Smarter Transport for a Sustainable Future

Report based on proceedings at the IBM Summit at Start
When one tugs at a single thing in nature, he finds it attached to the rest of the world.

John Muir, author and naturalist, founder of The Sierra Club
Contents

Executive summary .................................................................................................................................................. 3
Smarter Transport for a Sustainable Future ......................................................................................................... 3

Outline of the day’s agenda .................................................................................................................................. 3
What is sustainability? ........................................................................................................................................ 5
Common themes from the Summit ....................................................................................................................... 7

Collaboration is key to progress ......................................................................................................................... 7
Complexity requires systems thinking ............................................................................................................. 7
Data and metrics are the basis for finding solutions .......................................................................................... 7
Solutions require atypical personal and corporate behaviour .......................................................................... 7

Summary of proceedings .................................................................................................................................... 9

Transport is core to the economy, but is often considered in silos ................................................................. 9
The transport sector is a major contributor to the UK’s carbon emissions ....................................................... 9
Difficult choices and risks must be taken if we are to become more sustainable ............................................. 9
The challenge is to make transport more sustainable without damaging economic prospects ..................... 10
Long-distance (inter-city) travel generates half of all transport emissions ......................................................... 10
Freight is responsible for a major proportion of long-distance emissions ....................................................... 10
Roads represent the majority of our transport infrastructure ......................................................................... 11
But building more roads is not the answer to congestion relief ....................................................................... 11
Using analytics effectively can help reduce congestion and carbon ................................................................. 11
High-speed rail is being seen in some quarters as an important development ................................................ 12
There is no substitute for the private car in many situations however ............................................................. 12
The aviation sector is a particular challenge .................................................................................................... 12
Business travel has reduced in recent years, but will remain necessary ............................................................ 13
Alternatives to fossil fuels are therefore going to be critical ............................................................................. 13
Biofuels have been disappointing and are an example of the complexities of sustainability ....................... 14
The right policies and incentives can produce the right results ....................................................................... 14
More people using public transport more often may be the solution ............................................................. 14
Lack of investment has put us in a poor position in some areas of public transport ......................................... 14
City transportation – the growing popularity of cycling and cycle schemes .................................................... 15
Creating a joined-up customer experience is crucial in improving passenger experience ............................. 16
Forecasting data is key to matching supply and demand .................................................................................. 16
Smarter payment systems ................................................................................................................................ 17
ICT is underestimated as a tool to achieving a sustainable city .................................................................... 17
A more integrated approach to planning and policy is required ........................................................................ 17
Poor policies also contribute to poor decisions ................................................................................................... 18
But joining up policy is also structurally difficult ............................................................................................... 18
Are we targeting incentives correctly? ............................................................................................................. 19
Taxation has a role to play in changing behaviours ......................................................................................... 19
Different taxes produce different emotional responses .................................................................................... 19
Behavioural changes can be made to stick if the right ‘nudges’ are used ......................................................... 20
The sustainable alternative may be about not doing something ..................................................................... 20
And doing less can deliver clear business benefits .......................................................................................... 20
Benefits for the country as well as individuals and companies ...................................................................... 21

Outcomes: developing the themes ................................................................................................................... 24
The Start Innovation Jam ..................................................................................................................................... 24
The IBM Summit at Start ....................................................................................................................................... 25
About The Bathwick Group ................................................................................................................................ 26
Executive summary

Only the most hardened climate deniers and sustainability sceptics now argue that we can continue indefinitely to live and to consume as we do now. We are heading for deep trouble and possibly for disaster, driven by our historic disregard for the scarcity of resources and the collateral damage our progress has created.

More than 120 business, government, community leaders and commentators attended the Smarter Transport for a Sustainable Future day (Day 3) at the Summit. Philip Hammond, Secretary of Transport called the Summit a “Landmark Conference”. Delegates called it the first event of its kind where the issue of sustainable transport has been tackled head on across all modes of transport. They concluded we need to act faster and work together across industry boundaries; they left determined to make change happen. Their debates and comments are covered in this report - below are some of the key points that were made:

- To make a material impact on sustainability, steps need to be taken to quantify and measure sustainability, an activity being championed by the Go-Ahead group for example. Common agreed targets for CO2 reduction need to be established and creative approaches about how to reach them agreed

- Difficult choices and risks must be taken if we are to become more sustainable. This may entail re-visiting long-held beliefs on travel prevention, demand management and incentives to encourage behavioural change – such as taxing certain items and providing cash-back premiums for choosing others

- To many, social and environmental sustainability detracts from economic interests; they are seen as conflicts that restrict business, profit and growth. The real question needs to become how to balance business growth and sustainability? The challenge will be making transport more sustainable without damaging economic prospects

- Sustainability is a collective issue that requires a greater willingness by public and private stakeholders to collaborate, for example, increased sharing of transport data can be leveraged for the benefit of travellers and operators, and ultimately provide more joined-up services to customers

- Interconnected, embedded technology makes transport systems more intelligent. It enables operators to provide smarter payment systems that are easier for commuters to use. Predictive analytics can help transport authorities move from ‘sense and respond’ mode to ‘predict and act’

- The ability to forecast more accurately will be key to matching services to demand and to ensuring the sustainability of services being provided over the longer term by, for example, monitoring fuel usage on buses and trains

- It is not only about designing for the future and future-proofing new systems however, but also finding better ways to use legacy systems. Discussions on the delivery of the 2012 Olympics centred on the vision to create highly informed travellers around the Games

- A sustainable transport future will be one where selective investments are made in new infrastructure, combined with more enhanced used of technology; where operators actively measure and benchmark sustainability as a KPI; and where consumers are at the centre of the equation, as increasingly informed travellers

Creating a joined-up customer experience is crucial in improving passenger experience. Policy-makers, planners, travellers and operators need to unite in a common goal - to make smarter choices that use systems more efficiently, effectively, and sustainably.
What is sustainability?

