THINKING cities

POLIS Annual Conference 2014 Special Edition

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thinkingcities.com

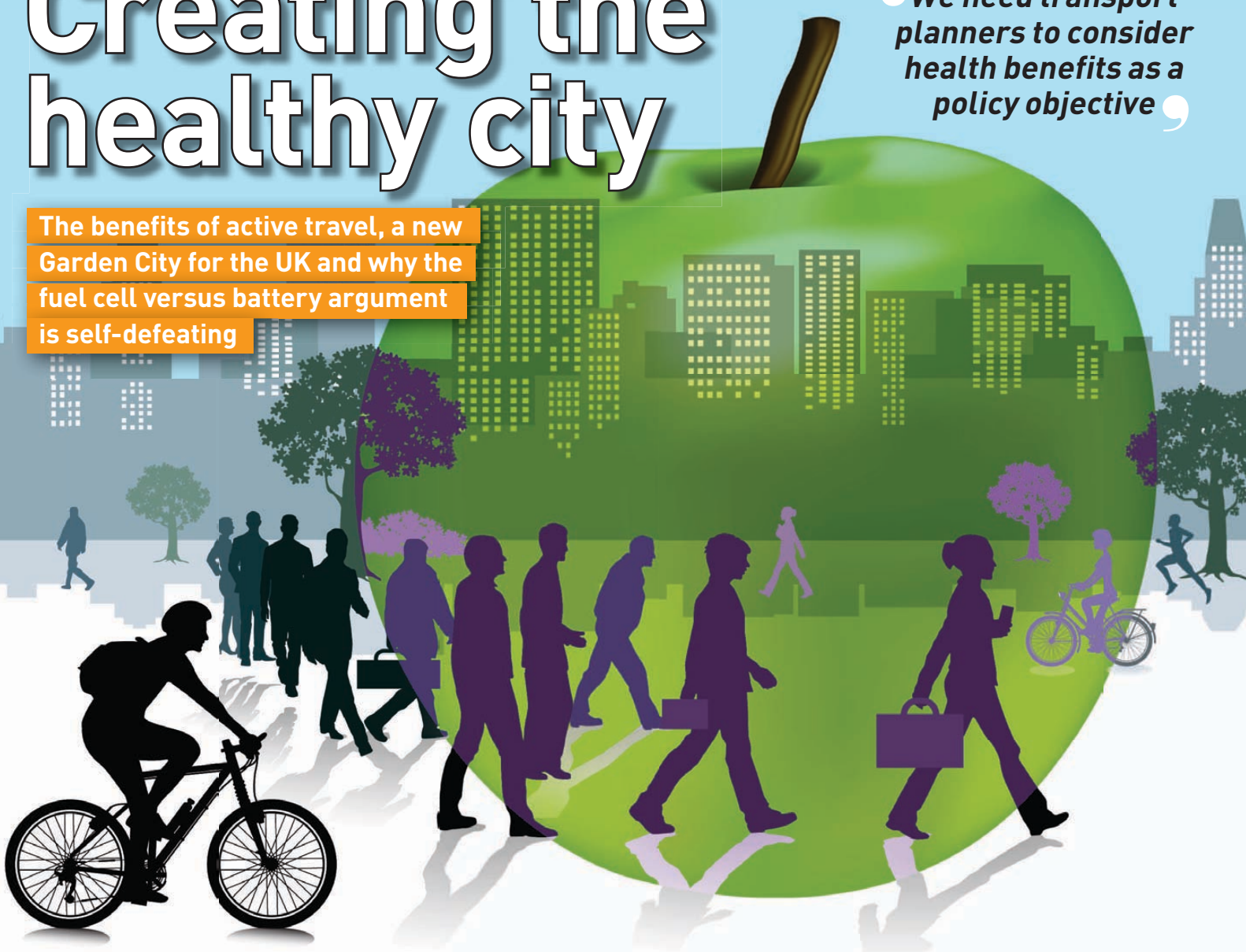
Volume 1 • Issue 3 November 2014

SMART TRANSPORT FOR CITIES AND REGIONS

Creating the healthy city

"We need transport planners to consider health benefits as a policy objective"

The benefits of active travel, a new Garden City for the UK and why the fuel cell versus battery argument is self-defeating



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Smart mobility, only more so

Kevin Borras and **Karen Vancluysen** on how defining what actually makes a city smart is getting more and more difficult...

In the two years since our idea of publishing a magazine about smart transport for cities and regions in collaboration with Polis became concrete, it has become apparent that the more thought-provoking articles that we receive, the wider the smart city envelope is pushed.

The articles that make up this special edition address this ever-more fascinating topic from a variety of different angles. So what is it that makes the definition of a smart city so hard to pin down? Maybe it's because just as what constitutes a traffic jam in one city is completely different in another, what constitutes a smart city may be completely different in a similar sized one on another continent.

Take the traffic jam theory – if you live in London you will have got all too used to sitting in your car, caught up in congestion, but go to a city such as Gothenburg and the traffic congestion is nowhere near as dense and lasts nothing like as long, seemingly, but that kilometre or two of non- or slow-moving traffic is as much an irritant to the residents of Gothenburg as that twice-daily 10km of first-gear crawl is to Londoners. So, if that theory holds true it may also be true of what makes a smart city or, as others have referred to it, the Ubiquitous City. Even before H3B Media and Polis joined forces we had discussed this seemingly far-fetched notion that seemed to encapsulate everything we could envisage as a topic for this fledging new media platform.

THE CONNECTED TRAVELLER

In the U-City, as we ended up calling it, the citizen was inextricably linked to the city by their smartphone. Notionally, at least, you were connected to the city from the moment you entered its boundaries until you left it. Interactive advertising spaces would react to your presence and would ping you things you were interested in or had searched for on Google or Amazon and to all intents and purposes U-City was personalising itself for you.

In essence that advertising hot spot would not show you a publicly viewable product placement (like you would see on a screen) but would send you information that you would want (things you might want to buy) or would need (tram times, for example) via your phone. This, we were told, was the future of urban mobility and was, more or less, the zenith for the traveller in the Ubiquitous City.

> ***The policy goal of many European cities is to work towards sustainable, healthy mobility and in that sense electromobility has a clear role to play as one part of the solution***

Karen Vancluysen is executive director of Polis

***Kevin Borras is editor-in-chief of* Thinking Cities**

But here we are, two years into our project, and although several articles may allude to something equitable with the basic premise of the U-City, we aren't really there yet. So, are we ever going to be truly and ubiquitously connected to every city? Do we want to be? Do we need to be? Moreover, how does it fit in with current thinking on electromobility...and is electromobility an end in itself?

A HEALTHY DOSE OF MOBILITY

Put simply, no it isn't. What it is, though, is a means to reach certain policy objectives. What we want for our cities, and particularly those within the Polis network is for them to be nice places to live in, where the air quality is good and it's pleasant for citizens to walk around, where they have a good quality of life. The policy goal of many European cities is to work towards sustainable, healthy mobility and in that sense electromobility has a clear role to play as one part of the solution.

Electromobility is also about innovation and about making those innovations more accessible to cities. Pioneers such as Rotterdam and Barcelona are taking the lead in implementing electromobility in their cities but we must ensure the road towards implementation is shortened for other cities. They can learn from the other cities by using the tools that are now available to them. It's important for cities to understand the impacts of the measures they are looking to implement.

Electromobility is also about cooperation and all stakeholders have a role to play. The European level can set framework conditions to push the electric vehicle market to ensure that enough charging infrastructure is in place and the cities can also push the market by being "living labs" where innovation can take off by providing incentives to make sure that electromobility is becoming attractive to the end user. The interaction between the different players and the role of the cities to provide incentives in the initial phase will ensure that the electric vehicle is picked up by the end user and then it can play a role in making our cities more sustainable and ultimately more liveable.

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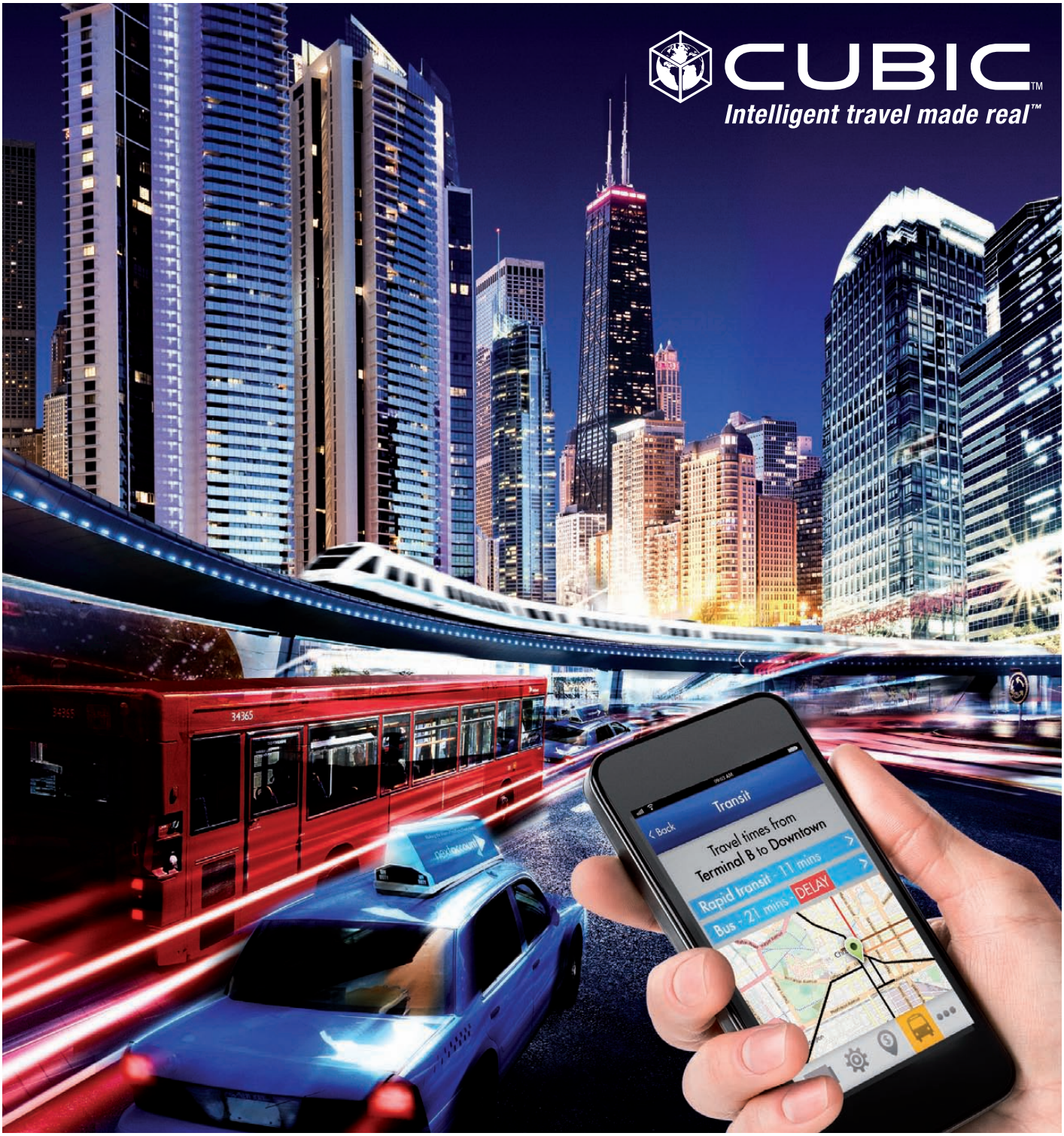

