an economic paper which concluded:

- across business, higher innovation investment is associated with higher levels of new product innovation
- more product innovation is in turn associated with higher overall productivity in firms
- productivity growth is the central driver of overall economic growth.

(Economic paper number 15: Innovation and Research Strategy for Growth)

So, innovation investment correlates with higher productivity and economic growth, and is core to creating a competitive position in rapidly changing global markets.

However, innovation involves risk, and markets operate imperfectly. There are financial and technical risks in investing in early-stage technologies and markets, and the return on investment is uncertain. Small companies can struggle to raise funds and larger companies can find it hard to justify early-stage investment, tempted instead to wait for the market to become clearer and the uncertainties to reduce. As a result, business investment in innovation is often lower and later than desirable for strong economic growth, and opportunities to capitalise on the UK's excellent research base and emerging global markets may be missed.

Innovation can also disrupt existing value chains and business models. In complex systems and supply chains, a 'disruptive' innovation can mean that many partners, suppliers and customers need to adapt and innovate concurrently and collaboratively, making it difficult to capitalise on the opportunity. For example, the

move to the electrical propulsion systems involved in low carbon vehicles requires new technologies and the formation of new partnerships.

Some companies in the value chain, focused on their day-to-day activities, may not even see the opportunities created by new technologies, or technologies with potential to cross over from one market to disrupt another. Information flows imperfectly in what is a complex and organic innovation system; business may need help to identify opportunities, access information and knowledge and respond to disruptive developments.

Finally, government influences markets – through how it chooses to buy, how and where it chooses to regulate or set standards, and how it applies fiscal incentives. All too often government action has been taken without a view as to how it can stimulate innovation and maximise the potential benefit for UK industry.

It was to help tackle these types of market failures and innovation bottlenecks that the Technology Strategy Board was set up. TSB's role is to help accelerate economic growth through the stimulation and support of business-led innovation. It is business-focused and business-led; with a Governing Board and staff providing strong experience of R&D and innovation and the commercialisation of technology.

TSB works across business, academia and government, helping companies take concepts through to commercialisation.

This means:

- tackling the barriers to innovation
- reducing risk
- promoting collaboration
- knowledge exchange
- open innovation
- creating a more effective innovation environment, using our convening power to make connections and to bring different partners together.

1.3 Investing in Priority Areas Based on Potential

The Technology Strategy Board's investment programme focuses on four main thematic areas:

Societal challenges that are driven by the demands of society and the resulting market opportunities

Cross-cutting competences that enable the translation of technologies into products and services

Enabling technologies, technologies providing underpinning capability

Emerging technologies, high-potential technologies just emerging from the research base.

The key features of these four areas are described below:

Societal Challenges

The TSB has identified five potential markets where innovation is led by societal challenge:

- energy
- healthcare
- built environment
- food
- transport.

It is always difficult to predict the future of markets and what products and services will be required, but since these are driven by societal need, they are almost certain to grow and will require innovative solutions to meet demand. They are also all areas where the markets are influenced by government action, so aspects of the future products and services can be specified.

Cross-Cutting Competences

Underpinning the challenge-led areas and markets, and linking them to the technologies supported, are the following cross-cutting competences:

- **High value manufacturing**: by linking technologies to markets and by focusing on high value aspects, UK businesses can differentiate themselves from the global competition
- **Digital economy**: with the increasing digitisation of markets, digital services are an opportunity for the UK to compete globally
- **Resource efficiency**: it is necessary to find a way to use the Earth's resources efficiently in ways that do not compromise the planet's ecosystems while providing a high standard of living for the population
- **Space**: space applications are a focus area where future markets can drive innovation in technology.

Enabling Technologies

The areas on which TSB focuses, and which are provide important links to the knowledge base, are:

- advanced materials
- biosciences
- electronics, sensors and photonics
- information and communication technologies.

Single developments in any one of these may unlock several market opportunities across multiple sectors.

Emerging Technologies and Industries

This area of TSB's work identifies high potential technologies just emerging from the research base and helps to accelerate their commercialisation. It includes areas such as synthetic biology, energy-efficient computing and energy harvesting.

The Technology Strategy Board works to ensure that its portfolio reflects synergies between these areas.

In making investments in each of these areas, TSB applies four key criteria:

- is there a large (global) market opportunity?
- does the UK have the capability to develop and exploit the technology?
- is the idea 'ready' – is the timing right?
- can the Technology Strategy Board make a difference?

For further information on the strategies, priorities and programmes of the Technology Strategy Board see www.innovateuk.org

2. Transport: A Key Area of Innovation

2.1 The Challenge & the Opportunity

The way that we use transport today is unsustainable in terms of energy use, impact, efficiency and cost effectiveness. Together with growing demand, this requires a major transformation in performance to deliver a sustainable transport system.

TSB's specific objective is to help UK industry profit from developments that improve vehicle efficiency and reduce emissions and also improve transport effectiveness and efficiency. The UK has a strong transport industry especially in the aerospace, road, rail and marine sectors as well as newer capabilities in intelligent transport systems. Transport is important to the UK economy as it provides employment for over 1.3 million people and nearly £40bn of GVA. It also provides a great challenge as it currently generates about 25% of UK carbon emissions. Growth in transport is also leading to increased congestion which is set to cost the economy £22bn by 2025. UK business can make a significant difference and generate wealth by:

- reducing carbon and other environmentally harmful emissions from all vehicles and increasing their efficiency
- supporting the acceleration of new vehicle technologies in line with national priorities
- improving the efficiency and cost-effectiveness of the transport system
- integrating different energy sources into transport systems and vehicles
- developing a longer-term strategy towards sustainability of transport to include the overall system and vehicles.

To benefit from these opportunities, the key players will need to continue to engage with the UK supply chain as well as the growing SME base to develop and commercialise new technologies.

The barriers to innovation

The barriers to innovation include:

- short-term demands on particular forms of transport can divert businesses and academics from addressing the longer-term opportunities of integration
- automotive manufacturing supply chains need to be re-engineered to provide the components for new electric, hybrid and fuel cell vehicles
- in the marine sector there is a need to share capabilities between the major shipbuilders, the leisure sector and their supply chains

- in aerospace, the long-term nature of investments in new aircraft can generate specific challenges to innovation
- in rail, innovation is hampered by the relative lack of processes and capabilities in clients and the supply chain to collaboratively bridge the gap between research and procurement
- innovation can be hampered by the lack of facilities for demonstration and validation at scale and in real-world situations.

TSB Focus of Investment

There are great gains to be made if we can enable industry to consider transport systems as a whole. We need to develop a forum where the issues and opportunities can be discussed and reviewed by the many parties involved. The Transport Systems Catapult centre will become fully operational in 2013, where these ideas can be pursued and tested.

On the roads, new emission regulations will require new technologies and a new automotive supply base. TSB have been supporting the development of low carbon road vehicle technologies for over five years; we need to take these closer to production, while continuing to develop technologies which reduce carbon emissions. The focus is now on cost reduction and capability demonstration so that new technologies can move rapidly into production.

TSB is working closely with the Automotive Council to identify key needs across its five strategic technologies, exploring how relevant developments in fuel cells and hydrogen can be integrated with the low carbon vehicle programme.

The mainline rail sector is strengthening its capabilities and resourcing of innovation and has published its 30-year vision in the Rail Technical Strategy. TSB is working with the industry to better understand the opportunities and the developments needed, building on an analysis of UK capabilities. To broaden its support and engagement with rail businesses, TSB is working with UK Tram and the Enabling Innovation Team to demonstrate UK capabilities relevant to light rail markets.

TSB continues to work with the UK marine industry to identify specific areas for intervention following the outputs of last year's vessel efficiency competition, to build UK capabilities in key areas to support the national Marine Growth Strategy. TSB will maintain its presence on the EU Marine Industry Leadership Council's Technology and Innovation Group, and the marine science group of the Department for the Environment, Food and Rural Affairs (Defra). Additionally, to build on the success of the EU Marine Technologies (MARTEC) activity, TSB is seeking to develop a longer-term engagement with Europe to position the UK in future maritime activity. There is an immediate need to respond to the challenge of moving to low-sulphur fuels and improving vessel efficiency.

In aerospace, the medium-term focus is on improving manufacturing systems to increase capacity and deliver innovative technologies to aircraft programmes. TSB is continuing to work with the industry, in particular to understand the implications of the update of the UK Aerospace Technology Strategy (UKATS) roadmaps and the outputs of the Aerospace Growth Partnership activities including the newly established UK Centre for Aerodynamics and the planned Aerospace Technology Institute.

2.1 Transport Integration

When viewing transport at a macro level, transport professionals believe that transport integration has the potential to boost the economy, improve social inclusion, and reduce the environmental impacts of travel. It seems clear that focussing on overall *mobility* should support the achievement of these goals, while at the same time improving the financial return on transport investments. But does it and what is the business case for integrated transport?

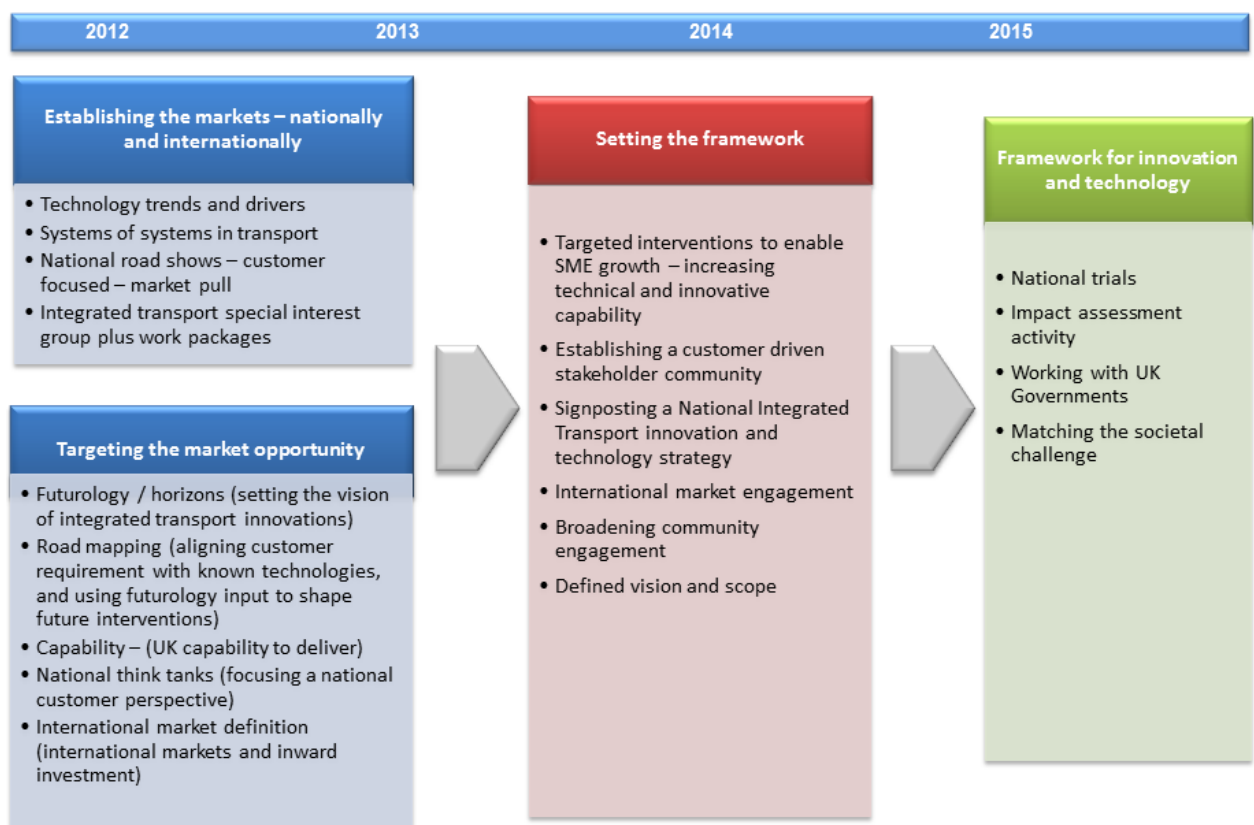
The integration of transport is a hugely complex task which will rely heavily on future solutions developed through collaboration and stakeholder participation. Equally the challenges of mastering new capability, supply chains, stakeholder, business models and commercial opportunity is not to be underestimated. Detailed planning and community engagement is vital and is at the very heart of success for future transport sustainability.

Current research indicates that:

- In the UK road traffic congestion is set to increase by 25% by 2022 with transport contributing up to 30% of the carbon emissions, of which 40% is from cars
- Mega users of transport such as healthcare, tourism, retail and logistics account for 30% of GDP and over £600bn in revenue for the UK. If congestion amounts to 2% lost GDP then removing this barrier can save over £12bn annually in these four sectors alone
- The Department for Transport (DfT) states that in certain places the current capacity of transport networks cannot meet the demand that is, or will be, placed upon them. This results in delays and, more importantly for business, adds cost to their operations because of the inability to predict journey times reliably
- Congestion across all modes of transport is not just an inconvenience in terms of lost time. It also costs the UK economy billions of pounds a year, which the Eddington Transport Study estimated could be £7-8bn of GDP per annum for road congestion alone
- DfT also shows that average speeds during the weekday morning peak on locally managed 'A' roads in England were slower in January 2013 (down 4.4 per cent), February 2013 (down 1.8 per cent) and March 2013 (down 1.9 per cent) compared to the same months in 2012, notwithstanding the environmental impacts

- Queues of passengers on the ground and aircraft in the air also have a significant economic cost and recently the US Federal Aviation Authority estimated 'air traffic delays cost the US economy up to US\$41bn in 2007
- Today's transport networks are fragmented, and work in silos rather than being overall effective and usable systems. This fragmentation and isolation has confused the customer and increased CO2 emissions, thus losing the original aim and benefit of these technologies. A potential solution is to integrate them through systems engineering, thus increasing overall performance of the network and the vehicles and infrastructure that operate within it.

The Technology Strategy Board has instigated a research programme to address these fundamental issues, with the aim of establishing an innovation and technology framework for the integrated mobility of people and goods. The elements of this programme are illustrated below.



2.2 The Research Programme

A summary of the main findings from the initial integrated transport research studies commissioned by the TSB is provided in section 2.3 below.

Over recent weeks TSB has also organised a series of roundtable discussions to begin a structured dialogue with transport end-users, with the aim of developing a firmer understanding of the business case for integrated transport. Details on these roundtables, along with a review and analysis of their outputs, are provided in chapter 3.

Preliminary discussions have also been initiated with stakeholders involved in promoting international trade and investment, with the aim of understanding the international opportunities associated with integrated transport. A summary of the initial conclusions from these discussions is provided in chapter 4.

Recommendations on actions to develop and capture the national and international opportunities associated with integrated transport are summarised in chapter 5.

2.3 Initial Research Findings

TSB has commissioned three initial research studies:

- A “think piece” produced by Atkins on how “system-of-systems” thinking can help to address the challenges relating to integrated transport systems
- A review produced by Frost & Sullivan of current and future mobility trends, their impact in the UK, and future growth potential
- An assessment of the potential market size for new technologies applied to the transport sector, undertaken by the Centre for Economics and Business Research, in a way that enables TSB to apply the findings to its potential investment decisions.

Summaries of the research findings from the first two of these studies are provided below, along with an overview of the third study which is on-going.

Integrated Transport Systems of Systems Study – Atkins

This report is intended to assist the Technology Strategy Board (TSB) in defining its strategy for innovation in transport, with particular reference to the challenges relating to integrated transport systems. The TSB has asked Atkins to develop a “thinkpiece” around how “system-of-systems” (SoS) thinking can help to illuminate these challenges. In phase I, Atkins brought together internal experts in integrated

transport and systems thinking to scope out the challenge of moving from integrated transport to mobility. In phase II, Atkins began to build a common system-of-systems framework and language to discuss and address these challenges and to develop a shared view of how to define and address this problem in a meaningful and impactful way that consistent with the TSB engagement approach, collecting best practice case studies and consulting with existing and potential new stakeholders to test our hypotheses in order to understand the potential for impact from the various intervention options proposed. In phase III, Atkins validated previous insights and recommendations through deeper engagement with expert stakeholders in the field. Atkins also developed a more sophisticated economic model of both the cost of congestion and the business opportunity from addressing it both domestically and in global markets.

At a macro level, transport integration boosts the economy, improves social inclusion and reduces environmental impact and it seems clear that a SoS approach focused on mobility should be able to enhance these goals substantially, improving the return on investment in transport. However, the desirability of addressing this challenge is brought sharply into focus by consideration of the cost to the economy in lost productivity and other forms of waste caused by congestion. On the basis of Lost Customer Hours (LCH) at the prices for business and leisure mobility used in the Eddington report, congestion could actually be as much as £80bn annually. This translates into a cost of congestion to each member of the population of approximately £1,300 annually, or about £3.50 a day. Considered as LCH per person per day, this would be approximately 48 minutes per day. This is not merely time wasted per day on our own personal travel, but also includes the congestion caused by both our own mobility and the mobility of the goods and services we consume. In other words, we may waste 8 minutes of our own time in traffic jams daily, but we can also presume that the logistics companies serving the supply chain of the goods and services we use are effectively spending 40 minutes in various forms of modal congestion on our behalf. It is therefore clear that we lack detailed understanding of the “congestion footprint” of different types of activity and that addressing this should be an important priority for the UK.

Although this is a uniquely difficult market to size and segment, it seems clear that there is considerable depth and variety to be found within it both domestically and in target global markets. Atkins believe that the value of the domestic market size for SoS solutions across infrastructure, vehicles, control systems, equipment, services and project integration could be between £16.5bn and £30.2bn. With the low CAGR typical of integration markets of 1.9% over the next five years, this rises to between £17.9bn and £32.6bn. Identifying the specific profit pools within this market and unlocking them will be a challenging task. This excludes the value of transport-replacing mobility solutions such as videoconferencing and telepresence which Atkins believe to be capable of eliminating up to £1.2bn of public sector and

£4.7bn of private sector travel annually in the next five years, whilst growing the market from £78-91m to £125-165m in the same period.

The overseas market for mobility solutions, both in terms of public procurement and supply chain opportunities, could amount to between £104.3bn to £183.7bn annually. Key overseas markets look to be China (£149.0bn p.a.) the US (£74.5bn p.a.) the Eurozone (£59.6bn p.a.) and Japan (£37.2bn p.a.) although other markets, such as the Middle East, Brazil, India and Russia may also be key. This is a considerable prize, even if only a tiny piece of it is securable for UK expertise. There are three main value streams to be found, each of unique and significant impact. Further work to identify more precisely the more promising international markets and a more nuanced understanding of the supply chain would also be of value. There is of course more than one way to define this market and of course more ways to approach the integration of transport than through the delivery of the mobility SoS, but the cost of congestion cannot be denied: its order of magnitude is of sufficient import to make it worthwhile to size it correctly and pervasive and pernicious impact on all sectors of the economy. If it costs the UK £80bn annually, as Atkins believe, then it is not realistic to spend up to 25% of this cost on reducing and eliminating this unnecessary waste, as our figures suggest.

It seems clear from the nature of transport as an enabler rather than an end in itself (which is revealed once one speaks in terms of “mobility” – getting people and goods to a place where they can be productive) Because of the long-term nature of transport infrastructure programmes, only government can truly own this SoS. Unfortunately, there are numerous structural issues that make it difficult for governmental leadership to remain focused on long-term benefit and clarity of purpose, without being constantly in conflict with the myriad short-term priorities that require urgent tactical responses.

Atkins’ engagement with expert stakeholders appears to indicate that their reading of the issues and challenges of SoS approaches has been substantially correct. Stakeholders consistently warn of the complexity and long-term nature of SoS approaches, as well as the critical importance of instilling SoS-friendly behaviours through cultural change and educational programmes and initiatives; Atkins present two of the most important pieces of thinking in this field to stimulate thinking. Due to the immaturity of approaches and the extremely small amount of expertise in this field, most of which is fully utilised in the defence sector, a growth in capability would appear to be a priority. Strategic leaders within transport are in many cases aware of SoS but are unclear as to how it can be of benefit, viewing it at this stage as a peripheral or even a technical issue. This attitude is fundamentally incorrect and it can be shown to be driving poor behaviours throughout the mobility SoS.

Education is therefore of fundamental importance for productive engagement with prospective leaders and stakeholder organisations. For the right behaviours to be

promulgated, both by users and suppliers their benefits must first be understood, disseminated and consistently incentivised through local choices, but this cannot be envisaged before the building of a cadre of thought leaders that can help to embed this approach into the relevant supply chains. A combination of academic expertise in SoS, professionals working in collaboration behaviours and organisational change and operationally credible, customer-focused, commercially savvy and delivery-oriented mobility solution and mobility replacement stakeholders will be necessary to lead this change and build clear and understandable messaging.

Atkins suggest the following headline activities as being worthy of serious consideration in addressing key mobility SoS challenges, in conjunction with the educational programme mentioned above:

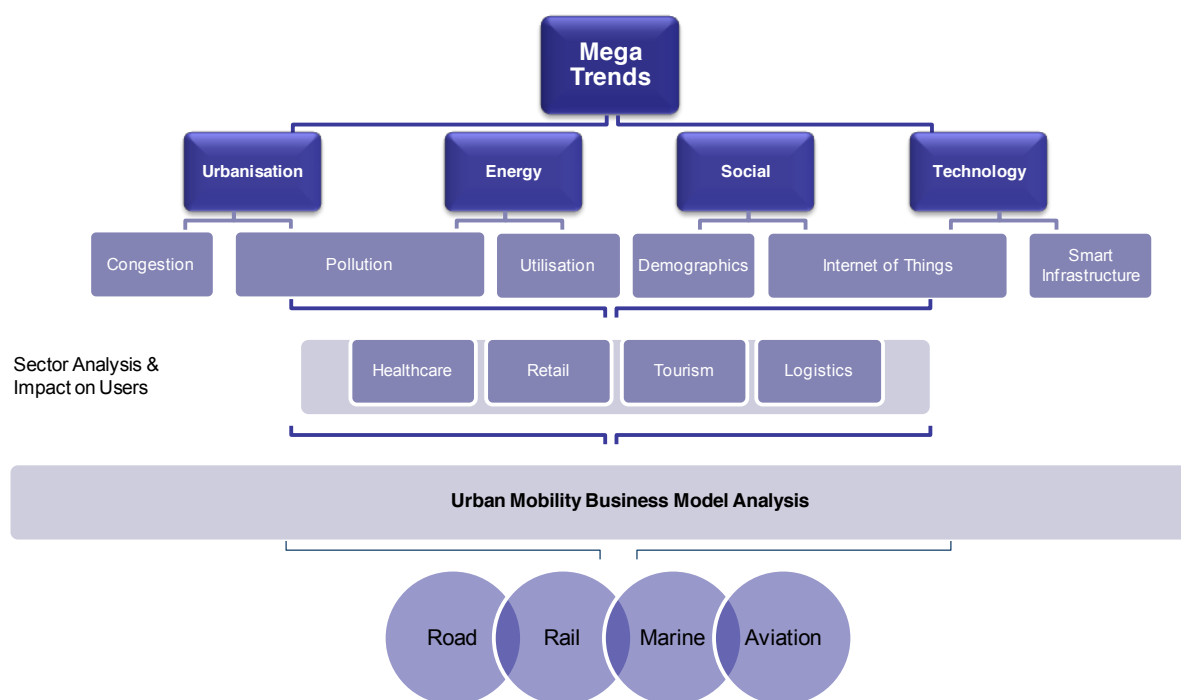
- Articulating the whole of the mobility system in architectural and economic terms and the sort of change needed (i.e. from “virtual” to “acknowledged”) in order to bring the mobility SoS network together (perhaps as a special interest group of wide-based stakeholders)
- Development of specific models for cultural and behavioural change (e.g. those based on the theories of Hofstede and Graves) that can be understood in terms of the present stakeholders in mobility
- Development of ticketing and information integration platforms and approaches with the necessary safeguards to prevent ITS “vendor frenzy”
- Development of “systemic behaviour” incentivisation demonstrators for individuals and organisations
- Identification of the most promising opportunities for domestic benefit and exportable UK expertise – this might mean focusing on a particular bounded sector vertical such as healthcare and re-imagining its mobility needs, or focusing on types of activity such as freight, leisure and commuting
- Identification of demand-led ways for the mobility SoS to address challenges such as “the Big Society”, perhaps through the analysis of “wicked” problems
- Development of “glueware” demonstrators and enablers (e.g. PRT) for mobility “micro-climates”
- Development of the evidence base for systems-oriented measurement and methods and metrics to measure and evaluate success.

Addressing any subset of these activities would make significant inroads into the challenge of building a mobility SoS and should be captured in a clear and acknowledged route map which tells stakeholders the story clearly and correctly and links it to resolving the congestion footprints associated with particular economic activities and sectors and helps to focus on the massive productivity benefits that could be attained, but are presently invisible amongst the plethora of activities that constitute the mobility SoS.

Transport Integration beyond Intelligent Transport Systems (ITS) – Frost & Sullivan

In 2011, the Technology Strategy Board (TSB) commissioned Frost & Sullivan to demonstrate the market trends, drivers, and restraints that were impacting mobility services in particular, with a view to highlighting future opportunities that could be exploited within or beyond Intelligent Transport Systems (ITS) markets. To achieve this, a three phased project was delivered which firstly gave a top level assessment of trends, technologies and markets that are currently impacting the road, rail, marine, and aviation industries, with the focus on the UK in particular. This provided a qualitative assessment of key variables identified by the TSB, such as the level of market consolidation, growth, level of innovation, and integration across transport modes for a number of solutions and technologies.

The second stage of the project considered how key megatrends related to Urbanisation, energy, social demographics and technology are affecting mobility, both in terms of the consequence of not taking action/intervention at a policy level, and the potential business models that are already starting to evolve. Of course, within each of these mega trends there are a number of opportunities and externalities that our study considers and profiles. Frost & Sullivan have seen that at the end of 2009, over 50% of the global population now live in urban areas, a trend forecast to increase, with the majority of countries economic growth coming from mega cities. The challenges this brings are mainly congestion and pollution, estimated to cost the UK around £60bn annually in lost productivity and health related conditions respectively. Clearly, there is a role for a more efficient and smarter transport network to reduce this effect.



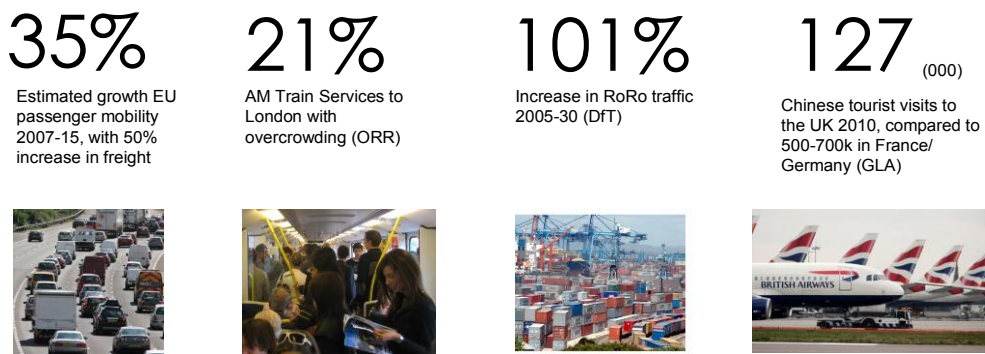
The same issue, pollution, is combining with alternative energy utilisation and technological advances as we move towards a smarter energy sector. With global population continuing to grow (exceeding 7bn in 2011), energy production has also increased by 28% between 2000-10. However this increase will continue at a declining rate; 23% 2010-20, and 13% 2020-30, set against the increasing population and demand for energy. This will be achieved through cleaner and more efficient fuels, and a reducing reliance on oil, particularly from the transport sector, with low emission vehicles and fuel consumption at the top of the agenda in each mode of transport.

In terms of demographics, the two key factors considered were firstly the changing needs and requirements of Generation Y, and conversely the ageing population. One key observation included that driving license holders in the 18-29 age group fell from 59% to 50% 2000-10, presumably as a result of increasing relative total cost of ownership, but also the changing characteristics of these GenY consumers, expecting 24/7 connectivity, and increasingly environmentally aware. Equally, the over 70 age group holding a driving license increased from 40-59% over the same period, so whilst new products and services (such as connected vehicles) are starting to emerge to reverse the trend of reducing younger drivers, key consideration will be given to road safety and accessibility to accommodate elderly drivers.

Most of the above trends considered, and benefits of the mobility opportunities, are facilitated by technology, as ticketing & payment, data management, connectivity, and location based services (to name but a few) continue to grow commercially and

offer new business models. This will play a pivotal role in providing effective solutions to all other mega trends; for example developing road user charging schemes to manage congestion/pollution, implementing social media in cars to interest generation Y consumers, and electric vehicles to provide emission free driving and reduce fossil fuel automotive reliance.

2.1.1 Urbanisation: Congestion costs UK over £30bn in Lost Productivity
Whilst most research and quantified effects of congestion relate to road, all other modes in the UK suffer from pinch points and inefficiencies in relation to capacity; mitigating this is essential



	Road	Rail	Marine	Air
Problem	•31m vehicles •90% urbanised country •Car still dominant mode – 71% 2009 (ONS) •£24bn lost productivity to 2025 (Eddington)	•11% CAGR 2000-10 •4% journeys PIXC, 21% AM services to London •1.3bn journeys 2010 •Est. User discomfort £3bn	•95% UK goods arrive by sea •Forecast 182% container growth 2030 •Capacity reached by 2022, a 1% loss = £3.4bn	•Air traffic growth 97% 2007-30 •Lack of links to economies - £1.2bn (BAA) •Tourism constrained – Chinese spend 10x less in UK than in France

F R O S T & S U L L I V A N

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Whilst recognising these trends will play a key role in mobility going forward, the project looked to test the effects and viability of such market applications, by profiling specific industry sectors, to consider the effects on the “mega users”. This showed that the healthcare, retail, tourism and logistics sectors alone account for over 30% of UK GDP, with revenues exceeding £600bn, and employing over 10m people. Within the healthcare sector specifically, the opportunities for mobility services could be huge, with over 1.7m employees and a £126bn budget, of which an estimated 5-18% is spent on transport related products/services. With over 5% of all UK road trips being attributed to the NHS, forward looking activities at a national, regional, and local level could start to make a big difference on the transport network in the UK as a whole. This could include car sharing schemes, increased data provision, and effective journey planning & partnerships with authorities to reap the benefits of reducing costs, emissions, and impact on resources (such as cancelled appointments, which cost the NHS over £600m per year alone).