Sustainability: most people think it’s a good idea, some people are passionate about it, some are truly ambivalent or even hostile to the notion, but everybody has a different definition. It is therefore important that we establish a definition to use as a baseline for this report. Sustainability, simply put, is the capacity to endure\(^1\).

At a global level: we live on a planet that is a complex inter-dependent set of eco-systems, and increasingly, socio-technical systems; sustainable behaviour is therefore that which ensures the environmental balance is maintained, allowing human civilisation to continue to survive.

At a regional/national level: we must maintain the economic structure of our society – markets, businesses, profits, infrastructure and jobs; societal stability in turn ensures the long-term demand for, and the sustainable growth of, products and services. Along with progressive social policies on equality and well-being, sustainable markets, businesses and societies aim to create long-term opportunity for all.

These three elements – economic, social, and environmental (also referred to as profit, people, and planet) – form the basis for the Triple-Bottom Line (TBL, figure 1), a simple description of the elements involved. The problem is that for many – particularly those of us charged with delivering hard, short-term results – the social and environmental appear to detract from the economic; they are seen as blockers.

It is this central dichotomy that is often cited as the reason for sustainability being a hard sell in business. But it shouldn’t be; organisations and those leading them want to survive and prosper as much as they ever did. The only issue is to illustrate both the urgency of taking action and the importance of all three factors in ensuring their organisational and individual survival.

We find ourselves at a unique point in our history. Unlike previous generations, we know that we are causing irreparable damage to the planet and that, regardless of arguments about the causes, significant changes in how we live must be achieved.

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1 The Bathwick Group’s definition, which separates the capacity to endure (surviving) from sustainable development (thriving), which is growth that has at most a neutral social and environmental impact.
Common themes from the Summit

Collaboration is key to progress

There are few challenges within organisations that can be solved by an individual employee or a single department, and few challenges in sustainability that can be addressed by a single organisation operating in isolation. ‘We need to collaborate more’ was a key conclusion of every day of the Summit at Start; collaboration is the key to unlocking creativity, finding new ways of approaching familiar problems, and generating widely-accepted solutions. We know however that few organisations collaborate well, internally or externally. Over the past five years we’ve analysed how and why this is so. Individual and corporate insecurities, unhelpful reward systems and competitive sensitivities are among the issues that combine to inhibit openness and sharing of data and ideas.

Collaboration is about changing the way individuals think and organisations respond, finding more effective business process alignment, and encouraging trust and positive behaviours. Achieving such change is at the heart of finding the efficiencies, technologies, and market models that will define a more sustainable future.

Complexity requires systems thinking

The complexities of organisations and markets are a barrier to understanding and change. The developed world today is a network of inter-dependent socio-technical systems, in which changes of any type have systemic impacts that are hard to foresee in the normal scope of an individual’s role. Few people ever experience more than a small part of the picture, and the decisions they take will only be appropriate within the context of their understanding.

Creating predictive frameworks and more holistic decision support models requires systems thinking – the process of understanding how things influence one another within the whole – which is an unusual set of skills. Few organisations employ such skills, except perhaps in strategy or technical design roles, but in an increasingly connected world systems thinking is becoming important. We would do well to recognise, nurture and value the appropriate skills, as second- and third-level impacts are increasingly coming to define the effectiveness, and therefore the success, of most organisations.

Data and metrics are the basis for finding solutions

We generate enormous quantities of data within our organisations, much of which languishes in silos, unused for lack of capacity, the right tools or skills to process and analyse its meaning. The amount of data, and the number of sources from which it comes, is spiralling upwards every day; we can’t hope to understand either the scale of the challenge we face or the best routes to a solution unless we learn what we know, and how to gain valuable insights from it.

Peter Drucker famously said “If it can’t be measured, it can’t be managed”. In a sustainability context, if you don’t have information on the impact of your operations and your activity, you won’t be able manage that impact down. Worse, you can’t enumerate and report success.

Solutions require atypical personal and corporate behaviour

Of all the challenges we face in becoming more sustainable, individual and organisational behaviour will perhaps be the hardest to address. Personal and corporate insecurities, consumption-oriented lifestyles, unhelpful corporate cultures, a focus on the short term, and a lack of awareness (or unwillingness to understand) inhibit our ability to effect change. They make us believe that what we do individually makes little difference, and help us to hide behind competitive sensitivities to justify inaction. Will it be more carrot or a bigger stick that will produce the changes we need? Probably both, and applied without fear or favour, according to delegates at the Summit.

Scottish philosopher David Hume wrote “All plans of government, which suppose great reformation in the manners of mankind, are plainly imaginary”. In other words, good luck with changing human behaviour. In the 250 years since that was written, have we learned enough, and are we optimistic enough, to prove him wrong?
Summary of proceedings

Transport is core to the economy, but is often considered in silos

The transport sector is core to the successful functioning of the UK; an efficient and reliable transport infrastructure is critical to economic performance. Transport is also a significant factor in environmental terms – with regard to land use, noise pollution and emissions, and in the smooth functioning of our social structures. Transport is therefore an important element in all three pillars of sustainability, but is too often considered in silos – from the point of view of delivery and suppliers rather than usage and consumers.