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Cityview

Senior transport officials from four forward-thinking cities discuss their plans for the future and how they are addressing the issues that matter most to their citizens – mobility and information

- **Philadelphia, USA** – Deputy Mayor Rina Cutler is transforming her city into one of the US's smartest
- **Bristol, UK** – Officially the greenest city in Europe in 2014
- **Vilnius, Lithuania** – Officially one of the smartest and best-managed cities in Europe
- **Belo Horizonte, Brazil** – BHTRANS CEO Ramon Victor Cesar on planning to be sustainanble, post FIFA World Cup

The City of Brotherly Love is getting smart in its old age

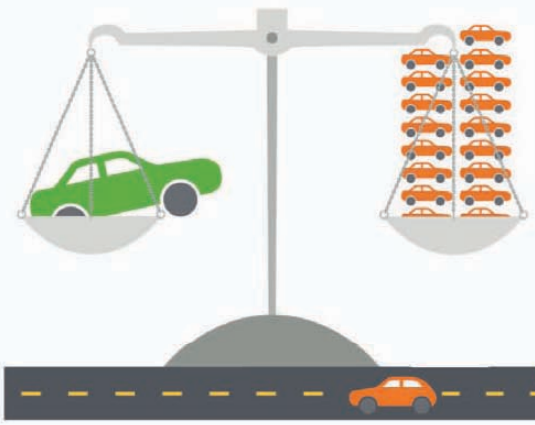
LONDON'S CAR CONUNDRUM

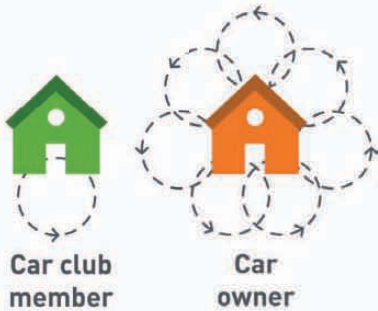
AIR QUALITY:
Road transport is a key producer of air pollution

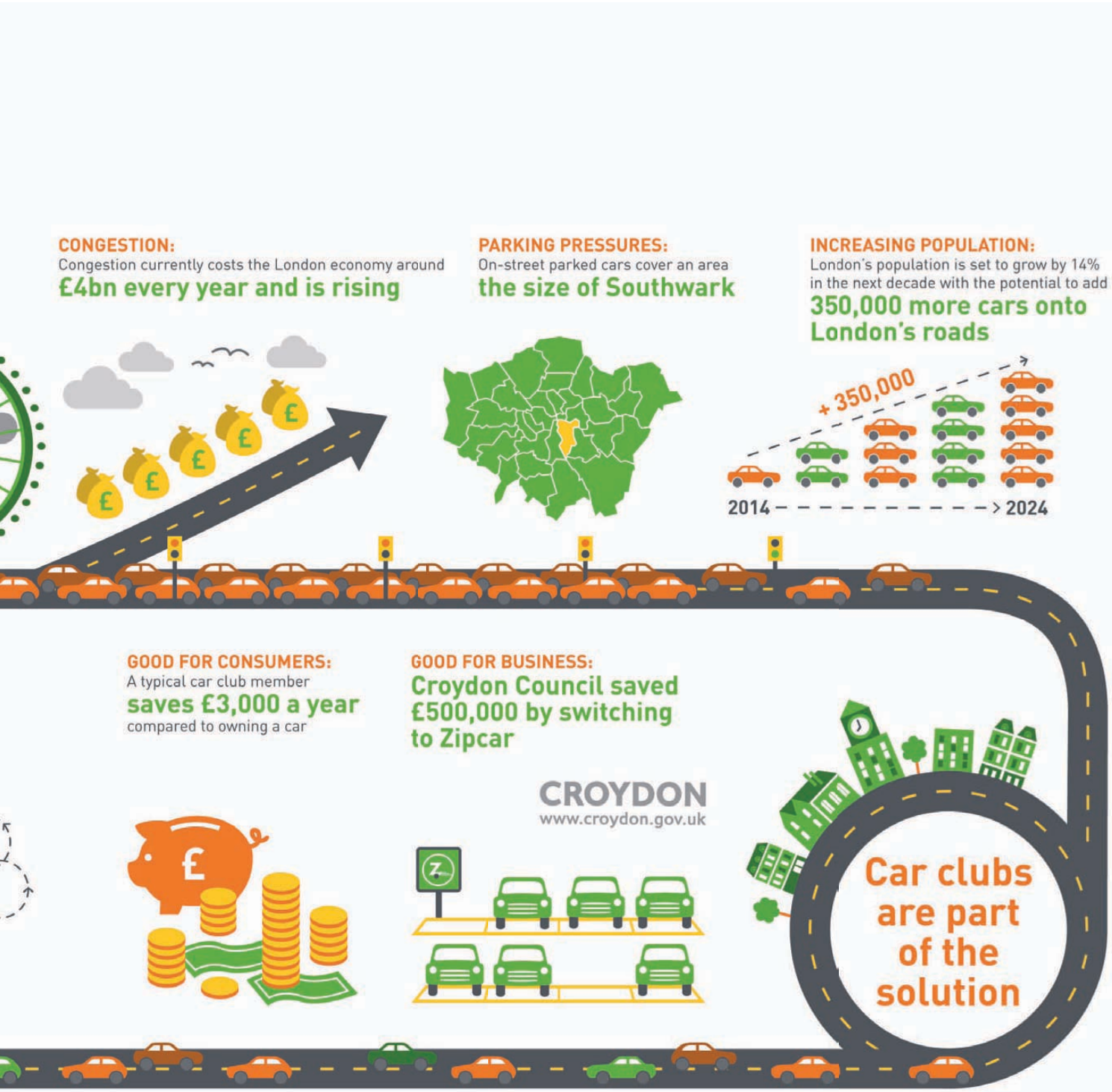
REDUCED CARS OWNERSHIP:
Each car club car takes around
17 private cars off the road

TRAVEL SMARTER:
Members are nearly twice as likely to cycle or take the train
than other Londoners

GOOD FOR THE CITY:
Members drive less after joining
7 times fewer short trips than car owners



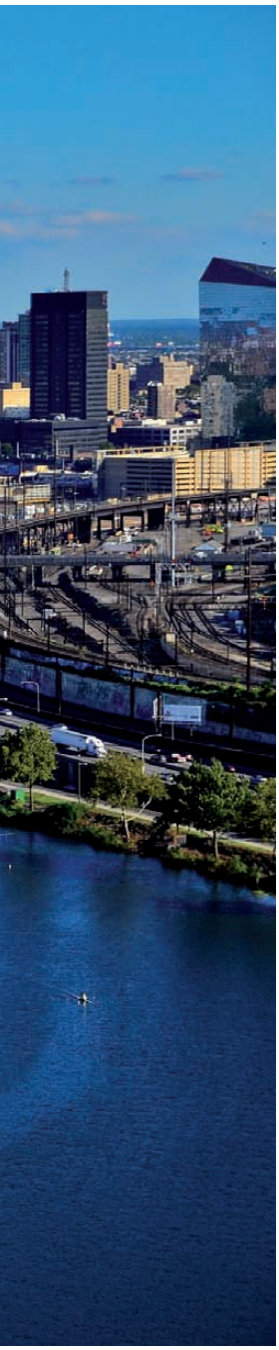




http://www.zipcar.co.uk/car-lite-london

Can we shift the modeshare and get drivers out of their cars and if so can we provide a viable alternative for multiple occupancy travel? How we can use technology to solve the capacity issue?

Rina Cutler



Rina Cutler's main two challenges as deputy mayor for Transportation in Philadelphia are funding and traffic congestion

Freedom to move

Sylvain Haon talks to **Rina Cutler**, Philadelphia's Deputy Mayor for Transportation, Energy and Utilities about the how the City of Brotherly Love is transforming itself into a smart city, step by step

Can you tell us a little about your role as Deputy Mayor for Transportation? What are you responsible for?