3. Mega Users: Account for ~30% GDP and over £600bn revenue, potential to unlock vast productivity gains in 4 industry sectors alone



	Healthcare	Retail	Tourism	Logistics
Background	•Estimated 5% of all traffic in England •60% NHS carbon footprint in procurement •Largest UK employer	•Estimated 11% of UK workforce employed in retail •16% UK retail establishments in London	•30m overseas visitors (2010) •3rd highest export	•Sector employs 1 in 12 UK workers across 196,000 companies •Infrastructure has the strongest relationship on performance
Jobs	•Est. 2m sector total •1.4m hospitals 2010 (6%)	•2.9m 2010 (12% labour)	•2.6m 2010	•2.3m 2010
£	•£126bn public (2010)	•£292bn sales (2010)	•£52bn direct, £63bn indirect •Total £115bn (2009)	•£75bn
GDP	•2009 – 9.8% •Priv. 1.6%, Pub. 8.2%	•8% UK	•8% UK	•5% UK

“If Congestion amounts to 2% lost GDP; removing this barrier can save over £12bn in 4 sectors alone, per year “

FROST & SULLIVAN

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Going forward, Frost & Sullivan believe there is a market opportunity or a number of opportunities for a mobility integrator role, combining services from transport operators, telecoms providers, technology solutions companies, and booking & payment offerings. This may be brought to market in a staged approach, or at different service levels. For example, a total networked mobility system would include a central organisation (presumably a large systems/technology provider) providing a one stop shop for mobility services such as fleet optimisation, apps, and journey planning, with the revenue streams provided by transaction fees, subscription, royalties, and advertising for example. At the other end of the spectrum there is an opportunity for the current individual mobility service providers (such as transport authorities or organisations) to enable integration with other services through open data and data sharing, the business model largely as it is now, to increase patronage and revenues for their particular service.

In order to achieve such opportunities, it is suggested that the TSB leverage their existing good relationships with industry through the Transport (and other) KTN's, facilitating working groups, round table events, and showcasing best practices/case studies in mobility, using some of the opportunities highlighted in our study as the incentive for their involvement.

The Potential Market Size for New Technologies applied to the Transport Sector - The Centre for Economics and Business Research (CEBR)

The aim of the study is to understand the potential market size for new technologies applied to the transport sector. In setting this aim, the CEBR hope to establish a

better understanding of the commercial opportunity that exists for the developers of these technologies.

The **objectives** of the study are:

- To identify market sizes now and examine how they may change in future
- To appropriately segment the analysis to enable a clear understanding of potential market sizes that affect different elements of transport (such as car, public transport and freight trips, or trips within urban areas and outside urban areas)
- To begin with the size of the UK market and scale appropriately to reflect global markets and
- To present results in a way that enables TSB to apply them to its potential investment decisions.

Background

The Technology Strategy Board (TSB) has a remit to support innovation in technologies for which there is a large global market, which could come to market within a few years, and where the UK has a national capability to deliver a long term advantage in the field. The transport sector presents opportunities for such technologies and TSB has asked CEBR to examine options for better understanding the size of potential markets for transport related technologies.



Such technologies would make it easier to move people and goods more intelligently and efficiently and would therefore be desirable by consumers. Their willingness to pay for the journey time improvements defines the potential market size.

The potential market size may be difficult to capture due to certain features of the market. A good example is the rail sector in which prices are fixed by regulation. In this case, it may be difficult for a rail operator to charge for benefits which flow from a technology which improves the customer experience. However, charges not included in ticket prices (such as charges paid to a third party applications provider) need not be so restricted.

Project issues and required competencies

In this section, we briefly describe some of the challenges that the CEBR believe are posed by the brief and how these define the competencies required within the project team.

Issue 1: Scope

TSB works with businesses to reduce the risks of developing solutions to a particular problem or challenge: which have a large potential global market; where there is a national capability in that it provides a long term advantage; where the product will come to market over the medium term; and where TSB can make an impact by intervening to provide support. The CEBR have developed this proposal specifically to address the first of these issues – market size. This limits the scope of the analysis. Specifically, it precludes investigation of:

- Particular technologies and
- UK scientific or industrial capacity in the appropriate market area.

The CEBR will concentrate instead on developing robust estimates of global travel markets and consumer, operator or government willingness to pay for different kinds of improvements in transport provision.

Issue 2: Data availability

There is a wealth of data available describing how consumers react to and value different aspects of improvements to transport services. However, they are subject to significant constraints, for example, they can be:

- Collected commercially by operators for market planning and are often confidential
- Fragmented between countries because they have been collected for national policy and planning purposes or
- Fragmented between projects and local areas because they have been assembled for the appraisal of a particular investment project.

While there are few truly national datasets relating to transport and travel behaviour (and even fewer internationally), there are many available data points which, suitably interpreted, provide a rich and rounded picture of travel and transport markets and willingness to pay to improve them. CEBR have developed their methodology to draw on consistent national and international datasets where these are available. However, these will certainly not be available for all of the market segments and valuations which they aim to cover. The segmentation and valuation will therefore need to rely on less comprehensive data sets drawn from specific studies or local areas. The CEBR will use their professional judgement to determine where insights are suitably transferable and provide appropriate ranges and caveats where evidence is weak.

Issue 3: An uncertain transport future

The experience of transport has changed significantly over recent decades. Private car ownership and use has increased substantially, particularly in the developing world, and congestion has grown with it, despite investment in new transport infrastructure. Road congestion has proved a boon for rail travel and in many places rail services are reaching capacity while new rail infrastructure takes many years to plan and deliver and can be very expensive. Over the last decade, there has been a transport information revolution from widespread satellite navigation to real time information at bus stops and comprehensive journey planning software tools.

Many of these trends are likely to continue, particularly where developing markets are experiencing similar growth in car ownership to that historically experienced in the developed nations. However, there is some evidence of a slowdown in car use in the UK over and above what can be accounted for by the recession and there remains uncertainty about the impact of improved digital communications on transport demand. In the medium term, there is also significant disagreement on national and global economic prospects which introduces further uncertainty into medium term planning.

CEBR regularly deals with these issues in its economic forecasting and project work. In this commission, they propose to deal with the above by presenting the current best evidence and then providing high and low scenarios for future market changes.

The journey experience

Transport is a diverse activity ranging from cycling to the shops, long haul flights, or to hauling hundreds of tons of raw materials by rail. Each of these different journeys has different characteristics (such as journey time, reliability, quality, comfort, information provision, etc.) and consumers value changes in these characteristics differently. A meaningful analysis of the potential market size for transport improving technologies must adequately distinguish between these different markets and different journey features.

There is substantial data in the UK about customer transport experiences. Aggregate data exists for example, from the National Travel Survey, Census journey to work subsample, Expenditure and Food Survey and Transport Statistics Great Britain on passenger demand by mode of transport, time of day and location. Between them, these and other datasets can provide a rich picture of the transport experiences, current expenditure and journey times across the UK network.

Willingness to pay

Transport analysis in the UK is based on a long tradition of academic econometric analysis of how people make transport decisions. This body of work has been derived from all modes of transport and from many examples of changes in fares,

service frequencies, improved interchanges, better information, better cleanliness, higher reliability and other factors.

From this (now relatively comprehensive) dataset, the ‘willingness to pay’ to change different elements of the journey experience have been assessed and distilled. It now forms the basis of the demand forecasts for and economic appraisal of transport investments. This approach to transport investment decision making is often criticised for getting its numbers wrong. However, criticisms of transport demand forecasts tend to be about their reliance on overly optimistic forecasts of economic growth rather than the underlying research on consumer behaviour.

For the purposes of approximate market sizing, the CEBR believe that this approach is suitable for estimating the approximate size of the market for transport improving technologies.

Market sizing

Following the analysis of journey experiences and willingness to pay, the CEBR will draw these strands together to estimate the total market size (as measured by the willingness to pay) for improvements to different aspects of the transport experience. This analysis will be segmented by:

- Journey purpose
- Mode of travel (including road, rail, air and marine) and
- Journey characteristics (such as journey time, reliability, and congestion for road journeys, and reliability, interchange, information quality, journey frequency, journey time, etc. for public transport).

The scope excludes examination of particular technologies and we need, therefore, to consider different ways of defining market size. For example, it is possible to estimate the market size for a technology that reduces congestion on the motorway network by 5% (whether purchased by individual drivers or on their behalf by the Highways Agency or other third party).

However, from the data available we can construct a more generic description of potential market sizes. This describes the maximum potential market size as the amount that users would be willing to pay in order to completely mitigate a particular burdensome element of the transport experience. For example, we may determine an approximate size of the cost imposed on people by inaccurate or out of date rail timetable information. The potential market size for a technology can then be judged according to how effectively it may mitigate this.

3. End-User Roundtables

3.1 Background

Atkins have demonstrated that "system of systems" engineering and transport integration at a macro level have the potential to boost the economy, since transport and the economy are parallel activities which feed positively into each other. Integration also improves social inclusion and reduces environmental impacts, and hence such an approach to travel and mobility should also enhance sustainability in transport. Equally, Frost & Sullivan have demonstrated how new technology trends could reshape how the UK uses its transport systems, how it interprets its future transport requirements, and how such technological advancements could be used to overcome current transport issues.

As with any market, however, success requires people to buy in to new innovations, in order to create the demand for new solutions in transport and the mobility created by the advanced systems engineering of people and goods. Fundamental to this successful buy in is an education and engagement programme with potential user communities which should help to specify future requirement and the end-user needs for future innovation. Gaining relevant inputs, and reaching out to relevant communities, is key to delivering successful market innovations, and hence our move to establish national roundtables to facilitate current understanding and signpost the potential for future integrated transport solutions.

To that end, between May and July 2013 March Publishing Ltd in conjunction with Intelligent & Green Systems Ltd organised a series of end-user workshops on behalf of the Technology Strategy Board in selected cities, namely London, Cambridge, Southampton, Birmingham and Leeds.



Workshop participants included a wide range of transport end users, service providers, infrastructure owners, local business development groups and academics. Full details of the participants in each workshop are provided in Appendix A.

Whilst the feedback and the outputs from these initial workshops cannot be guaranteed to be representative of all the issues facing the UK, being inevitably coloured by the make-up of the invited participants and by specific local concerns, we remain confident that the inputs are of considerable value and that they provide a solid basis for the analysis of key drivers and opportunities in the area of integrated transport. This view is reinforced by the fact that many of the workshop contributors were local subject matter experts, and all gave their time freely to contribute their thoughts and experiences on this important issue.

The initial independent research detailed in Section 2 has been combined with a detailed analysis of the issues raised in each of these end-user workshops, as well as the structured analysis of the feedback subsequently provided by the workshop participants, in order to provide the basis for the conclusions and the recommendations detailed in Section 5 of this report.

3.2 A Structured Analysis of Roundtable Outputs

Verbatim transcripts of the contributions of both speakers and participants at each of the workshops were recorded and documented as part of the research process. A full transcript for each event can be found in Appendix A.

A structured analysis of each of these discussions, along with subsequent feedback provided by the attendees, was then undertaken.

To better understand the challenges faced and the opportunities available in each of the regions covered by the research programme, significant and recurring comments have been classified into the following 7 areas:



Political Regulatory & Governance



Commercial & Investment



Transport Planning & Operations



Community & Society



Data & Information Technology

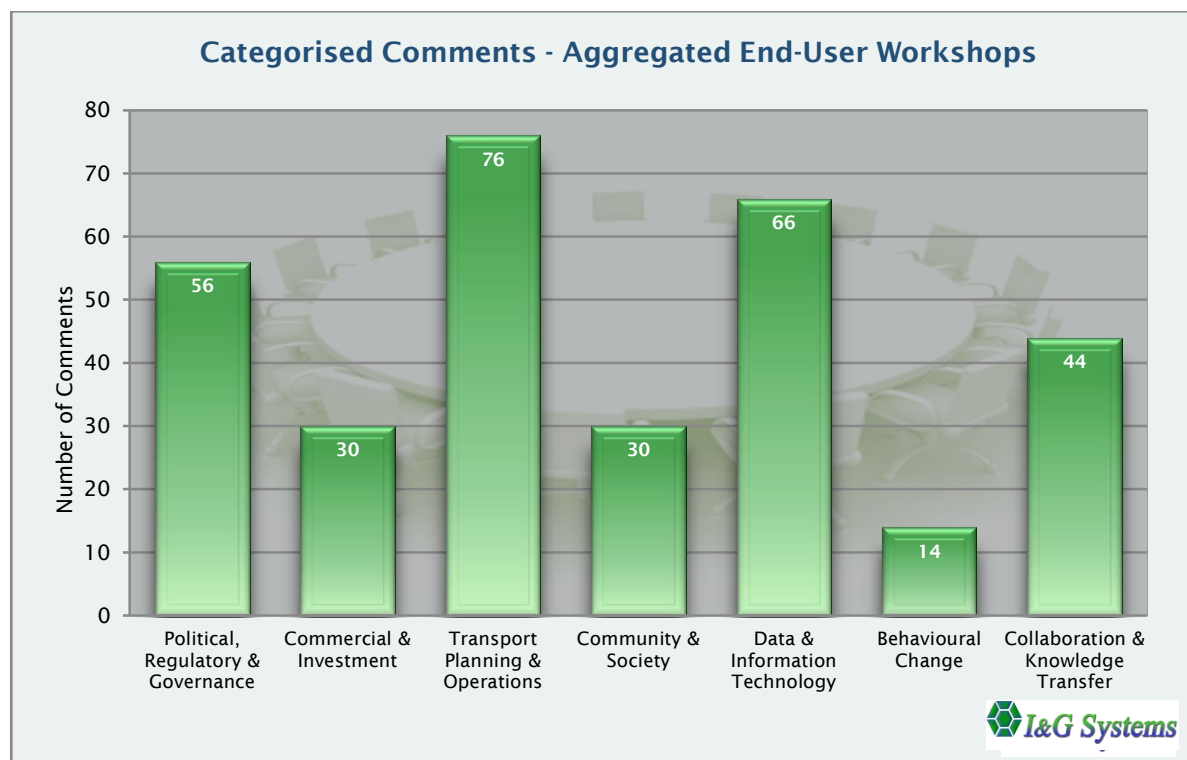


Behavioural Change



Collaboration & Technology Transfer

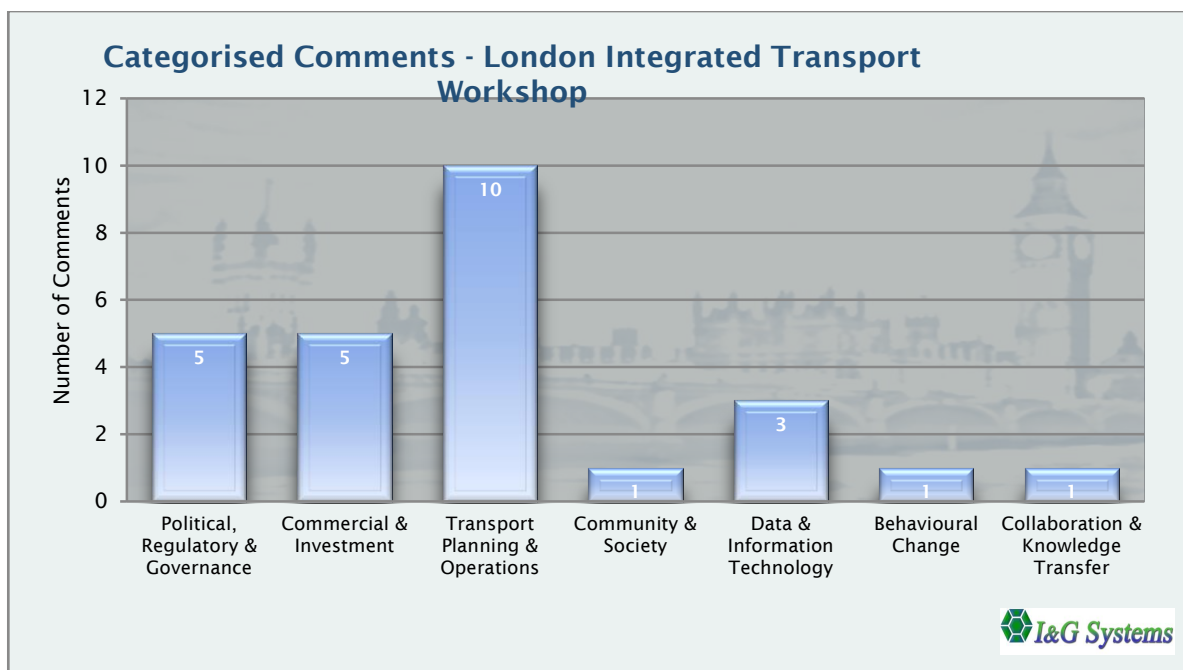
Some comments were expressed as barriers and challenges to the further development of integrated transport, whilst others were provided in the context of new or developing ideas and opportunities that could be exploited. If we take a positive stance and observe that barriers and challenges also represent opportunities, the number of comments related to each category can be summarised as follows.



An analysis based on the above categorisation indicates that the relative number of comments by category was as follows:

Category		No. of comments
1.	Transport Planning & Operations	76
2.	Data & Information Technology	66
3.	Political, Regulatory & Governance	56
4.	Collaboration & Technology Transfer	44
5.	Commercial & Investment	30
=	Community & Society	30
7.	Behavioural Change	14

3.3 London Workshop Summary

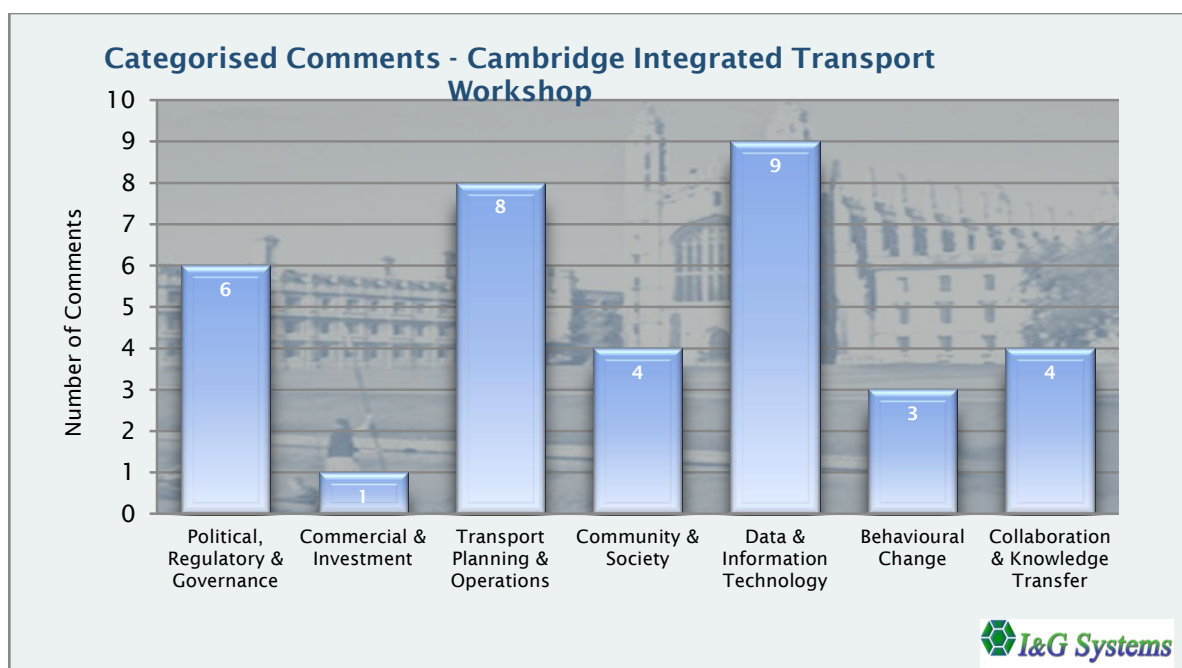


In common with the overall analysis, Transport Planning & Operations was by far the most common topic of discussion at the London workshop, while Political Regulatory & Governance and Commercial & Investment received more attention relative to the other cities. Other categories, notably data & information technology were much less notable than in the other cities.

Significant Discussions – London End-User Workshop		
	Challenges	Opportunities
Political, Regulatory & Governance	- Disconnect between different transport bureaucracies - joined up thinking required - Political Conflict - Other departmental or local priorities overriding transport requirement - Political Short-termism vs Long Term Decision Making required for Transport - Politicisation of Infrastructure Decision Making - Short-termism of Decision Making	
Commercial & Investment	- Rising Energy Costs - The commercial impact of closures / accidents	- Investment in Alternative Airports to Heathrow - E-commerce and goods distribution - Integration of retail opportunities at transport hubs
Transport Planning & Operations	- Affordability of Public Transport - Capacity Constraints - Many people from the north of England have given up on Heathrow	Maximising usage of the transport infrastructure over a 24hr period - Spreading activity more over the 24hr clock "anything-anytime-anywhere"

	Plateauing Quality of Service in Public Transport	- Flexible Pricing - Collocation of offices & transport hubs - Massive growth in air cargo - new ideas & solutions are required - Regional Travel Co-ordination Opportunities - Shift to round the clock service provision - requires addressing of people constraints (limits working hours)
Community & Society		Grassroots involvement to deliver sustainable communities
Data & Information Technology		- Passenger Information & Tracking - Modal Integration & Smart Ticketing for different modes - Door to Door journeys - Unlocking available data to add value and improve performance
Behavioural Change		Home / Independent Working
Collaboration & Knowledge Transfer		Learn from international best practice

3.4 Cambridge Workshop Summary

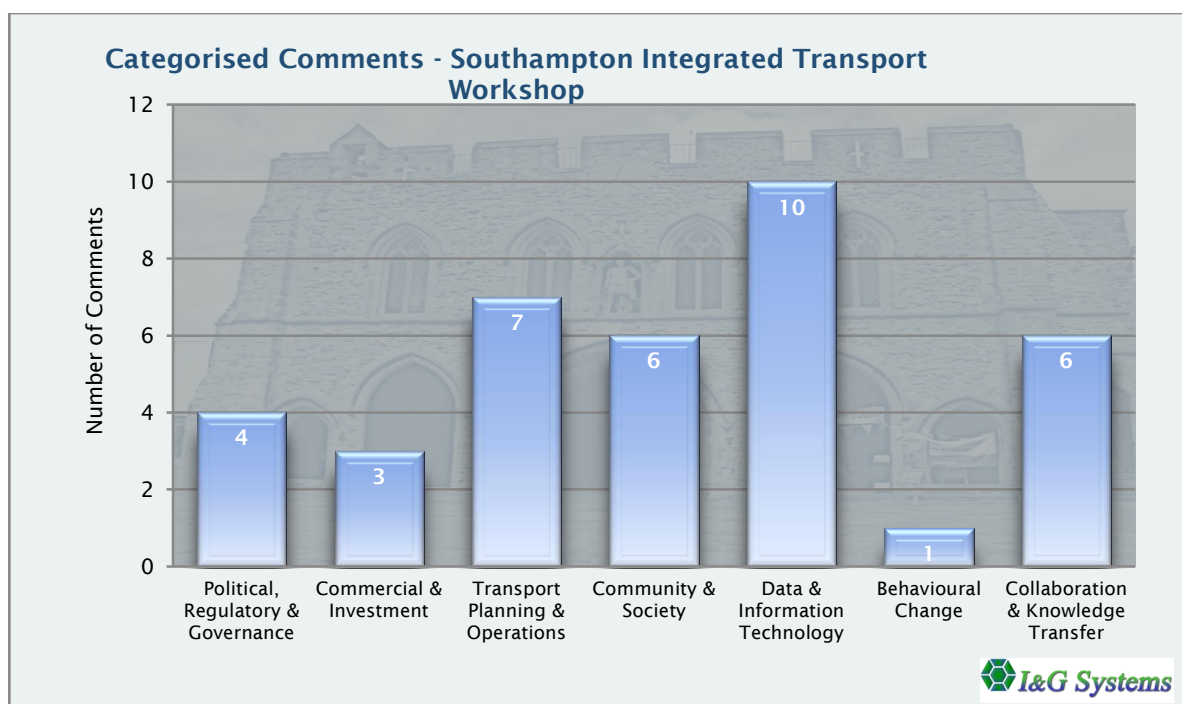


The theme of Data & Information Technology was the most discussed at the Cambridge workshop, whilst issues relating to Transport Planning & Operations and Political, Regulatory and Governance also came up several times. Commercial and Investment issues were covered much less than at other workshops.

Significant Discussions – Cambridge End-User Workshop		
	Challenges	Opportunities
Political, Regulatory & Governance	- Conflicting Interests between Local & Central Government - Differing Urban vs Rural transport agendas - Entrenched political positions + politically motivated decision making - Regulation remains a barrier to innovation (e.g. OFCOM restricting wider access to post box assets) - Split between corporate strategy & political policy making (private corporations vs public sector)	Office parking charge levies - Currently viewed as a local tax
Commercial & Investment	Should investment be driven by the public or private sectors?	
Transport Planning & Operations	Lack of effective co-ordination of existing transport assets (e.g. London buses)	- Multi-user vehicles (e.g. promoting usage of parked work vehicle for local services) - Development of improved goods distribution systems better suited to developing E-

		- commerce requirements - Localised Delivery Points - Single Deliveries from multiple suppliers - Possible transition from next day to same day deliveries - requires changes to logistics infrastructure & ways of working - Hub Based Transport Service Developments - Combatting the Deterioration of our Town Centres (Park + Ride / Specialist pick up & delivery points)
Community & Society	Interaction & Collaboration Spaces Still Required Even with Remote Working	- Touchdown Workspaces / Connected Hubs - Villages becoming centres for work - Changing socio-economic patterns impact on delivery & transport patterns
Data & Information Technology	- Lack of Centralised Control Hinders Development of Data Solutions - Traffic Lighting - Remains un-coordinated despite technology existing	- Stride Project - Transport & Internet of Things Demonstrator - Open Transport Data Platforms - Journey Time Prediction - Monitoring Driver Behaviours based on telemetry data - Traffic Incident Systems - Analysis & Communications via Social Media - Leveraging Social Media & Cloud solutions for Smart Transport Application Developments - E-Commerce & Dark Warehousing
Behavioural Change	- Cars are becoming more luxurious and remain a personal space - making behavioural change even more challenging - Public transport unattractive to the more wealthy	Changing the mind-set that transport services should be free or minimal cost - What would people be willing to pay for. If we charge more, we must meet or exceed people's expectations
Collaboration & Knowledge Transfer	Supply chain and cross sectorial collaboration	- Learning from international best practice around delivery solutions - Learning from industry best practice in other sectors where shared logistics and distribution models are established

3.5 Southampton Workshop Summary

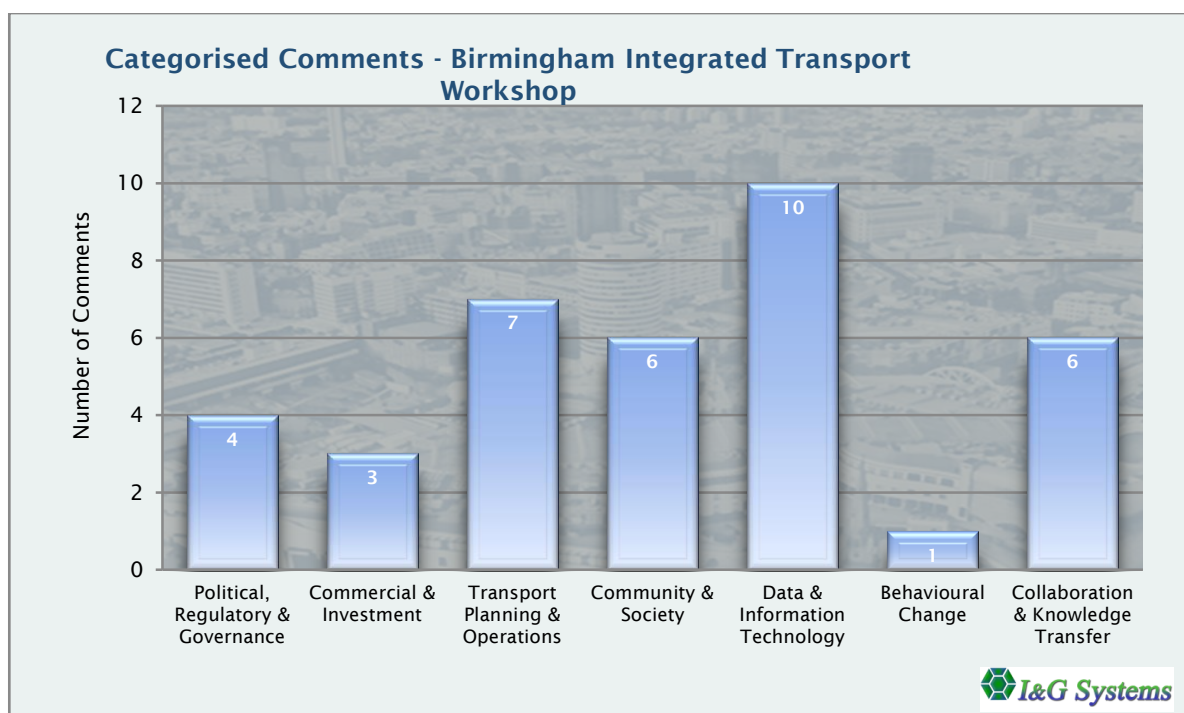


Four topic areas were clearly the most popular at the Southampton workshop: Data Information & Technology, Transport Planning & Operations, Community & Society & Collaboration & Knowledge transfer.