Part of the value of the IBM Summit was that it considered the issues holistically; as several people at the Summit commented:

“This is the first event I’ve seen that tackles sustainable transport issues head-on across all modes of transport.”

Delegate

In reporting on the Summit therefore we have taken that same approach, from the point of view of transport users rather than suppliers, considering long-distance inter-urban and rural journeys, urban inter-modal transport, the customer experience, policy issues, and the impact of technology.

The transport sector is a major contributor to the UK’s carbon emissions

The World Business Council for Sustainable Development defines sustainable transport as “The ability to meet society’s need to move freely, gain access, communicate, trade and establish relationships without sacrificing other essential human or ecological values, today and in the future”.

A good definition and a commendable sentiment but we are a long way from making it a reality, and the transport sector remains a high profile target for environmentally-focused criticism. With the continuing popular focus on carbon footprint, the UK’s packed roads and skies are a visible reminder of transport’s contribution to global warming – road transport alone is estimated to be responsible for about 20% of UK carbon emissions. Airlines add a further 7%, and growth continues apace – the number of air passengers using UK airports increased from 32m in 1970 to 235m in 2006. That number is expected to double again to 470m passengers by 2030!

Difficult choices and risks must be taken if we are to become more sustainable

The address by The Prince of Wales during the day reinforced many of the comments from both speakers and delegates – that there are no easy solutions to becoming more sustainable, and uncomfortable choices will have to be made. But solutions to the current and growing problems of transport-related emissions and congestion in the UK must be found from both environmental and economic viewpoints; those decisions will carry elements of risk, and we will need to be politically and personally ready to accept them.

“Some have called the Start initiative too risky. But I assure you that I’m perfectly prepared to take any risk on behalf of our children and grandchildren to ensure that what we leave behind is durable, and not the poisoned chalice that we are creating today.”

HRH The Prince of Wales

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2 The World Business Council for Sustainable Development (WBCSD) is a CEO-led, global association of some 200 companies dealing exclusively with business and sustainable development.

3 Department of Transport UK Transport and Climate Change data
The challenge is to make transport more sustainable without damaging economic prospects

Achieving a balance across the three elements of sustainability – economic, social and environmental – is an essential part of planning the future of transport in this country. Updating and de-carbonising infrastructure will require major investments in the coming years – at a time of austerity – and we will live with the consequences of today’s decisions for many years to come.

“Cutting carbon, important though it is, is relatively simple; doing it in a way that promotes economic growth, and promotes social mobility and sustainable development is a far tougher challenge. The investments we make now must last for generations; we must look carefully at which investments make the most sense in a future of decarbonised surface transport.”

Rt Hon Philip Hammond, Secretary of State for Transport

Part of that planning challenge is to determine accurately where the greatest benefits can be achieved, relying on real data rather than perceptions. For example, the argument that a third runway at Heathrow would be an environmental disaster is probably misleading; emissions from stacked aircraft would likely be reduced if more capacity were available, and increases in ‘local’ aviation emissions from higher traffic would be offset by lower emissions in other countries. Not allowing Heathrow to expand would push traffic to other hub facilities in Europe, with a negative economic result in the UK. That’s not to say that a third runway is a good idea – there are local noise, pollution and community dislocation concerns for example – but the arguments for and against, as with all transport planning, should be based on a holistic and data-based view.

“Long-distance (inter-city) travel generates half of all transport emissions

One important fact revealed at the start of the day was that whether by road, air, or rail, half of all transport emissions in the UK is generated by long-distance travel between major population centres. The importance of addressing this type of journey was highlighted during the day by Jim Steer.

“How important is inter-city transport links amongst all the other transport and policy concerns in sustainable transport? Trips that are longer than 25 miles – albeit a small percentage of trips overall – represent about half of all transport carbon emissions.”

Jim Steer, Founder, Greengauge21

The Highways Agency echoed the importance of inter-city travel and of the major road system, in particular to the movement of freight.

“The highways agency is responsible for only 3% of England’s roads; but on those roads is a third of all traffic and two thirds of all freight.”

Graham Dalton, Chief Executive, Highways Agency

Freight is responsible for a major proportion of long-distance emissions

The Institute of Mechanical Engineers estimates that the movement of freight in the UK is responsible for 37% of transport emissions across all the modes (road, rail, air, canal, and pipeline). Given that HGVs alone emit more than seven times the GHGs4 of the whole of the rail sector, and while recognising the particular needs of freight operators, it would seem to make sense to consider moving as much long-distance freight as possible to lower-impact forms of transport.

4 Carbon is the best-known greenhouse gas (GHG) and most usually noted as the cause of climate change, but there are many other GHGs (methane and nitrogen dioxide for example) and other impacts on human health resulting from fossil fuel use in transport, such as airborne particulates (soot, sulphur dioxide, etc.)
Roads represent the majority of our transport infrastructure

The long-term reliance on roads for both commercial and personal transport means that the road system is by far the largest piece of the UK’s transport infrastructure. Road transport was responsible for 90% of all GHG emissions from domestic transport in 2008, and more than four-fifths of all journeys made. It is clear therefore where the biggest prize for emissions reduction lies, and why, as quoted on the day, motorists have been on the sustainability ‘naughty step’ for so long.

“84% of all journeys made in the UK are made by car. The roads represent our most important network and the overwhelming bulk of our total network assets.