Philadelphia has a very unusual structure. The city has a deputy mayor in charge of transportation, energy, and utilities so underneath the umbrella of my responsibilities sits the airport, the water department and the streets department. I also sit on the board of the transit agency and the port authority and I get involved in a lot of the economic development activity in the city as they all have some impact on the transportation infrastructure system. The mayor created the deputy system as he wanted us to look at infrastructure in a very "global" way and it's why utilities and energy are kind of tucked into the transportation sector as well.

That's really interesting, as linking those potentially separate sectors is a very solid basis of a truly thinking city. So what are the main challenges in terms of transportation for a large US city? A lot of European cities would say congestion is their biggest challenge but is that the same for you in Philadelphia?

Actually, I would have congestion at number two. The first significant challenge we face, or I face, is funding. For some reason the United States, at both the Federal and State levels, decided that it doesn't have to pay for infrastructure. Somehow they believe that the taxes they pay should be sufficient to fund the infrastructure but it doesn't even come close. Funding is always going to be the primary issue and I think we are always trying to be creative in that respect. The State of Pennsylvania just passed its gas tax so that will supportive but it won't really get us to a place where we can implement great new projects and provide us with any significant new capacity.

In terms of congestion we're coming at it from the point of view that we just can't build ourselves out of it. There's not a lot of money to increase capacity, and while the driving public would probably love us to provide extra lanes to our highway and interstate system, the community is not that enamoured of that fact that most of our interstates come right through the city of Philadelphia so expanding them would mean taking out entire neighbourhoods as the community areas are right next to the road. There would be a huge number of homes and businesses that would need to be destroyed in order to make way for an expanded Interstate and this is just not going to be acceptable.

When we look at capacity issues in Philadelphia we look at two very distinct variables: can we shift the modeshare and get drivers out of their cars and if so can we provide a viable alternative for multiple occupancy travel; and the second is how we can use technology to solve the capacity issue. Both of those variables offer significant benefits but present significant challenges too.

You mention technology there. What kind of technology do you have in mind?

As you no doubt know, the research sector in the US is really looking at driverless cars. Twenty years ago this was nothing more than pie in the sky and nobody really believed it was going to happen and the idea of driverless cars just made everyone think of the Jetsons TV show where they drove around in these little personal spaceships. When it was first considered I think people thought that the technology was going to be in the ground, so that's where the R&D focus started. What would the sensors need to do in order to keep a safe distance between cars...now of course we know that the technology is going to be in the car and that's how it's proceeding. The technology will be built into new cars and there are many who are looking at automated vehicles as the way of the future. This is going to cause it's own set of issues.

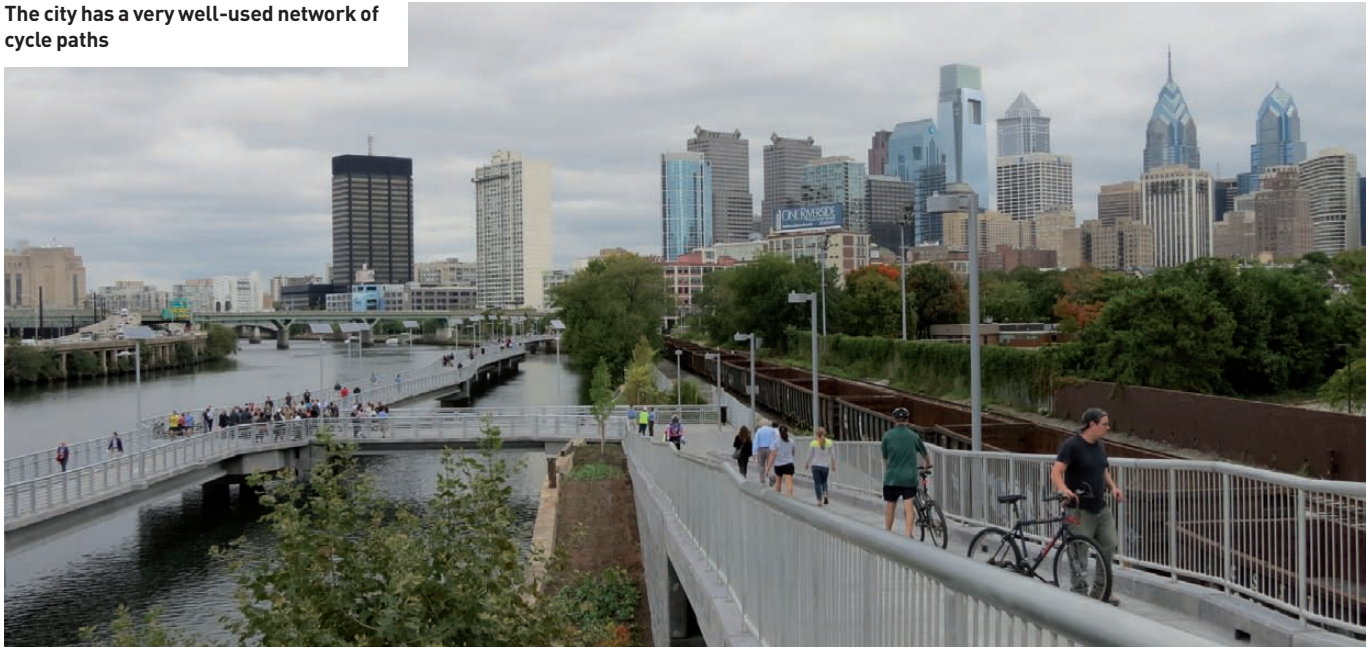
Do you think these developments could change your role as deputy mayor for transportation – and are you somewhat afraid of this?

Cities are far more likely to give thought to the issues of social justice, or injustice, than Federal Government. In terms of freight I think this kind of technological advancement can do amazing things in getting freight off the Interstate system

Well, no – I actually welcome anything that can help me manage traffic. I don't think I will be out of a job any time soon. For many decades people will be using regular automobiles so how it will work is that lanes that are currently for regular traffic or handle high occupancy vehicles (HOVs) will switch over to V2X lanes and the unmanaged lanes will still operate for what we can refer to as 'regular traffic'. It will take a long time for everyone to own a new-enough car in order to have access to this new technology. What is interesting is cost - I think this will create a social equity issue. Will this mean that only the rich will be able to afford an automated car and will the social justice question be answered? Cities are far more likely to give thought to the issues of social justice, or injustice, than Federal Government. In terms of freight I think this kind of technological advancement can do amazing things in getting freight off the Interstate system. The ability to coordinate freight with technology has huge promise. Of course we'd prefer a system where we can move trucks to their own managed lanes so it's all really interesting but will take several decades until we get to that point. Therefore what is most interesting is what interim solutions do we use in order to get to that point?

In Philadelphia we have just started a pilot project on a very dangerous road – it's curvy, it runs along the river, people drive far too fast on it and invariably end up in the river...it's not a great way for me to keep my job if people keep driving their cars into the water. If I have police officers out there doing enforcement then people will slow down but it's not the greatest use of that resource so we are trying a technology where we put sensors in the roadway and if you drive over those sensors at more than 10mph faster than the speed limit it turns the next traffic light red. We will stop you. And furthermore we decided to tell people it was there - we hoped that that way they wouldn't have to trigger the red light if they saw a sign and instinctively slowed down. The first thing we learned was that the technology couldn't be used in the morning or evening rush hours as people couldn't reach those speeds

The city has a very well-used network of cycle paths



"If you really want to drive into Philadelphia at 8am every weekday at least we have given you all the information you needed in order to make that choice"

even if they wanted to and it really messed up the synchronisation of the traffic signals so we pulled it off the rush hour and analysed a lot of data to show us where and at what time most violations occurred and where most accidents were happening. Funnily enough it was mainly in the overnight hours anyway so we've only been running the system around the middle of the day and at night and it's been interesting. Those kinds of easy, low-cost technology solutions to specific, localised problems are where cities' interests will ultimately lie.

Is automated driving really enough of a measure to address, if not solve, congestion though?
It's a solution but there needs to be many, many tools in the toolbox as we are just not ever going to have the capacity we need if everyone in Philadelphia decided that they were going to carry on using their car and more often than not drive by themselves during, in particular, our two rush hours. I have to admit that I'm pretty mobility-agnostic about how people move around – my concern is that they have options in order to do so. If you really do want to drive into Philadelphia at 8am on a weekday morning and you have been given all the information you need in order for you to know what's coming your way and that it's not really a good idea, then the best of luck to you. Truly. My job is to ensure if you do make that choice then you are going to be taking that choice while on the safest road possible but ostensibly it's about providing viable options to those people who are actually willing to leave their car at home and use other means of transportation in order to get to work or wherever it is they are going.

"It's about providing viable options to those people who are actually willing to leave their car at home and use other means of transportation in order to get to work or wherever it is they are going"

This means, in many cases, transit and rail and now I need to look at what I need to do in order to upgrade those systems. Some of the public transit options are of course sitting in the same traffic as the cars I just mentioned. For the traveller, or the commuter, it's the choice of do I drive in the privacy of my own car where I can make my own choices, listen to loud music if I want to, versus get on a bus and just sit in the same traffic. One of the options we are looking at is a transit priority system on high volume traffic corridors and we are doing a lot of pilot programs with the transit authority to figure out changes we can make in the system so we don't have four buses from different lines all showing up at the same stop at the same time so I can run an express service in certain corridors.

Also how can I shift people from one subway line to another if one is at full capacity and the other is at half…transit ridership figures have gone up every year for the past decade. If we deliver a great product we can shift more and more people towards the transit system without any requirement to actually do so. If we can move buses through the rush hour traffic a lot more quickly and efficiently than we can move cars, people will absolutely move over to taking public transit. I think there's a lot of focus on encouraging people to walk and cycle more and we have incentive strategies for that.