Significant Discussions – Southampton End-User Workshop		
	Challenges	Opportunities
Political, Regulatory & Governance	- Knock-on transport impacts of other government legislation (e.g. closure of local public hospitals) - Local Authority Planning Constraints - Working across political boundaries - things are not well joined up	Using legislation (e.g. road tolls) to change behaviours
Commercial & Investment	- Cost of travel - there are examples where people are finding it hard to get to work because they can't necessarily afford the rail and bus transport fares - Demonstrating Investor Value	Improved incentivisation for usage of public transport for non-essential car usage - e.g. wider congestion charging. Overcoming political barriers to achieve this is a challenge
Transport Planning & Operations	- Changing Freight Haulier Behaviours - Correlating service quality to value - Making users value transport - Timetables are disjointed - Too much focus on Supply Led Solutions instead of demand - Traffic Lighting - more lights per sq. mile than virtually any other city in Europe	- Consolidated distribution/deliveries to wider community (e.g. hoteliers & SMEs) to - Network optimisation (particularly rail)
Community & Society	Combatting apathy - perceptions among the public that nothing can be done	Engineering new communities where people live and work to reduce traffic

	NIMBYISM	flows. - Further encouragement & incentivisation for remote working - Changing behaviours around the "school run" either via legislation or varying school opening schedules. - Developing integrated living, business & commercial spaces
Data & Information Technology	- Digital Connections & Information Sharing - Transport information is not joined up	- Agile Technology Solutions - Fleet tracking (National Express) - Improved Customer Information on arrival & departure times (National Express) - Safety (Alcoholock) (National Express) - End to end journey planners across transport operators - Using data to better develop demand based / capacity constrained transport provision models. - Utilising existing technology to measure road usage - Improving awareness and improving usage of existing data services
Behavioural Change		Improving vehicle utilisation rates to closer to 100% (currently estimated at 50%).
Collaboration & Knowledge Transfer	- Effective collaboration between the transport supply chain & major retailers - Limited Business Collaboration Across Sectors	- Improve relations between industry and Higher Education - International Engagement on Innovation & Best Practice - Integrated information sharing across users & providers - Stakeholder Engagement & Business Consultation

3.6 Birmingham Workshop Summary

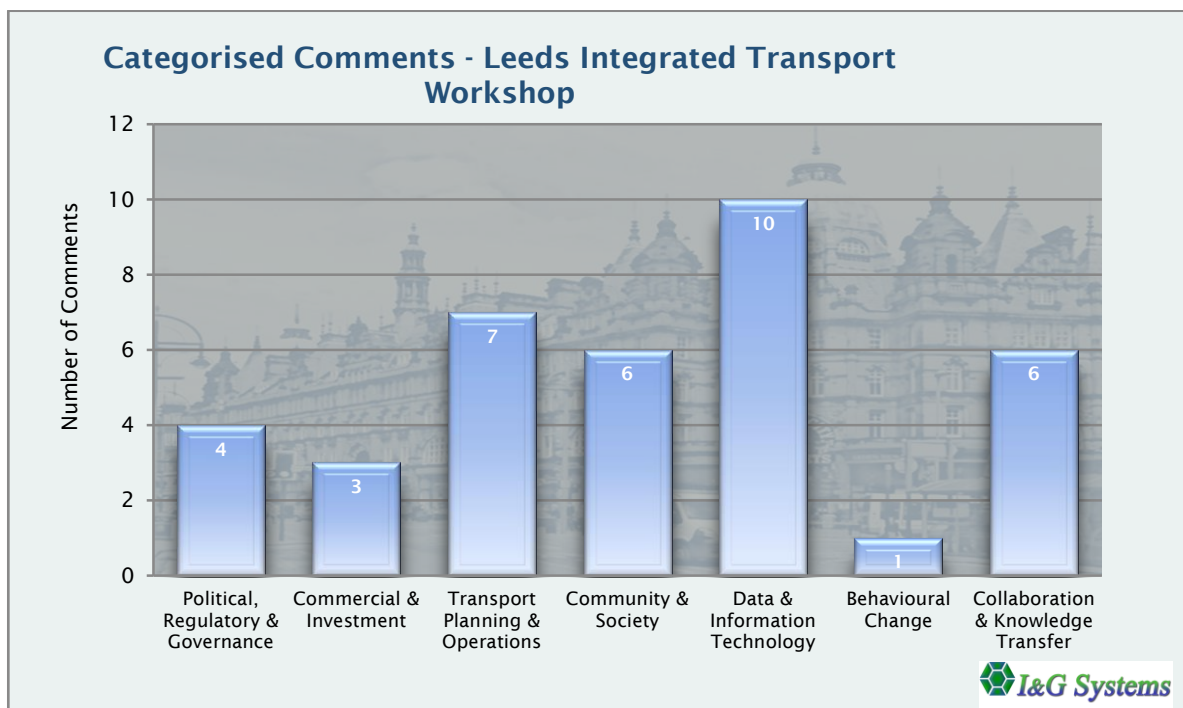


The Birmingham discussion was of a similar pattern to that held in Cambridge, with the most popular topics for discussion being the same four categories of Data & Information Technology, Transport Planning & Operations, Community & Society and Collaboration & Technology Transfer.

Significant Discussions – Birmingham End-User Workshop		
	Challenges	Opportunities
Political, Regulatory & Governance	- Administrative boundaries are often not commensurate with Travel to Work boundaries - Asymmetry of policy decision making and transport authority areas - Competition between LEP's for funding - Complex network of administrative areas and decision makers - Regulation remains a barrier to innovation (e.g. Hydrogen storage regulation limiting adoption)	Government intervention to support the interoperability, development and adoption of Smart Travel Card solutions
Commercial & Investment	- If our ideas are indeed world-class, can we not attract worldwide investment to help our ideas grow? - Lacklustre private sector support for government initiatives such as the green bus fund without significant subsidies - Societal benefits do not always correlate with profit generating activities	Export Opportunities should we develop leadership in innovative transport solutions

Transport Planning & Operations		• Retailing transport services instead of simply supplying it • Integrated Fares & Capping • Connected Meeting Points or Hubs based in airports, shopping centres or train stations. • New costing regimes for public transport to increase adoption where capacity is not fully utilised • Air Freight Opportunities - Although capacity constraints exist at Heathrow, other airports including Birmingham have the opportunity to develop into significant secondary freight hubs • HS2 Regional Development Potential
Community & Society	• Conflicting Interests between the public & private sectors • Increasing Urbanisation • Transport is too often seen as a separate issue. However transport is massively relevant to jobs and employment and is an absolute priority for cities	•
Data & Information Technology	• Big data challenges - Effective data gathering equivalent to that which the supermarkets gather about us • Lack of Smart Card Interoperability between different transport networks/regions • Technology alone cannot deal with car dependence & congestion	• Achieving Intelligent Mobility - Not just in public transport • Personalised Journey Planners Synchronised with other software & technologies such as Outlook and Smart Phones for effective travel planning • Personal Mobility Accounts - using data and knowledge of behaviours to influence customer choices • Pay for what you use smart cards • Travel information - On the move journey planning, leveraging Real Time Information, GPS Systems, Automatic Vehicle Locators, Travel apps and solar bus-stop flags • Consistently formatted open data to develop new transport data solutions (Already being investigated by the Transport Systems Catapult) The aim here is not to develop a whole new solution, but to improve the links between the systems so that people can use them to leverage existing data. Making this information available in a profitable way still remains a challenge • Wider Technology Usage in vehicles - Such as vehicle tracking for automatic payment of road tax or road use charging
Behavioural Change	• Cost and consumer resistance issues related to electric vehicles	• Future transport demands and changing travel habits of the younger generation
Collaboration & Knowledge Transfer	• In the UK we are great at thinking up ideas and talking about them, but too often we do not readily turn them into investable business models that take things forward • Rail Devolution - Encouraging collaboration between rail stakeholders	• Improved engagement with the younger generation • Improving engagement between business leaders and young innovators • Joint-venturing with other cities around the world

3.7 Leeds Workshop Summary



Similarly to the sessions in Southampton and Birmingham, the four most popular topics for discussion at the Leeds workshop were Data & Information Technology, Transport Planning & Operations, Community & Society and Collaboration & Technology Transfer.

Significant Discussions – Leeds End-User Workshop

	Challenges	Opportunities
Political, Regulatory & Governance	- Conflict between regional priorities - Short-termism of Political thinking - We need to develop new models for calculating payback and returns over longer periods to break out of this cycle - The constant turnover of new transport ministers compounds this problem, as each of them seems to have their own pet project rather than a wider vision - The convoluted transport planning system can also act as a barrier to getting projects off the ground - We need to develop a long-term integrated regional vision for Yorkshire for the next 50 or more years. It is frustrating to see bodies adopting disjointed, piecemeal approaches instead of taking a strategic view of the challenges	- Devolution of Transport Powers to a City Centric Approach - Independent transport agencies with a longer term view of transport priorities, that works with independent university researched evidence
Commercial & Investment		Major investment opportunities around stations if the land can be unlocked- particularly at nodes such

		as where a railway intersects with motorways • Access to Stations: We should encourage businesses to run more enterprises such as cycle hire, or smart car hire, from stations. The return here could be shared between the business and the station operator
Transport Planning & Operations	• Ageing transport infrastructure • Even if we cannot afford to make the investments right now, we must make sure we don't sabotage future potential opportunities by our current actions • Lack of integrated transport infrastructure • Structure of Rail Operator Contracts - current franchises often appear to be too short to justify significant investments in infrastructure or new technologies	•
Community & Society		• Rebalancing Transport & Logistics Supply Chains • Develop a more integrated view of transport and its inter-relationship with energy infrastructure • Development of Business Campuses: For example where a railway meets a motorway
Data & Information Technology		• Smart Junctions - Too often traffic lights do not appear to be speaking to each other
Collaboration & Knowledge Transfer		• Improved adoption cycles by closer ties between Research & Development and Business/Industry • Improved linkages between stakeholders and universities to realise technical innovations in commercial contexts • Development of specialist clusters fostering - collaboration between different technology institutes, universities and business. Such a public private partnership could be the best way of investing the money • Staff Suggestion Schemes: Ensuring that staff are encouraged and adequately rewarded to come up with innovative new ideas that improve the business • Partnering with Young People: Passing on knowledge we have gained as an older generation but also harnessing the ideas and enthusiasm of the younger generation to come up with new ideas • Local Community Engagement - a great deal of local knowledge is held by those directly involved in providing transport services, such as taxi drivers. They should be directly involved in the development and implementation of new smart applications to resolve local issues

3.8 Workshop Feedback Analysis

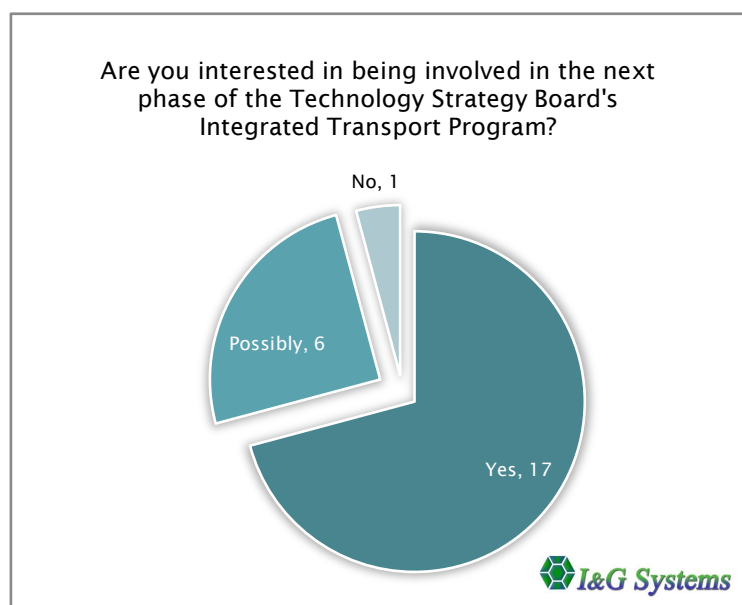
Subsequent to the workshops, participants were invited to provide further structured feedback relating to:

1. **Respondent interest in further involvement** in the next stage of development of the Technology Strategy Board's integrated transport programme – See 3.8.1
2. **Service Offerings:** Areas in which their organisations are best placed to support the successful development and delivery of this programme – See 3.8.2
3. **Importance of Integrated Transport Overall:** Their view of how important the development of integrated transport systems is for their region – See 3.8.3
4. **Benefits of Integrated Transport to Different Sectors:** The scale of benefit of integrated transport systems to different sectors of the economy in their region – See 3.8.3
5. **Regional Organisations:** Any regional organisations or consortia that could make a significant contribution to the development and implementation of an integrated transport programme in their region – See 3.8.4
6. **Best Practice:** Any examples of world-class integrated transport initiatives that could serve as examples of national best-practice – See 3.9.

A total of 24 workshop attendees provided additional feedback to the workshop sessions. A statistical analysis of this feedback is provided below, and a detailed summary of all the feedback is included in Appendix B.

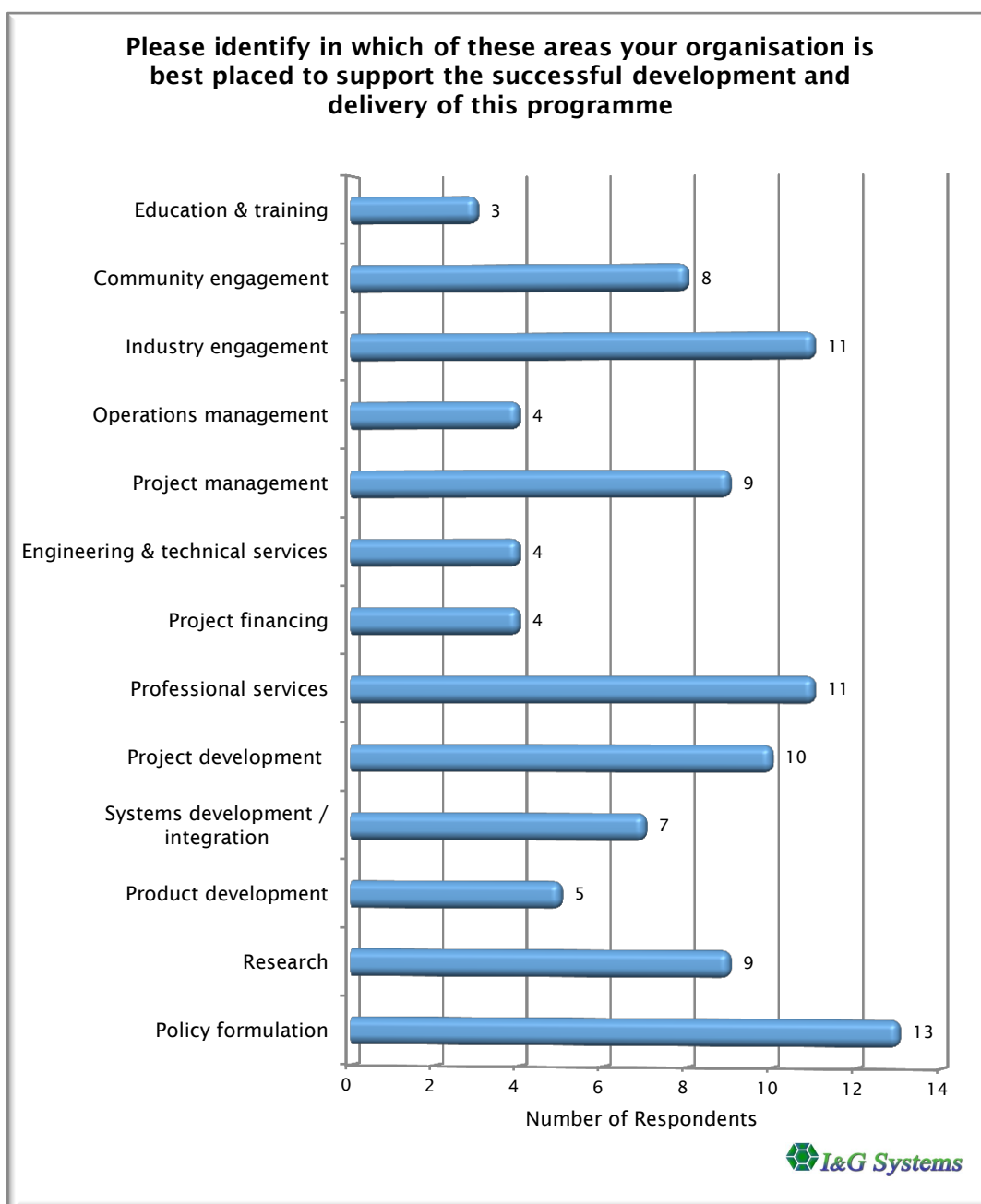
3.8.1 – Respondent Interest in Further Involvement

Encouragingly, the vast majority of respondents expressed an interest in continued involvement in the next phase of the Technology Strategy Board's integrated transport programme.



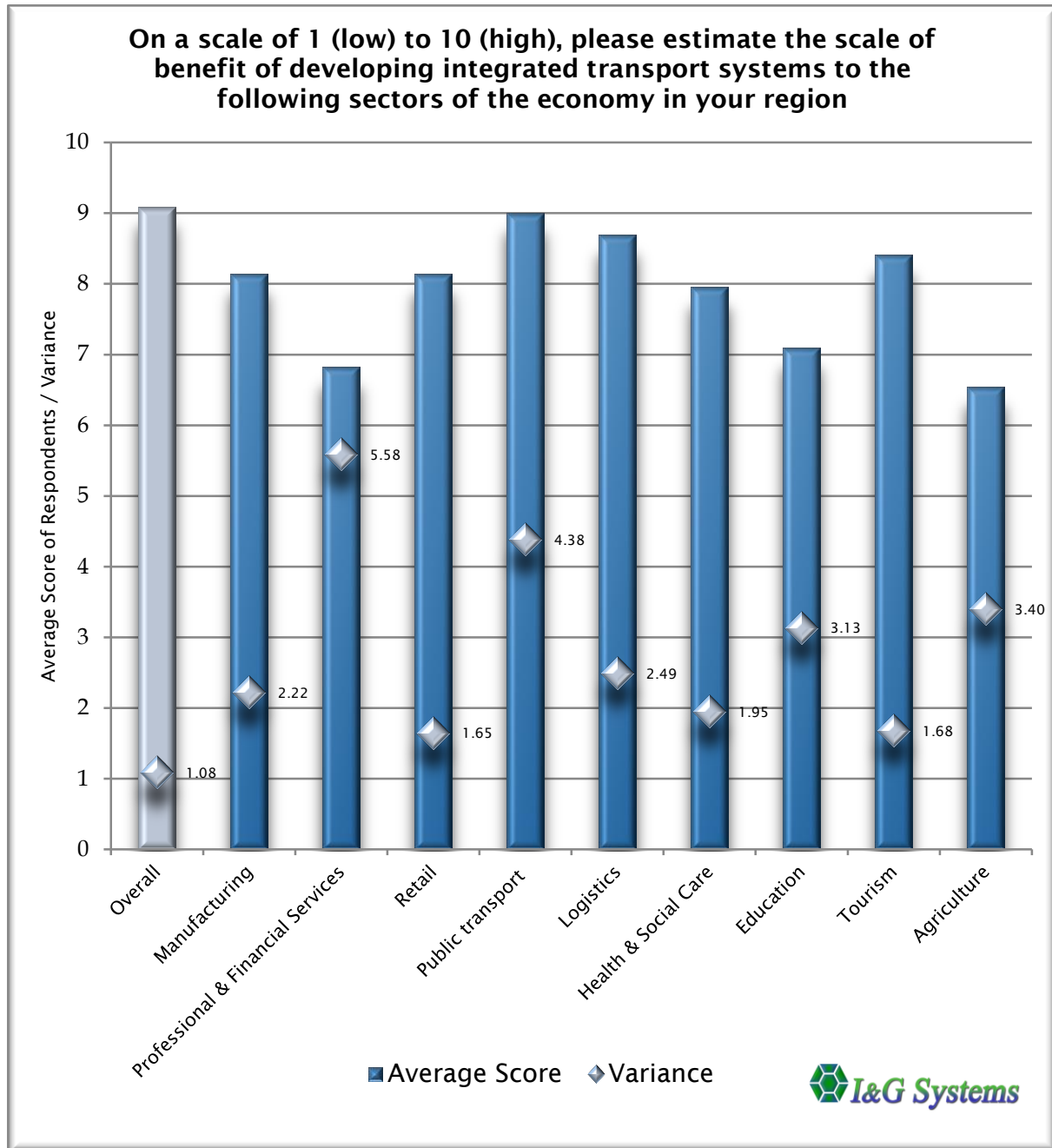
3.8.2 – Service Offerings of Respondents

Demonstrating the wide variety of workshop participants involved in the sessions, the following is a summary of the services that participants felt they could contribute to the delivery of this programme:



3.8.3 – Relative Importance of Integrated Transport to Different Sectors

When asked which sector had the most to gain from integrated transport development the results were as follows:



NB: "Overall" importance of integrated transport was posed a separate question, so the average values and variances across all sectors will not match.

Based upon an analysis of the responses, the ranking of the various sectors in terms of the potential impact of integrated transport is as follows:

Rank	Sector	Average Score	Variance
1.	Public Transport	9	4.38
2.	Logistics	8.7	2.49
3.	Tourism	8.4	1.68
4.	Retail	8.1	1.65
=	Manufacturing	8.1	2.22
6.	Health & Social Care	8	1.95
7.	Education	7.1	3.13
8.	Professional & Financial Services	6.8	5.58
9.	Agriculture	6.5	3.40

The respondents' rating of the *overall benefit* of integrated transport was consistently high among all respondents, with an average score of 9.1. The highest overall rating was a 10 and the lowest a 7, accounting for the very low level of variance shown for that rating. However, when responses were broken down by sector there was a wide range of responses for some sectors. This accounts for the large variance shown for a number of the sectors, particularly for Professional & Financial Services and Public Transport where individual responses ranged the full scale from 1 (low) to 10 (high) indicating a wide disparity in the perceived potential impacts of integrated transport for various sectors. Further engagement and discussion with representatives of transport end-users in each of these sectors would be advisable to better understand their requirements.

3.8.4 – Regional Organisations & Consortia

The following local organisations and consortia were identified as potential significant contributors to the Integrated Transport agenda in the structured feedback by correspondents.

Region	Regional Organisations
London	Regional Transport Forum
Cambridge	- Cambridge Cleantech - East of England Transport Information Consortium - The Centre for Mathematical Science Cambridge University - Supply Chain Innovation Excellence
Southampton	- C of C - Business Solent - Solent Maritime Board
Birmingham / Midlands	- Innovation Birmingham - Chambers of Commerce - National Skills Academies - Future Cities Catapult and Transport Systems Catapult - Black Country Local Enterprise Partnership - Greater Birmingham & Solihull Local Enterprise Partnership - Coventry & Warwickshire Local Enterprise Partnership
Sheffield	- Sheffield City Region - Sheffield City Region Local Enterprise Partnership - Advanced Manufacturing Research Centre (AMRC) - Logistics and Supply Chain Management (LSCM) University of Sheffield - South Yorkshire Integrated Transport Authority - South Yorkshire Local Transport Partnership - Centre for Energy, Environment and Sustainability (CEES) - Sheffield Bus Partnership - PTEG - www.pteg.net/ - South Yorkshire Transport Passenger Executive
Leeds	- White Rose Universities Consortium - Leeds Chamber of Commerce - The LCR / LEP. - METRO. - All LCR Local Authorities - Regional MP's. - West Yorkshire+ - West and South Yorkshire Integrated Transport Authorities

3.9 Best Practice Case Studies

Respondents to the feedback process were also asked to provide details of any examples of world-class integrated transport initiatives that they believe could serve as examples of national best-practice. Along with outputs provided during the workshop sessions, the following diagram provides details of the best practice examples cited:



The Sheffield Bus Partnership¹

Launched in October 2012 following public consultation, Sheffield Bus Partnership is a collaboration between local bus and tram operators. In a public consultation, Sheffield Bus Partnership is giving people the opportunity to comment on proposals for changes to a number of the city's bus services included within the Partnership. The proposed will take into account customer feedback the Partnership has received during the past nine months, and aim to make sure Sheffield's bus network continues to meet customer needs.

¹ See: <http://www.sheffieldbuspartnership.co.uk/holding.html> and <http://www.travelsouthyorkshire.com/sbp/>

Sheffield Supertram²

Stagecoach Supertram serves the city of Sheffield with three light rail routes covering 29km (50% of the system is on street running with mixed traffic). The tram network links six park and ride sites with the busy city centre and gives easy access to the rail station, shopping areas, both of Sheffield's prestigious universities, the Cathedral, sports arenas and many new popular entertainment venues.

HS2 Initiative

Now in the midst of consultation for Phase Two proposed route, the High Speed 2 (HS2) is a planned high-speed railway between London Euston and the English Midlands, Northern England, and potentially the central belt of Scotland. At present there are no plans for a link to Heathrow Airport or a direct link to HS1 and the continent.

The project is being developed by High Speed Two Ltd, a company limited by guarantee established by the UK government.

North Fareham & The Welbourne Project³

Welbourne, a planned new community in the North of Fareham will include 6500 homes, workplaces, schools, open spaces, shops and local community services. New infrastructure such as roads and energy infrastructure will support the new community.

The Welborne Plan will include planning policies on housing development and the level of affordable housing. It will set out policies for the amount, nature and location of employment opportunities and infrastructure needed to support the new community such as roads, public transport, schools and community facilities. It will incorporate a green infrastructure strategy outlining how new open spaces will be created and maintained and how connections to the countryside can be improved.

Platform Road Development⁴

Platform for Prosperity is the name of the scheme which proposes to carry out highway improvement works along Platform Road and the adjoining road network to alleviate traffic congestion and help boost economic growth within the city centre and the Port of Southampton.

The improvements will provide a new section of dual carriageway along the full length of Platform Road, from Town Quay through to Canute Road, which will enable the existing gyratory system around Queen's Park to be downgraded to a local access route. The scheme also aims to make environmental improvements to

² See <http://www.supertram.com/>

³ See http://www.fareham.gov.uk/planning/new_community/

⁴ See <http://www.southampton.gov.uk/s-environment/future/ccplans/platform.aspx>

Queen's Park and Vokes Memorial Gardens, with improved pedestrian and cycle ways to encourage sustainable modes of travel and greater use of the parkland. Please click [here](#) for an artist impression of the proposed dock gate 5 signalised junctions.

The Platform for Prosperity scheme is a long standing aspiration of Southampton City Council, which was originally conceived in the mid 1990s as part of the Port of Southampton Western Approach project. The offer of support from Central Government, via the Regional Growth Fund www.bis.gov.uk/RGF and Associated British Ports (ABP) has provided the opportunity for the City Council to deliver the improvements.

UK Central

UK Central (previously known as the M42 Economic Gateway) in Solihull is the West Midlands' principal international gateway and strongest performing economy, supporting an estimated 100,000 jobs region-wide and contributing £5.1 billion to regional GDP.⁵



Source: Greater Birmingham & Solihull Local Enterprise Partnership

⁵ See: <http://centreofenterprise.com/m42-economic-gateway/>

New Street Gateway & Metro Interchange at Snow Hill⁶

New Street station is one of the busiest on the nation's transport network and is used by 140,000 passengers a day - that's more than double the number that the station was designed for when it was last rebuilt in the 1960s.

The New Street Gateway project aims to transform the experience for passengers, improve links to and through the city centre and act as a catalyst for growth for the local area's economy. The project's leaders estimate that it will generate over £2bn in transport and wider economic benefits for the region.

The project will create a new start for one of the busiest, most important stations in the country. The redevelopment of New Street will be carried out by Network Rail alongside Mace who are the principal contractor and delivery partner. The project is backed by Network Rail, Birmingham City Council, Advantage West Midlands, Centro and the Department for Transport.

King's Cross Redevelopment⁷

After a decade of planning and development, the first phase of King's Cross' redevelopment opened to the public in August 2013. The project, led by the King's Cross Central Limited Partnership has invested over £300m to date on key infrastructure such as roads, bridges and utilities, by 2016, the partnership plans to have completed the redevelopment of around 67 acres of land.

TFL's Bus Countdown Scheme⁸

Launched in September 2011, FTLs bus countdown service, available both online and as an app for all of the major smartphone platforms, and with a text service, Countdown can tell the user when busses are scheduled to arrive at any of London's 18,541 bus stops. This service compliments the already existing countdown signs displaying real time information for around 2,500 stops in the capital.