Rt Hon Philip Hammond, Secretary of State for Transport

The importance and relevance of the road system is not likely to change soon either. As several speakers and delegates noted, there are few alternatives in many situations to the convenience of motorised transport capable of going from any point to any other point at a schedule to suit the driver/operator.

“Roads have outlived the canal revolution, they’ve outlived rail revolution, and they are outliving the telecoms revolution; they are here to stay, and we have to make them more sustainable.

Graham Dalton, Chief Executive, Highways Agency

But building more roads is not the answer to congestion relief

Despite, or because of, the pervasive road system we already have, building more roads is unlikely to be the right solution to congestion in the UK. Leaving aside the ballooning costs of road-widening schemes or new construction, there is plenty of evidence that providing new capacity does little except encourage more people to use it, thereby exhausting all the new capacity relatively quickly. The point was well made by Ken Livingstone, who also pointed out that the phenomenon was nothing new, and went back to the earliest developments of urban motorways.

“The first motorway system was built in New York by Robert Moses; they built a huge network of motorways, the first of which they thought would provide capacity for 20 years; it filled up in 18 months. They built more, which quickly filled up. The lesson is that however many roads you build, they will fill up. The only answer is an efficient public transport system.

Ken Livingston, Former Mayor of London, Politician and Broadcaster

Using analytics effectively can help reduce congestion and carbon

By contrast, applying analytics and modelling to road traffic has been shown to provide significant economic and environmental savings today. Delegates heard a number of detailed examples, including how predicting and controlling motorway traffic volumes and speeds reduces the start-stop traffic conditions that are both dangerous and fuel-intensive.

5 Department of Transport UK Transport and Climate Change data
By adopting controlled speed on the M25 to reduce stop-start, we achieved a more consistent traffic flow. Steady traffic dramatically reduces carbon impact – by at least 7% compared with stop-start congestion.

Graham Dalton, Chief Executive, Highways Agency

High-speed rail is being seen in some quarters as an important development

Given the points already made about the environmental footprint of long-distance travel and the relative impact of different modes of transport, it is unsurprising that high-speed rail should figure large in the government’s thinking about the future of inter-urban travel. In addition to the long-distance freight and passenger opportunities from high-speed rail, the possibility of replacing a proportion of domestic air travel is also attractive.

For long-distance, inter-urban travel, our challenge is to make the train the transport mode of choice. For short-distance urban travel our challenge is to make public transport or low impact modes such as walking and cycling the most attractive options. For intermediates journeys involving complex routing across rural and suburban areas, there is no realistic prospect of replacing the private car.

In addition to the obvious benefits of ease of use, private cars have proved to be very high on the list of consumer priorities; overall demand for private car ownership, which accelerated in the 1980s, has resisted multiple indirect tax rises over recent years. In addition, the growth of online retailing and home delivery has contributed to a huge increase in light van mileage. Total emissions from private cars are the same today as in 1990 despite the increase in total numbers of vehicles; emissions from vans have increased by 64% over the same period.

Domestic air travel, with its very short flights that produce relatively high emissions (take-off and climb being a larger proportion of the total flight time), emits about three times the average GHG per passenger kilometre of rail, so replacement would make a significant impact on emissions for travel between major city hubs in the UK (even before accounting for travel to/from airports to destination).

There is no substitute for the private car in many situations however

Long-distance travel between well-served major cities along arterial routes is one thing, and relatively simple to consider; cross-country, complex, point-to-point travel is quite another, and cannot reasonably be completed other than by car.

The aviation sector is a particular challenge

The aviation sector in the UK more than doubled its carbon emissions between 1990 and 2008, and now represents 5.5% of total UK GHG emissions. It is clear that the demand for aviation, particularly for leisure, is set to continue growing at a strong pace. As such, aviation is a clear target for efforts to reduce the UK’s carbon footprint, but the industry clearly cannot access most alternative fuel options – there is no foreseeable alternative to carrying low entropy liquid fuels onboard the aircraft.

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6 Source: ATOC and DfT estimates of domestic flights (172.8g CO2e ppkm) versus rail (61g CO2e ppkm)

7 Source: National Atmospheric Emissions Inventory
The global aviation industry emits 700m tonnes of carbon every year. That amount will grow because it’s harder for us to reduce carbon than other transport modes, or other activities. The Stern Review said that aviation would grow to 3-5% of global emissions by 2050.

Jonathan Counsell, Head of Environment, British Airways plc

The key to reducing carbon is therefore the augmentation or eventual replacement of standard aviation kerosene with biofuels, but significant hurdles exist, not least the lack of production facilities and therefore supply, leading to uneconomic pricing.

Business travel has reduced in recent years, but will remain necessary

The government has also shown significant interest in the technology-driven approach to new and sustainable working practices. There is now a minister for the reduction of travel (Lib Dem Norman Baker) working with DCMS, BIS and other government departments to encourage home working, and promoting high-speed broadband and video-conferencing as an alternative to long-distance travel.

Although technology has enabled a radical change in the way people work and communicate today, and high-quality videoconferencing and remote/mobile working facilities has enabled many companies to reduce office space and encourage working from home, there is still a high demand for travel, and often with good reason, as Ken Livingstone pointed out.

Communicating over videoconferencing means that you miss the tiny details that will tell you that people are lying to you. People everywhere, especially in the financial sector, will continue to need a face-to-face system.