Do you see a good level of responsiveness from the people of Philadelphia towards taking public transit, walking and cycling?
Very much so actually, particularly on the bike commuting side. There has been a huge leap in the numbers of people cycling and this is before we set up the bikeshare program. Paris was the first city

to really implement that kind of scheme and we've looked at similar ones in most of the large and medium-sized cities in the world that run bikeshare programs to see the kind of things they do, what sort of scheme would work well for us as a large US city. Our bikeshare program goes live in the Spring of 2015 and we are now engaging with transit agencies to talk about "last mile" to get people to and from the transit stop by bike rather than driving. We are focused on making people think of their bicycle as a part of the transportation system and not a separate piece. The future looks really good in terms of the use of smart, connective technology to help us achieve our goals without having to build hugely expensive new infrastructure.

The bike scheme will invariably decrease transit numbers too, of course, but it's primarily targeted at people who will drive less than two or three miles on a daily basis. People tend to not realise that some of our bus and rail lines are at capacity so reducing that capacity is a very happy by-product of the bikeshare scheme. We start every conversation with the assumption that everyone is a pedestrian.

The concept of the smart city is very much about connecting different networks to provide greater efficiency, so does having such a varied portfolio of responsibilities as you have (transportation, energy, utilities) help you in your work? Or does it, in fact, not help at all?

No, it helps tremendously. There are people who work in their own silos who would have no idea that some of those connections even exist. As an example, the transit system has a traffic operations center and the city is building a traffic operations center and yet it didn't occur to either of them that they really needed to be able to communicate with one another. In an emergency situation they know they can talk to each other but on a day-to-day basis they didn't think to say "I need to see what you are looking at on your cameras and you need to see what I am looking at on mine." We are taking steps to ensure that every agency in the city who operates cameras, be it the police department who uses cameras to detect crime or the street department that uses cameras for traffic purposes or agencies who use cameras for transit applications, everyone can see what everyone else is looking at.

Those communications networks need to be able to come together. Another example is that the water department is conducting a groundbreaking program on green streets and storm water management so we are developing a new design guide for green

The Phlash is one example of Philadelphia's well-used public bus system

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If we can move buses through the rush hour traffic a lot more quickly and efficiently than we can move cars, people will move over to taking public transit. There's a lot of focus on encouraging people to walk and cycle more and we have incentive strategies for that

Cars, buses, trucks, motorbikes and bicycles compete for roadspace with tourist trolleybuses

infrastructure so that brings in both my streets and parks departments as we are going to need to manage storm water every time we rebuild any of our infrastructure. The city owns most of the concrete! We need to manage the storm water with our own resources before it goes into the main waterways. When we build new playgrounds we will build them with porous concrete, and we've just built our first porous street which also helped a great deal with snow management and snow plow distribution as the moisture, in whatever form, gets pulled off the street far more quickly.

What about movement of goods in the city? This is where freight traffic interacts with local traffic – is this something you are working on too?

It is. We are trying to incentivise business to move their goods in during the early morning so they stay away from my rush hour! And we have created a lot of truck loading zones that take a good portion of car parking off the street and have created loading zones in certain time windows so we are trying to figure out what they need to do. If I can get you in and delivered then out again, I can get the next one in and delivered and out. Certain US cities, and New York City springs to mind, worked on programs where goods deliveries were restricted to certain time windows but it didn't prove to be entirely feasible, either politically or financially but it's an interesting question when you are looking at the connection between land use and transportation and you know in advance the kind of problems you are going to create for yourself. This is where having those responsibilities under one person is a really good thing. The transportation needs, the land use needs and the commercial needs are all pretty much tied in for me under my portfolio of responsibilities. I sit on the National Freight Committee for the Mayor and there is actually a lot of interest in both the infrastructure and funding sides as well as goods movement.

Cities such as ours, Chicago and New York that are at the nexus of several freight lines, are very focused on the smart movement of goods within their cities. We're finding that the freight and railroad sectors are coming to the table.

Basically though, it's all a question of balance. No one is going to get rid of cars and at least in my lifetime the bike population is not going to overtake the automobile population and everyone is a pedestrian at some point. My focus is getting everyone to move around Philadelphia safely and to get them home in one piece at the end of the day. To be a Thinking City you need the right combination of intelligent technology, the intelligent use of your existing technology and, crucially, the right leadership at the very top. The leadership needs the ability to look decades into the future and know what the city will need, from the State and Federal level, order to move in the right direction.

FYI

For more information about the city of Philadelphia and in particular the work of **Rina Cutler** and her Transoortation, Energy and Utilities department, visit **www.phila.gov** and **www.discoverPHL.com**

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The year of living sustainably

Only a month to go and Bristol will be Europe's Green Capital. The city's bid demonstrated 40 years of environmental efforts with real progress in areas such as food, travel, energy and waste. **George Ferguson**, the Mayor of Bristol, gives **Dagmar Köhler** an insight into the role transport plays in a sustainable city region, attitudes towards changes in the transport system and why international cooperation has been a major pillar of Bristol's path to success

Photos: Chris Bahn

> ***The cost to health services as a result is estimated to be up to £100m a year, making active transport an absolute priority in economic terms alone***

Bristol has been selected as the Green Capital of Europe 2015 – congratulations! What does it mean to you and for Bristol to be the Green Capital next year?
It means a huge amount, but we must ensure that it touches everyone's lives in the city. We are determined that all Bristol's communities and diverse cultures reap the benefits of the environmental initiatives and the increased attention and funding that we have secured for the Green Capital programme during 2015. There are strong existing networks between local communities. We shall work to empower people to ensure that the value of sustainable living is delivered across Bristol.

What role does a city's transport system play in it becoming a sustainable city, and ultimately to be awarded the Green Capital of Europe?
It is a vital one that makes a major contribution to the bigger picture of a healthy and sustainable city. Bristol is a complex, historic city making transport connections especially challenging. There is no simple solution to an unacceptably high level of congestion. We must pursue a flexible but high performing public transport network, encouragement of active transport in the form of walking and cycling, and a 'carrot and stick' approach to entice people out of their cars, and to share them, if we are to have streets that are no longer clogged with traffic, and air that is safe to breathe.

So is congestion is your major transport challenge? How will you tackle it in the future?
Bristol is a medium sized historic city with a high number of car commuters from a relatively prosperous city region – over 50,000 every day. The sad fact is that 9 out of 10 of these cars are occupied by a single person. This contributes to congestion – a major issue and cost for Bristol. Steps we've taken to minimise disruption include promoting mode change through the Local Sustainable Transport Fund and joint travel plans with neighbouring authorities, increasing capacity at our three park and ride sites and pioneering a new code of conduct with utilities in the city to improve co-ordination of planned roadworks. We're also rolling out Residents' Parking Schemes to many areas, implementing city-wide 20mph (32km/h) limits and investing hugely in the

George Ferguson, Mayor of Bristol

George Ferguson is the first elected mayor of Bristol since 2012, succeeding Bristol's former system of Lord Mayors – a civic and ceremonial role. Ferguson is the only independent to lead a major city in Britain, following a career as an architect, environmental campaigner and social entrepreneur. He has a broad variety of experience in urban regeneration, including founding his own theatre and brewery. Ferguson is Past President of the Royal Institute of British Architects (2003/5) and co-founder of the UK based Academy of Urbanism (2006). He led the team that secured Bristol the title of European Green Capital 2015 and is raising the profile of Bristol across the world as one of Europe's most liveable and creative cities.

The sad fact is that 9 out of 10 of these cars are occupied by a single person only. This contributes to congestion – a major issue and cost for Bristol

infrastructure for active travel options like cycling and walking and for better public transport.

Bristol's transport policy is encapsulated in the Local Transport Plan (LTP) that sets out the strategy from 2011 to 2026 and includes the four neighbouring municipalities. What useful experiences have you gleaned from working across municipal boundaries for transport planning?

Developing joint transport strategies with neighbouring authorities is essential if we are to reduce congestion and its cost to the local economy. The £200m (€255m) MetroBus programme, combined with park and ride is a major part of that, funded by the Department for Transport (DfT) with local contributions from the three councils involved, but we could benefit from an integrated transport authority, such as exists in London.

Our £80million investment in the Greater Bristol Bus Network, alongside the MetroBus scheme and MetroWest rail network, form the basis of a much cleaner, smarter, more connected transport system than currently exists. MetroBus has been designed to link and connect with existing rail and bus services.

My message to all cities is that we need to work as city regions to tackle poor transport. Bicycle loans and training programmes should be expanded along with taster bus tickets, smart ticketing, and travel planning advice to encourage use of other forms of transport.

Part of Bristol's Local Transport Plan (LTP) is to change the travel culture by promoting walking and cycling. Have you calculated the health benefits of the doubled modal share for cycling?

This is work that is well underway, along with a wide-reaching Mayoral Commission on Air Quality which will report in early 2015. What we do know is that the invisible occurrence of death linked directly with emissions from vehicles on our roads is significantly more than the very visible deaths caused by motor accidents. The cost to health services as a result is estimated to be up to £100m a year, making active transport an absolute priority in economic terms alone.

Park & Rides schemes have made a major contribution to tackling congestion; Bristol's involvement in the national Cycle to Work scheme is part of its Local Transport Plan; The city has doubled the number of cyclists over the last few years

How did Bristol convince the jury and become the Green Capital of Europe 2015?

Bristol is located in South West England and has a population of approximately 450,000 (nearly 600,000 in the metropolitan area). Bristol has implemented a long-term commitment to improving the environment in the city. Carbon emissions have been reduced by 15 per cent (2005-2010), despite a growing economy. This made Bristol the lowest emitter of the eight major English cities outside London.