⁶ See <http://www.newstreetnewstart.co.uk/>

⁷ See <http://www.kingscross.co.uk>

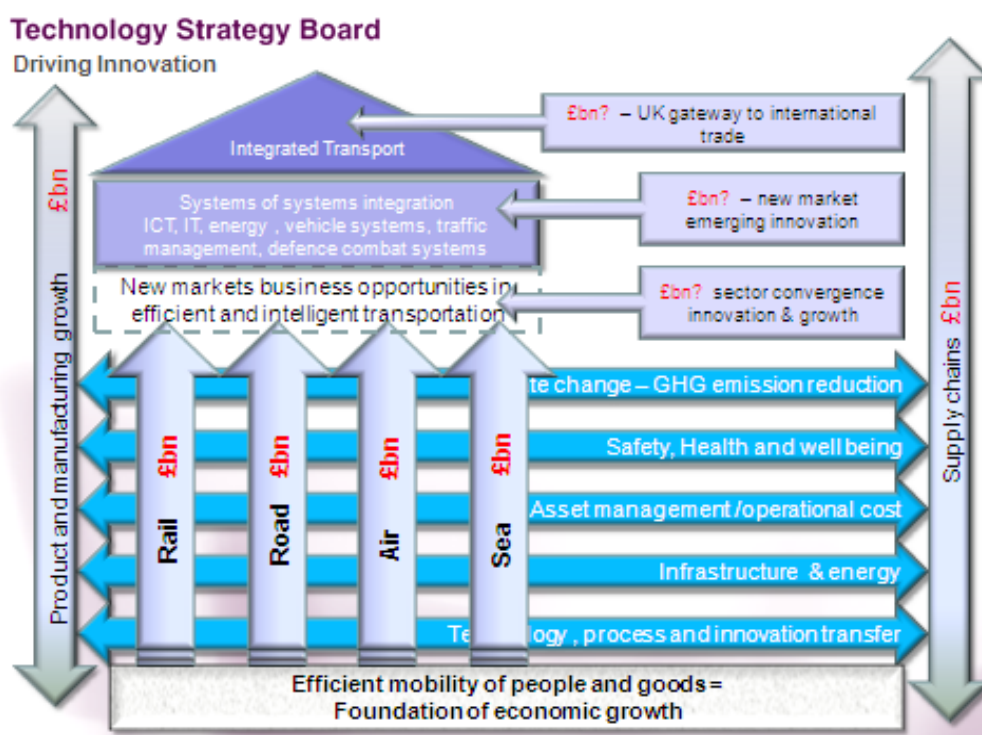
⁸ See <http://countdown.tfl.gov.uk> and <http://www.tfl.gov.uk/corporate/projectsandschemes/11560.aspx>

4. The International Context

Participants in the end-user roundtables identified international collaboration and the trans-national sharing of best-practice as key requirements for the successful development of integrated transport in the UK.

Preliminary research undertaken by the Technology Strategy Board has confirmed that the development of an effective integrated transport programme in the UK has the potential to provide a gateway to significant international trade opportunities related to new markets for emerging innovation and the new opportunities created by sector convergence, innovation and growth.

Much work still has to be done to assess the actual magnitude of these opportunities, and the most effective ways of capturing them, but the principle of integrating international opportunities with the prospective national value of integrated transport is illustrated below.



Source: Technology Strategy Board

Capturing these international trade opportunities will require systematic engagement with established UK trade development and support programmes. Initial research, carried out in parallel with the end-user workshops, has identified the following international trade programmes as relevant in this regard, and recommended actions to achieve effective engagement with these programmes are contained in chapter 5 below.

4.1 UK Trade & Investment

UK Trade & Investment (UKTI) works with UK-based businesses to ensure their success in international markets, and encourage the best overseas companies to look to the UK as their global partner of choice.

UKTI has professional advisers both within the UK and across more than 100 international markets.

UKTI has a co-ordination role across government and to establish a more systematic approach to relationships with companies which are the most economically significant investors and exporters.

UKTI's aims & objectives are to:

- Deliver measurable improvement in the business performance of UK Trade & Investment's international trade customers, with an emphasis on innovative and R&D active firms.
- Increase the contribution of foreign direct investment to knowledge intensive economic activity in the UK, including R&D.
- Deliver a measurable improvement in the reputation of the UK in leading overseas markets as the international business partner of choice.

TSB's preliminary review with UKTI has identified the following areas as having significant potential for progressing trade opportunities in integrated transport.

4.1.1 High Value Opportunities (HVO) Programme

The High Value Opportunities programme is UKTI's flagship initiative that identifies, prioritises and supports UK businesses of all sizes to access large scale overseas procurement projects that offer huge contract opportunities for British business.

The market opportunities - from major infrastructure, manufacturing and engineering through to big supply or value chain opportunities - run into trillions. Using UKTI's overseas network and a robust evaluation mechanism, the HVO programme identifies those large scale projects around the globe that offer the best opportunities for UK companies.

UKTI supports British businesses by providing access to its global network and expertise to help them win more of these high value opportunities that will help to deliver long-term sustainable growth for the UK.

UKTI carefully researches and validates these projects and offers UK companies of all sizes a more intensive level of support to access these major opportunities.

Through the HVO programme UKTI:

- Identifies projects offering the most value to the UK;
- Supports UK businesses to win contracts in and around HVOs;
- Through building relationships with opportunity providers, collects information on forthcoming and current High Value Opportunities globally;
- Brings together expertise from across our network, alongside private sector business specialists.
- Builds strong relationships with key UK businesses able to deliver against these opportunities, facilitating the development of partnerships/consortia where appropriate.

The HVO programme targets 100 projects globally covering a broad range of markets and sectors. At the present time, the HVO projects list includes *transport related* projects in sixteen countries, as follows:

Australia	Hong Kong	Indonesia	Malaysia
Denmark	India	Kuwait	Oman
Peru	Poland	Singapore	USA
Philippines	Qatar	Saudi Arabia	Taiwan

UKTI activities associated with these HVO projects include the development of value chain models for specialist projects such as airports, which are designed to determine the nature and the timing of specific commercial opportunities for UK companies.

A full listing of the top 100 HVO opportunities identified as at June 2013 is included in Appendix C.

4.1.2 Regional International Trade Teams

UKTI's International Trade Teams are located in over 40 local offices around the country. Every UK region also has dedicated sector specialists who can provide tailored support to specific industries.

International Trade Advisers provide professional advice on a range of UKTI services, including financial subsidies, export documentation, contacts in overseas markets, overseas visits, e-commerce, export training and market research.

The early involvement of UKTI's regional teams in the formulation and delivery of TSB's integrated transport projects offers the opportunity to embed the development of international trade into these projects.

4.1.3 UKTI Trade Challenge Partner Initiative

In March 2013 UKTI launched the Trade Challenge Partners initiative, under which partners are being drawn from Trade Associations, Accredited Trade Organisations and other membership organisations focused on overseas trade, and representing virtually all sectors and industries of the UK economy.

UKTI aims to work with these partners to:

- respond to the National Challenge to get more SMEs exporting
- maximise the extensive industry knowledge of the Partners to support UK trade overseas
- improve planning and provide more effective practical support and communications.

More than one hundred partners have now joined this initiative, including a number of organisations directly involved in the transport area (eg. British Airport Services & Equipment Association, British Aviation Group, British Marine Federation, Railway Industry Association).

This initiative provides the opportunity for TSB and its industry partners to engage systematically with trade associations and other trade organisations working in the transport area.

4.1.4 Inward UK Investment

In addition to providing export support, UK Trade & Investment is the national government agency that offers free support and independent advice to foreign companies looking to invest or locate in the UK.

As such, UKTI is well positioned to support international fund raising and partnering support for the successful development and implementation of advanced integrated transport infrastructure projects in the UK.

4.1.5 UKTI Science & Innovation Unit

The Science and Innovation Unit is UKTI's focal point for relationships with science and innovation bodies in the UK and internationally, including liaison with the Technology Strategy Board.

In the development of the integrated transport programme, the opportunity exists to broaden and strengthen the relationship with UKTI in the trade development areas identified above and in specialist research areas such as robotics and autonomous systems.

4.2 International Science & Innovation Network

Science and innovation play a key role in promoting UK prosperity and growth through the international Science and Innovation Network (SIN).

Research and knowledge is increasingly developed and transferred through international collaboration. This collaboration provides opportunities to work with the best in the world, exchange students and researchers, and gain access to large scale international facilities. It encourages new ideas, fostering new opportunities for innovation in support of growth. International collaboration in science and innovation is also vital for meeting global policy challenges such as climate change, energy security and pandemic disease.

For these reasons, the Department for Business, Innovation and Skills and the Foreign & Commonwealth Office jointly fund the international Science and Innovation Network (SIN).

SIN consists of almost 100 staff based in 28 countries and 47 cities around the world. SIN officers engage with the local science and innovation community in support of UK policy overseas. They create strategic relationships to harness the value of science and innovation discoveries and investments overseas, leading to mutual UK and host-country benefits.

SIN teams develop country specific action plans and work to the following global objectives:

- influence science and innovation policies of governments, industry and academia to benefit the UK

- improve UK policy based on international experience and emerging opportunities and challenges
- stimulate strategic science collaborations to benefit the UK and deliver wider policy goals
- harness international technology partnerships and investment to grow UK innovation capability.

The international SIN network provides the opportunity for the Technology Strategy Board to develop an effective bridge between UK national and international innovation programmes.

4.3 Foreign & Commonwealth Office (FCO)

Since May 2010 the FCO has made supporting UK business abroad and attracting investors to the UK one its core activities. Contributing to the Government's effort to return Britain to strong, sustainable growth and prosperity is now one of the three strategic priorities for the FCO as a whole.

The FCO's Charter for Business sets out commitments to business which include:

1. The FCO is committed to giving the UK's commercial and economic interests strong support within our foreign policy and the UK's bilateral relationships. We will incorporate the views of UK business and draw on the best economic analysis.
2. The FCO will use its knowledge of foreign culture and the local political and economic situation to help UK businesses identify and pursue new opportunities, manage risk and build relationships with the right foreign decision-makers, individual companies and potential investors.
3. FCO ministers and officials will lobby tirelessly on behalf of UK business interests overseas; and use every opportunity to champion the UK's reputation as an outstanding place to invest and do business.
4. FCO Ministers and staff will talk directly with UK business and trade associations to brief them on developments in foreign policy, including issues relating to business and human rights, and to understand at first hand UK business needs and priorities.
5. The FCO will seek to influence international economic policy, trade and investment policy, the EU agenda and business environment in individual countries in a way which promotes UK business interests.

A new Business Engagement Unit has been established within the FCO to act as a central access point for businesses seeking to work with the FCO on business development. This unit provides the opportunity for the Technology Strategy Board to establish an effective working relationship with the FCO, in order to capitalise upon the UK's leadership in integrated transport programmes.

4.4 EU Horizon 2020 Research & Innovation Programmes

Horizon 2020 is the financial instrument implementing the *Innovation Union*, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. Running from 2014 to 2020 with an €80 billion budget, the EU's new programme for research and innovation is part of the drive to create new growth and jobs in Europe.

Horizon 2020 will combine all research and innovation funding currently provided through the Framework Programmes for Research and Technical Development, the innovation related activities of the Competitiveness and Innovation Framework Programme (CIP) and the European Institute of Innovation and Technology (EIT).

The proposed support for research and innovation under Horizon 2020 will help address major concerns shared by all Europeans such as climate change, developing sustainable transport and mobility, making renewable energy more affordable, ensuring food safety and security, or coping with the challenge of an ageing population.

Horizon 2020 aims to tackle societal challenges by helping to bridge the gap between research and the market by, for example, helping innovative enterprise to develop their technological breakthroughs into viable products with real commercial potential. This market-driven approach will include creating partnerships with the private sector and Member States to bring together the resources needed.

The Technology Strategy Board has an established working relationship with the EU, which should enable it to take maximum advantage of the new Horizon 2020 programme in implementing its integrated transport initiative.

4.5 UK Business Development Councils

The UK has a number of well-established business development councils which are available to support British companies develop their commercial relationships in priority markets around the world.

These organisations, which work closely with UKTI to promote trade and investment, include the UK-ASEAN Business Council, the UK-India Business Council, and China-Britain Business Council.

These organisations can provide the Technology Strategy Board and its industry partners with an effective platform to develop relationships with major commercial markets around the world in support of the integrated transport programme.

4.6 Regional Economic Councils

A number of business-led economic councils have been established to promote regional growth and prosperity through cooperation and the exchange of ideas between the private sector and government. Leading examples are The Pacific Basin Economic Council (PBEC) and the Dubai Economic Council (DEC).

The development of advanced integrated transport solutions is one of the top priorities for these councils, working in cooperation with international organisations including the UN, the World Bank, and the relevant regional development banks.

The City of London has a key role to play in developing relationships with these economic councils, through the provision of financial, legal and professional services.

These councils have the potential to provide the Technology Strategy Board with an ideal focal point to develop relationships in these key regions.

4.7 International Organisations

A number of major organisations exist to support international economic cooperation and development. The development of transport and its related infrastructure is high on the agenda of most of these organisations.

Relevant organisations include the World Bank (IBRD), the United Nations Development Programme (UNDP), the Asia-Pacific Economic Forum (APEC), and the Asian Development Bank (ADB).

These organisations offer major opportunities for the Technology Strategy Board to engage with and capitalise upon leading transport developments around the world.

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These organisations offer major opportunities for the Technology Strategy Board to engage with and capitalise upon leading transport developments around the world.



5. Conclusions & Recommendations

5.1 Common Themes and Challenges

The priority areas of interest varied significantly between different cities, but whether they were expressed in terms of a positive opportunity or a negative challenge, a number of notable recurring themes and challenges were identified at three or more of the different workshops. These included:

Connected Collaboration Hubs

Although the terminology varied between workshops, the concept of connected, interactive workspaces, hubs or campuses was a recurring theme in four of the five workshops. It was widely felt that these centres could be developed near major transport hubs or where people live to cut down on congestion, or provide alternative workspaces to their regular offices. Service jobs in particular could be based at these new out of town campuses.

Improving Collaboration & Knowledge Transfer between Higher Education and Business

A number of contributors were keen to see improved structures in place to promote better collaboration between academia and business. Many felt that although the UK has a good track record for the development of new and innovative ideas, not enough effort is dedicated to the effective commercialisation of ideas through collaboration with business leaders.

Partnering & Engaging with the Younger Generation

Related to the above, many participants felt strongly that improved engagement between politicians, business leaders and the younger generation was key to unlocking the innovation potential around transport. With changing travel patterns, communication methods and new emerging Information Technology skills it was widely felt that it was important not to leave this important section of society out of the debate.

NIMBYism

Frustrations with a “Not in my back yard” attitude amongst both the political class and local residents towards infrastructure developments and improvements that are required to promote innovation and increase capacity were a recurring theme throughout the workshops.

International Collaboration & Best Practice

Many workshop participants felt there was much to learn from international best practice around transport delivery solutions. Whilst the transport challenges faced

in the UK are significant, such challenges are universal and in many cases more extreme in other countries. Some participants also felt that international collaboration, city twinning on specific projects, or improved international knowledge transfer would be beneficial.

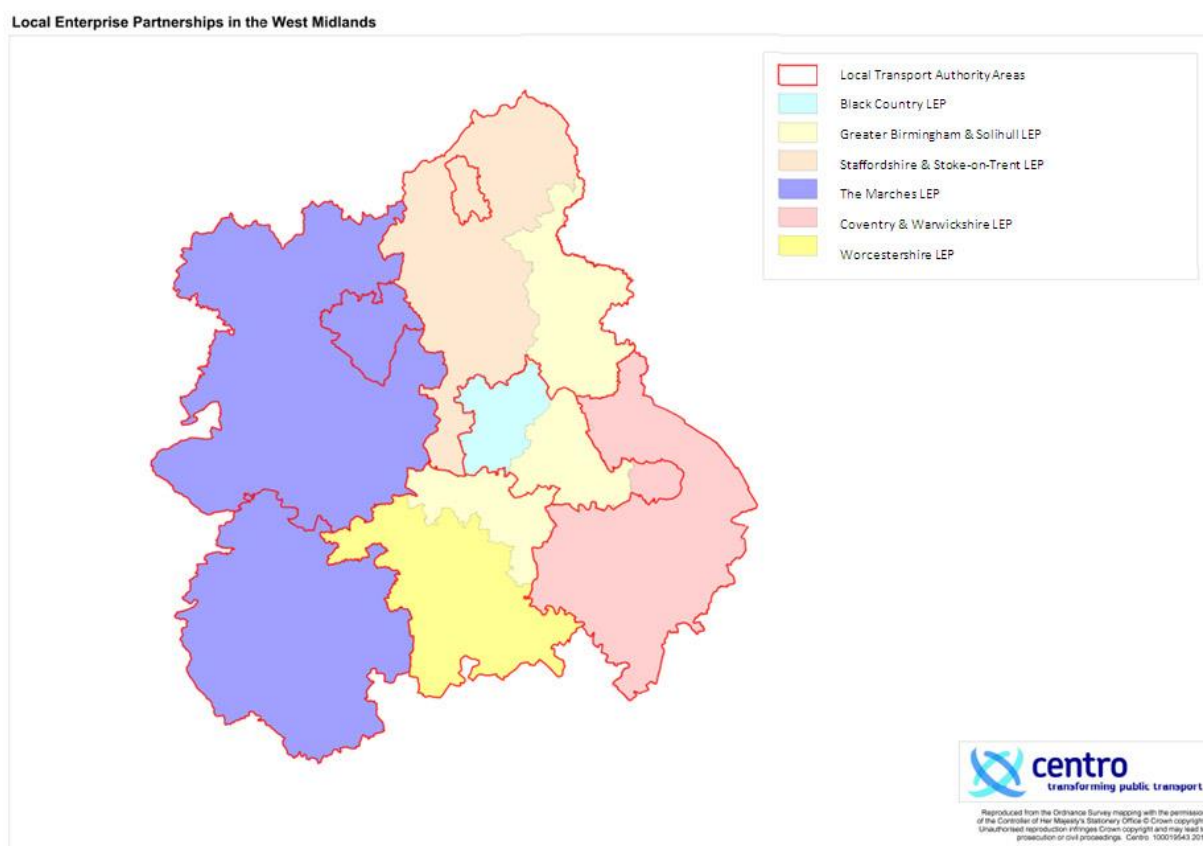
Short-termism & Entrenched Political Positions

The short term nature of UK politics, and politically motivated transport decision-making were another frustration amongst workshop participants. Many felt that we need to develop new models for calculating payback and returns over longer periods to break out of this cycle.

Transport Political and Governance Boundaries Inconsistent with Travel Patterns

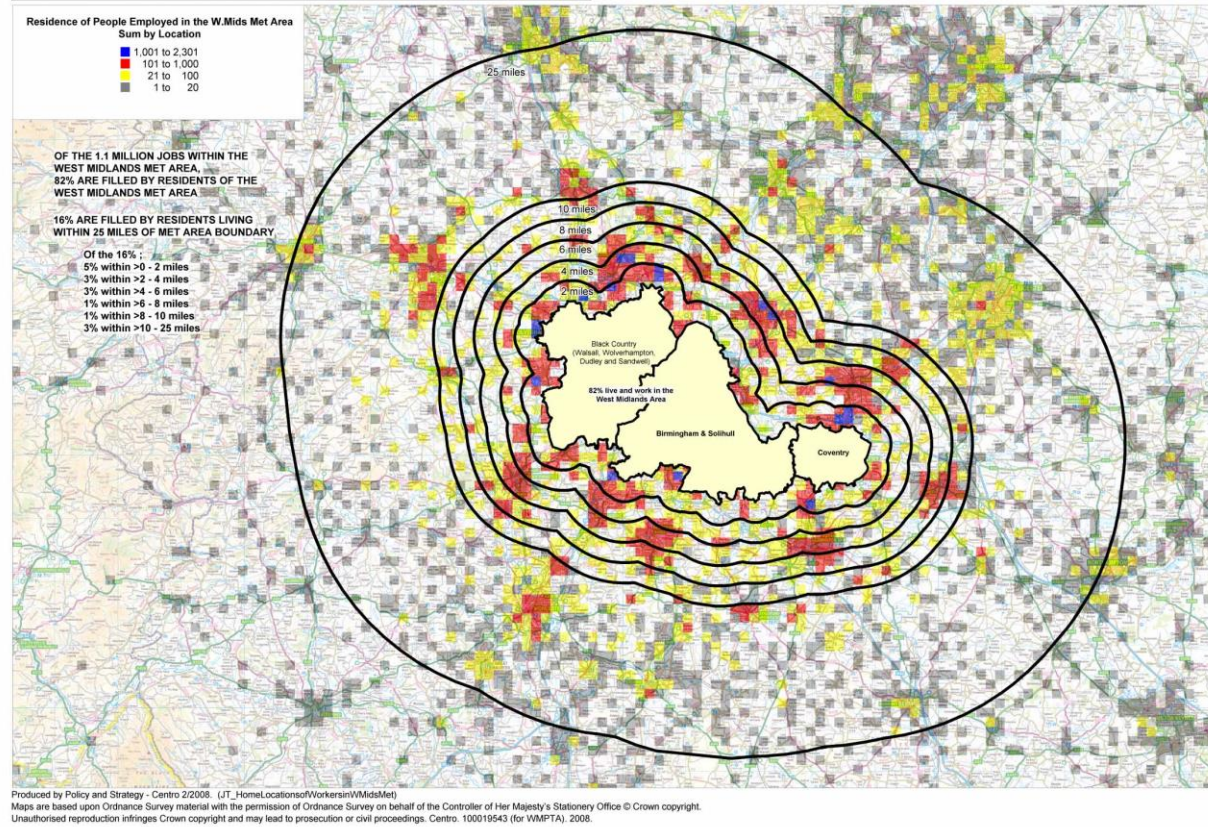
Many felt that the current nature and geographical scope of Local Enterprise Partnerships in cities was creating additional barriers to the effective implementation of regional and intra-regional integrated transport solutions.

To illustrate the situation, this diagram shows the West Midlands region showing, within the red boundaries, the local transport authority areas, with the LEPs overlaid over the top.



Source: Centro

Origin of Journeys to Work into the West Midlands Metropolitan Area (2001 Census)



Source: Centro

When we compare the structure of the LEPs with the travel movements of workers in the West Midlands region, as shown above, the mismatch is yet clearer to see.

Following an analysis of the outputs from the workshop sessions held to date, along with the structured feedback provided by the participants, we would recommend the following next steps to progress the programme of Integrated Transport development by the Technology Strategy Board:

5.2 Programme Implementation Recommendations

Capture the requirements of transport End-Users in other regions

To ensure that the opinions, requirements and observations of users in regions outside the scope of the first phase of workshops (i.e. the West of England, the South-West, Wales, North West, North East, Scotland and Northern Ireland), a further series of workshops should be held. Such workshops should also be followed up with structured feedback questionnaires to ensure requirements are captured in the most specific and tangible format possible.

Understand Sector Specific Customer Requirements

As demonstrated by the variance in scores for different sectors shown in section 3.4, different end-users view different sectors as widely differing priorities for Integrated Transport. To ensure that actual sector specific are effectively captured, a series of workshops and/or other communications should be carried out with business leaders in specific sectors such as Health, Tourism, Retail, Agriculture etc. We would also propose that workshops focussed on these sector specific customer requirements be held in cities/regions where there is a pre-existing local expertise in the sector in question, e.g. Southampton for Marine or London for discussions on Professional & Financial Services.

Analytical models commonly used to effectively capture user requirements developed in other industries such as Retail could also be used to more effectively capture and dissect the opinions of workshop participants.

Develop a national level integrated transport roadmap

The inputs captured from the recommendations above should be used to generate a National level Integrated Transport roadmap. A mapping and value-chain analysis of requirements at the community level should be developed to identify over-arching, common priorities and then developed into a national level plan.

Engagement with Technology Leaders

The Technology Strategy Partnership should look to continue and enhance its engagement UK technology leaders such as ARM Holdings plc to better leverage emerging technologies and help the UK to develop international leadership in Integrated Transport technologies.

Wider Communications Programme

A wider communications programme should be launched, to include elements such as webcasts, communications via the _connect platform and a broadcast standard documentary (for use on television and at conferences/seminars) highlighting the issues and opportunities raised by the workshop programme to date in order to reach to a wider audience.

5.3 Political, Regulatory & Governance Recommendations

Investigate the Further Development of Larger Integrated Transport Planning Authorities

Given the strength and consistency of feeling amongst workshop participants relating to the mismatch between Transport Planning Authorities and actual travel patterns, serious thought should be given to the development of larger, more powerful Unitary bodies for integrated transport planning such as already exist in Scotland and Wales. The inability to co-ordinate funding and align behind one strategy really does make integration difficult. Perhaps transport authorities should be detached from local authority boundaries, but some sort of national body would still be required to co-ordinate the likes of intercity trains.

Such an effort can build on the research and progress in this area as demonstrated by Lord Heseltine “No Stone Unturned” Review⁹ and City Deals¹⁰ which have already been put in place, looking to local areas to set their own agendas.

It is also important that any such planning authorities:

- 1) Remain as independent of political leanings as possible
- 2) Be backed up by independent university researched evidence to support their development plans
- 3) Have both a long term view and mandate to combat the political short-termism that has been identified as a major barrier to transport innovation.

⁹ See: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/34648/12-1213-no-stone-untuned-in-pursuit-of-growth.pdf

¹⁰ See: <https://www.gov.uk/government/policies/giving-more-power-back-to-cities-through-city-deals/supporting-pages/city-deals>

5.4 Commercial & Investment Recommendations

Engage with National and International Finance

Actively engage with “The City UK”¹¹ and other relevant UK and International financial bodies to:

- Develop new business models that value not only pure financial return of transport investment, but also the opportunity costs of not investing, and the potential benefits including societal (employment, jobs, wellbeing), commercial development of cities and the environment
- Overcome other private sector investment barriers
- Better demonstrate investor value
- Promote opportunities for financial investment in integrated transport systems.

Encourage Inward Investment & City Twinning

Work with international financiers to secure finance for innovative integrated transport projects with real returns. Explore the possibility of twinning with international cities to increase funding opportunities, share R&D learnings and raise the profile of UK based projects.

Encourage the retailing of transport services

By leveraging improvements in customer requirements capture, tailored service provision, travel smart cards and passenger information systems, encourage travel providers to retail their transport services rather than viewing themselves simply as service providers.

Unlock the Commercial Potential of Transport Hubs

Work with Network Rail and rail operators to unlock the commercial development potential that is under-used in many railway stations, to help develop them into regional transport hubs, collaboration spaces and unlock new retail opportunities (eg smart car or cycle hire) at major transport hubs.

¹¹ <http://www.thecityuk.com>

5.5 Transport Planning & Operations Recommendations

Logistics Asset Utilisation

Identify and analyse in more detail the technology innovation requirements of the road haulage and rail freight industries, to achieve higher levels of transport utilisation and more effective integration with retailers.

Smart Home Delivery Solutions

Given the rapidly changing nature of consumer purchases of many goods and services through e-commerce, support the development of integrated home delivery and e-commerce solutions with reference to current industry best practice on shared logistics eg in the brewing industry.

Encourage the Development of Regional Freight Hubs

Leverage the spare capacity at regional airports given the constraints in place at Heathrow to develop Regional Air Freight Hubs, increasing competition and reducing freight travel distances for many parts of the country.

5.6 Community & Society Recommendations

Support the Development of Sustainable Communities

Review the transport behaviour impacts and benefits of sustainable community developments such as North Fareham to radically reduce transport usage and congestion, and capture the national and international potential for such developments.

Engage with the Younger Generation

Support the effective engagement with young people to encourage them to engage with integrated transport issues and to understand their current and future needs. This may involve youth specific workshops, engagement with the UK Youth Parliament¹² or local youth groups.

Connected Collaboration Hubs

Support research into and deployment of connected collaboration hubs near to major transport hubs and/or residential areas encouraging new ways of working and reducing the need to travel into city centres. One important international best case study in this area was cited as the “Spaces”¹³ approach adopted in the Netherlands.

Understand and Influence “Home Working” Trends

Work to understand the trends, drivers and impacts of home working on transport systems.

Influence the “School Run”

Work with Education authorities, road users, safety experts and legislators to reduce the environmental, health and congestion impacts of “the School Run”. Investigate international models of best-practice and alternative solutions that may aid in reducing its impact.

¹² <http://www.ukyouthparliament.org.uk/>

¹³ <http://www.spaces.nl/>

5.7 Data & Information Technology Recommendations

Smart Traffic Lighting

Review the implementation of intelligent traffic-light solutions in UK cities that have deployed the technology, identifying best practice and the potential for wider national implementation.

Travel Planner Services

Continue to support the development of dynamic, open source national travel planner solutions incorporating all potential modes of transport for fulfilling a journey and building on the best practice of existing solutions such as TFL's travel planner.

Improve Transport Data Software Integration

Work with developers to support the integration of effective transport planning data into a wider range of applications such as Outlook. As in the example given during the Birmingham work-shop, why does Microsoft Outlook not suggest potential transport options for any appointment that we book into our diary.

Continued Support for Smart Transport Application Development

Continue to support to the roll-out of the outcomes from the STRIDE (Smart Transport Internet of Things Data Ecosystem) project and other projects leveraging the convergence between transport data and the Internet of Things.

Transport Smart Cards & "Personal Mobility Accounts"

Work with transport operators and legislators to help break down the barriers hindering the development and wider adoption of Smart Transport Solutions such as "personal mobility accounts" which use data and knowledge of behaviours to influence the travel choices customers make.

5.8 Behavioural Change Recommendations

Understand and Influence Decision Making & Behavioural Change

Leverage the tools, techniques and expertise developed as part of the social science, such as The Theory of Planned Behaviour¹⁴, the Theory of Reasoned Action¹⁵ and the Technology Acceptance Model¹⁶ to better understand and influence decision making patterns that influence travel patterns and congestion. Such an approach may help to improve community engagement and address the challenges of NIMBYism as a constraint on transport development and innovation.

At the corporate level the same approach could be adopted through the study the works of Geert Hofstede¹⁷ to better understand drivers of organisational cultural change.

5.9 Collaboration & Knowledge Transfer Recommendations

Support the Development of Regional Centres of Excellence for Different Transport Modes

Support the development of technical expertise by the use of cluster policies, with regions developing specialisations and the linking up agencies, higher education research capabilities and private sector support. We can learn from examples such as the Fraunhofer model (<http://www.fraunhofer.de/en.html>) where they have very strong collaboration between different technology institutes, universities and business. The private sector should be identifying long term, profitable challenges for Universities to address so that R&D can be more focussed on adoption and commercialisation of technical innovations.

Centres of Excellence in different regions could then be encouraged to collaborate with other national and international cities with comparable challenges and geographies.

Development of commercially viable business campuses at integrated transport hubs

Leverage the expertise developed as in Regional Centres of Excellence, encourage local businesses to operate out of business campuses directly linked to these centres of excellence and integrated transport hubs.

Improve Adoption Cycles

¹⁴ http://en.wikipedia.org/wiki/Theory_of_planned_behavior

¹⁵ http://en.wikipedia.org/wiki/Theory_of_reasoned_action

¹⁶ http://en.wikipedia.org/wiki/Technology_acceptance_model

¹⁷ http://en.wikipedia.org/wiki/Geert_Hofstede

Work with Universities and R&D Departments to identify barriers to adoption of new transport technology, streamline supply chains and improve adoption.