Ken Livingston, Former Mayor of London, Politician and Broadcaster

Alternatives to fossil fuels are therefore going to be critical

The burden for GHG reduction in the short term may therefore rely primarily on finding alternatives to fossil fuels, or at least to lower-impact forms. The sheer size of and growth in road transport emissions in particular means that an alternative to burning irreplaceable and dirty fossil fuels must be found.

Cars are not going away, so alternative energy delivery systems, and in particular electric vehicles, are critical in addressing carbon reduction in the transport sector.

Delegate

The main alternatives that have been trialled in the UK include electric vehicles, fuel cells, and biofuels; each has their advantages, but also a range of disadvantages that present difficulties in scaling a solution to replace the efficiency and relative simplicity of liquid fossil fuels. Low entropy fuels such as petrol are relatively easy to handle, distribute and store, and provide reliable delivery of energy for motive power. The two main problems with such fuels – GHG emissions and the fact that resources are finite – mean that it is clear that we need long-term sustainable alternatives. It is not yet clear however how such alternatives will be produced, stored and distributed in a way that at least equals the simplicity of oil-based fuels.
Biofuels have been disappointing and are an example of the complexities of sustainability

The story of biofuels in particular illustrates the difficulties. Much investment has gone into experimentation with biofuel production methods over the years, and a number of controversial issues have arisen as a result, including allegations of deforestation to create agricultural land to grow crops for bioethanol, resulting in soil erosion, exacerbating water stress, loss of biodiversity and local social problems.

Such problems show how a primary objective such as de-carbonisation can give rise to unintended secondary and tertiary effects that negate any positive sustainability result achieved.

Once the great hope for transport decarbonisation, the biofuel story has led to early disappointments, and emphasised that sustainability is about the total impact of an activity not merely the first order effects.

Rt Hon Philip Hammond, Secretary of State for Transport

But there are certainly situations in which there is little or no alternative to a liquid, relatively easy to handle fuel carried with a vehicle. Biofuel does therefore perhaps hold the key to more sustainable aviation and last mile delivery of road freight, if solutions can be found to the challenges the industry currently faces.

The right policies and incentives can produce the right results

There are pilot projects working successfully today which show how the market could develop, given the right carrots (incentives and seed-funding from governments), and sticks (raising of the cost of fossil fuels through taxation). The example quoted by Jonathan Counsell of BA during the Summit also benefits from the source of the biofuel – anaerobic digestion of waste which would otherwise attract landfill charges. The combination of incentives and tax avoidance has made the facility an economic proposition.

More people using public transport more often may be the solution

One solution to the de-carbonisation and de-congestion of transport in general is to encourage more people to use public transport. Given that both bus and rail travel are achieved for roughly a third of the carbon impact of a car (69g CO2e ppkm for buses, 61g for rail, against 198-207 average for a private vehicle8), switching in volume would likely produce a significant carbon reduction dividend.

Cars produce 60% of all transport carbon emissions. So the simplest way of cutting those emissions is to get more people to use public transport.

Keith Ludeman, Group Chief Executive, Go-Ahead Group

While this is undoubtedly true, there are a number of reasons that achieving such a change is problematic; people value their personal space and, more seriously, their security. Service regularity, cleanliness, and information availability are all reasons quoted for not switching and using public transport more regularly.

Lack of investment has put us in a poor position in some areas of public transport

Perhaps the central problem with the UK’s public transport infrastructure is a historic and persistent lack of investment, which affects the attractiveness and, worse, the reliability of public services.

8 Source: DEFRA/DECC GHG conversion factors for company reporting, 2009
We are still using machinery on the Underground today that means we need to go to transport museums to find spare parts.

Ken Livingston, Former Mayor of London, Politician and Broadcaster

It’s all very well to talk about more people using buses for example, but outside the major city centres, services are scant and equipment outdated. No wonder many young people have adopted the term ‘loser cruisers’ to describe them.

Delegate

Such historic under-investment is unlikely to be addressed in the near future given the time of austerity in which we live and the long-term unwillingness of UK governments to invest in public infrastructure. It is unclear how such problems might be addressed and therefore how local public transport in particular will be measurably improved in the short term.

City transportation – the growing popularity of cycling and cycle schemes

Urban transportation raises a different set of challenges and opportunities to long-distance travel. The relatively short distances involved with urban transportation mean a variety of alternative fuels and modes become potentially viable. Infrastructure for electric vehicles is easier to create, and passenger density makes public transport, and buses in particular, more economically viable.

Commuting by bicycle has increased in popularity considerably over the past ten years. The growth of the dedicated cycle network (albeit frustratingly slow) and the simpler but less attractive cycle lanes on roads have provided an incentive to many people to adopt two-wheeled transport.

Mode share for cycling in London is 2%, which represents a doubling of cycling in London over the past 10 years. The target is to reach 5% share by 2026.

Mick Hickford, Head of Special Projects, Transport for London

The ‘Boris bike’ scheme in London has proved successful to date. In the first six months of operation (July 2010 – January 2011), 110,000 people signed up for the scheme, and made more than 2m trips. Continued development seems certain – the success of the scheme has created the problem of a ‘tidal’ lack of bikes at rush hour times, in which bikes all end up in central London in the morning, and then are unavailable in the evening, having all gone from the centre to the ‘edges’ of town during the rush hour home.

Taking again a data-based approach to analysis, figures from London would suggest that the perception held by many that cycling is unsafe may not be as true as it seems, at least for the capital.

There is a perception that cycling is unsafe. Despite a doubling of cycling in London over the past 10 years, the number of accidents has actually gone down.