Bristol's local road transport system is responsible for 27 per cent of the city's energy use and 20 per cent of the city's CO_2 emissions, producing 1 tonne per capita. Bristol has doubled the number of cyclists in recent years and is committed to doubling this number again by 2020 compared to 2010. Bristol has the ambition of becoming a European hub for low-carbon industry and demonstrated nearly 5 per cent growth in the green economy in 2012.

The city has committed a budget of €500m for transport improvements by 2015 and up to €300m for energy efficiency and renewable energy by 2020. The city is determined to make Bristol one of the most liveable and environmentally friendly cities in Europe.

Many cities face opposition against measures perceived to be threatening drivers. Do you have the support of citizens to make Bristol's transport system more sustainable?

I think I do in general, although the noise from some drivers might indicate otherwise! New transport measures will always be controversial and there has been some opposition to the introduction of 20mph limits in the city but also considerable parent and other support. I am determined that we continue to work with local communities to make our neighbourhoods safer and healthier places and have carried out an extensive consultation with local residents on the rollout of Bristol's 20mph zones with very positive returns.

There are proven safety and noise benefits to residential areas of reducing speed to 20mph. Research shows that the real impact on journey times for drivers is remarkably small but sometimes that is difficult to convince those who rush between junctions!

Carbon emissions have been reduced in Bristol by 15 per cent between 2005 and 2010. Does this include significant reduction of emissions originating from passenger and freight transport?

Measuring carbon emissions originating solely from transport across the city would require a major project and resources although it is apparent we are leaders in air quality measurement and in October we were proud to host an international masterclass on urban air quality in the run up to our year as Green Capital of Europe.

This event brought together policymakers, air quality experts, academics and practitioners to identify and explore current challenges. What we've learnt will help us put together a collective report to the European Commission on the experiences and opportunities for air quality management in European cities. Research by TRL has indicated that the use of generic cycles in calculating emissions may underestimate real emissions as the drive cycles do not take account of aggressive driving in real world situations.

The freight consolidation centre is a start in terms of reducing the impact of deliveries into the city, but until it is adopted by the major supermarkets and others it will not have a significant impact on air pollution reduction in the city. I would like to be able to take stronger action on this front.

Bristol is well-connected on the European level and beyond, including involvement in CIVITAS, city networks and non-European partner cites. What

> ***Whether it's these smaller ideas or thinking about large scale partnerships, our cross-border cooperation opens up all sorts of doors***

makes cross-border cooperation so valuable for Bristol?

When I came into office I was very clear that we needed to think more broadly and make the most of the funding, learning and good practice that the world has to offer. One of my early initiatives was opening up city centre streets to people on certain Sundays and closing them to vehicles, an idea borrowed from Bordeaux and Bogota, which has been a tremendous success in opening people's eyes to the possibilities.

Whether it's these smaller ideas or thinking about large-scale partnerships, our cross-border cooperation opens up all sorts of doors and helps put Bristol on the international map, something which is absolutely vital as a modern city which is a world leader in creative, green and smart industries.

For example we're piloting the successful US concept of Cities of Service in the UK, we've joined the Polis network, are one of The Rockefeller Foundation's 100 Resilient Cities and are benefiting from a variety of European funding. The European relationship is incredibly important, particularly as Bristol is Green Capital for 2015. We've recognised this recently by appointing our first permanent representative in Brussels.

Has the concept of 'Smart Cities' caught Bristol's attention?

Absolutely. We were a runner-up in bidding for Government funding, securing £3m which we're putting to good use. We've opened up over 100 data sets to enable people to develop. These data sets include real-time air quality readings and traffic speeds across the city.

Our aspirations go much further, such as our bid to pilot driverless cars in the city on the basis that if they work here they can work anywhere! We are also working on a fascinating project with the University of Bristol to trial superfast and experimental connectivity technologies as a living test-bed. We are making use of a network of ducts to install fibre to link up schools, community centres and local businesses. We want to invite hi-tech companies to use the network to develop technologies that require huge amounts of bandwidth – essentially challenging people to try things in a live environment. Meanwhile, as one of the cities awarded a share of the Government's Urban Broadband Fund, 'Gigabit Bristol' will improve broadband speeds for up to thousands of small businesses.

Bristol's Enterprise zone

On the green agenda we've got a huge amount happening, including setting up our own energy company, retro-fitting our own housing stock with renewable technologies and opening a council-owned wind farm. It's a very exciting time for Bristol as a laboratory for urban change.

FYI

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http://bristolgreencapital.org

http://www.bristol.gov.uk

http://www.bristol-china-partnership.com/

http://www.bristolisopen.com

http://opendata.bristol.gov.uk

http://www.polisnetwork.eu/members/9/26/Bristol/

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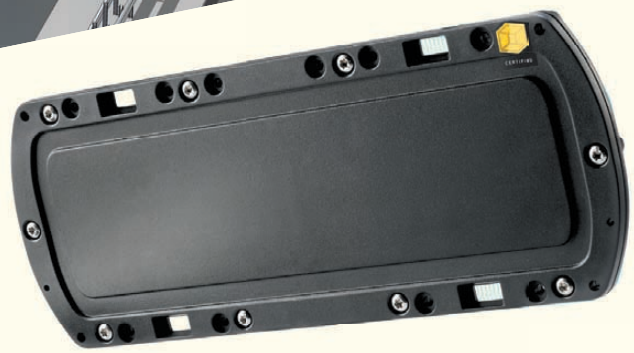

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THE QUEEN'S AWARDS FOR ENTERPRISE: INNOVATION 2011

Smart solutions, increased happiness

© Andrius Ufartas/BFL photo

Vilnius is a hub for political, economic, social and environmental change in Lithuania – and Eastern Europe as a whole – and remains one of the fastest-growing cities in the region, as **Anton Nikitin** explains

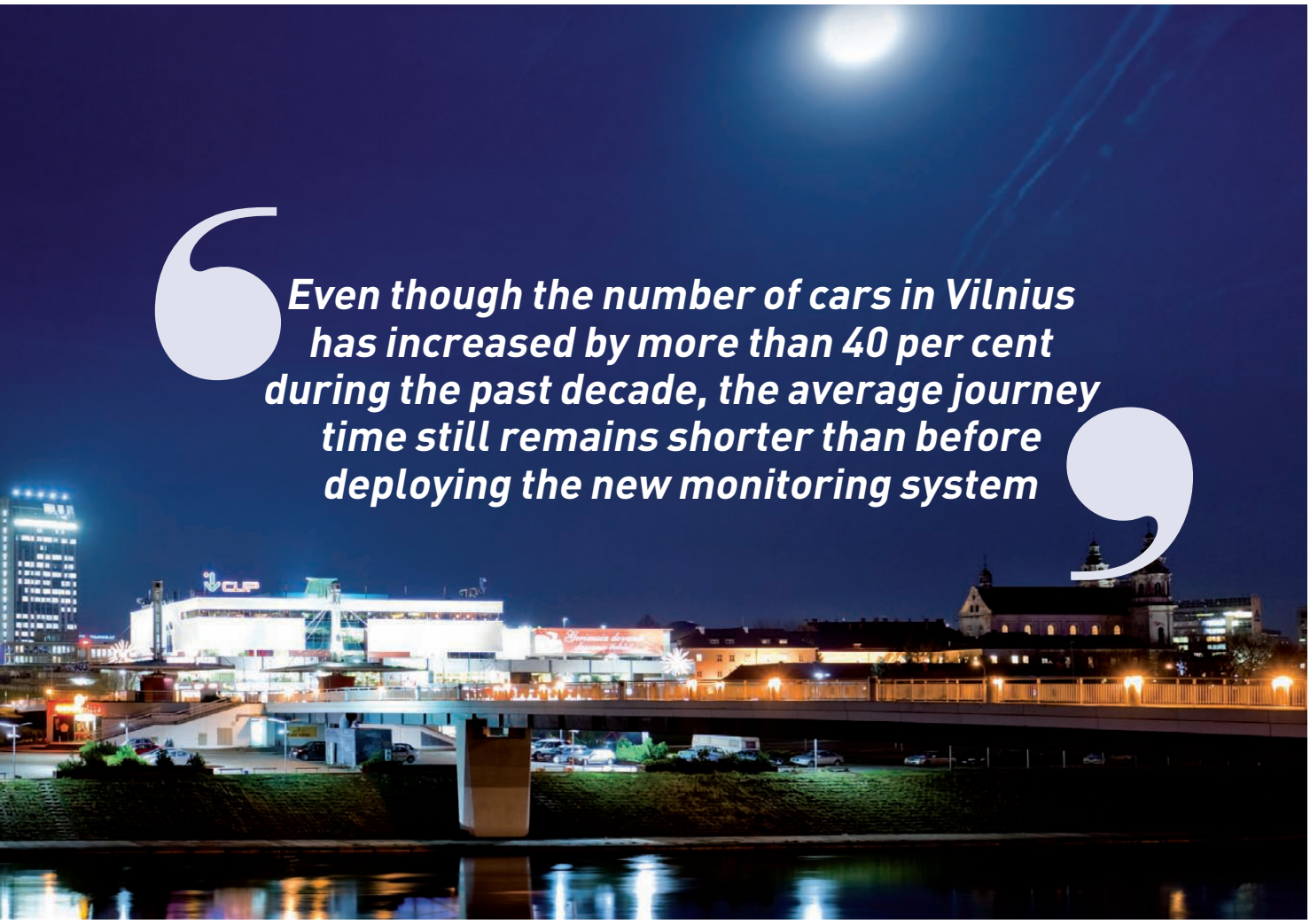
Some years ago a decision to start with smart solutions for inhabitants and their e.participation in the city's decision making was made by the Vilnius government and one of the results has been what could well be the first time that a European city has totally modernized its entire lighting system all at once, with the deployed high efficiency modern LED lighting fixtures set to reduce energy consumption in the city by more than 70 per cent.