Identify and exploit opportunities for partnering with key local research institutions

Engage with leading regional networks such as Cambridge Cleantech, Innovation Birmingham and others as identified in section 3.9.4 to better understand, capture and act on local transport priorities.

Partner with key local research institutions such as the new Southampton Marine and Maritime Institute (SMMI), and with Solent University on the topic of Marine.

Learn from suggested best practice

Engage with project leaders and stakeholders of the nominated best practice case studies shown in section 3.9. to capture key learnings that can be translated to future projects.

Encourage further collaboration between the transport supply chain and major retailers.

Encourage retailer representatives to gather and discuss integrated transport issues, the haulage industry is a broad group, making it difficult to pull them all together with a common voice, but the potential for supply chain efficiencies does exist.

Develop Regional Think Tanks

Assist in the formation of regional think tanks where business, government and academia can meet on a regular basis in order to discuss policy, strategy, commercial requirements and public issues in an open forum in order to best learn where the customer / end-user wishes to benefit from integrated transport solutions.

Suggestion Systems

Develop and support meaningful and rewarding “suggestion systems” to unlock innovation and improve local transport systems.

5.10 International Recommendations

UK Trade & Investment (UKTI)

Work with UKTI to establish a systematic process by which TSB and its industry partners can identify, develop and capture commercial opportunities associated with international transport projects that have been identified by UKTI through the High Value Opportunities programme.

Work with UKTI to develop opportunities for international inward investment into integrated transport projects in the UK.

Capitalise on UKTI's Trade Challenge Partner initiative to establish and develop working relationships with trade organisations working in the area of integrated transport.

Actively support the early involvement of UKTI's regional trade teams in the formulation and delivery of TSB's integrated transport projects.

Broaden and strengthen the working relationship with UKTI through the Science & Innovation Unit, to develop the trade development relationships identified above and in specialist research areas such as robotics and autonomous systems.

International Science & Innovation Network (SIN)

Work with the international SIN network to develop an effective bridge between UK national and international innovation programmes in the area of integrated transport.

Foreign & Commonwealth Office (FCO)

Work with the FCO's Business Engagement Unit to establish an effective working relationship between TSB and the FCO, in order to capitalise upon the UK's leadership in integrated transport.

EU Horizon 2020

Work with the EU to take maximum advantage of the new Horizon 2020 programme in implementing the UK's integrated transport initiative.

UK Business Development Councils

Work with the UK business development councils to develop relationships with major commercial markets around the world in support of the integrated transport programme.

Regional Economic Councils

Establish and develop relationships with the leading regional economic development councils (The Pacific Basin Economic Council (PBEC) and the Dubai Economic Council (DEC)) to provide the Technology Strategy Board with a focal point in these key regions and to better understand the scale and importance of end-user requirements in integrated transport.

International Organisations

Establish and develop relationships with relevant international organisations – including the World Bank (IBRD), the United Nations Development Programme (UNDP), the Asia-Pacific Economic Forum (APEC), the Asian Development Bank (ADB) and the Association of South East Asian Nations (ASEAN) – to ensure that the Technology Strategy Board engages with and capitalises upon leading transport developments around the world.

Appendix A - Round Table Transcripts

A1 - London Round-table - 9 May 2013

Introduction & Welcome

Andrew Everett, Head of Transport, Technology Strategy Board

Welcome to the first roundtable organised by the Technology Strategy Board (TSB) for transport end-users.

The TSB is the UK's innovation agency, set up around five years ago by the UK Government to help UK businesses to grow by developing and commercialising innovative ideas and accessing global markets.

When the TSB first looked at transport a number of years ago it identified that this is a very siloed area. Everyone talks about road, rail, marine and air – but nobody actually talks about how all of the transport system actually fits together and the commercial opportunities that exist there.

Up until about six months ago the TSB was very much focussed upon supporting the development of specific leading technologies within these transport silos by, for example, supporting the development of low-carbon vehicle technologies and the next generation of wings for aircraft. But the TSB has now decided that it also needs to look at transport systemically, addressing such questions as how and why we use transport, its contribution to the economy, and how it all fits together. In so doing, we need to be modally agnostic both for now and in the future since we know that the transport challenges in the UK are great – for example by 2025 road transport congestion in the UK is likely to increase by 20%.

So we have got to think of different ways of approaching the transport system and identify the new business opportunities that will come from resolving these great challenges. We need to consider the variety of users of the transport system – so not just for people who are commuting into London or moving goods around, but also people who use transport for leisure, and specialist groups such as the emergency services. So there are many different user groups, each with their own needs, and we need to think about how they all interact with the transport system.

The discussion today will be run under Chatham House rules, so there will be no specific attribution of contributions other than those from the formal programme speakers. We hope that this will lead to a free, open and honest discussion which identifies fresh business opportunities by looking at transport in a new and different way.

Transport - An Overview of the Challenges

Sir Paul Judge

I've had my own personal transport challenge this morning with the two-mile bus journey from my home in Pimlico to Charing Cross taking more than 45 minutes, caused by streets still being

closed after yesterday's opening of Parliament by the Queen. That's a good demonstration, I think, of the critical need for resilience in any effective urban transport system.

Today is Ascension Day and this afternoon we will be carrying out the ancient ceremony of The Beating of the Bounds in the Ward of Tower, within the City Of London, where I am an Alderman. The Ward of Tower is probably the first integrated transport hub established within the UK, because when London Bridge was built in 1230 all of the shipping stopped there to unload— and to this day shipping and insurance are still the two key industries in that Ward that have developed over hundreds of years.

Transport integration is clearly key, and today we need to address this in the critical context of the competitiveness agenda. How can the UK do better compared with other countries? We always have to remind ourselves that we're about 1% of the world population producing about 4% of the world GNP and if we were to disappear beneath the waves our GNP would be produced within a year by the rest of the world. There are now around seven billion people in the world, with roughly one billion in the developed world and six billion in the emerging world. And we are now all far closer together than we once were, and much of that is to do with transport – it's the movement of people and goods that has made such a huge difference. The movement of people on jet aircraft and the movement of goods by container ships, massively reducing the cost of moving goods around the world.

Another important factor is the impact of information technology, resulting in the fact that we now have a much more “perfect market” than we had just 20 or 30 years ago, with the result that the “invisible hand” of Adam Smith makes sure that resources flow to where they can best be used.

We have remember that in this country we have no automatic right to enjoy our current level of affluence, while around the world there are 6 billion people working hard, family orientated, keen on education, and trying to organise themselves to improve their lot. We have to try as hard as we can to do as well.

The best system probably is the “benevolent dictator”. Now obviously it's difficult to keep a dictator benevolent, but it certainly has lessons in the transport area. If one takes China, one can obviously debate whether it is benevolent in terms of human rights etc, but in terms of infrastructure it is benevolent in the sense that it provide the best infrastructure for the people in order to encourage economic development. A lot that is happening in China is quite remarkable: back in 1950 there were 21,000 km of railway, there are now 91,000km and 8,000km of those take trains that go more than 250km/hour. In the city of Shanghai, the Maglev Train from the airport travels at up to 450 km/hour, producing a 7 minute journey time into the town centre, while the metro has expanded from nothing in 1995 to 420km – the biggest metro system in the world. Beijing has just less than this at just less than 400km, but they have decided to expand this to 1000 km by 2020. China now has 85,000km of expressways, which is actually more than the USA. And the impressive new airport in Beijing, which was built for the 2008 Beijing Olympics, is no longer considered sufficient and a new airport is being constructed at Daxing which will have an initial capacity of 120 million passengers per year with the capability to grow to 200 million passengers per year making it one of the world's largest airports.

In Hong Kong, under a quite different political system, the UK led the construction of the new airport before hand over, and for the past few years this has been voted the best airport in the world. So clearly we can do these things – but what one learns is the important difference between the technology and the politics – and the need to align these in order for something to work. One can have the politics of China, or the politics of a Hong Kong Governor, but here in the

UK we operate under the politics of a full democracy which can make it much more difficult to achieve these things.

We also have to overcome a tremendous silo position here in the UK between the different types of transport. So, for example, new transport developments like Crossrail/Thameslink and the Heathrow Line into Paddington would have benefited considerably from better integration with existing underground lines like the Metropolitan Line, but for some obscure reasons this could not be achieved. Similarly, linking and coordinating traffic-lights is now technically quite straightforward, so the fact that this is not done here in London is clearly a political issue.

Political differences in approach to such matters as compensation are also of great importance. So in France, where compensation of a minimum 120% is the norm for acquiring houses effected by major projects such as new rail lines, major projects are welcomed by communities – while here in the UK, with our compulsory purchase orders, compensation is much tighter with the negative results that we see on projects like HS2. Similar issues exist for airport expansion and noise pollution around Heathrow and our other airports.

In a public policy sense, such people should be properly compensated, as the French do. But for some reason we seem unable to get this rounded position together.

We do have our successes, of course. I am the proud possessor of a Freedom Pass, an excellent recent innovation which allows open travel on the London tube and bus systems. In fact historically this country has led the world on many technological and commercial innovation of transport systems. The first real commercial canal, built in 1761 in Bridgewater, allowed the first mass shipment of coal into Manchester resulting in the halving of its cost – an impact equivalent to that of the modern container ships. The introduction of commercial railways, with the Rocket in 1829, led to the extensive construction of railways around the world within twenty years. We've just celebrated the 150th anniversary of the London Underground, the world's first urban underground transport system, and even Heathrow is still just about the world's busiest international airport.

So we have tremendous transport technology in the UK, and we have to really address two questions: (i) how do we use this technology effectively here in the UK to gain commercial advantage (ii) how do we export this technology successfully to other countries around the world?

We must find ways of bringing the technology and the politics together to achieve these joint aims, and today we intend to have a very open and honest discussion to move this agenda forward.

Key Challenges for Users of the UK Rail Network

Amanda Clack, PWC

Partner at PWC, currently working predominantly with the private sector but with extensive experience in the public sector.

Affordability

The cost of rail travel has risen to the point that it has become unaffordable for many. Passengers have experienced a decade of above inflation fare rises, and this trend is projected to continue.

Rail fare increase above inflation

This is constraining the demand for rail services. For example, the DfT's survey on public attitudes towards train services (2012) found that:

- 16% of people do not use long distance rail because the price is too high
- 62% of non-users could be encouraged to use long distance rail if fares were cheaper

According to a National Passenger Survey from Autumn 2012, less than half (47%) of passengers are satisfied with the value for money from their rail ticket, and the Guardian reported in January 2013 that the price of some annual season tickets could increase by £1000 by 2019, with passengers facing six more years of rises.

Capacity Constraints

Many services are constrained by capacity as customer demand is not being adequately managed. Many rail services are experiencing demand excess of capacity in the face of rising annual passenger numbers with the effect most acute in the South East:

- Over 60% of all rail journeys taken start or finish in London, and
- Half of all public transport journeys are within TfL.

There is limited demand management applied to continued growth in passenger numbers. Shoulder pricing, flexible season tickets have been mooted but are not yet reality. As a consequence, the passenger experience has been affected – satisfaction levels remain low for certain basic services such as the ability to get a seat or even board a train. The Office of Rail Regulation reports that 60.7% of UK rail journeys start or end in London. This represents 706.3m journeys per year. Meanwhile the Brown Review of 2012 concluded that: 'Passenger numbers have grown by 92% since privatisation and Britain has enjoyed the fastest rate of growth amongst major European railways.'

Quality of Service

Improving service quality will become a key part of the rail franchise evaluation process following the Brown Review and in light of plateauing passenger satisfaction levels.

Passenger Satisfaction

Measures of quality are likely to become a key factor in the evaluation of franchise bids. This could include using National Passenger Survey scores as a way to monitor performance. Part of this will involve harnessing innovation – such as the introduction of customer-facing technologies including smart ticketing, real-time passenger information and reliable on-board wifi. The challenge for rail operators will be to balance the imperative to improve services against the need to drive efficiencies.

Passenger Information and Ticketing:

The provision of travel information remains inconsistent, while the choice of ticketing media continues to grow and fragment year on year. Providing accurate, up-to-date travel information to help customers plan their journeys and respond to disruptions remains a major challenge. There have been significant improvements in recent years, but more can and should be done:

- Should data be made openly available to app developers and others to create a tool for customers?
- Or should the interpretation of information by third parties be quality controlled in some way?

Rail operators need to do more to guide customers of different ages and abilities. This ranges from better information at stations to social media and ‘next generation’ technologies that provide information in real-time.

The ‘Door-to-Door’ Journey:

Deregulation and franchising have contributed to growth in single-mode, single operator offerings, rather than tickets that provide the best deal for the end-to-end journey. Customers are seeing improved, joined up services in sectors such as banking and retail. They expect transport operators to do the same. The Department for Transport’s “Door to Door” Strategy stresses that rail’s customer proposition needs to extend beyond the station and integrate with other modes of transport. This has the potential to help with wider ‘joined up’ changes including making smart and integrated ticketing the foundation of the door-to-door journey, making joint investments in major stations and interchange hubs and improving travel connections through timetable coordination and information sharing.

Discussion:

- **Public Subsidy:** There is a requirement to integrate more effectively the public subsidy payments (currently around £4.5bn made by the DFT) and the rail franchise receipts (made to the Treasury)
- **Cycling:** One of the most impressive forms of integrated transport in Central London is cycling, and this should be at the core of future planning
- **Place Making:** We need to link integrated transport planning to the environment and the importance of place-making
- **The Changing Nature of Work:** We should incorporate the implications of the changing nature of work and the opportunities presented by location independent working. One of the big four global accountancy practices reduced flights from 25,000/day to 12,000/day through the use of IT and teleconferencing
- **Collocation:** We need to consider opportunities for the collocation of offices and transport hubs (stations, airports etc)
- **Travel Behaviour:** Individuals have only a limited capacity to respond to demand management and differential pricing. Organisations need to plan and encourage changes in travel behaviour wherever this is possible within operational constraints
- **The Impacts of Rising Energy Costs:** There is a need to take into account certain realities; and one of these is that the cost of energy will continue to rise so the real cost of travel will continue to increase. We therefore need to take a “360 degree awareness” approach to

transport planning – we can't look at any one thing in isolation. If public transport's not going to be cheaper then it has to be easier.

Aviation

John Fitzgerald, Cathay Pacific Airways; Swire Group

The Swire Group runs Cathay Pacific Airways and a number of associated businesses, e.g. a flower import and distribution business with a major hub in Milton Keynes. All of these businesses are critically dependent on the transport infrastructure.

The need for international air travel is still growing – Cathay Pacific will operate 5 flights a day between London and Hong Kong from June. The main commercial constraint for Cathay Pacific is slots at the airport.

In operational terms, the M25 motorway is critical. And when there is any significant closure on this motorway it has a commercial impact. The speed of response to accidents and greater recognition of the commercial impact of closures has got to be looked at in a more integrated manner.

Likewise, at Heathrow there needs to be greater recognition of the commercial importance of operational support functions such as security. Closing such functions early can have a major disruptive impact on flights and people's travel experience.

There also needs to be greater recognition of the massive growth of air cargo, and new ideas and solutions are needed for getting this to and from the airport.

Regional domestic airports are of increasing importance, although interestingly Emirates now operates more inter-continental flights from these airports than BA. Many people from the north of England have given up on Heathrow, and are increasingly flying direct or via Amsterdam/Frankfurt. Cathay Pacific can't currently operate profitably out of Manchester with their existing 747s, but are likely to do so when they take delivery of their new aircraft.

The Government is levying every-increasing taxation on air travel, but the investment in transport infrastructure is not keeping pace with the development of airports and airline services (e.g. on-line check-in). Improvements in the performance of transport links like the M25, tube and rail are critical for future commercial success.

Discussion:

- **Alternative Airports:** Getting to Heathrow for many people is a nightmare so why are airlines not making more use of airports like Stansted and Birmingham? John Fitzgerald: it's simple; we can't make money out of those airports on long-haul routes. To illustrate this, when we recently moved our flights from Gatwick to Heathrow our yield increased by £100 one-way for every passenger. This increase in yield is directly linked to customer demand and connectivity
- **Regional Co-ordination:** Stansted has virtually developed into an "East European Hub" with vast numbers of people using low-cost flights to travel from Easter Europe to East Cambridgeshire and South Lincolnshire, but there is currently no regional travel

coordination to take advantage of new services such as the rapid-transit guided-bus systems between Cambridge and Huntingdon

- Airport ownership is key. Gatwick has improved considerably under its new ownership, and Stansted - recently acquired by the Manchester Airport Group - can expect to see equivalent improvements
- Airport Privatisation: When it was done, everyone knew that it was the wrong answer to sell off Heathrow, Gatwick and Stansted together, but this was the most profitable short-term course of action. It must also be remembered that no one had ever privatised a group of airports before
- Innovative Developments: Some other positive developments include: TFL's bus countdown service, an excellent example of successful innovation; while road traffic is increasing, car share of traffic use in London is actually falling.

Integrated Transport

Stephen Hart, Lead Transport, Technology Strategy Board

Some introductory statistics: (i) the average person spends something like 66 hours a year in traffic in London, (ii) each Boris bike (Barclays Cycle Hire) in London costs around £24,000 per year.

I've been leading on Transport & Marine at the TSB for the past two years ago, and am now taking the lead on our Integrated Transport initiative. When we talk about transport, where do we start? Most will think initially about airplanes, containers, ships, cars etc. But as we think more deeply, we have recognised that we need to focus on the economic value of transport to the UK.

The "Societal" Challenge – The Why:

- Economic growth is vital to our national sustainability, society and quality of life
- The very foundation of economic growth relies on the efficient movement of moving people and goods, getting people to work and moving services such as education, tourism, food and drink and healthcare, as well as leisure activities even going to the shops is crucial to people's lifestyle
- However this movement is reliant on transport which is hugely complex, diverse and vital to every human activity and has become a national dependency
- Impacts to the environment and reliance in energy resources
- Travel is becoming expensive and fuel continues to rise – in some cases prohibitive
- Fragmentation to transport networks and how people choose transport is based on local and immediate considerations based on little or no quality information or post to post code, sustainable delivery

- The time is right to be serious about applying intelligence to the movement of people and goods – balancing the networks, and choice, to ask the question how can we move people and goods more efficiently.

The technology capability of the UK is enormous - the problem we've got is that the technology doesn't meet customers' needs. We need to look at it the other way around, and ask end users the question: what is it you are looking for?

The idea of these round-tables is bridge the gap between the technologies available and the end-user needs.

The TSB has recently carried out research of the impact of congestion on different sectors. This research shows that:

- Congestion costs the UK over £30bn in lost productivity
- Whilst most research relates to road transport, all modes of transport in the UK suffer from pinch points.

ROAD

- 35% estimated growth in EU passenger mobility 2007-2015, with 50% increase in freight.
- There are 31m vehicles on our roads
- We are a 90% urbanised country
- The car still dominant mode of transport – 71% in 2009 (ONS)
- £24bn of productivity was lost to 2015 (Eddigton).

RAIL

- There were 1.3 bn journeys in 2010, representing a 11% compound annual growth rate.
- 4% of journeys are overcrowded, with 21% of morning journeys in London being overcrowded (ORR)
- Estimated costs of user discomfort are £3bn.

MARINE

- There has been a 101% increase in RoRo traffic in the period 2005-30 (DfT)
- 95% of UK goods arrive by sea
- There is forecast to be 182% container growth by 2030
- Capacity will be reached by 2022, after which each 1% loss will cost £3.4bn.

AIR

- Air traffic growth was 97% from 2007-30
- The lack of links to economies costs £1.2bn per annum according to the British Airports Authority

- Tourism is constrained; there were 127,000 Chinese visitors to UK 2010, compared to 500-700K in France/Germany (GLA), spending 10 times less than in France.

We need to look at the impacts, and build the business case for innovation and investment.

Examples of business sectors that rely on transport are:

HEALTHCARE

- Healthcare represents estimated 5% of all traffic in England
- 60% of the NHS's carbon footprint is attributable to procurement
- The healthcare sector is the UK's largest employer with an estimated 2m working in the sector overall in 2010, with 1.4m of these working in hospitals
- Healthcare represents £126bn of UK public healthcare spending (UK Treasury), which in 2009 was 9.8% of our GDP (public 8.2%, private 1.6%).

RETAIL

- Retail sales in 2010 were valued at £292bn excluding the sale of automotive fuels.
- Retail employs 2.9m people, 12% of the population in 2010
- 16% of UK retail establishments are based in London
- The retail sector represents 8% of the UK's GDP.

TOURISM

- There were 30m overseas visitors in 2010, making it the 3rd highest UK export.
- Tourism employed 2.6m people in 2010
- Tourism was valued at £52bn direct, £63bn indirect, totalling £115bn in 2009, which represented 8% of the country's GDP.

LOGISTICS

- This is the sector whose performance is most closely linked to the transport infrastructure.
- 2.3m were employed in Logistics related activities in 2010, employing 1 in 12 workers across 196,000 companies
- The logistics sector is valued at £75bn, representing 5% of GDP.

Just these four mega-users account for around 30% of GDP, and with over £600bn of revenue they must have the potential to unlock vast productivity gains. There has to be great innovation potential in relation to transport in these sectors, and our aim is to identify where it is. To do this we need your help.

Discussion

Air Travel: John Fitzgerald added that current fuel costs now make it uneconomic for any airline to use their existing 747s for long-haul flights. As new, larger, more fuel efficient aircraft are delivered these will be used to maximise the airlines' carrying capacity at Heathrow – where no new slots are available – while at the same time increasing flights from more regional airports using smaller, more fuel-efficient planes.

Models for Financial Investment: These days airports are as much about retail as they are about transport. Taking this into account, are there better models for financial investment in airports which could address more effectively the current operational and capacity problems?

Some key questions to be addressed:

- What would each of us want to see changed, and what could we each contribute to overcome the systemic inertia that tends to typify the transport field?
- Civil servants tend not to like change, so they need to be challenged to introduce innovation. Who should lead the necessary change?
- The DoT has had many short-stay ministers who have generally been unable/unwilling to take the long-term decisions required to support transport infrastructure investments. Typically ministers have stayed in position around two years, while the civil servants only tend to stay three or four years
- Political conflict often exists between local priorities, as represented by MPs, and national transport requirements. A new, longer term approach is required to overcome this
- There is a need to shift to a 24 hour clock approach for transport and services planning, to reflect changes in global business and society
- What can be done to encourage people to introduce small incremental changes to improve overall transport system performance – e.g. to overcome problems like the congestion produced by the road works in Notting Hill Gate? At the current time there appear to be no incentives to encourage people to do this
- Who is responsible for monitoring transport systems performance and taking action to change individual elements (eg traffic lights) to improve systems performance? At the present time there seems to be a disconnect between the different bureaucracies
- In order to deliver successful integrated planning solutions, we need to challenge the highways mind set which tends to give priority to the car rather than to the quality of place
- Grassroots involvement is also needed to design and deliver successful sustainable community solutions
- For the first time in London, three major planning strategies are out for consultation at the same time: (i) Transport for London (ii) Economic Plan for London (iii) Geo-spatial Plan. This provides a unique opportunity to overcome the traditional silo constraints for transport planning. London needs to be planned as a major international city, with 12% of the UK's population producing 25% of the GDP
- E-commerce has changed to become “omni-channel” e-commerce, so people who are smart enabled can make multiple choices about retail. Options include point of ordering and point of delivery, not only home delivery but also pick-up from the store or from transport terminal. In the UK our problem has been planning, compared with Germany where digital Public Access Computer (PAC) Stations are being provided as street furniture within about two miles of where everybody lives. These are being used as both ordering

and distribution points. In the future, the implications of e-commerce may be felt even more widely with 3D-printing, where products will be delivered electronically, transforming the commercial delivery requirements

- The expanding capabilities of e-commerce should be combined with the possibilities for 24 hour, anything-anytime-anywhere activity. This would allow activity to be spread more evenly around the day, thus making better use of the transport infrastructure available
- Transport infrastructure options need to be more accurately costed to determine affordability. It's no good asking people what they want if the options are unaffordable. Infrastructure boards of various sorts have been established to take a longer-term view, establishing broader costs and benefits, but they have a tendency to become too political and too short-term. Past investments (canals, rail, roads) have faced equivalent challenges and if these had not been overcome we would not have the benefit of our current levels of infrastructure. In the past, private members bills have often been required to overcome political barriers, as is currently the case for HS2
- Have identified the need for better connected information to make better use of capacity. There is an ever growing amount of data available – in terms of information, knowledge, values - the challenge is how to unlock this to improve performance and add value for the multiple stakeholders. How can business engage with and influence this process in partnership with Government, and in particular with Department for Transport?
- As well as capacity constraints, there is need to address people constraints – since it is people who set the rules and regulations that limit the use of the existing capacity. For example, how can the working hours for trains be extended to 24 hour working? Need to set this as a goal and work towards it.

Concluding Remarks

John Fitzgerald, Cathay Group

The Government needs to support “joined up thinking” to support the more effective use of public transport. For example, train ticketing has become far more complex since privatisation – this is an example of the type of issue that needs to be addressed.

Amada Clack, PWC

Need to capitalise on what's good, and what's working, while mitigating what's not working.

Other parts of the world (India, China) are pushing ahead with innovation, taking best practice from around the world.

There is a real opportunity for TSB to act as an enabler to take this thinking to a completely new level here in the UK and really make a significant difference.

Stephen Hart, TSB

We are looking to set up a special interest group. If you would like to be part of this group, we would welcome your views and your involvement.

The group will be working with DfT, BIS and the Treasury to identify where we can intervene and where we can make a significant difference. The need is to demonstrate innovation and value on a large scale.

Part of this process will involve road-mapping capabilities and connecting these to the issues and opportunities that have been identified.

We will start to bring in the technology people to involve them in the identification and development of specific solutions to meet the requirements identified.

In this way, over the next two to three we plan to evolve a process which will make a major contribution in this area.

London Round-Table Participants		
Sir Paul	Judge	
Bryan	Treherne	South London Chamber of Commerce
John	Davie	Altra Capital
Martin	Garratt	Cambridge Cleantech
Jonathan	Mantle	JMA Documentary
Steve	Buckley	OCS Group
John	Fitzgerald	Cathay Pacific Airways
Amanda	Clack	PwC
Alan	Kell	I&G Systems
Ash	Mishra	Strategic Asia
Ted	Wiggans	Xaar
Ben	Pape	PMP
Lita	Khazakha	The Prince's Foundation
Richard	Wishart	Delivery Management
Andrew	Everett	Technology Strategy Board
Stephen	Hart	Technology Strategy Board
Harby	Janagol	Harvey Best
Stephen	Willis	Dial Partners
Mark	Vickers	The Crown Estate
Ian	Smith	South London Partnership
Neil	Ridley	Transport KTN
Alan	Lewis	TTR
Prof Peter	Landshoff	Centre for Mathematical Sciences
Keith	Bevis	evalu8
Jeff	Tucker	March Publishing
Kathrin	McClintock	Taylor Vinters
Caroline	Evans	Mindleap
Gareth	Nicholls	PwC

A2 – Cambridge Round-table – 17 June 2013

Transport - An Overview of the Challenges

Sir Paul Judge

The Transport overview by Sir Paul Judge was broadly in line with that given at the first Roundtable event held in London on 9 May. Please refer to this for further details.

One additional comment at the end of his opening remarks was as follows:

Integration of different modes of transport continues to be a major challenge. We are here to discuss how we can make the constituent parts of the transport system flow together better whilst also making improvements to each individual mode of transport.

Transport Innovation

Kathrin McClintock, Partner, Taylor Vinters

First of all I'd like to give some background on Taylor Vinters. We are a law firm based in Cambridge, London and Singapore. We have a particular focus on technology as well as close links with Universities and Colleges. We work with the clever people from these institutions to help them set up new business and protect their valuable intellectual property as this is often core to their business. We help these businesses access funding, and grow into successful global firms of the future. Our Singapore office links with the local expertise with in innovation, technology and research firms. As there is plenty of funding available in Singapore, we led a delegation in May by the Cambridge Connection (<http://www.taylorvinters.com/technology/cambridge-connection>) to introduce them to potential business partners and funding partners.

On technology innovation: As a property lawyer, I take great interest in how buildings work and how workplace effectiveness affects the investment values of our buildings. We have worked on big infrastructure projects including Crossrail, and the lease arrangements for the tunnel which is currently being dug under London for this project. We also worked on the Emirates Air-Line project (<http://www.tfl.gov.uk/modalpages/23828.aspx>), the cable-car that links one side of the Thames to the other.

Even with flexible working and 24 hour connectivity, people still need to get to their offices, because the need for inter-action and collaboration still exists. Looking at my own commute, and the stress I feel by the end of my journey. Transport to London for me is fairly straightforward, with a reasonable train journey followed by a walk through the city. Getting to Cambridge is much more convoluted and cross country. No matter what time I set out, I will always hit the rush-hour somewhere. It can mean be up to two hours sitting in traffic, and even though I do get regular traffic updates via the radio, there is little I can do to avoid the congestion. This all means by the time I arrive at the office it feels as though I have done a day's work already.

The topic of today's discussion made me consider what might my commute to Cambridge might look like in 10 or 20 years' time. I read with interest the work of Futurologist Richard Watson (<http://www.nowandnext.com/>), who predicts trends in various areas. I have selected a few that are relevant to transport issues. He predicts that by 2020, free parking will cease to exist, as will driving on the roads for free; instead, he is expecting hydrogen based fuel stations by 2025, and

by 2030, self-driving cars. By 2035, he predicts self-repairing roads, and 2040 the phasing out of petrol engines.

Thinking about the concept of a self-driving car, (which might also advise me on the optimum time to leave my property to avoid the jams), this would free up my driving time to allow me to continue to work or communicate with my family during the journey. I could also avoid the traffic by leaving the busy roads to use new “touchdown workspaces”, hubs that allow for connectivity in a suitable environment, so I could stop off at one of these, and interact with my colleagues. If a client is also stuck in the same traffic jam, we could organise to meet at this touchdown workspace instead of the office and save time and effort.