Mick Hickford, Head of Special Projects, Transport for London

Whether promoting healthier carbon-free alternatives such as cycling, or using park-and-ride or congestion charge schemes to force use of public transport, it is important to consider how people will use and adapt to change, and how to make such alternatives more attractive.
Creating a joined-up customer experience is crucial in improving passenger experience

Perhaps the key to improving the customer experience of public transport is the ability to make such journeys seamless and easy, particularly those journeys that use different modes of transport. At the heart of creating a joined-up experience is the collation and availability of information to both the transport companies and the traveller. Given that our transport operators are franchises operated by different companies, even though much of the system is concentrated in a small number of players, the solution to better information is not in any one company’s hands, but rather in creating a platform which can share the information on services, fares, and passenger demand required to allow operators to integrate their services, particularly in inter-modal journeys.

"82% of franchises in this country are operated by the 5 big transport groups.
Keith Ludeman, Group Chief Executive, Go-Ahead Group"

"If we’re going to get modal shift and seamless handing off of passengers, it’s not going to be about centralising ownership, but about enabling through information availability.
Graham Dalton, Chief Executive, Highways Agency Group"

Providing better information should not be exclusive to public transport however; cities can give drivers better incentives to access retail centres, and avoid congestion, through the provision of better information on parking facilities for example; Singapore was the pioneer in providing such information through its Land Transport System.

Singapore’s LTA creates seamless and efficient public transport experience

4.5 million people ride buses and trains each day in Singapore; the city is keen to ensure that public transport remains the mode of choice and a seamless part of the rider’s lifestyle by maximising convenience and choice.

To achieve that aim, the Singapore Land Transport Authority developed a new fare processing system that allows any Smart Card compliant with Singapore’s standard to be used with public transport. Today, with a single Smart Card, a rider can use all modes of public transportation, pay for parking and congestion charges, as well as make small purchases. By aggregating all transaction records, the LTA can look into the overall commuter base and create profiles based on routes taken, connections made between transportation modes and how these patterns change over time, from time-of-day to seasonal differences. The system has enabled Singapore’s LTA to develop optimal routes and schedules, reduce congestion, increase the appeal of public transit, while also cutting fare leakage by 80 percent and the cost of fare processing by 2 percent.

Forecasting data is key to matching supply and demand

Good data and analytics are at the core of enhancing the travel experience and reduce the costs of transport provision, through smoothing traffic flows and ensuring sufficient public transport is available to handle demand. The key to both benefits is using analysis of both historic and real-time data to inform predictive demand models. Such models can be used to ensure that demand and supply is closely matched, which in turn will deliver the most efficient use of resources.
Using ICT in this way is at the heart of planning for the Olympic Games in 2012. Combining predicted traffic flows with geographic data, behavioural analysis and service schedules is enabling the Olympic Delivery Authority to plan for an estimated additional one million trips per day within London. The trips will be concentrated on transport options around Olympic venues, such as on the Jubilee and Central line services to Stratford, east London. But the planning is highly complex – organisers are expecting up to a third of Londoners to alter their normal travel arrangements (in commuting for example), making simulation and advanced analytics vital to attempts to avoid overloading of transport facilities across London.

"We are using every data source we can (such as GIS systems) to understand where and how people will travel.
Hugh Sumner, Director of Transport, Olympic Delivery Authority"

Travel demand management includes the four ‘R’s: re-route, re-time, re-mode, reduce. We are planning how background traffic can be re-scheduled to reduce the peak impacts on the system.
Hugh Sumner, Director of Transport, Olympic Delivery Authority

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Smarter payment systems
The other key ingredient in creating a seamless customer experience is integrated payment systems. London’s Oyster card for example allows travellers to access train, tube and bus services with one pre-paid proximity card, which is intelligent enough to apply the lowest fare options when possible, making travel for local inhabitants simpler, cheaper and more efficient, and reducing costs for operators. The card is smart enough to cap fares to the prevailing day travelcard cost, meaning that travellers don’t need to worry about changing travel plans during a day.

Oyster has therefore made public transport a much simpler proposition which travellers don’t need to think about. The success of the card is beyond doubt; Transport for London (TfL) reports that with 7 million cards in regular use, more than 80% of all tube journeys and more than 90% of all bus journeys are completed using Oyster.

ICT is underestimated as a tool to achieving a sustainable city
Travel information services, smart payment systems and joined-up customer experiences can encourage travellers to use public transport, and travel at off-peak times of the day to smooth out traffic flow, but information technologies were also cited as key to helping Stockholm reach its target of being carbon-free by 2050 by avoiding travel altogether.

"One very important commitment we have made is to provide everyone in the city with very fast broadband in their home, so they can avoid commuting as much as possible. ICT is an underestimated tool for reducing transport demand and creating a more sustainable city.
Gunnar Soderholm, Head of the Environmental and Health Administration, City of Stockholm Group"

Just as technology can eliminate some of the need for business travel, in the hands of individuals it can eliminate significant traffic at rush hour times by supporting flexible working hours, or avoiding commuting altogether through home-working.

A more integrated approach to planning and policy is required
Making public transport more attractive, reducing demand on strained road resources, and providing efficient and information-rich seamless experiences are worthy aims, but may only be possible if transport and planning policies are more joined-up than they are today. Customer demand cannot simply be dialled down to reduce environmental
and social impacts, because much travel is not undertaken as an end in itself – it is usually because of a need to achieve some other goal – it is a ‘derived demand’ service.