More than that, the City of Vilnius can provide the fastest Internet connection in the world, great quality of life and the cleanest water and freshest air in Europe. The latest study by Eurostat shows that 93 per cent of people are satisfied with living in the City of Vilnius.

THE NATURAL SWITCH FOR THE TECHNOLOGY

Smart technology continues to expand and become an integral part of our everyday lives. Forgetting your phone at home can ruin your day more than leaving your wallet behind. Applications geared for smart devices make life easier both for individuals and businesses. As technology advances, smart solutions begin to change the way entire cities and even countries function and contribute towards forming new directions for change.

The capital of Lithuania stands out in Europe as well as the entire world in this area. Our unique status is called Smart Vilnius. As stated by the founder and supervisor of this project, Vilnius City Council member Indrė Jakaitytė, the priority for Smart Vilnius is to harness technology and solutions that



The *New York Times* named Vilnius as one of the top 10 best-managed cities in the world

make life easier for the people who live in the capital and to make the services offered by the city more effective and accessible.

SMARTER CITY MANAGEMENT FOR BETTER ECONOMY

The city's smart and forward-thinking management has been recognised by analysts and the media, with the rise in foreign direct investments and their effectiveness also being reported. The *New York Times*, in its article "How Innovative Cities Are Thinking, How They Work" named Vilnius one of the world's Top Ten best managed cities, alongside of Berlin, Barcelona, Cape Town, Copenhagen, Montreal, Santiago and, Shanghai. Cities were evaluated not only by their quality of life but also by how wisely and well they are managed.

"It has been Vilnius' priority to become open to citizens and those who are willing to make business in the city. We believe that smarter city management was the key to make Vilnius a convenient place to live and do business," said the Mayor of the City of Vilnius, Arturas Zuokas.

Vilnius city government introduced the e.participation platforms, which involved citizens in the decision-making processes of the city. The website of Vilnius was developed to give all the information on city agenda and now allowed citizens to express their opinions and suggestions by interacting with the City Council members, participating in polls or preparing e-petitions or even voting for the topics that are in the Council's agenda.

The platform also makes it easy to get one of more than 100 online services for business and residents provided by the City — from licensing to various permits or documents.

Mayor Zuokas also added that it would be hard to find another country in Europe that is so in tune with the needs of investors as Lithuania.

"Vilnius, as a capital, is a business-friendly city and is trusted by such high calibre companies as IBM, Barclays, Western Union, Teva Group, Thermo

Fisher Scientific, CSC and others. Lithuania, as their choice for an investment, proves that we are a very sound place for international establishments to do business", Mayor Zuokas suggests.

This was recognized by experts and the media, such as the *FDI Magazine* of *The Financial Times* which has recently placed Vilnius on top of the rankings for investment performance or "Best to invest" rating, which has had Vilnius sixth amongst the metropolises of Eastern Europe. The City is also is recognized to have highly qualified human resources, 97 per cent of which speak at least one foreign language.

IMPROVING INFRASTRUCTURE AS A KEY TO THE GROWTH OF THE CITY

For the past decade, the City of Vilnius has been taking an integrated transport management approach and seeking the best suitable IT solutions to improve its public transportation. Many different projects implemented in transportation sector improved the mobility of both citizens and city guests.

The traffic monitoring and regulation system was deployed some years ago and all the traffic lights of the city were renewed and connected into a single traffic-monitoring centre. It has made a tremendous impact on the traffic situation in the city — even though the number of cars increased by more than 40 per cent during the past decade, the average journey time still remains shorter than before deploying the system.

The public transportation system also went through positive changes — the City of Vilnius presented the single card for public transportation together with which dozens of new vehicles were acquired and the fast track buses were presented to make journeys more comfortable and fast. What is more, the bike sharing system has been launched to extend the possibilities of moving in the city and has become one of the most popular means of transportation around the city centre.

The City has recently launched the new mobile applications package of Smart Vilnius. The newly presented m.Ticket app allows commuters to buy mobile tickets, plan a journey and see the live timetables of the public transportation. The m.Parking app which has become extremely popular after its launch, has a start-stop function that allows users to pay only for the exact real parking time instead of an hourly rate and forget about coins that were needed to be slotted into parking machines. This app now has had more than 50,000 downloads and the numbers are still growing.

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Smart Vilnius Project Coordinator Indrė Jakaitytė

IBM RECOGNITION

Smart Vilnius has also attracted the notice of giants of the IT industry. Vilnius won the IBM Smarter Cities Challenge at the end of March 2014 and beat hundreds of other cities for a prize valued at US$500,000. The finest experts in the world have provided Vilnius with their ideas, recommendations and conclusions about the city's transportation, its control, further perfection of the smart system and how to use the data that is collected.

Six experts from the United States, Canada and India analysed the city and drew the conclusion that Vilnius has a strong foundation of technology enablers that have already been implemented and which can be leveraged to achieve the vision of the #1 Smarter City in Central & Eastern Europe. IBM's executives also stated that Vilnius has a group proactive, motivated and innovative leaders determined to leverage technology to increase residents quality of life, productivity and economic growth.

According to the Smart Vilnius Project Coordinator Indrė Jakaitytė, this is a significant win and the input of the experts is very important in further developing the project. It's also important recognition for the capital and a big step forward in becoming a Smart City leader in the entire region.

Vilnius is now working on the plan which will help the city to improve its transportation systems – from traffic light management to parking to public transport planning. The main scope is to merge all the components and deploy different management and prediction tools therefore creating Vilnius Intelligent Integrated Transportation System (VIITS).

The system will collect data across all the city

The newly presented m.Ticket app allows commuters to buy mobile tickets, plan a journey and see the live timetables of the public transportation

data sources, integrate and analyze it. VIITS will also apply analytics to manage, predict and optimize city's transportation thus improving travellers' experience. This integrated real-time view of Vilnius private, public and emergency traffic will not only allow to predict journey duration across city locations and use the real-time data to predict traffic volume but also inform commuters and emergency services about the real-time situation and manage the traffic, scheduled changes according to the predicted information.

The improvements will also affect the route planning for commuters in the city that will include all kinds of transportation from buses to city bikes and, in the near future, car sharing system. The route planner, as a part of VIITS, is to be made as a smart tool to easily plan journeys made by car as well — it will foresee the traffic situation, inform drivers or public transportation users about the traffic jams and suggest routes to avoid them.

The long-term outcomes of the integrated approach is to achieve that by 2020 there would be 50 per cent of commuters using public means of transportation and the other half would be using private cars. At the moment the proportion between car drivers and public transportation users is 60:40. The city, after deploying VIITS, will implement the key policy objective of Vilnius Strategic plan, namely sustainable urban transport system development, increasing the mobility of the population using public and non-motor transport, as well as introducing Park & Ride and Bike & Ride systems and reducing CO_2 emission and congestion.

PROUD TO LIT THE ENTIRE CITY WITH LEDS

Over the next two years Vilnius will be modernizing its street lighting. The deployed high-efficiency modern LED lighting fixtures will reduce energy consumption in the City by more than 70 per cent and the advanced technology will save over €2m annually on electricity. The project will be implemented through a Public Private Partnership (PPP) by Gemmo SpA of Italy and is considered to be one of the best practice examples of a PPP in the European Union.

"This is probably the first time in Europe that a city's entire lighting system has been totally modernized all at once. Not only will it save our taxpayers money, but it will make the streets even safer at night and cut down on traffic accidents. This new best practice model will also serve to reduce environmental pollution and that's important", says Mayor Arturas Zuokas.

Marie Donnelly, Director of the European Commission's Energy Directorate, spoke highly of the Vilnius lighting overhaul project. She noted that it is a good example for the EU on how to save energy and implement the best sustainable environmental solutions.

SMART VILNIUS – FOR EVERYTHING IN LIFE

There are plans that Smart Vilnius will eventually encompass not only the city transportation system and e-democracy but will unite an entire spectrum of smart solutions for the city. There are also exciting plans for new initiatives that will address energy, e-schools and free WiFi in city parks and public spaces as well as other smart city initiatives.

"All the decisions and improvements we've been making on daily basis, whether it was a transportation system or the new citizen's participation platform, were small yet significant steps to becoming a smarter city. Vilnius right from its establishment has always been a prosperous and fast-moving, tolerant and peaceful and city that welcomes all cultures and ideas," explains Mayor Zuokas.

"In fact I'd like to welcome all the readers of *Thinking Cities* magazine to our beautiful city and evaluate Vilnius and its progress for themselves."

FYI

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BHTRANS is the Brazilian city of Belo Horizonte's transit agency, responsible for planning, management and supervision of the city's transport system. BHTRANS' CEO **Ramon Victor Cesar** told *Thinking Cities* about sustainability in transport planning, the city's international networking and its smart city vision

Sustainability on the horizon

Ramon Victor Cesar, CEO of BHTRANS

One of the great challenges in any Brazilian city is related to the growth of car use by both the middle class and the lower income classes

Belo Horizonte and Polis are working together in the FP7-funded SOLUTIONS project, in which the city is assessing opportunities for the transfer of transport solutions. What are the most pressing transport challenges in Belo Horizonte?

The biggest challenge for mobility in Belo Horizonte is to reverse current trends and make urban mobility more sustainable. We need to integrate the mobility policy into the urban policy. We need to improve the public transport system, to encourage non-motorized modes and achieve a more rational use of the car in the city.

What does Belo Horizonte's modal split reveal about the current trends?

Since 1972, Origin and Destination Surveys are conducted in Belo Horizonte, which serve as the basis for planning, implementation and monitoring results. The most recent Origin and Destination Survey from 2012 points out a strong transformation of urban mobility and for the first time ever, individual motorized modes exceed the use of public transport modes!