On the future of free parking and the usage of vehicles - whilst I am busy at the office, by car could be made available to do useful things for the community, such as deliveries for local services.

So going back to integration, innovation and technology we need primarily to think about people. How transport impacts on work, leisure and people’s ability to give their best at work and at home.

Discussion:

To an extent, the future is already here, because Nottingham City Council have already introduced workplace parking charges for offices like the one we are in today (the Nottingham Workplace Parking Levy www.nottinghamcity.gov.uk/index.aspx?articleid=2581) . The Boots office in Nottingham, which is partly in the city district and partly in that of another local authority, has relocated all of the parking on its site to avoid such charges. So far Nottingham is the only major city in the UK to do this. It is seen as a local tax on Nottingham businesses, but if it were rolled out more widely this would change.

The Stride Project – The Smart Transport Internet of Things Database

Dr John Davies, Chief ICT Researcher, Corporate ICT Research, BT

Stride is a 12 month project funded by the Technology Strategy Board. It was launched in March 2013, and it is one of 8 projects funded under a programme called the Internet of Things Ecosystem Demonstrator Programme.

This programme is all about the creation of Internet of Things clusters which include:

- Stakeholders, who are involved in real-world scenarios and have problems which need to be solved.
- Application Developers to help meet these challengers
- Owners of DataStreams, which provide with rich sources of information to feed off.
- Technology Businesses – who make this information and data available and useable via open information hubs.

The Stride Project is focussed on the transport sector and specifically in the East of England Region. The major stakeholders in the project are part of an organisation known as the East of England Transport Initiative. This group includes representation from Cambridge University, Local Authorities, The Highways Agency in the region and various hauliers including Turners, as well as local emergency services and the Port of Felixstowe. The focus is mainly on road transport, so one of the key aims of the project is to improve the efficient performance of the A14 and other key routes in the region.

The technical focus is on the integration of multiple data sources onto a single information hub, creating a critical mass of transport data. This open platform will be available to developers both

inside and outside the consortium to develop transport applications of interest to users, develop new value chains and business models.

Whilst the Internet of Things is traditionally not viewed as part of transport, it is one of the key enabling technologies which might help to address the issues that the transport sector finds itself facing.

The Internet of Things is dependent on the increase trend for devices to be connected to the internet. Some estimates state that by 2020 there will be 50bn such devices, some go as far as to estimate that there are already more devices connected to the internet than there are human beings on the planet. These devices range from roadside sensors to environmental sensors spread around the world, and sensors on household devices such as washing machines. Decreasing costs to add network capability to devices are driving up usage, and governments around the world are increasingly looking at IoT technology to help address socio economic issues such as CO2 emissions and healthcare provision. The area is naturally also attracting serious commercial attention across a range of sectors as the technology becomes increasingly cost effective.

In the IOT ecosystem data is being accessed from a whole range of sources and sensors including:

- Outputs from the Highways Agency road sensors which give frequent updates on traffic volumes, traffic speeds, and traffic flows.
- GPS devices in the cabs of hauliers and local busses.
- Information from traffic light systems of local authorities.

The above information is communicated to a central hub, which allows for data from a wide variety of sources to be accessed by application developers, which might not otherwise be possible. The information broker plays a key role in connecting all these rich sources of data with these application developers, supporting the development of new and innovative solutions for end users.

Access to the information in the hub needs to be secure (where the information is not publically accessible). Much of the information is being provided in real time. For example from the Highways Agency, several gigabytes of data is received every 5 minutes about movements on all the trunk routes in England, so the capability is needed to process this data quickly and effectively. Trust is also an important factor; stakeholders need to believe that their data will be properly looked after when it is being communicated to the hub. Support is also required to ensure accessibility to the data for developers and information providers.

The current main application focuses for the Stride project are around the 3 following areas:

1) Journey Time Prediction

The main data source here is the Highways Agency using real time feeds and historic data. With this data a predictive model is being built combining real-time data to build in allowances for current congestion hot-spots. This helps to provide very accurate journey time predications which can help with the efficient scheduling of haulage. Talking to hauliers involved in the group, as they don't currently have access to this information they have to allow for large amounts of contingency, building in up to 2 hours of contingency, which is inefficient and costly.

The application is developed on the Android smart phone platform and is also integrated with data sources including:

- VMS sign text (Highways Agency)
- Roadworks Data (Elgin)
- Weather Data (BBC)
- Traffic incidents data (Trafficlink)

A prototype version for the trunk roads in the East of England region is already up and running, and the project team are looking to extend the platform to consider multi-modal journeys.

2) Driver Behaviour

This application combines telemetry data with other sources of information not usually available to drivers such as speed limits data, weather conditions etc . It uses analytics to provide a summary of how the vehicle is being driven compared to benchmarks to help ensure driver safety, driver improvements in behaviours and reduce the environmental/financial costs of journeys.

3) Traffic Incident Systems

The idea in this system is to use Highways Agency sensors to determine quickly when an incident has occurred and what the impacts might be. Analysis of traffic behaviour profiles shows that they do vary depending on the type incident. Accidents, lane closures and traffic simply due to the weight of vehicles on a given section of road have different data profiles.

The project team are also looking to engage with social media data such as Twitter to gain additional information and context when an incident has occurred. The geographic boundaries of a twitter search can be restricted to understand what comments people are making about a particular road in a particular geographic location.

This system should help emergency services to better share information on incidents. Currently much of the information available is simply shared over the phone. Providing a platform to help publish and share data will enable the road incidents to be cleared more quickly, improving transport efficiency.

On consortium partners:

- BT is the project co-ordinator on the Stride project.
- The University of Cambridge (led by Prof Peter Landshoff) is helping to develop one of the applications.
- Dartt, the specialist transport consultancy is looking at the driver behaviour application.
- Aimes Grid Services is a cloud services provider working on the networking and computing infrastructure.
- Ctrl-Shift is a specialist consultancy with an interest on data sharing and related challenges.

The project team continues to be interested in the involvement of other project partners from those looking to learn more and collaborate.

Integrated Transport

Stephen Hart, Technology Strategy Board

The talk by Stephen Hart was broadly in line with that given at the first Roundtable event held in London on 9 May. Please refer to this for further details.

Additional Comments and observations are as follows:

Congestion is not the core problem; it is the result of something else. Car purchases continue, and high earners remain unlikely to use public transport. The transport challenge is largely a human one.

Whilst congestion does offer some benefits to the economy - including in terms of fuel purchases, employment of drivers and the usage of taxis - we also need to consider the other impacts. Transport uses massive volumes of raw materials in the manufacture of vehicles and lots of energy, and generates significant emissions in the actual production processes. With all of this said, business in key areas are predicted to lose 5-10% off their bottom line as a result of worsening congestion.

If we are to believe the predictions, congestion is due to get 30% worse than it is today by 2025, which is an equivalent increase to that we have already seen since the mid-eighties. Overcrowding on roads and trains is an increasing issue for all aspects of society. With such congestion, how can we access leisure services that are based outside of city centres?

On aviation, Tourist Britain wants to see an increase of 121 aircraft a day to meet the growing demands to visit the UK. Tourism is starting to suffer due to our infrastructure running at capacity, and we are falling behind other tourist destinations such as France and Germany for this reason.

The Transport System is also integral to economic growth, but economic growth in turn prompts the purchase of more transport services, so it is a big loop.

The common theme in all of the above is people's behaviour, we need change the way we approach these challenges and how we look at transport in the future. At the Technology Strategy Board we are looking for innovative solutions to overcome these problems. This includes a broad look at the transport system as a whole, and may involve systems that we have seen in places such as Sweden, where they are increasingly using connected hubs on main transport routes as an alternative to office working. We also need to consider the impacts of new technologies such as Skype and 3D printing, and understand the impacts these will have on the future transport systems in this country.

Much of our industry and business is reliant on effective transportation systems, business is being lost where we are not linked up. Fuel costs are rising, and there is now a generation that is looking at alternatives to road travel for cost reasons. The insurance industry is also facing challenges because of the rising costs of transport which is pushing some drivers into not buying insurance, forcing the industry to review and change their business models.

Whilst there are many new emerging technologies and innovations, we need to find the right opportunities to match these up with valid business requirements. How can the UK remain ahead of the game? This is part of the reason for the engagement with you, what is the market for the available solution; we are willing to invest if there is a clear market demand and not just a technology push.

Discussion

Some key points:

- Where there is *centralised control*, for example with Transport for London, they can pull together all of the relevant data to make it easier to develop effective applications much more easily than for other parts of the country. This organisational and institutional situation is as much of a challenge to be addressed as the innovation in this space. DoT versus local authorities versus train operators and so on, there are many conflicting interests and it involves both the public and private sectors. The TSB is trying to improve communications with local authorities and councils to provide integrated services, but people often work in isolation

- In London, the *traffic lights system* remains uncoordinated, the technology exists to link the lights using GSM technology, as they have done in cities like New York, but this is not yet being done here in the UK
- *Villages are becoming centres for work*, and the local postman is becoming integral to the businesses that operate there. With increasing numbers of us working from home, we have developed a leadership in Europe, and perhaps even globally in terms of home shopping. Are we doing enough in terms of the systems and technology to meet this changing socio-economic environment? Can we not do more to reduce the number of white vans conducting multiple deliveries to local areas?
- *Local Deliveries and E-Commerce*: The cost of failed deliveries is up to £3bn a year. Shop Box has delivered products and IP around secure delivery points that can receive a single delivery a day instead of multiple deliveries to help reduce the amount of traffic on our roads. Such work could integrate well with solutions such as the Stride project. It is not only about receiving goods safely, but also integrating with planning solutions. Single deliveries from multiple suppliers require collaboration between competitors which remains a challenge. Deposit box models from Germany and France can also be learnt from
- *Private vs Public Sector*: How are the Technology Strategy Board going to influence strategy and policy making when there is an increasing polarity between private corporations and the public sector? The TSB are in the process of setting up a SiG with HM Treasury, DEC, BiS and UKTI to help improve communications and engage further
- *Transport Application Developments*: The data we have available via cloud sourcing in a social media sense will be revolutionary. As demonstrated by Google's recent purchase of Waze for \$1.3bn which allows the user to see the speed being done by local users, locations of police speed traps etc (<http://www.waze.com/>)
- *UK E-Commerce and Dark Warehousing*: As much of the UK's logistics infrastructure is based on the assumption that the UK roads are in an H shape across the country, this has led to many hauliers setting up shop in the East Midlands in order to be able to guarantee next day deliveries. We may, however, move from an overnight model to a same day model which requires local shared Dark Warehouses where e-commerce companies can deposit their goods for deliveries to be fulfilled locally. This would help reduce the pressure on our road infrastructure of 40 foot long trailers moving back and forth to the East midlands every night. For this change to be effective, the e-commerce, road transport and haulage industries need to link up and leverage these new social and logistics technologies. Government has a tricky part to play in developing new stakeholder models to deliver this
- *Regulation remains a barrier to innovation*: This can be a frustration to effective market development of effective solutions. As an example, Tom-Tom use mobile communications data to gather their data on traffic. At the time there were no regulations to cover this area, they quickly grew to become one of the biggest solutions providers in the area. OFCOM the postal regulator forces the Post Office to retain a lasting legacy over post box assets, blocking access to other innovative delivery solutions to these boxes that are all over our country. Opening up access to the box locations would be a better mandate for universal service, particularly in a declining traditional postage market
- *Data requirements for a move away from Subsidised Public Transport*: Is the subsidising of commercial transport services really viable? These are commercial operations, so we are essentially subsidising businesses, which is not particularly politically acceptable in the current climate. Through the Future Transport Scheme

(which has a £3m budget to encourage the move away from subsidised transport systems), Cambridge County Council are attempting to develop new Cambridge based hub services (<http://www.cambridgefutures.org/>). One of the biggest challenges remains gathering proper data about people's transport requirements. Data gathering is currently carried out in a rather archaic fashion through liaison with local authorities. Improved data could help to develop a viable, dynamic bus service here in Cambridge, which could in turn encourage more people to use public transport, making the services more profitable and efficient

- *Combatting the Deterioration of our Town Centres:* Even with the growth of e-commerce there is still a case for the effective delivery of services in shops, as there is no substitute for actually experiencing the look and feel of goods before purchase. In the example of John Lewis, a customer can select the goods they wish to purchase, then subsequently pick the goods up a few minutes later from the park and ride rather than having to carry the item back to where their car was parked
- *Learning from Industry Best Practice:* There are lessons to be learnt from other parts of industry where shared logistics systems have had to be developed as a business necessity. For example in the brewing and drinks industries, where deliveries to pubs and other outlets are shared, as the outlets wish to sell goods from competing companies, but are not in a position to accept multiple deliveries from many different competitors. This situation has forced these competing organisations to collaborate and develop cloaked pricing models and shared logistics and distribution to meet the needs of their customers. We should look to learn as much as we can from these experiences
- *Learning from other countries:* Are there lessons to be learnt from transport solutions in developing countries, where small bus services are much more dynamic to the needs of customers, rather than fixed routes and times. In countries such as Thailand or Peru, 7 to 12 seater small buses offer local services at flexible prices that actually meet people's requirements
- *Other issues Public Transport:*
 - Although there are 7,000 buses operating in London, they are not being effectively co-ordinated to actually serve the needs of transport users
 - People of income are still hesitant to use public transport services as they often see it as "beneath them"
 - Operational Issues continue to face transport, and particularly bus services for rural communities; there is no on-demand system available.

Discussion Session 1 – General Challenges

Key Points:

- *Infrastructure developments in Cambridge:* The changing dynamic of transport in the area impacts on the transportation infrastructure. Business and Enterprise development

could be impacted if not managed effectively, how will the costs be addressed?
Stakeholders need to work together

- *On Free Services:* People need to move away from the concept of “free services”. We need to ask what would be willing to pay for. We need to address the mind set of expectation that transport services will be free. If people continue to receive the services for free, they will not value them
- *On behavioural change:* The reality is that behaviours do change, but we need to effectively predict the coming changes by engaging with communities and business. We then need to develop the infrastructure and solutions to cope in good time. This will help us to remain one step ahead of the curve
- *Political Positioning:* Entrenched political positions combined with nimbyism can be damaging to progress. If business is going to lead people into the right decisions, we need to take the political angle out of it. In cities, cars are being forced out by politically motivated implementation of 20mph speed limits (where research indicates that the casualty rates resultant in such a change do not show significant improvement). These limits can be counterproductive, as vehicles move so slowly that they actually generate more emissions due to never moving out of second gear
- *Urban vs Rural:* The agenda of different populations is extremely different. Urban residents tend to be all for the restriction of vehicles in their centres, but the rural population has very different motivations and very much needs their cars to carry out their daily lives.

Discussion Session 2 – The Investment and Business Case

Key Points:

- *Public vs Private Innovation:* Should investment and innovation in transport be driven by the private or public sectors? If we look at the Age of Steam, in this case, much of the ground-breaking innovation and business development was carried out by entrepreneurs and private individuals. In Utrecht, in the Netherlands, there was a mandate by local government for the usage of only electric vehicles for the express delivery of parcels in the city centre, which forced delivery firms such as DHL to adopt new business practices. So there is a public mandate for how public transport systems should operate. In an alternative example, in LA, where the General Motors lobby was so strong, the led to the decline of a fine railway infrastructure, forcing everyone onto the roads
- *Industry Collaboration:* Local national and international logistics linkage is difficult. To get different industries across the supply chain to integrate and work together more effectively is key
- *Cultural Differences or Government Subsidies:* Whilst we admire many of the transport systems in many other European cities, they are hugely subsidised, so there is a balance between public and private. If you are going to charge more for the services, you must deliver what people expect
- *Behavioural Change:* Outside cities, behavioural change remains challenging, as the car is a personal space, with quality air-conditioning, stereo systems, phone integration etc. The alternatives must be good enough to force the change in behaviours
- *Local Cambridgeshire Situation:* Travel patterns in terms of low car usage in the City of Cambridge are actually an exemplar in Europe, because of all of the bicycles in use. This

may be because of the cultural situation in terms of post graduates and university students. This has created a critical mass situation that makes such a system possible.

Cambridge Round-Table Participants		
Sir Paul	Judge	
Martin	Garratt	Cambridge Cleantech
Jonathan	Mantle	JMA Documentary
Alan	Kell	I&G Systems
Owen	Kell	I&G Systems
Richard	Wishart	Delivery Management
Stephen	Hart	TSB
Prof Peter	Landshoff	Centre for Mathematical Sciences
Jeff	Tucker	March Publishing
Hugh	Purser	Asia-Pacific Technology Network
Christopher	Wilkinshaw	Marshall Group
John	Davies	BT
Glenn	Barrell	My Parcel Centre
Andrew	Leslie	Shop Box
Jenny	Wilton	Manufacturing Advisory Service
Jeremy	Smith	Cambridge County Council
Mathew	Shuter	Cambridge County Council

A3 – Southampton Round-table – 4 July 2013

Introduction

Andy Grimly, Partner, Price Waterhouse Coopers

Hello, I'm Andy Grimly, a Partner here at PWC (<http://www.pwc.co.uk/>) based locally. We are delighted to be involved with this initiative by the Technology Strategy Board. We have been involved in hosting the sessions in London and here in Southampton, and will be hosting later this month in Birmingham as well. We're looking forward to an interesting discussion later this morning and we hope you enjoy it.

Transport - An Overview of the Challenges

Sir Paul Judge

The Transport overview by Sir Paul Judge was broadly in line with that given at the first Roundtable events held in London on 9 May and Cambridge on 17 June. Please refer to these for further details.

Local Transportation Perspective

Sally Lynksey, CEO, Business Solent

Welcome everyone this morning, and thank you to PWC for hosting this discussion. Business Solent (<http://www.businesssolent.com/>) is very interested in the Transport agenda, and champions a number of leading organisations working in this area. Many of the companies in the region that we represent will state *Transport* to be a leading priority area. We have been working collectively on overcoming barriers in transport for some time in the city and indeed as a wider region.

There are already some excellent connections here in Southampton with good road networks, motorways, rail, air and of course the sea, but we should be making more of our close proximity to London as a region as that is a key strength of this area. As we are bordered by 180 degrees of water, we are also an international gateway to the world which should also be a major opportunity for increasing our trading channels. If you look at the cruise industry for example, this has trebled over the last 5 years, but with that have come significant challenges around transport infrastructure.

Other positives locally include:

- The development of Platform Road with the support of Regional Growth Funding, which will help support the development of the port and the cruise industry. (www.southampton.gov.uk/news-events/latest-news/platformroad.aspx)
- Massive improvements to public rail with the support of Balfour Beatty, who are a partner to the local council

- A proposed consolidation centre coming to Southampton to ease congestion and help retailers with in time deliveries and so on
- There is talk about a proposed ring road, and personally I can't wait for that, if they take the traffic lights with them, that would be all the better
- We have a thriving international airport which serves over 40 destinations and has opportunities to expand to even more new destinations (<http://www.southamptonairport.com/>)
- There will be three new bike lanes coming into Southampton to form a safe way of getting into the city
- There are proposals to link Portsmouth's rail network to Southampton airport, which would help to increase business, trade and employment.

In terms of challenges, we do have a lack of integrated transport solutions here in Southampton so this discussion today is most welcome. How can we explore better connections between our various transport modes? This has been long discussed in Southampton, but transport in the city is not joined up. The information is not joined up, the promotion of different services is not joined up, and neither are the timetables, so there is a big gap there relating to the connection of transport modes. Cost of travel is another issue; there are examples where people are finding it hard to get to work because they can't necessarily afford the rail and bus transport fares. I have even heard some fairly extreme examples of people having to cycle miles to get on a train to go to work, and then walking miles at the other end.

We are an international port city with massive potential to expand our commercial trade into India, China and other countries. We have the competition of London Gateway emerging, but we also have a big opportunity to be a lead player nationally and internationally here in Southampton. In order to succeed, we must be able to accommodate growth, we must work with the local authorities to overcome obstacles in areas such as planning. We've identified that there is a local need for more warehousing, but where should this warehousing go? There is a clear opportunity to explore port-centric logistics here in a positive way that could also drive growth and jobs (http://en.wikipedia.org/wiki/Port_centric_logistics).

We have also talked widely about the M3 Winhall junction with congestion there every single morning, which must cost the economy millions. Eastleigh Riverside development has also been talked about for some time, and it has perhaps become something of a joke locally, but it should not be because it is a massive site for potential employment, technology parks and distribution. All sorts of positive things could happen here, it has immediate access to the motorways, rail networks and so on, but it is grid-locked because of the Chickenhall Lane Road issue. There must be ways, with all the expertise we have in our region, to unlock that potential. (<http://www.eastleigh.gov.uk/PDF/EC4EastleighRiverSideMay2011.pdf>).

There is a continued disconnect between East and West within the City which also needs to be addressed.

It is also about how do we connect things digitally, so that we can share information more effectively and attract more people to do business in the region and use transport in new innovative ways.

I feel it is great that Transport is a government priority. I understand that there is significant funding available from various streams, which I hope we get the opportunity to learn more about today. In terms of the strengths and assets we have in the region to leverage these opportunities and work with the funding streams, of course we have Lloyds Register who have recently relocated to Southampton, where they are partnering with the local university on the new Southampton Marine and Maritime Institute (SMMI) which Universities and Science Minister David Willetts recently hailed as an exemplar of the relationships required between industry and higher education to drive future economic growth in the UK and around the world. (http://www.southampton.ac.uk/mediacentre/news/2012/mar/12_56.shtml). This is another local magnet to help grow and promote our centre of excellent and supply chains around Marine. We have significant strength research and expertise from our Universities to leverage these opportunities around integrated transport, technology transfer, supply chains, and develop our key sectors around Marine, Maritime Aerospace and so on.

We would also pledge our support through Business Solent and Business South to engage with this integrated transport agenda, through a series of action groups that are already in place around areas including Maritime and Logistics, Digital Services, Creative Industries and other key sectors. We have a framework and existing infrastructure which we would welcome your engagement with to further the agenda. We can also offer our support in terms of the setup of events or workshops in this area.

Discussion

On traffic lights, Sir Paul Judge commented at how uncoordinated traffic lighting systems are in the UK given how the technology to better manage traffic flows through the usage of mobile telephony systems now exists. Participants commented that we have a very old gating system here, but along Bitterne Road West we have a very good example of an improved gating system. The idea is that it gates access from rural areas and as you are coming along, traffic systems are sequenced, whereby peak time flows are managed by differing signals. We led the way in this area in the UK in the 1970s and 1980s and have now outsourced our traffic light systems to Balfour Beatty. The problem remains however that we have more traffic lights per square mile than virtually any other city in Europe, making it one of the slowest cities to travel from East to West as a city. There is also a bus priority scheme underway based on GPS technology which aims to help alleviate these problems.

Coach Service Innovations

Amine Belkacem, Customer Service Manager, National Express

For those that don't know a great deal about National Express (<http://www.nationalexpress.com/>), let me provide a few details. We are the largest scheduled coach operator in Europe, and last year we carried 21m passengers. 35% of our carried passengers are to and from airports. We are the largest national transport operator at Heathrow, Gatwick, Stansted, Luton and Manchester airports. Our competitive advantage lies with direct access to airport doors, combined with competitive prices. We also operate the largest bus service in Birmingham, the wider West Midlands, and Dundee.

So, what are we doing around technology as a coach company? We have already gone through a large number of changes to meet ever changing customer requirements. We have implemented a

tracking system on the whole coach fleet to help provide improved customer information. Customers can now track the progress of their coach of interest, providing accurate information around predicted arrival and departure times. We have also made significant investments in the area of safety, equipping our coaches with “Alcolock”. This system forces every driver to blow into an alcohol testing system before attempting to start the coach. If there is a positive reading, the coach will not start and that information would be fed to our control department in head office (www.alcolockgb.com/).

So, where are we headed in terms of technology, and what would we like to see in the next few years? Information provision to our customers is crucial. We want to encourage repeat business and make travel easier for our customers. In the future, say a customer wants to travel from here to Miami, we envisage them being able to go to our website and input their journey plans and be provided with the best value or most efficient route for their whole journey. This kind of information already exists, and we have an opportunity to collect this information into a central database to be shared with other transport operators and providers in order to provide customers with this kind of output.

Integrated Transport

Stephen Hart, Technology Strategy Board

The talk by Stephen Hart was broadly in line with that given at previous round table events held in London on 9 May and Cambridge on 17th June. Please refer to these for further details.

Discussion

Some key points:

- *Road haulage industry:* The road haulage industry needs to be defended here for its innovation. Economic necessity has made us work together better. As we grow, we increasingly work with a wide variety of partners in the transport space. Many of the innovations under consideration have already been carried out to a large extent, and many of the future innovations will be more about consolidating the industry
- *Developing new communities:* Is it possible to engineer new communities where people can live and work to reduce the amount of traffic on the roads?
- *Cultural Change is Possible* but one of the key elements for change has been legislation. As soon as new correctly enforced legislation such as road tolls come in this will immediately change behaviours
- *Political Barriers:* Working across political barriers is exceedingly difficult, with so many people involved in decision making, and things are often not well joined up
- *Collaboration with Major Retailers:* The logistics industry does work fairly well on collaboration, but there is one key element missing from this debate, and that is the customers, the major retailers. Even major logistics companies get squeezed by the retailers around when deliveries are due to arrive. Working nights and weekends is preferable for logistics companies, they operate 24 hours a day, but retailers often only operate 8 hours a day, and are not set up to receive deliveries at the most efficient times. The utilisation levels of logistics equipment largely determine their efficiency, so notwithstanding the restrictions of the working time directive, running vehicles as close to 100% of the time as possible is preferable. Currently, as an

industry we estimate that 50% of vehicle hours are spent empty. Getting retailer representatives sat around a table with representatives of the haulage industry would help, but the haulage industry is a broad group, making it difficult to pull them all together with a common voice

- *Distribution Initiatives in Southampton:* One of the unique features we are trying to trial in Southampton is to engage a wider audience beyond the typical areas of retail and construction to include the public and wider community who also receive deliveries such as hoteliers and SMEs. For example working with Solent University (<http://www.solent.ac.uk/>), they estimate that they could reduce the amount of deliveries they take by 75% (150 deliveries less per week) by adopting this model. We are however, not currently looking at other moves such as green vehicles for deliveries as this increases the cost of delivery and puts unfair pressure on those providing the delivery services given how tight the margins already are. Without a 300 mile range, the usage of electric vehicles for wider deliveries, the viability of using electric vehicles is also questioned. Where electric vehicles are being used, for example in Bristol, a subsidy is still required to make it viable
- *Network Optimisation:* As a regular traveller between Winchester and London, I am struck by the poor utilisation of the available infrastructure. Even at 7pm at night, although the passenger trains are over-congested, the freight trains are frequently only 25-30% full. Whilst on the tube many lines run at up to 30 trains per hour, the same is not the case for inter-city services, where much of the challenge is around signalling
- *Global city innovation challenges:* Compared to mega-cities like Sao Paolo, Lagos or Moscow, our problems are minor. In these cities, it can take four hours to advance size kilometres. Everyone in these cities is talking about innovation. With increasing rates of urbanisation in developing countries, these problems will only get worse. Awareness and access are the key challenges. Even if you have the technology, people are not always aware of where to go to access effective information. The danger in developing countries is that despite the increasing issues around congestion, cars are becoming sexier and more appealing. How can we access and engage with so many of the brilliant ideas that are emerging from the discourse around the world?
- *Integrated Information Sharing:* In the example where a haulier is planning to move 4 trucks out of their depot, could we not introduce a system whereby they can share this information with the wider community, so local road users can know that now might not be the best time to depart on their journey? In terms of consumer behaviours too, investment in integrated information sharing to allow drivers to make more effective decisions about their journeys could also make a difference. How can we bring all of the timetable and traffic information together onto a single platform and provide end-to-end journey information. TFL does this effectively for its London based journey planner, but we need wider solutions nationally. If we have these solutions, the industry can better self-regulate, trading off like a market with different prices and times for deliveries or journeys. Individual bus companies for example, do not have the funds available to develop these systems independently, but if the data was available in a central source, they could begin to offer improved information services in this area
- *Combatting Apathy:* Whilst there remains a wider perception that transport is facing some major issues, when you attempt to engage the wider community on the issue, you are often faced with major apathy. The only way to make people sit up and take notice more is to make them endure more pain around the issue. As a logistics supplier, the cost of traffic doesn't necessarily affect our business as we will pass the costs onto the consumer, but the costs are often invisible. One of the big issues here is that the area of transport is so wide and diverse that there is not one single one size

fits all solution. In such a broad debate the risk is that nothing will ever get done. Local authorities can help to facilitate change, but are constrained by recent cuts to their funding

- *Changing Commuter Behaviours:* How can we influence commuters to change their modes of transport? Is it the luxury of driving in your own car? Could we make 1st class coach services to induce people to leave their cars at home? Could we incentivise people in other ways? Perhaps giving them a discount on their next fuel purchase if they switch to making some of their journeys by public transport.

Discussion Session 1 – What are the considerations for future transport requirements?