“Transport is a derived demand. People are travelling for a reason and they have dispersed patterns of activity. The need to be in different places is deep-seated; we won’t achieve shifts in travel behaviour through higher prices. They key is to integrate land use and linked activity with transport planning.

Jim Steer, Founder, Greengauge21

Demand for transport during rush hour for example will therefore be difficult to modify without changing the way we plan urban spaces. If we continue to pursue quite separate land planning and transport planning processes, we are unlikely to be able to benefit from efficiencies that could be generated through integration, or to be able to provide transport operators with a clearer environment in which to plan and improve their service delivery.

“In Britain, we’ve lacked integration of land use, urban regeneration, energy, and transport policies, so it’s been very difficult for the transport sector to respond in the right way.

Len Porter, Chief Executive, RSSB

Poor policies also contribute to poor decisions

Quite aside from the missed opportunities of non-integration of different policy areas, many aspects of transport policy are at odds with each other (and sometimes with common sense). Perhaps the best example among many expressed on the day was quoted by Graham Dalton of the Highways Agency.

“Why do we make retro-reflective road signs and then have a rule which says you have to light them?

Graham Dalton, Chief Executive, Highways Agency

But joining up policy is also structurally difficult

The problem with joining up policy is not just in integrating thinking across different planning objectives; it is that the delivery and consumption of transport crosses many boundaries – between different industry sectors, different regulators, and different geographic areas of responsibility. A concern often expressed is that central planning from Whitehall doesn’t deliver locally suitable solutions.

“TfL (Transport for London) covers all modes of transport in London except national rail, which gives us the opportunity to create cross-mode planning, and solutions like Oyster. Outside London, there is no single governance or authority, and deregulation of buses for example has made coordination very difficult. There is no integration in land usage planning. Policymakers are based in London, and it is easy for them to underestimate the difficulty of planning and implementing integrated policies.

David Quarmby, Chairman, RAC Foundation

The coalition government plans to meet such concerns through its efforts to localise planning and decision-making through the new Local Enterprise Partnerships (LEPs). LEPs are described on the Communities and Local Government (CLG) web site thus:

“Local enterprise partnerships will play a central role in determining local economic priorities and undertaking activities to drive economic growth and the creation of local jobs. They are also a key vehicle in delivering Government objectives for economic growth and decentralisation.”
The idea is that creating planning and development entities based on “more meaningful economic areas” than the previous Regional Development Authorities (RDAs) will ensure that local realities will create more applicable and successful local development. The problem is that consideration of transport and associated policy areas must take into account both local priorities and cross-boundary imperatives. In the case of transport therefore it remains to be seen whether a more fragmented approach to service planning will improve or exacerbate existing problems.

Are we targeting incentives correctly?

An important part of policy implementation is providing the right encouragement (and penalties where necessary) to create the desired change. Some speakers and delegates at the Summit pointed to a lack of incentives in the key area of investment in cleaner technologies. A stark example quoted during the day related to the cost of new buses, in which cleaner technologies currently lack economies of scale. The need for government intervention to seed the market is already accepted and in place for private cars; without offering similar incentives, it is hard to see how commercial operators will be willing or able to fund the switch alone.

I would run a fleet of Hydrogen buses tomorrow, but they cost £1m each, compared with diesel buses (£180k), or hybrid (£300k) – the economies of scale aren’t there. The government is paying £5k subsidy on a £28k personal vehicle like the Nissan Leaf, but nothing on commercial vehicles.

Keith Ludeman, Group Chief Executive, Go-Ahead Group

Taxation has a role to play in changing behaviours

There are a number of ways that governments change behaviours in addition to direct incentives, not the least of which is by taxation. Taxation can have the desired effect when properly applied, but it is not clear that the present government has yet put plans in place that might change behaviour with regard to personal transport.

Should we be doing more to cut the deficit by raising green taxes? I assumed we would tax activities we want to discourage, and not tax activities we wanted to encourage, but it isn’t clear that we are doing that yet.

Professor David Begg, Publisher, Transport Times

Different taxes produce different emotional responses

There are already a range of taxes on different forms of travel however – many seemingly designed to raise taxes without damaging demand – and the public tends to show different emotional responses to different taxation types. The strong antipathy in both the media and general public to road use charging is evidence that some categories of tax are seen as punitive, regressive, and restrictive of freedoms. Yet fuel duty (tax on petrol) doesn’t produce anything like the negative response, perhaps because its application is not obvious (it is not levied separately like road tax for example). It is nevertheless an effectively variable tax on road use – the more you use your car, the more tax you pay.

There is a variable tax on the journey you go – you could call it a sustainability tax – it’s called fuel duty. We don’t make the link between that and modifying our behaviour as we would with road charging however. People make value judgements on what they spend money on.

Graham Dalton, Chief Executive, Highways Agency
Behavioural changes can be made to stick if the right ‘nudges’ are used

However the government decides to act to change behaviours, there are interesting case studies available that show how change can be achieved through relatively small and short-lived incentives that do enough to start the ball rolling – to nudge people – in the right direction. One such example discussed during the Summit was the case of Stockholm where a smart traffic management system (including congestion charging) was introduced a few years ago. Part of the incentive for drivers to reduce their carbon footprint was a congestion charging exemption for cars using alternative fuel. Although the exemption was removed nearly two years ago, the switch to alternative fuels has continued to gather pace.

“Last year, 40% of all new cars sold in Stockholm were ‘green’ or alternative fuel cars. One of the biggest drivers was exemption from congestion charges; that exemption was discontinued in January 2009, but the rate of green car sales has continued to increase.”