Modal Split in Belo Horizonte 2012:

Walk	34.78%	**Walk**	34.78%
Bike	0.41%	**Bike**	0.41%
Public transport	28.06%	**Bus**	21.89%
		Metro	1.75%
		School transport	4.42%
Individual motorized modes	36.75%	**Car (driver)**	22.32%
		Car (passenger)	9.07%
		Motorcycle	4.00%
		Taxi	1.21%
		Others	0.15%

Source: Agência Metropolitana BH – Origin and Destination Survey 2012.

Comparative modal split: Belo Horizonte (2012), São Paulo (2007) and average of Brazilian cities with more than 1 million inhabitants (2012)

	Belo Horizonte (2012)	São Paulo (2007)	SIMU – ANTP Average of cities with more than 1 million inhabitants (2012)
Public transport	28.1%	36.5%	31.8%
Individual motorised transport	36.7%	29.5%	32.6%
Non motorised modes	35.2%	33.9%	35.6%

Source: Standards values to compare, using: Agência Metropolitana BH – Pesquisa Origem e destino 2012; Metrô SP (http://www.metro.sp.gov.br/pdf/mobilidade/pesquisa-mobilidade-2012.pdf)
ANTP (http://antp.org.br/_5dotSystem/download/dcmDocument/2014/08/01/CB06D67E-03DD-400E-8B86-D64D78AFC553.pdf)

How does this compare to that of other cities in Brazil?
Only a few Brazilian cities monitor the evolution of the modal split through surveys but São Paulo is another city with a consistent historic series to which we can compare. Also, the National Association of Public Transportation (ANTP) conducts a national balance of urban mobility information through the Information System for Urban Mobility (SIMU), which provides average values for cities over one million inhabitants. In comparison to São Paulo and "the average Brazilian city", individual transport modes have an exceptionally high share in Belo Horizonte while public transport is underrepresented.

Is this a challenge arising from the growing middle class and the improved economic situation of citizens in Brazil?
One of the great challenges in any Brazilian city is related to the growth of car use by both the middle class and the lower income classes. The intense changes in modal distribution are associated with doubling the fleet of vehicles in the past 10 years, motivated by the increase in the purchasing power of the population and increase of credit lines to purchase.

One of our strategic goals is to make public transport more attractive compared to individual transport. If urban policy aims to reduce distances, the deployment of BRT (Bus Rapid Transit) Corridors in a structural network is crucial to obtain the desired quality. In 2014, the first two BRT corridors were implemented in Cristiano Machado Avenue and Antônio Carlos Avenue and a corridor of High Level of Service Bus in Pedro II Avenue.

Belo Horizonte's mobility plan, PlanMob-BH, was developed jointly by BHTRANS and the City Council. Is sustainability an explicit objective?
In fact, the Urban Mobility Master Plan of Belo Horizonte (PlanMob-BH) can be considered what the EU calls a SUMP (Sustainable Urban Mobility Plan), because its principles, guidelines and objectives are explicitly sustainable. PlanMob-BH is the first mobility plan in Brazil that complies with the resolutions of the recent National Urban Mobility Law (Law 12.587, of 1/3/2012), and considers the following four basic challenges:
1 Integration of mobility into urban policies;
2 Improvements of public transport;
3 Encourage non-motorized modes; and
4 More rational private car use.

REFERENCES

1 http://www.antp.org.br/website/produtos/sistema-de-informacaoes-da-mobilidade/show.asp?ppgCode=63451652-6DEE-4CCE-81D5-1162F86C1C19
2 http://www.bhtrans.pbh.gov.br/observatorio
3 www.turblog.eu

For the first time, the individual motorized modes exceed the use collective modes

MOVE Bus Rapid Transit in Center City

Cycling accounted for 0.4% of all trips in Belo Horizonte in 2012

The plan's starting point was that we realized a strong tendency toward unsustainability. What we did was to build scenarios that consider policies and projects.

But rather than thinking that the PlanMob-BH would solve all our problems, we emphasize that implementation needs to be gradually adjusted based on monitoring results and problems delivered by the "Urban Mobility Observatory". The process needs to be supported by increasing political will of more sustainable measures.

What about the people – do you have the support of citizens to create more sustainable transport?

We still can't say that there is unrestricted support of our citizens towards sustainable transport in Belo Horizonte, although support is increasing.

In 2014, a wide public discussion about the PlanMob-BH was held at the Fourth Conference of Urban Policy and the majority of proposals were

Photos: BHTRANS

Pedestrian treatment – Caetés street (before and after)

validated and supplemented. An Urban Mobility Observatory[2] was created with the support of almost 60 stakeholders who have joint strategic objectives. Nevertheless, when the subject is restriction of the use of the automobile, clearly this consensus does not exist.

Can international cooperation such as your involvement in European initiatives play a role to achieve a more sustainable transport system?
Belo Horizonte's participation in European projects is a rich learning opportunity and encourages us to implement new practices towards sustainable mobility. Between 2009 and 2011 BHTRANS participated in the Turblog WW Project[3] that brought great results on urban logistics. Now, within the SOLUTIONS Project we move forward with the topic of urban freight movement, tools to implement the mobility plan and infrastructure for bicycles. We are partnering with the city of Bremen, Germany and are supported by experts from various clusters of the project.

Belo Horizonte hosted six 2014 FIFA World Cup games. Prior to the games you worked with the city of Stuttgart, a Polis member who hosted world cup games in 2006. What could you learn from each other?
In 2008, Belo Horizonte signed a cooperation agreement with the city of Stuttgart to transfer some of the German knowledge and experience gained during the 2006 World Cup. A BHTRANS staff member went to visit Stuttgart's traffic control centre, which really helped us to understand the importance of operational planning of major events. On this basis, we worked hard to prepare detailed plans that were successfully tested during the Confederations Cup in 2013. We then applied them with more tranquillity during the World Cup.

How did you manage the protests against the World Cup in Belo Horizonte? Were some of the protests actually related to transport in any way?
The protests during the World Cup in Belo Horizonte were controlled by Military Police actions, with the support of BHTRANS for the traffic questions. We faced violent actions on the first day of manifestations, while the following days protesters were acting in a more peaceful and playful manner, with creative and artistic interventions. One of the major themes of the event remains the reduction of transport fares, but during the World Cup that theme had less importance.

Photo: BHTRANS

BHTRANS operation centre

The concept of 'smart cities' is heavily discussed currently. Is it such a big issue in Brazil as well and what is your vision of a smart city?
In Brazil, the debate about Smart Cities is picking up speed. The discussion is closely linked to increasing use of technologies and to the democratization of access to the Internet and innovative ways of communication and information. We believe that building a truly smart city is about more than technological dissemination, while technology is necessary though.

In the case of transport, Belo Horizonte was one of the first cities to have partnered with Google to make information available on Google Maps and our goal is to make more information available for free day by day to support the development of apps. This year, the new headquarters of the Prefecture-COP have been inaugurated, which include in addition to other municipal services, an operational control Centre of transport and transit, making intense use of ITS tools.

FYI

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Environment and Health in Transport

This section looks at the impact that urban and regional mobility has on the environment and on health, and how the adverse impact can be reduced

- **Sustainable transport** – Why does it have to be hydrogen *versus* electric?
- **Malta** – The impact of a National Electromobility Action Plan
- **Göteborg, Sweden** – The city that wants to get to know its cyclists
- **Active travel** – It's not just the people that benefit
- **Ebbsfleet, UK** – A new Garden City for the Garden of England

Malta has made the take-up of electric vehicles one of the key elements of its National Electromobility Action Plan

Conflict of interest

Bert Witkamp examines the pros and cons of hydrogen fuel cell vehicles and battery electric vehicles and wonders: are they foes or allies?

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For the past few decades there has been something of a "war" between the proponents of full cell electric vehicles (FCEV) and battery electric vehicles (BEV).Both sides claim that they are the only option for the future and will ultimately be the "winner" – however, both may become losers in this battle.

Many political decision-makers are likely to wait and see which technology will become the winner and this means that they are not committing themselves to any new technology. In this situation everyone is going to lose because it is clear that the transformation to electric driving will at worst not happen and at best be delayed without the political leadership and support from these self same decision-makers.

We can argue that the first political drive towards low or zero emission vehicles as a viable alternative for traditional combustion engine vehicles came from California over 20 years go. In 1990 the Low Emission Vehicle (LEV) was introduced in California with the aim of reducing emissions from mobile sources. The well-known Zero Emission Vehicle (ZEV) regulation was actually introduced as part of this LEV and initially went largely unnoticed.

ZEV required 2 per cent of vehicles sold to be zero emissions by 1998 and 10 per cent by 2003. At the start, this could only mean electric vehicles as no other technology was available. Very strong lobbying from OEMs began when they realized that California would not abandon the regulation and they started to understand the implications. They did not want to be forced to produce something for which there is no demand and wanted flexibility.

In parallel, low emission targets were developed on the national level together with some OEMs such as Hyundai, Ford and Honda, who wanted to participate but on the condition that in the zero emission vehicle mandate an extra option be introduced – the over-compliance credits to compensate for the California EV requirements.