Key Points:

- *Incentivising Non-Essential Car Users:* In Southampton there is a mix of essential and non-essential car use. Can we not incentivise non-essential users to leave their cars at home somehow? In London the congestion charge has had a significant impact in this area
- *Changes to Ways of Working:* The perception of the majority of employers remains that you need to be sat working in an office to be working effectively. The technology exists now that makes remote working totally viable as an alternative and indeed in many cases more effective. A major professional services firm recently installed a whole suite of video conferencing facilities at their offices around the world, along with a change in policy on corporate travel. With these changes they managed to reduce their number of flights per day from 25,000 to 12,000. These kinds of changes not only reduce congestion, but also offer potentially significant reductions to corporate costs
- *Government Incentivisation and Regulation:* Road pricing is perhaps the most powerful tool to induce changes in road user behaviour, but successive governments seem unwilling or unable to implement these systems beyond the congestion charge in London. Again, technology now exists to enable us to measure how and where people are using the roads, but the political will is still not there
- *Knock on Impacts of Other Government Legislation:* For example the closure of local public hospitals. Here, the impacts on transport of the closure of local hospitals and the centralisation of services to larger regional centres create greater congestion and longer travel times for service users

Also the encouragement by government legislation and regional development incentives to open up new freight distribution centres in far flung areas of the country such as Dunfermline whilst this may be beneficial to the local economy in that area, makes little sense in terms of logistics

- *The School Run:* In earlier generations, all children used to walk to school, even the Chief Medical Officer is encouraging the banning of the school run, not only to reduce congestion, but also because of the potential health benefits to children. In modern British families, both parents often work, and they need to take the car to ensure they can drop their children off at school at a reasonable time and also ensure they also get to work on time

Other potential options exist around extended hours or extended weeks during holidays for schools. In Singapore they have a system of morning and afternoon schools which

share the same facilities, which halves the number of schools required, and also helps to distribute the traffic more evenly throughout the day

- *Critical Mass on Open Source Platforms:* Many start-ups already exist offering services around integrated transport, but there is often a lack of awareness about the fact that these services exist, so they do not gain the critical mass. The TSBs programme that is on-going around open-source shared information that may help to address this issue
- *New Innovative Communities:* For example the forthcoming development around North Fareham and the Welbourne project (http://www.fareham.gov.uk/planning/new_community/). Where new business parks are being integrated with living and commercial spaces, totally changing travel behaviours. Villages and towns in the UK are also increasingly becoming places of work for small businesses. Business realities and emerging technologies mean that innovation in the way people work is happening sometimes despite the failure of programs such as the eco-towns program here in the UK
- *NIMBYISM:* One of the major barriers to change remains around NIMBYism. People do want to see improvements in transport infrastructure, but for example, do not want to see the new freight interchange or power station located in their local area
- *Freight Haulage:* Changing behaviours in freight haulage is difficult. For example, if you go to a freight haulage company they will state that “the optimum train length is 20 containers” even if you have a client that only has a requirement for 5 containers. The building of an interchangeable yard (which of course faces the challenges of NIMBYISM as stated above) and getting the other 15 containers on board to enable that train to run efficiently so you don’t have such high levels of wastage. The cost of potential signalling changes also makes innovation and improvements to track utilisation very difficult.

Discussion Session 2 – What is the business case for innovation and technology? How can investment unlock barriers?

Key Points:

- *Business Collaboration:* Although it would seemingly be to their advantage, it remains difficult for businesses to collaborate around transport solutions. Silos are well entrenched, and hard to break down
- *Listening to the Customer:* We are always talking about supply led solutions, is it not time to take demand more into consideration?
- *Innovate or Die:* We have come to the point in terms of the advancement of the problem that if you don’t begin to sell the idea of innovation to your customers, then as a business you are probably facing extinction going forward
- *Gorillas vs Gazelles:* We discussed the concept of traditional business strategy around transport versus the need to be sleek, fast and adaptable to meet changing customer demands. The Technology Strategy Board also needs to be agile in this fashion. Software technologies are now often being developed with agile technologies, where the end point may not always be known, as requirements are changing constantly. Using the old waterfall methods of development may mean that you end the project over budget with a solution that people do not actually want or need. Short development and release cycles with agile solutions that may eventually combine to provide a wider, whole solution are more likely to be successful

- *Who pays?* You may have all of the solutions, but ultimately, who is going to come up with the pay cheque to cover the investment needed? How can you make the solution practical enough and packaged in the right way that investors would be able to understand the potential value? People see transport as a large problem, but not yet as a significant opportunity
- *Business Consultation:* Our discussion group felt that business consultation was completely and fundamentally important to the formulation and delivery of effective transport solutions. How can you engage with such a wide variety of stakeholders to properly capture meaningful inputs? This is an area the Technology Strategy Board can clearly assist with. Regulation or government direction may be required to improve collaboration between businesses
- *Pain before gain:* Our discussion group felt that there will be more pain before anything is gained, especially in the arena of congestion. Businesses currently build-in extra time for, especially, road journeys and whereas a 40 minute or 1 hour delay is perceived as “normal”, a 2, 3, or 4 hour delay is not uncommon and has become acceptable. When delays start to exceed 4 hours, or when long delays become more frequent (i.e. when the pain starts to become intolerable) businesses, especially, will have to find solutions.

Taking the Debate Forward:

Stephen Hart, Technology Strategy Board

These sessions are designed to help to identify real life issues to feed into a wider process, as well as identifying a network of people and organisations who may look to bid into or be part of future competitions in this area. We will be seeking out common themes and issues emerging from the five workshops to help inform and structure our next steps and initiatives.

We would also welcome suggestions and proposals from session participants on how to take the debate forward.

The TSB is involved in a number of initiatives to take the area forward:

- On Justifying Funding: The TSB have engaged economists to investigate who will be willing to pay, what structure might payments and investments take and other such questions
- Special Interest Group: We are in the process of setting up a special interest group and we are looking for end-users to engage with this group. HM Treasury, BIS, the Dept for Transport and UKTI are already being engaged, but we also want to ensure end-users are also involved
- Integrated Demonstrator Competition: We have released a paper and are likely to launch a competition towards the end of this year which will focus on a region or a city with a real-life transport issue which innovation may help to solve
- The Transport Systems Catapult (<https://ts.catapult.org.uk/>): We are also working with this government initiative to share ideas and investigate further innovations

- Transport Knowledge Transfer Network
<http://www.cenex.co.uk/programmes/transport-ktn>: We are working with the Transport KTN to understand how knowledge transfer can help to meet the emerging challenges
- Roadmapping: We will be looking to develop a roadmap for the future of integrated transport, and we are also looking for end-user engagement in this road-mapping exercise
- Call for Papers: We are looking to work with the Institute of Engineering and Technology (IET) to launch a call for papers investigating how innovation and technology will change over the next five years.

Southampton Workshop Participants		
Sir Paul	Judge	
Ash	Mishra	Strategic Asia
Ben	Pape	Institute of Engineering & Technology
Stephen	Hart	Technology Strategy Board
Jeff	Tucker	March Publishing
Sally	Lynskey	Business Solent
Amine	Belkacem	National Express
David	Bailey	Balfour Beattie
Simon	Fry	Southampton City Council
John	Enyon	Import Services Ltd
David	Kelly	Lloyds Register
Paul	Walker	Southampton City Council
Gary	Whittle	Meachers Global Logistics
Steve	Porter	Isle of Wight Chamber of Commerce
John	Broomfield	Kilbride Group
Andy	Grimly	PwC
Richard	Cooke	Southampton City Council
Owen	Kell	I&G Systems
Peter	Baker	Red Funnel Group

A4 – Birmingham Round-table – 15 July 2013

Introduction & Welcome

Steve Baker, Director, Price Waterhouse Coopers (PWC)

Firstly welcome everybody and welcome to our Birmingham offices. We are very pleased to host this session for the Technology Strategy Board. My name is Steve Baker and I am part of the Director team here at Cornwall Court. I spend a lot of my time with both public and private sector clients addressing transport related challenges which a lot of our clients face on a regular basis.

This PWC office was established in 1928 and we have long standing relationships with Birmingham and wider Midland based clients, giving us a strong insight into the issues for companies in this region.

We have three offices in the Midlands: Birmingham, East Midlands and Milton Keynes, and many of our staff need to commute significant distances to reach their office locations. One of the challenges for visitors to this building here is what to do when they arrive in Birmingham, particularly if they are travelling by train. The interesting thing about our office here is that it is around 7 minutes to walk to Birmingham New Street Station, but 10-15 minutes in a taxi, so we have an on-going opportunity to encourage walking to our offices by both workers and visitors. This pattern is repeated in a number of our offices around the country, which are often based in city centres, and frequently the best method of accessing the offices for travellers by train is to walk.

Overview of Technology Strategy Board

Andrew Everett, Head of Transport, Technology Strategy Board

Hello everybody, my name is Andrew Everett from the Technology Strategy Board. For those not familiar with the Technology Strategy Board, we are the UK's innovation agency funded by the Department for Business Innovation and Skills. We have a budget of approximately £400m per year which is split among a variety of sectors including Energy, Healthcare, Digital, Manufacturing, and Enabling Technologies Electronics Sensors and Photonics etc. I cover the transport area, which traditionally has meant support for the development of vehicles to make them lower carbon and more efficient. This has included studies into more efficient engines, lightweight structures for aerospace, and working with the automotive sector around the development of low-carbon vehicles. We realise now there is also a great opportunity to look at transport systems as a whole.

TSB's remit is to help UK businesses innovate and gain wealth from developing new business opportunities. So we are all about trying to find the linkages and opportunity areas where UK businesses can innovate, where we can help them take more risks to accelerate ideas into commercialisation. Our aim is to provide a return on the UK taxpayer's money that is being invested here to get a return back to the UK. To date we are quite successful in this regard, getting an average 7:1 return on our investments.

Steve my colleague will present later on the overall aims of these sessions a little later, but as I see it, these sessions are designed to look at transport in a slightly different way, not from a traditional vehicle manufacturers or infrastructure providers standpoint, but instead to look at the whole transport system as a system to see where the opportunities are, so please come forward with all of your ideas and get engaged with the discussion. Thank you.

Overview of the Challenges

Sir Paul Judge

The Transport overview by Sir Paul Judge was broadly in line with that given at the previous Roundtable events held in London, Cambridge and Southampton. Please refer to these for further details.

Transport Challenges & Youth Engagement

Geoff Inskip, Chief Executive, Centro

Paul has touched on a whole raft of areas but perhaps for the West Midlands the unique challenge is not always recognised. I don't think many of us really realise the challenges brought about by increasing urban populations here in the UK, but we will have 10 million more people, 60% of whom will be living in cities, within 20 years' time. If we want to do something about this challenge, we have to do something about it now, we can't just sit and wait until the 20 years is up.

Wider questions about energy security, climate change challenges (and how we often export our manufacturing overseas along with the problems that this can cause rather than taking responsibility for it ourselves) also need to be addressed. I think we are also all aware of the housing issue, as it is already affecting us all today. We have to face all these challenges in context of a stagnant economy, whilst also attempting to generate jobs and growth. We realise that cities will need to be the big engine for growth going forward as well. All of these issues combined mean we will face significant transport challenges in the near future unless we invest in our transport infrastructure in the right way.

I believe that complacency is a problem. The issues I have listed earlier are not sufficiently discussed and recognised. In our schools for example, we don't engage with children enough about these issues at an early enough stage.

A frightening statistic is that the developing world is using up 1 and a half worlds worth of resource and if the developed world were to begin to demand the usage of resources at the same level as the developed world we would need five whole worlds worth of resources to maintain this standard of living for all. Clearly this is not sustainable; some kind of radical change is required.

At one level with the business improvement districts here in Birmingham, we talk about the "Vision for Movement" (<http://bigcityplan.birmingham.gov.uk/wp-content/uploads/2010/11/Birmingham-City-Centre-Vision-for-Movement.pdf>) which envisages the development of a walkable city that is still connected at a national and international level.

Efficient cities, smart cities are about innovation to ensure that we can get people around. One of the challenges that we have is around the use of *big data*. How do we capture accurate data about peoples travel? Consider how much data the big supermarkets such as Tesco collect on you if you use their Clubcard system; yet in the transport industry, we know little or nothing about you. We don't know what you do, where you go or when you do it - and some may say this is a good thing. If we had this data, and used it effectively, what might we be able to provide in terms of an improved service?

We are talking about transport in general here - not just public transport, but overall mobility and meeting your mobility needs in a different way. So the discussion topic for us is very much about:

- How do we achieve *intelligent mobility*?
- How do we start *retailing alternative transport services* rather than just being a supplier of transport?

This approach means using new partnerships and technology such as real time information systems. We need intelligent transport systems that not only tell you when the next bus will arrive (which we already have in Birmingham), but can also tell car drivers when it might be more efficient to park up their car at the local train station and travel to the city by car. Why can't our calendars in Outlook and our Smartphones be aligned with the data from the journey planner? The one thing that smartphones definitely know these days is where you are. When you press on your next calendar appointment, why doesn't your smart-phone provide you with alternatives for how to get there, be that by road or public transport. This is very simple to do, but is not yet being done. We are not using technology to our best advantage in this respect. If we can develop leadership in this area, this is the kind of service that can definitely be exported.

An example of innovation in this area is the Tube Exits app (<http://www.tubeexits.co.uk/>) which advises you on the most efficient position to stand on the platform to ensure that you are as close as possible to the exit at your arrival station on the tube. I understand that the designer of this app sold the idea for around £1m.

The challenge for me is how to put the clever youngsters who develop such apps together with the right business people who understand the challenges. If you simply challenge the youngsters to "give me a solution", they won't know what the question is, whereas we know what the issues are, but we don't know how to develop the solutions. Such engagement, putting these different people in a room together - particularly via our universities - is critical to our future success.

Where are the young people on our boards and how are we effectively engaging with them? We at Centro will be starting this form of engagement in the autumn of this year through the youth parliament, in order to encourage them to engage with these issues and to understand their current and future needs.

When asked to talk today around integrated transport, I decided to take an approach that considers not only traditional modal integration between bus, rail and roads, but also integrating with the wider agenda around economic development. With the changing fiscal landscape, how are we going to develop going forward?

Centro is the Integrated Transport Authority for the West Midlands, covering a geography from Wolverhampton & Dudley in the West to Coventry in the East. We are made up of 27 elected members from each of these respective areas, where we are responsible for providing fiscal balance and transport planning for the whole area – with the aim of ensuring that integrated transport occurs over all of the transport modes in this area.

So what do we actually do?

- Strategic Planning
- Delivering Transport Infrastructure Schemes
- Bus Services (Working in partnership with service providers and also providing subsidised bus services)
- Operation of Midland Metro (In partnership with the local operator)
- Rail Services (expanding and delivering improvements to the rail network)
- Concessionary Travel (Management of this scheme providing free travel to the over 65s and free travel for young people for the 7 local authorities in the West Midlands)
- Information & Ticketing (Working with the various modes of transport in the region).

Our two key local transport plan objectives are i) Economic Growth and ii) Low Carbon. Projects being delivered with partners to support these include:

- Birmingham Airport Runway Extension
- New Street Station Gateway
(<http://www.centro.org.uk/newsroom/PressReleases/PressRelease47968.aspx>)
- Midland Metro Birmingham City Centre Extension
(<http://www.centro.org.uk/metro/CityCentreExtension.aspx>)
- Nuneaton-Coventry Rail Upgrade
(<http://www.centro.org.uk/newsroom/PressReleases/PressRelease20419.aspx>)
- Darlaston Strategic Development Area project
(http://cms.walsall.gov.uk/index/transport_and_streets/transorming_walsall_transportation_system/darlastonsda.htm)
- ‘Smart Network, Smarter Choices’ (SNSC) – A Sustainable Transport Fund project <http://www.centro.org.uk/LTP/LSTF.aspx>

This area is currently underperforming when compared to the rest of the UK in terms of Regional Gross Value Added, with £16bn Regional Gross Value Added productivity gap compared to UK average. We also face high unemployment rates and are facing similar challenges around carbon (34% reduction required by 2020) and congestion (which costs the regional economy £2.5bn per annum in lost productivity) as other regions.

There are also several socio economic barriers in the region which are a combination of:

- Skills shortage
- Levels of worklessness and economic inactivity
- An underperforming economy in terms of Competition, Investment, Innovation and Enterprise
- Infrastructure.

Transport is too often seen as a separate issue - however transport is massively relevant to jobs and employment and is an absolute priority for our cities.

Cities need:

- Accessible, Integrated, Multi-Modal Public Transport System...linking people to jobs and jobs to people
- Strong transport and commuting links with nearby cities and towns to help drive economic growth and prosperity.

Centro's Vision is:

"To deliver a world class public transport system delivered by a best in class organisation"

Technology sits at the heart of this vision, ensuring that people have the right information at their finger-tips to allow customers to make informed decisions around transport. In terms of this, what we are working towards is the concept of a "Personal Mobility Account", using data and knowledge of behaviours to influence the choices customers make. Part of this is ensuring that we have an excellent product that people can trust, encouraging intelligent mobility. We are also working with the concept of "pay for what you use" using smart card technology to bill people according to the services they have actually used. Although this is a simple concept, its implementation can be complex.

In the journey of the future we might look at our smart phone at the start of the day to determine the best route to our destination. We might then jump in a low carbon smart car for our trip to the park and ride, at which point we use our Swift card to get onto the train. At the other end of our train journey, there is a cycle hire option to get to the office. For our next journey, our smart phone can again advise us of the best/most efficient route. At the end of a month, using this smart technology would enable us to receive an itemised monthly bill summarising our travel movements.

The following are what we see as the major policy and governance barriers to effective implementation:

- Changes in administrative, economic and political geographies
- Local Enterprise Partnership (LEP) boundaries not being commensurate with Travel to Work boundaries, and significant levels of competition between LEP's for funding
- Economies of scale in coordinating of planning, services and delivery for transport have become weakened
- Wider Travel to Work area and planning at strategic level for promoting integrated transport has also been weakened.

To illustrate the situation, this diagram shows the West Midlands region showing, within the red boundaries, the local transport authority areas, with the LEPs overlaid over the top. This helps to give you an understanding of the overlapping and complex nature of the geography we have to deal with.

To place this further in terms of the context of how people move and travel within the region, this diagram illustrates how 820m of the 1.1m jobs in the area West Midlands are accessed from within the region, whilst the remainder are accessed from outside the region. The geographic area shown below as you can see is much larger than the administrative area we control, and there are a wide range of decision makers influencing how investment is made and monies are allocated.

In terms of policy solutions, “City Deals” has already been put in place, which set the tone for how central government is looking to local areas to set their own agendas. In the arrangement we currently operate under, there are a range of different partners all of whom are looking to set up their own city deal. We somehow need to maintain a co-ordinated view across the region.

<https://www.gov.uk/government/policies/giving-more-power-back-to-cities-through-city-deals/supporting-pages/city-deals>

Lord Heseltine’s “No Stone Unturned” Review has identified ways of achieving growth and greater value for our budget. We are looking at how we can apply these findings, initially in the Greater Birmingham area, and then wider as to how greater devolution of money and powers can bring people together to make effective decisions.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/34648/12-1213-no-stone-untuned-in-pursuit-of-growth.pdf

In terms of outcomes from this, the comprehensive spending review announced the Single Local Growth Fund (SLGF) with arrangements and possibilities for a competitive process across each of the LEP areas. From a transport perspective we need to ensure there is an element of co-ordination for improvements.

This is where we stand currently in terms of a review of transport governance.

Overlaid on that is rail devolution which is looking at a wider geography. This tries to pick up the movement within the “travel to work” area, trying to make sure each of our partners is coming together to discuss where and how the rail network is developed in the future.

In terms of technology barriers, a number of areas need to be looked at. Technology can help to reduce congestion and change the way we travel, but it isn’t the whole answer, as:

- Electric vehicles are still expensive and face consumer resistance
- The private sector tends to be slow to exploit new opportunities without public sector support – e.g. the green bus fund. Would National Expresses have bought these buses without a government subsidy to support them in delivering them?
<https://www.gov.uk/government/organisations/department-for-transport/series/background-to-the-green-bus-fund>
- Regulation presents a barrier eg Hydrogen, where regulation controlling how Hydrogen is stored acts as a barrier to take up.
- And technology can’t deal with congestion and car dependence on its own.

In terms of solutions technology, we are looking at the following:

- How we pay to move
 - Smart cards, Smart Phones, NFC and Credit Cards
- Travel information
 - On the move journey planning, Real Time Information, Automatic Vehicle Locators, Travel apps and solar bus-stop flags
- Alternative fuels
 - hybrid and electric buses, electric vehicle charging points
- Smart Design.

In summary:

- Progress has been rapid
- Another 10 years will see even greater change
- Institutional and Regulatory issues currently present the greatest barrier
- Technology acts as an enabler – economic growth & carbon reduction are key drivers
- Centro are looking at moving away from being a provider to a retailer of mobility services, using improved information to provide people with the services they require rather than the services we think they might need.

Integrated Transport

Stephen Hart, Technology Strategy Board

The talk by Stephen Hart was broadly in line with that given at previous round table events held in previous workshops. Please refer to these for further details.

Discussion

Some key points:

- *On Partnering and Collaboration:* We need to move the transport agenda to a new place, and we all have a role to play in that process. At Centro we are labelling this process “our new journey”. We are happy to take the lead in this area, but the question does continually arise who should be taking the lead, government or the private sector. The answer of course is for both to work together. However, our governance boards need to be taking on innovative new ideas and engaging with young people to make this a success.
- *On Changing Ways of Working and Its Impact of Transport Demand:* Among the younger generation and with evolving working habits perhaps it is time to consider whether the journeys from home to work are required at all. In the future we may increasingly be using some form of “connected meeting points” rather than offices ringing a city. The TSB’s Future Cities Catapult and Connected Digital Economy catapult have a role to play preventing people having to travel, or perhaps move instead in a smarter way. This is the kind of club membership system operated by “Spaces” in Amsterdam. <http://www.spaces.nl/>. Airports, shopping centres or train stations might become “hubs” for this kind of interaction in the future.
- *Future Transport Demands for Young People:* Young people do still want to meet, because they want to socialise and trade ideas, but this may well not be in an office environment.
- *Open Data:* The reason many people do not use journey planners is that they tend only to provide regional or city specific information. If we can develop legislation to force transport providers to provide data in a consistent format then new solutions and ideas could be developed. The Transport Systems Catapult is aware of these opportunities and is looking at best practice in this area and is looking to link up existing models such as the Highways Agency Model, the Transport for London Model, the Network Rail Model, the Sunderland City Model etc. Our aim here is not to develop a whole new solution, but to improve the links between the systems so that people can use them to leverage existing data. Making this information available in a profitable way still remains a challenge.

- *Effective Use of Big Data:* There already exists a national door-to-door journey planner system that works, called Transport Direct (<http://www.transportdirect.info>), so why we all have our own makes little sense. Big data, and open data is certainly something we do at Centro, but using Big Data in a way that puts people into a “personalised journey mode” is what needs to happen. We need to know what you are doing and where you are going to be able to provide you with a solution that meets your needs. For example if you, use the new National Rail Enquiries app, it has a button called “get me home” which, once you have provided it with your home address, will be able to give you details of your most direct journey home by rail no matter where you are. In other words, you don’t want to punch location and destination into a journey planner, since with the GPS system the phone should know where you are, and the destination is listed in your calendar, so a more intelligent system should be able to automatically route you to where you wish to go.
- *Regional Smartcards:* Are you looking at interoperability of your local “Swift” smart cards with other local regions? One of the key challenges for innovation for Centro is the barriers between regions, which force us to develop commercial arrangements with any area outside our control. There is no reason why these things should not happen if we put the right mechanisms in place. Beyond smart cards, we could even introduce technology such as face-recognition to log journeys and managing billing. The smart technology needs to be deployed across the whole transport network if we want the data capture to be seamless.
- *Government Intervention?* Given the challenges that have been identified around interoperability and working between cities and regions, what support or intervention should Government be giving to help authorities work better together? The Government is best placed to facilitate and help break down barriers rather than introducing new legislation in this area. There are no real barriers if there is a will to get things done. Fifteen years ago I set up an organisation called the Integrated Transport Smart Card Organisation (ITSO) <http://www.itso.org.uk/> which is the open platform around which all ticketing systems in the UK are now built. It has taken that long to get it to where it is now, and Government has been very slow to enforce it on the railways which means that train data has been missing. So this is an example of a way that Government can intervene to remove barriers and help to improve things.

Discussion Session 1 – What are the considerations for future transport requirements?

Key Points:

- *Can we make public transport free?:* Cost and convenience are key barriers to widespread usage of public transport, but this would need to be heavily subsidised. If you remove the cost, clearly many more people will use it. Linking public transport to new retail outlets might constitute a new business model to make this happen. Elements of public transport such as the Park and Ride in Cambridge are free in order to encourage adoption. Another example of subsidised travel is the 365 Euro annual pass for public transport in Vienna. Here, the revenue has increased substantially, but as people are not all using it at the same time marginal costs have really increased.
- *Asymmetry of Policy Decision Making and Transport Authority Areas:* While there is a Transport Minister for Wales and a Transport Minister for Scotland, there is no unified transport authority for the West Midlands. The area from which people are travelling from-to work in Birmingham does not match up to the transport authority’s remit,

making co-ordinated transport investment challenging. In Manchester too, the command for all these different policy areas of transport, housing etc. are all under one geographical area, whereby here 3 different LEPs take control of these for the West Midlands. The inability to co-ordinate funding and align behind one strategy really does make it difficult. Perhaps transport authorities should be detached from local authority boundaries, but some sort of national body would still be required to co-ordinate the likes of intercity trains.

- *Air Freight Opportunities:* With the runway extension at Birmingham International Airport, we now have the capacity to handle over 36 million passengers and 800,000 tonnes of freight. The problem is that the air freight market has stagnated in recent years due to capacity constraints at Heathrow, so there is an opportunity there for Birmingham to develop into a secondary freight airport. We should follow the example they give in France where they have one main freight airport than handles the majority of the freight, but two or three other regional airports that also handle around 600,000 tonnes of freight per year.
- *We Must Progress with HS2:* It is vital that we get on with the development of the HS2 high speed link, and extend it beyond Birmingham. This would be a major boon to local connectivity and reduction in manufacturing costs. We are currently making mountains out of mole-hills with the issues. For journeys under 500kms high speed trains are seriously competitive with flights.
- *Nationalise the M6 Toll?* We should make the M6 toll free of charge to remove the through traffic impact of vehicles avoiding the toll on the city centre, or at least make it cheaper at off peak. Charges at present are simply being driven by maintenance costs and the operating company is already in massive debt anyway.
- *Figure of Eight Loop:* There is a conceivable plan in place to develop a figure of eight loop rail loop to connect up the region with the airport. We are already looking at developing 31,000 new jobs related to the airport over the next 20 years, this plan could potentially double that number.
- *Technology Usage in Vehicles:* Policy could be used to encourage the usage of technology in vehicles. There are many options for tracking vehicles which could be integrated into vehicles at manufacture in order to do things such as automatic payment of road tax or road usage charging. Tracking vehicles also has many potential usages in terms of road safety, insurance, linking into the DVLA's database etc. I personally think the potential benefits outweigh the big brother personal privacy concerns.

Discussion Session 2 – What is the business case for innovation and technology? How can investment unlock barriers?

Key Points:

- *Is there really an innovation case?* In this group there were certain viewpoints that it was really about getting the legislation right whilst simply giving industry the space and time to get on with it
- *How do we move forward?* Success will be created by getting the right environment and putting the right people together. There was reference a number of times to the Lunar

Society which in the 18th century generated so many of the successful ideas around the industrial revolution and made a great deal of people very rich. But as in that case, how do you move from an ideas generating group to a profit generating group? However, there was some debate as to whether this was a valid question for transport. Can profit really be the only driver, or should a societal benefit also be part of the equation?

- *Digital Birmingham* was established in 2006 as the driving force to ensure that the benefits of digital and new emerging technologies are available to all people, businesses and sectors in the city, based upon Birmingham's *Smart City Vision* (www.digitalbirmingham.co.uk/)
- *Investment Channels*: Can we generate the levels of investment required to scale up our ideas around transport innovation? Does a valid investment base for this exist now in the UK? If our ideas are indeed world-class, can we not attract worldwide investment to help our ideas grow? This might also imply joint-venturing with other cities around the world
- *The Smart City Alliance Initiative* Is taking a lead in supporting new business growth, start-ups and SMEs with models for enabling investment in city applications and big data which could be a good prototype going forward. One of the things we have heard many times in Britain is that we are great at thinking up ideas and talking about them, but too often we do not readily turn them into investable business models that take things forward. (www.innovationbham.com)

Birmingham Work-Shop Participants		
Sir Paul	Judge	
Alan	Kell	I&G Systems
Owen	Kell	I&G Systems
Andrew	Everett	Technology Strategy Board
Stephen	Hart	Technology Strategy Board
Jeff	Tucker	March Publishing
John	Hornby	NEC Group
Paul	Forrest	West Midlands Economic Forum
David	Bharier	Birmingham Chamber
David	Hardman	Innovation Birmingham
Rick	Abbotts	Federation of Small Businesses
Laura	Shoaf	Black Country Director of Transport
Simon	Purohit	Strategic Transportation - Strategic Regeneration
Kevin	Gurden	IBM
John	Phillips	IOD
Nicola	Fleet-Milne	Birmingham Future
John	Morris	Birmingham Airport
Kevin	Johnson	Urban Communications
Steve	Keeley	Centro
Stephen	Baker	PwC
Neil	Philpott	PwC

Paula-Marie	Brown	Inst of Engineering and Technology
David	Price	Master Key to Asia

A5 – Leeds Round-table – 16 July 2013

An Introduction to the Technology Strategy Board

Stephen Hart, Technology Strategy Board

Good morning everybody. In a nutshell, who are we? We are the UK's innovation agency. We are the national organisation set up to invest and intervene with public money in challenge areas in the UK with a view to supporting innovation and creating business growth. We are doing this with a view to promoting the international export of these innovations, and also if possible to attracting international participation to the UK.

We are around 225 people now, having started with 70 people in 2007. We are split into challenge areas such as Healthcare, Sustainable Buildings and Transport, and enabling areas such as ICT, Digital and Materials. We have recently launched a number of new Catapult programs which you may have heard about, and we have around £420 million of annual funding from the Department for Business, Information and Skills, which is also set to rise over the coming year.

We are proud of what we do, being recognised as the innovation agency for the UK. Today we are here to discuss transport integration, and we welcome your inputs.

Overview of the Challenges

Sir Paul Judge

The Transport overview by Sir Paul Judge was broadly in line with that given at the previous Roundtable events held in London, Cambridge Birmingham, and Southampton. Please refer to these for further details.