Gunnar Soderholm, Head of the Environmental and Health Administration, City of Stockholm

The sustainable alternative may be about not doing something

One of the most interesting (and insightful) observations during the discussions on the main theme of the day was that becoming more sustainable is not always about doing something to create change or doing something more efficiently, it is often about not doing something. Whether that is achieved by not using or consuming something, or by applying lateral thinking and clever design to solve problems in different ways, the elimination of the need for costly resources may be the best way to approach sustainability in the transport arena.

“Engineering is different today – young engineers are good at not doing things. In the past, the mind-set was ‘I have to build some of that, more of that, more drains, more road surface’, etc. The mind-set today is to design in such a way to avoid having to do things.”

Graham Dalton, Chief Executive, Highways Agency

And doing less can deliver clear business benefits

“Sustainability doesn’t cost more – quite often it costs less, through avoiding expenses you otherwise might have incurred.”

Graham Dalton, Chief Executive, Highways Agency

Not having to do things, build things, or incur expense, saves money and time by definition. Far from the perception held in some sections of the public and the media, sustainable planning and operation is not about making things more expensive, but rather about making things more efficient and more effective – creating a better customer experience at a lower cost.

“£3bn per year on fuel – 30% of BA’s cost base is fuel. We have an economic as well as an environmental incentive to reduce usage and therefore emissions.”

Jonathan Counsell, Head of Environment, British Airways plc

Some organisations in the transport sector have recognised
and embraced this philosophy, for both economic and environmental reasons; but there is a long way to go to change thinking throughout the industry.

Benefits for the country as well as individuals and companies

“Poor and unpredictable transport damages business confidence and inward investment.”

Ken Livingston, Former Mayor of London, Politician and Broadcaster

As a final point, it is worth noting that the transport sector, in all its forms, has a significant impact on domestic and international perception of the UK and on the economic performance of the country. Making transport more efficient and sustainable is not only about delivering economic benefits for companies and reducing the impact the industry has on the environment; better transport facilities and improved infrastructure has a key role to play in ensuring the future economic health of the UK.
Outcomes: developing the themes

The Start Innovation Jam

The IBM Summit at Start was “one of the most significant events of its kind that has ever taken place in this country” according to Charles Hendry, the Minister of State for Energy & Climate Change. The Summit brought together key stakeholders from many communities, and created a momentum amongst attendees to do something to make a difference. The journey towards a sustainable economy will be a long one, and the Summit was always intended to be the start of a process rather than a single, albeit impressive, event. As a continuation of that process, IBM has announced that it will be hosting a ‘Start Innovation Jam’ in April of 2011.

An Innovation Jam is an online text-based discussion forum for conducting a large-scale brainstorming event. Diverse groups of individuals are connected via a web browser to discuss and develop actionable ideas for business-critical or urgent societal issues. The key word is ‘actionable’. The purpose of this Jam is to take what was learned from the Summit, and turn it into a bank of actionable ideas. This is about how – the Summit identified a number of urgent needs to which we need to find solutions: we need to encourage collaboration between differing constituencies, but how do we make it happen? How do we start to change individual and corporate behaviours? How do we engage with younger people and how do we act NOW to make a difference? The Jam aims to answer these questions and in doing so kick off hundreds of projects that will generate real solutions and provide inspiration for a thousand more.

The Jam will be facilitated by IBM in conjunction with the Start organisation and many of the other Start partners. They will be inviting everyone who attended the Summit, their partners and clients, and many others who wish to join them on the journey.
The IBM Summit at Start

Start is an initiative established by HRH The Prince of Wales, that aims to create a vision of a more sustainable future, and seeks to promote sustainability through simple, positive and aspirational messages.

IBM is one of the founding partners, and is the exclusive partner for Business to Business engagement. In September 2010 IBM led a Business Summit – nine invitation-only days that covered key topics on the sustainability agenda for business. Its starting point was simple: “ask not what you can do for sustainability – ask what sustainability can do for you”.

Business engagement in the broad sustainability agenda is crucial if we are to make progress. Business led the industrial revolution, it led the digital revolution and all the signs are that it will drive the sustainability revolution too. Each day of the summit saw senior business leaders, public sector officials, NGOs, academics and commentators come together in London’s Lancaster House to make a difference to how sustainability is perceived and positioned in the UK. Over 1,000 of the UK’s most influential people joined forces with some of IBM’s global experts to create a new constituency around economic, social and environmental sustainability.

Charles Hendry, the UK Minister of State for Energy and Climate Change said that the IBM Summit at Start was “one of the most significant events of its kind that has ever taken place in this country”; this document, written by The Bathwick Group, reports the output from the summit, with a specific focus on Day 3, ‘Smarter Transport for a Sustainable Future’.
About The Bathwick Group

The Bathwick Group is a research-based consulting company that helps clients address their most pressing needs in strategic planning and go-to-market execution.

**Sustainability & the future economy:**
Defining the future – risks and opportunities; strategic modelling and benchmarking, future-proofing to mitigate strategic risks, and identification of new market opportunities

**The future of business & organisational performance:**
Focused on collaboration and disruptive platforms; solving client challenges rapidly by combining external experts and IP protection mechanisms to expedite solutions to important challenges

**The application and future of information technologies:**
Focused on infrastructure (futures and cloud computing) and interaction (including social media) in business. Future-proofing strategy and effectiveness audits for enterprise IT leaders, cloud assessments, data audits, and benchmarking

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