The Yorkshire Perspective

Keith Madeley MBE, Chairman, the Yorkshire Society

Thank you very much and welcome to the Leeds Club. One of the reason I am involved with this is because back in 2008 we were involved with taking Leeds to the City of London, running a series of seminars with the assistance of Jeff Tucker of March Publishing. This event resulted in the signing of a Memorandum of Understanding between Yorkshire Forward and the Chinese province of Chongqing.

I am pleased that many of the regional organisations that I am involved with have come along to support this event today, and I'd like to thank you all for your support.

The Leeds Club, which was founded in 1849, moved into this very building in 1854. It has been billed as *the* meeting place for business leaders over the years, so the fact that we are all here this morning is I feel very appropriate.

A lot of people do not know that the very first railway to be granted powers by Act of Parliament was The Middleton Railway here in Leeds, and in 1812 this became the first commercial railway to successfully use steam locomotives to bring coal down from the mines to the canal docks (where the Asda Head Office is now located). Leeds is also proud to have built more railway engines than any other place in England, including the Fowler locomotives. This is a surprise to many, as the Leeds built locomotives were largely for export.

So we very much welcome this opportunity to begin a dialogue with the Technology Strategy Board around the issue of Transport, which we hope will be followed up by further events. Here in the Yorkshire region we are a tenth of the UK population with nearly 6 million people, with more universities than any other region, so we are well placed to tap into that wealth of knowledge.

So once again let me welcome you Sir Paul and all your colleagues, I am sure we will have a very interesting morning.

Rebalancing the Supply Chains

Professor Lenny Koh, Sheffield University, Research Centre & Centre of Energy Environment & Sustainability

I am honoured to be the only woman at this event today, but I would also encourage more women to become involved in Engineering Technology and Research. What I would like to do today is say a few words about the kind of research we carry out in this region. I don't want to pretend to be the person that knows everything, but we would like to learn from your experiences and your challenges to work with the TSB to develop appropriate physical solutions. I would like to focus today on the work we are doing to rebalance the supply chains in this region, since Transport and Logistics form key components of these supply chain.

We are trying to achieve a challenging national target of 80% CO₂ reduction by 2050. Given the state of research and development to date, I am really not sure we can meet this target. Prices of CO₂ are falling, businesses are often not prioritising curbing carbon emissions, and the Kyoto protocol has failed. These are just some of the challenges we need to address.

As a result of growing global populations, there will be increasing competition internationally for limited resources, be that food, water, energy or other resources. However, I think that our major challenge is around ageing infrastructure. In order to compete in the international landscape, with the rapid advances in infrastructure among our competitors such as China, we will need to overcome this challenge. This infrastructure is of vital importance in such areas as High Speed Rail, which has already been mentioned today. Without an effective transportation network businesses will not be able to grow internationally, and goods products and services will not be delivered effectively from A to B.

However, we need to look at these issues in a more integrated way. We are currently looking at transport separately from other areas such as energy infrastructure. We may be trying to optimise one part of the infrastructure without taking into account other related parts. This is an area we can perhaps discuss further as part of the breakout sessions.

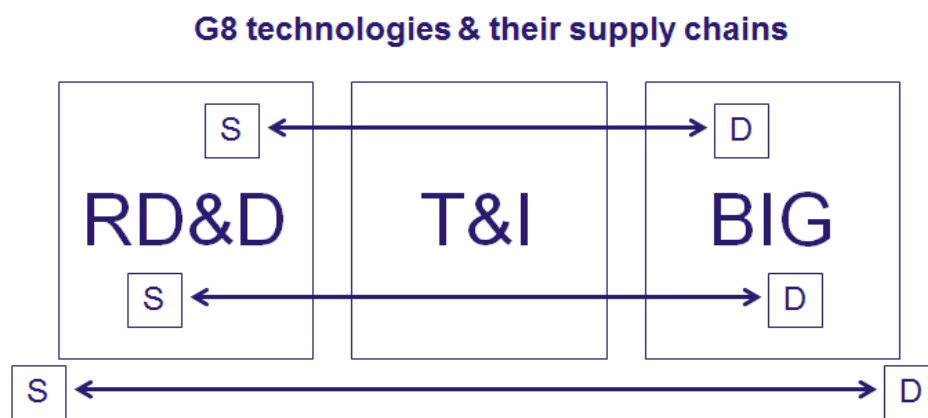
On Energy Security, we are relying too much on imported gas from countries such as Norway. The Americans have been very clear in terms of their policy on Shale Gas, but here we are still in

the process of trying to determine whether Shale Gas is something as important here to help secure our energy supplies.

The “great eight technologies” are the eight key technologies being talked about by Government which will receive significant support funding into the future. These have been identified as: big data, space, robotics and autonomous systems, synthetic biology, regenerative medicine, agri-science, advanced materials and energy. (Ref <http://news.bis.gov.uk/Press-Releases/-600-million-investment-in-the-eight-great-technologies-68680.aspx>).

The relationship between these technologies and their supply chains will be of critical important, and as a university we will need to work very closely with business to develop these technologies and their associated supply chains.

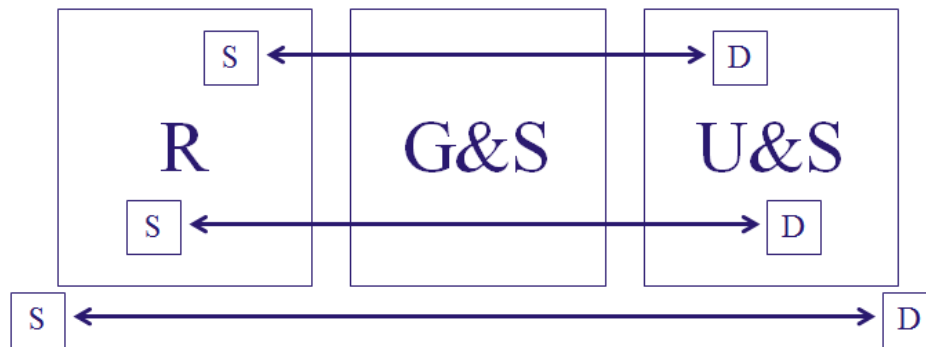
In the diagram below, the box on the left represents Research, Development and Demonstration in these areas, the middle is Technology and Innovation, while the box on the right is Business, Industry and Government. At present the process of connecting supply to demand is just too long, and the opportunity lies in shortening the lead times in this process . Adoption cycles for new technology will be significantly improved if we can shorten the time of this process.



So how are we going to do this? I think the TSB already plays a critical role in this area, with industry taking the lead on so many of their projects, and we are here to help industry solve their problems.

On the left of the following diagram is Resources, including Energy, Transport and Infrastructure. In the middle you can see Goods & Services, and on the right, Users & Society. Shortening the lead time and life cycle in this system will lead to better integration of user and societal needs in terms of how we utilise and manage our resources. Universities, Industry and Government all have a critical role in this process.

G8 technologies & their supply chains



I think we have already talked about the various different modes of travel, including road, rail, air, and sea, but I also think the Space form of transport is something we should not ignore looking forward into the future. Technology innovations in all these areas will have a significant role to play to ensure we get our goods and services faster, cheaper and greener.

The way I look at it, everything should be considered as a supply chain, and from what we have discussed there are many different supply chains in operation, including:

- Energy supply chain
- Food supply chain
- Manufacturing supply chain
- Water supply chain
- Materials supply chain
- Infrastructure supply chain
- Resources supply chain.

This approach helps us to prioritise our resources and effort going forward.

I know we are in Leeds today, but we have tended to focus on the Sheffield City region for our research. There is a lot of collaboration going on between the regions, and we all face similar challenges.

I am very much engaged with the Sheffield City Region LEPs Low Carbon Sector Group. I also chair the Sheffield City Region Low Carbon Sector Skills Group, looking at the skill gaps that exist in this area. We have done a lot of work in the region looking over the 9 districts that make up the Sheffield City Region at energy demand, both in terms of natural gas and electricity demand. We then map and plot our findings on a geographical information system to show where the pressure points are in terms of energy demand.

This information is useful for business investment as it shows where demand is the highest, where the system is under pressure, and where improvements and interventions might be made. Also it can be used to highlight areas where the growth potential is much higher. We have done these mappings for both gas and electricity demand, while also looking at projected consumption as another way of visualising the data. This data can also feed into government work targeting the reduction of fuel poverty.

This presentation has given you a quick overview of some of our current supply chain research, and we look forward to working with you to develop the key relationships between this work and the development and delivery of effective integrated transport systems.

Integrated Transport

Stephen Hart, Technology Strategy Board

The talk by Stephen Hart was broadly in line with that given at previous round table events held in previous workshops. Please refer to these for further details.

Discussion

Some key points:

- *On Short Termism:* We need to move away from a short term 3 to 5 year view, adopting an approach more similar to that taken by the Stern Review on the Economics of Climate Change (http://webarchive.nationalarchives.gov.uk/+/http://www.hm-treasury.gov.uk/sternreview_index.htm). We need to develop new models for calculating payback and returns over longer periods to break out of this cycle. The constant turnover of new transport ministers compounds this problem, as each of them seems to have their own pet project rather than a wider vision. The convoluted transport planning system can also act as a barrier to getting projects off the ground. For example, we've been discussing the New Generation Transport (NGT) System in Leeds for 20 years now, and we still don't have anything in the ground (<http://www.ngtmetro.com/About>)
- *Focus on the Yorkshire Region:* We need to develop a long-term integrated regional vision for Yorkshire for the next 50 or more years. It is frustrating to see bodies adopting disjointed, piecemeal approaches instead of taking a strategic view of the challenges. Too much of the research, foresight and funding is dedicated to improvements of the London region - we need an integrated vision to fight our corner and get our share. Even if we cannot afford to make the investments right now, we must make sure we don't sabotage future potential opportunities by our current actions. Some of the key strategic connections that can be made in Yorkshire offer significant and relatively quick returns, and these need to be given priority
- *On Devolution of Transport Powers:* The Leeds City Region has now formed itself into a organisation that can technically manage budgets and run transport infrastructure projects. The city centric approach is clearly the most effective approach. (<http://www.leedscityregion.gov.uk>). I hope this government has the courage of its convictions to push through devolution of funding around transport and won't get side-tracked by concerns about whether the local authorities have the wisdom to spend the money effectively. We can't have a system where we have to go and beg in Whitehall every time we need to install a new roundabout. We feel we are sometimes being outmanoeuvred and out lobbied by other regions when fighting to get adequate funding for the region. We are trying to get a cross party group of MPs together to lobby more effectively in the future

- *Bradford Crossrail:* In local discussions, regional and trans-Pennine connections are actually far more important to local businesses than high speed rail links. There are massive opportunities to increase capacity in Yorkshire by some clever forward thinking. One of the big hot-potato in this region has been a project known as Bradford Crossrail. With this connection we have the opportunity to develop a hub equivalent to the new Northern hub equivalent to that being built in Manchester. Unfortunately, Bradford does not seem to want it, but the regional view is that it is required. Our lobbying position on this issue for now is that Bradford should not be allowed to prevent that connection being made at some future point. Provisions need to be made by enlightened far thinking people now for that development to be made at some point in the future. The question here is not so much about technology innovation, but about improved engagement across the region to develop a shared vision (<http://bradfordrail.com/cross-rail/>)
- *Lack of Integrated Infrastructure:* If a railway crosses a motorway, why isn't there a station there? I can only think of one location in the whole of Yorkshire where there is a train station connected to a bus station.

Discussion Session 1 – What are the considerations for future transport requirements? If there were £1bn of private matched funding available, what could be done?

Key Points:

- *Effectively Leveraging New Technologies:* This is about much more than just “do we or don't we have a railway line running under Bradford”. To spend money wisely and develop a leading international edge we need better engagement between suppliers, private industry, SMEs, institutions etc. to identify how we can genuinely leverage new revolutionary technologies into Transport. I'm talking about intelligent motor cars, space technology and other radical new ideas. In the longer term, this is the fundamental sea-change issue rather than parochial local issues. Money could be used as seed-corn for projects to invest in transport innovation, much of which could be secured via patents. I'm talking about thrusting the UK into a leadership position in new innovative transport technologies with a view to exporting around the world
- *On Private Sector Investment & University Linkages:* There is a fair bit of private sector investment coming into transport projects. In Huddersfield, for example, an amazing array of projects are being funded by the private sector, Network Rail, and others. There isn't really a lot of joined up thinking between universities, but some organisation that links up all of the departments of universities in Northern England would be useful. There are lots of synergies to be had across the region. There is a crying need for new rolling stock in the region, there was once a well-resourced research centre in Derby which is now all gone and fragmented. Recreating a new body along these lines, linked into the private sector would help, as the expertise does exist
- *Where is the Leadership?* Short-termism and NIMBYISM even beyond the micro level are still major barriers. Until that is tackled, whatever grand plans you may have you'll never even get these past the media. When HS2 was first launched there was a big debate on Radio 4, and quite honestly the detractors were more articulate and organised in their arguments than the proponents of the project. You need an independent agency that people can actually trust, who can actually present the arguments, backed up by independent University researched evidence
- *Engagement between Universities and the Private Sector:* One of the things that frustrates me is the amount of business we have lost in this country to other countries

such as Germany through the lack of long term thinking. For example, their significant investment in technology infrastructure to support renewables meant they stole a march on us, and new companies looking to invest in this area automatically go to Germany because the infrastructure is in place. We could develop a cluster policy, with specialisations by region linking up agencies, higher education and business. We can learn from examples such as the Fraunhofer model (<http://www.fraunhofer.de/en.html>) where they have very strong collaboration between different technology institutes, universities and business. Such a public private partnership could be the best way of investing the money. R&D should be focussed on adoption and commercialisation. The private sector should be identifying long term, profitable challenges for Universities to address rather than universities coming up with ideas that have no practical market usage to reduce the risk of failure

- *Local Politicians Role:* Local politicians do have a role to play. We do have a good awareness of the requirements, but lack the research and expertise locally. We don't want to be importing all the technology from overseas. Some kind of networked institution at sub-regional level that has been discussed with the involvement of public, private and institutional sectors could fit the bill
- *Lack of a Grand Plan:* There is a lack of a long term big vision. We need to identify where the hot-spots are, where the key benefits are, it is still not clear what body can do this work. In the past political boundaries have not matched up to the locations of the real challenges
- *Development of Business Campuses:* For example where a railway meets a motorway. We could link up business, universities and corporates to develop centres of excellence. I want 3:1 minimum return on my investment so the business proposition needs to be viable. These centres could be near where people live to cut down on congestion. Service jobs in particular could be based at these new out of town campuses.

Discussion Session 2 – What is the business case for innovation and technology? How can investment unlock barriers?

Key Points:

- *Return on Investment:* When railways were first constructed in the Victorian era, they were built by private companies to make money. But current franchises often appear to be too short to justify significant investments in infrastructure or new technologies. However, one example of a good operator appears to be Chiltern Railways, which is owned by Deutsche Bahn AG . How are they managing to innovate and invest in such a forward thinking manner? (<http://www.chilternrailways.co.uk/about-us>)
- *Opportunities around unlocking land:* Although it can be challenging to engage with Network Rail, there are major investment opportunities around stations if we can unlock the land - particularly at nodes such as where a railway intersects with motorways. In London, such land deals have been one of the most important catalysts for investment in transport
- *University Linkages:* There are major opportunities in the region to better link business requirements and university research and development programmes

- *Staff Suggestion Schemes:* Ensuring that staff are encouraged and adequately rewarded to come up with innovative new ideas that improve the business. On a wider scale we could get organisations together to put forward suggestions, this is something the Chamber of Commerce could become involved with, as well as looking at the commercial value of these suggestions
- *Partnering with Young People:* Passing on knowledge we have gained as an older generation but also harnessing the ideas and enthusiasm of the younger generation to come up with new ideas
- *Access to Stations:* We should encourage businesses to run more enterprises such as cycle hire, or smart car hire, from stations. The return here could be shared between the business and the station operator
- *Development of Smart Local Apps:* a great deal of local knowledge is held by those directly involved in providing transport services, such as taxi drivers. They should be directly involved in the development and implementation of new smart applications to resolve local issues
- *Smart Junctions:* Too often traffic lights do not appear to be speaking to each other. At the extreme we could look at other systems, such as in Tehran where they put all the lights on amber and there appear to be no additional road safety issues while congestion is eased. There are simple solutions available if there is a will to think outside the box, focussing on the resolution of local issues.

Leeds Work-Shop Participants		
Sir Paul	Judge	
Alan	Kell	I&G Systems
Owen	Kell	I&G Systems
Stephen	Hart	Technology Strategy Board
Jeff	Tucker	March Publishing
Andrew	Leslie	Shop Box
Steven	Leigh	Mid Yorkshire Chamber
David	Horsman	Mid Yorkshire Chamber
Samuel	Lewis	Mid Yorkshire Chamber
Keith	Madeley	Yorkshire Society
Edward	Ryder	Chartered Inst Marketing
Stuart	Barker	The Agenci
Prof Lenny	Koh	Sheffield University
Ian	Brown	Leeds University
Dr. Anthony	Whiteing	Leeds Institute for Transport Studies
Rashad	Bokhari	Cranford College
Andrew	Osborn	PwC
David	Collins	PwC
Colin	Mawhinney	Leeds City Council
Paul	Salveson	Huddersfield University
Mark	Goldstone	Leeds Chamber of Commerce
Ben	Meehan	Jelf Holdings
Andrew	Latchmore	Shulmans LLP
Ashley	Prescott	Irwin Mitchell
Philip	Smith	Reed Human Resources
Ian	Williams	Leeds, York & North Yorkshire Chamber
Andy	Nolan	Sheffield Council
Robert	Bilton	Leeds NHS
John	Dawson	<u>Arts@Trinity</u>
Victor	Shiguang	AMRC
Ian	Billyard	Leeds College of Building

Appendix B - Round Tables : Supplemental Feedback

[illegible]

Appendix C – High Value Opportunities

No	Project	Market	Sector	Total Value	Responsible Director	Project Coordinator
1	North American Rail	Multiple	Rail		Paula Freedman	Denise Harris
	California High Speed Rail	USA		55,000,000,000		
	Toronto Rail	Canada		TBC		
2,3	Petrobras Business Plan 2010 - 2014	Brazil	Oil & Gas	5,620,000,000	Carole Sweeney	Tom Putman
	Petrobras top-side equipment					-
	Petrobras subsea equipment					-
4	Brazilian Sports Infrastructure	Brazil	Sports Infrastructure	29,330,000,000	Steve O'Leary	Emma Theunissen (Niamh Flynn)
5	China Healthcare	China	Health Infrastructure	3,000,000,000	Howard Lyons	Phil Dowrick
6	China Airports	China	Airports	9,900,000,000	John Saville	Neil Smith
	Beijing new airport					-
7	Infrastructure projects across Colombia	Colombia	Mixed Infrastructure	20,200,000,000	Paula Freedman	Denise Harris
	Municipal infrastructure projects					-
	Multiple transport projects					-
8	Oil & Gas East Africa	Multiple	Oil & Gas	TBC	Carole Sweeney	Tom Putman
	Tanzanian Gas	Tanzania				
	Mozambique Gas	Mozambique				
	Kenyan Gas	Kenya				
	Uganda Gas	Uganda				
9	Central European Nuclear	Multiple	Nuclear		Carole Sweeney	Kester McMorris
10	GCC Rail projects	GCC	Rail	53,000,000,000	Steve O'Leary	Neil Smith
	UAE Rail project					
	Kuwait Metro System					
	Omani Railway Network					
	Qatari Rail Network					
	Saudi Railways Development Programme					
11	West Kowloon Cultural District	Hong Kong	Culture	1,700,000,000	Sue Bishop	Andrew Myland
12	Indian Industrial Corridors	India	Mixed Infrastructure	60,000,000,000	John Saville	Kingsley Thomas
	Delihi/Mumbai					
	Industrial Corridor					
	Bangalore/Mumbai					
	Industrial Corridor					
13	Fukushima Decommissioning	Japan	Nuclear	10,000,000,000	Paula Freedman	Mark Boorman
14	Education in Latin America		Education	TBC	Sue Bishop	Andrew Myland
	Brazilian Education	Brazil				

	Colombian Education	Colombia				
	Mexican Education	Mexico				
15	Libya Reconstruction	Libya	Mixed Infrastructure	200,000,000	Edward Oakden	Denise Harris
16/17	Saudi / Iraq Oil & Gas Projects	Multiple	Oil & Gas	107,000,000,000	Edward Oakden	Josh King
	South Rumaila Oil Field	Iraq				
	Natural Gas Capture and Processing Facilities	Iraq				
	Al Majnoon super-giant oil field	Iraq				
	Red Sea Offshore Oil & Gas	Saudi Arabia				
18/19	Energy/Airports in Turkey and the Stans	Multiple	Multiple		Nick Archer	Helena Hadden
	Akkuyu Nuclear Power Plan	Turkey	Energy	12,600,000,000		
	Istanbul Airport	Turkey	Urban Development & Infrastructure	5,000,000,000		
20	Global Mining Supply Chains	Multiple	Mining	TBC	Steve O'Leary	Josh King
21	World Cup 2022	Qatar	Sports Infrastructure	3,000,000,000	Nick Archer	Emma Theunissen (Niamh Flynn)
22	Russian Sports Infrastructure Projects		Sports Infrastructure	32,000,000,000	Nick Archer	Emma Theunissen (Niamh Flynn)
	2014 Sochi Winter Olympics	Russian Federation				
	FIFA World Cup 2018	Russian Federation				
23	Healthcare Development Programme	Saudi Arabia	Health Infrastructure	40,000,000,000	Howard Lyons	Phil Dowrick
24	Development of Saadiyat Island	United Arab Emirates	Mixed Infrastructure	14,000,000,000	Sue Bishop	Helena Hadden
83	Airport Expansion (Dubai)	UAE	Airports	1,153,000,000	Steve O'Leary	Helena Hadden
25	WestConnex Highway	Australia	Mixed Infrastructure	8,590,000,000	Paula Freedman	Mark Boorman
26	Shipyards & Shipbuilding Programme	Brazil	Marine	6,000,000,000	Carole Sweeney	Tom Putman
27	PPP Healthcare Programme	Brazil	Health Infrastructure	TBC	Howard Lyons	Phil Dowrick
28	China New Energy	China	Multiple	296,000,000,000	Carole Sweeney	Kester Morris
29	China Built Environment	China	Mixed Infrastructure	54,900,000,000	John Saville	Kingsley Thomas
30	Femern Link Project	Denmark	Mixed Infrastructure	5,000,000,000	Paula Freedman	Denise Harris
31	Ethiopia Transport Corridor	Ethiopia	Mixed Infrastructure	7,000,000,000	Nick Archer	Andrew Myland
	Mining Opportunities	Ecuador	Mining	TBC	Paula Freedman	Mark Boorman

32	Suez Canal Corridor Project	Egypt	Mixed Infrastructure	30,000,000,000	Nick Archer	Andrew Myland
34	ITER Nuclear Fusion Project	France	Nuclear	6,000,000,000	Carole Sweeney	Kester McMorris
35	Multiple Infrastructure	Greece	Mixed Infrastructure	3,000,000,000	Paula Freedman	Mark Boorman
36	Shatin to Central Link	Hong Kong	Rail	5,000,000,000	Steve O'Leary	Josh King
	Kai Tak Development	Hong Kong	Mixed Infrastructure	8,000,000,000	Sue Bishop	Andrew Myland
	Zhuhai-Macao Bridge & Related Projects	Hong Kong	Mixed Infrastructure	4,000,000,000	John Saville	Kingsley Thomas
37	Hong Kong Airport	Hong Kong	Airports	TBC	John Saville	Josh King
	Hong Kong Environment	Hong Kong	Water	2,500,000,000	Steve O'Leary	Josh King
38	Hong Kong Hospitals	Hong Kong	Healthcare Infrastructure	TBC	Howard Lyons	Kingsley Thomas
42	Jordanian Nuclear - New Build	Jordan	Nuclear	TBC	Carole Sweeney	Kester McMorris
43	Soekarno-Hatta International Airport Rail Link	Indonesia	Rail	1,890,000,000	John Saville	Neil Smith
44	Airport Upgrade (including ATC)	Indonesia	Airports	1,800,000,000	John Saville	Neil Smith
45	Tanjung Priok Port Expansion	Indonesia	Ports	1,650,000,000	John Saville	Neil Smith
	Indian metro opportunities	India	Rail	9,000,000,000	John Saville	Neil Smith
46	West Bengal Urban Regeneration (Kolkata)	India	Mixed Infrastructure	TBC	John Saville	Kingsley Thomas
47	Civil Aircraft Development Programme	India	Civil Aircraft	9,200,000,000	Carole Sweeney	Tom Putman
49	Conventional Power and Renewables	India	Conventional Power	30,000,000,000	John Saville	Kingsley Thomas
50	Civil Nuclear	India	Nuclear	30,000,000,000	John Saville	Kingsley Thomas
51	Multiple Oil & Gas Projects	Kazakhstan	Oil & Gas	30,000,000,000	Carole Sweeney	Tom Putman
52	Global Sports Projects in Korea	Korea	Sports Infrastructure	16,000,000,000	Paula Freedman	Emma Theunissen (Niamh Flynn)
53	Airport Redevelopment	Kuwait	Airports	TBC	Nick Archer	Helena Hadden
54	Boubyan Island Development	Kuwait	Mixed Infrastructure	7,500,000,000	Nick Archer	Andrew Myland
55	New Hospitals Project	Kuwait	Health Infrastructure	2,000,000,000	Howard Lyons	Phil Dowrick

56	Macau Retail & Leisure	China	Retail	12,000,000,000	Sue Bishop	Andrew Myland
57	PEMEX contracts for Deepwater E&P	Mexico	Oil & Gas	50,000,000,000	Paula Freedman	Mark Boorman
58	Veracruz Port Expansion	Mexico	Ports	2,700,000,000	Paula Freedman	Mark Boorman
59	Malaysian Transport Projects	Malaysia	Rail	30,000,000,000	John Saville	Neil Smith
60	Nigeria Oil & Gas projects	Nigeria	Oil & Gas	TBC	Carole Sweeney	Tom Putman
61	Oil & Gas Norway	Norway	Oil & Gas	10,000,000,000	Carole Sweeney	Tom Putman
62	Healthcare	Oman	Healthcare Infrastructure	660,000,000	Howard Lyons	Phil Dowrick
63	Nuclear Global Supply Chains	Multiple	Nuclear	TBC	Carole Sweeney	Kester McMorris
64	Major Sports Events in the Stans	Multiple	Sports Infrastructure	TBC	Steve O'Leary	Emma Theunissen (Niamh Flynn)
65	Peru Mass Rapid Transport System	Peru	Rail	1,978,000,000	Paula Freedman	Mark Boorman
66	Callao Mass Transportation System	Peru	Rail	1,937,000,000	Paula Freedman	Mark Boorman
67	PPP Infrastructure Projects	Philippines	Transport	5,000,000,000	John Saville	Kingsley Thomas
68	Polish Rail	Poland	Transport	TBC	Paula Freedman	Mark Boorman
69	Qatari National Food Security Programme	Qatar	Food Security	25,000,000,000	Sue Bishop	Andrew Myland
70	Sadara Petrochemical Complex	Saudi Arabia	Chemicals	12,500,000,000	Carole Sweeney	Kester McMorris
71	Saudi Airport Developments	Saudi Arabia	Airports	5,000,000,000	Nick Archer	Andrew Myland
72	Water, wastewater and desalination projects	Saudi Arabia	Water	33,000,000,000	Nick Archer	Andrew Myland
73	Saudi Nuclear - New Build	Saudi Arabia	Nuclear	TBC	Carole Sweeney	Kester McMorris
74	Saudi Education	Saudi Arabia	Education	13,850,000,000	Sue Bishop	Andrew Myland
75	Jeddah Urban Redevelopment Programme	Saudi Arabia	Mixed Infrastructure	1,332,000,000	Steve O'Leary	Josh King
76	Mass Rapid Transport	Singapore	Rail	30,000,000,000	Steve O'Leary	Josh King
77	Tuas Mega port (including Changi)	Singapore	Ports	2,310,000,000	John Saville	Kingsley Thomas
78	Oil & Gas Angola	Multiple	Oil & Gas	TBC	Carole Sweeney	Tom Putman

79	Water and Flood Management	Thailand	Water	19,500,000,000	Steve O'Leary	Josh King
80	Low carbon cities	Taiwan	Mixed Infrastructure	2,200,000,000	Steve O'Leary	Josh King
81	Rail projects	Taiwan	Rail	11,400,000,000	Paula Freedman	Mark Boorman
82	Nuclear & Offshore Wind Taiwan	Taiwan	Multiple	12,400,000,000	Carole Sweeney	Kester McMorris
84	Bay Delta Conservation Tunnel	USA	Mixed Infrastructure	8,394,000,000	Paula Freedman	Denise Harris
85	Asian Games 2019	Vietnam	Sports Infrastructure	4,000,000,000	Steve O'Leary	Emma Theunissen (Niamh Flynn)
86	Urban Regeneration and Transport Projects	Vietnam	Mixed Infrastructure	12,500,000,000	Steve O'Leary	Josh King
87	Ninh Thuan 1 Nuclear	Vietnam	Nuclear	5,276,000,000	Carole Sweeney	Kester McMorris
88	South African Ports	South Africa	Ports	18,824,000,000	Steve O'Leary	Josh King
89	Mine water clearance	South Africa	Water	450,000,000	Steve O'Leary	Josh King
90	Chinese Entrepreneurs' Club	China	Other	TBC	John Saville	
91	Burma (Myanmar)	Burma	Other	TBC	John Saville	
92	Afghanistan / Pakistan	Multiple	Other	TBC	John Saville	
93	Hurricane Sandy / Christchurch Disaster Relief	Multiple	Mixed Infrastructure	TBC	Paula Freedman	
94	Islamic Finance	Multiple	Finance	TBC	Sue Bishop	
95	World Islamic Forum	Multiple	Finance	TBC	John Saville	
96	UAE Industrial Partnership	UAE	Other	TBC	Nick Archer	

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