It is argued by some that following this development, OEM's started to use the development of the much less mature FCEV technology as a delaying tactic, something analysed in detail by Joeri Wesseling[1] based on anynomous intervies among CARB employees, OEM employees and EV advocates. From this he has observed that in the period up to the 2003 rule-making, car manufacturers focused predominantly on Neighborhood EVs and EVs in complying with the ZEV mandate, with some OEM's lobbying for the option to focus on FCEV commercialization only although it was further from commercialization. Also, many EV advocates believed that CARB was favoring HFCVs and that car manufacturers used FCEV technology as a defensive distraction

Within OEMs and suppliers the need to focus the often-scarce resources in one major issue that is impacting priorities

Is this really the start of a clean fuel war?

tactic to forestall EV commercialization. ''So instead of producing 4.000 EVs, they wanted to produce 30 test HFCVs,'' which is much cheaper of course. Using that argument, their lobby convinced CARB that no additional HFCVs were necessary to comply with the ZEV mandate. The media played a large role in this debate.The media played an important role in these tactics.

THAT WAS THEN...THIS IS NOW

This situation has actually not changed very much over the last 20 years. Hydrogen has not yet realized its often "promised" zero emission solution into reality for mobility – only a few dozen demonstration hydrogen cars are on the roads today. Battery-operated vehicles have made decent inroads and we can now count them in the hundreds of thousands. But in reality of course, combustion engine vehicles using fossil fuels remain king and there are many forces at play trying to maintain that *status quo*.

So what next – a clean fuel war? In the press and other media, the next "war of clean fuels" is already being announced with some of the large OEMs supposedly having made final technology choices of battery electric versus hydrogen. Some like to divide the OEMs into three camps: hydrogen (Toyota, Honda, Hyundai); electric (BMW, Nissan, GM) or "not yet decided" (pretty much everyone else). However, the reality is a lot more complex and most OEMs are following all development closely and deciding on their strategic options per fuel, leading, following partnerships or waiting to see on a case-by-case basis.

So although one can observe that nothing has changed very much over the past two decades, the technology choice is still not being made, the costs are still too high and the infrastructure problem has still not been solved. In reality, the status in 2014 has evolved dramatically. Both hydrogen concept cars and battery electric cars have demonstrated that nice looking and fully functioning cars can be built – in other words, cars that people actually want to buy! Tesla is an excellent example of a car manufacturer that is showing that electric cars can be attractive, high-performance and possessing a range that is more than enough to convince many people who were previously driving large BMWs, Audis and other prestige makes and models to make the switch to full electric. Tesla has proven wrong many critics who have been advocating that electric cars are maybe a solution for small, city vehicles but surely not to compete with "real" cars. Tesla's Model S is a very palatable answer to a potentially difficult question.

A PHONEY WAR?

So, will there be a war between

hydrogen and electric cars? If we want to believe some of the media the war has already started, however the real question is whether a choice between the two technologies really has to be made. What are the potential reasons for a war? Competing for public resources and subsidies to do research and development into building charging infrastructures is one reason. Within OEMs and suppliers the need to focus the often-scarce resources is another issue impacting priorities. A more sinister reason is that lobbyists trying to maintain the dominance of the combustion engine as the favoured power source proclaim that as the technology choices are not yet being made it is not wise to make any decision about which one to support. In other words, it is best not to do anything yet, maintain the aforementioned *status quo* and wait and see how the technologies develop.

That OEMs and other private stakeholders have specific interests in one technology or another, or even want to maintain the *status quo,* is of course a very understandable part of our market economy. However, from a societal point of view clear choices have been made in many countries and regions that suggest we do want to move to a different society. Part of this is the shift towards clean fuels for transport.

And what about the costs? As discussed earlier, alternative fuel cars have already shown that they can be high performing and attractive for consumers. In Norway, for example, it is now evident that on an equal cost basis, consumers are moving towards electric cars that now have a market share of more than 20 per cent for new car sales. There is now a very wide consensus among experts and industry that by around 2030 all technologies for cars will converge and be in the same ballpark; therefore in terms of direct costs for the consumer clean fuel cars

Is it really this simple? A straight choice between Hydrogen, fossil fuel and electricity?

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will become a cost-neutral option. Having said that, the speed at which batteries are improving in terms of cost, performance and weight reduction, this could well happen much earlier! But already today, taking into account incentives and individual situations, electric cars can already be cost-competitive.

CLEAN GETAWAY

Clean fuel has now become a driver in many countries (in the US, California in particular, as a drive for cleaner air and in the EU as a drive for a low CO_2 society) seeking benefits in several areas at the same time. Yes, it reduces CO_2 emissions and it does make our air clean from fine particles, NO_x, CO_2 and many other components for which evidence is growing that the actual impact on our health and well-being is much greater than thought initially and which is costing society hundreds of billions of euros per year...but clean fuel is also providing many developed and developing countries an important means towards independence from fossil fuel imports.

The EU alone is importing €1 billion per day of fossil fuels, money which is not staying in the local economy providing a source of investments and jobs. In addition, it also threatens political independence and democratic values as we now see in the Ukrainian crisis.

From a high level point of view, the political will to make the change towards clean fuel-driven transport is there but uncertainty about technologies, conflicting views on what to support or to choose are actually delaying the transition. As such the "fuel cell versus batteries war" is mainly serving the interests of those who do not want to see changes happen.

A DEGREE OF COMMONALITY

Before we explore the differences between hydrogen and battery electric cars, let's first look at what are actually the common elements of the two technologies.

The EU alone is importing €1 billion per day of fossil fuels, money which is not staying in the local economy providing a source of investments and jobs

From a technology point of view, both technologies have an electric drive train with high efficiency and silent electric motors. Both have a battery on board to provide the electricity to power the motor and to capture braking energy. Both emit zero harmful components, hydrogen cars emitting water (vapour) and BEVs no emission at all, apart from the non-exhaust emssions from tyre wear, brakes and the road surface. Interestingly, lightweight ultra-strong carbon fibre is of high interest both for hydrogen storage tanks as well as BEVs, for which light weight is essential to reduce the battery size.

The structural difference is limited to the question of where the electricity comes from to drive the car. Hydrogen cars carry compressed hydrogen in a carbon fibre tank use oxygen from the ambient air which is converted into electricity and water in a fuel cell. The main advantages being promoted are the range of the car and the rapid fuelling time, with the major drawbacks being that hydrogen is currently being made out of fossil fuels and will remain relatively costly.

BEVs have stored electricity in the large battery that needs to be charged through the grid. The main advantages are the high-energy efficiency, while the main drawback is the limited range and longer charging times. As previously mentioned, costs for both technologies are not yet at a competitive level and the infrastructure is not yet at an adequate level.

THE HYDROGEN ECONOMY

A discussion is often held in the context of looking at competing clean fuel car technologies as if this is an isolated environment that can be optimised as such. On the contrary, it now becomes evident that both from a cost point of view as well as a technology point of view we have to take a much more holistic approach in order to compare apples with apples.

Firstly, most technology comparisons exclude externalized costs related to health and the environment caused by car emissions; climate change; the economic and political costs related to the fossil fuel dependence; and the current societal costs related to the fossil fuel infrastructure. Next, cars are only part of our transport structure and we need to look at other forms of transport as well as heavy duty trucks and buses which are responsible for a large part of the problems and generated societal costs.

The hydrogen economy has often been hailed as the solution to all our energy problems, but this has not materialised. However, it may very well be that hydrogen can play an important role in the future. Utilities that are at this moment building wind and solar energy facilities are now starting to think: "how can

It's not just electric private cars that are seeing a notable upswing in uptake

Photo: Kevin Borras

we balance this?" This is where hydrogen could come in as storage medium.

Urgency begins to build up. Within the European Commission they have organised a Strategic Energy Technology Plan (SET-Plan) with several different initiatives (wind, solar, nuclear, fuel cells, carbon capture and storage, smart grids, smart cities). These were initially independent initiatives but now they are starting to consider how all these separate elements could and indeed should work together as it does not make sense to keep these independent initiatives.

In this context, the Joint Research Undertaking Hydrogen (JRUH) in the EU aims for much more than "simply" putting hydrogen vehicles on the road. JRUH is a public private partnership supporting research, technological development and demonstration activities in fuel cell and hydrogen energy technologies in Europe.

The three members of the Fuel Cells and Hydrogen Joint Undertaking (FCH JU) are the European Commission, fuel cell and hydrogen industries represented by the NEW Industry Grouping (New-IG) and the research community represented by Research Grouping N.ERGHY.Hydrogen.

Renewable energy (REN) is becoming mainstream – 56 per cent of newly installed power capacity globally was renewable energy in 2013, and in the EU this was 73 per cent (source: UNEP). REN is now providing 20 per cent of global power needs, of which half are from modern technologies.

In Germany in the first quarter of 2014, 27 per cent of the electricity produced was from REN and a record peak production of 74 per cent was recorded on 11 May.

Although REN generation provides possibilities to manage demand and supply changes, it is clear that storage of REN is needed in the future as more REN is produced. This is one of the main objectives of the EU Joint Hydrogen Undertaking project and pilot projects to prove the feasibility of power-to-gas at MW scale are ongoing, making Europe the leader in this area. For HFEV to become a long term success, clean hydrogen is a must. This in combination with the role hydrogen might play in providing an energy carrier for REN power generation a win-win situation might develop. Of course hydrogen fuel cells may also provide other stationary power solutions in the future.

HYDROGEN, FUEL CELLS AND BATTERIES FOR TRANSPORT

As discussed earlier, the transfer to a sustainable zero emission solution for cars is, from a technological point of view, a transition to electric driving as no other technological solutions are available at this point in time, nor is anything foreseen to be developed in the near future.

The focus of the article has been on the developments for cars, but heavy-duty freight vehicles, buses and other (off-road) vehicles are almost as big in terms of fuel need and emissions. Of course shipping and aviation are consuming significant amounts of fuel and emitting substantial amounts of harmful substances as well. Therefore, a

A transition to a real sustainable and zero emission solution is needed for shipping and aviation as well as these sectors are consuming significant amounts of fuel and emitting substantial amounts of harmful substances

transition to a real sustainable and zero emission solution is needed for these forms of transport as well.

With consensus building that the electrification of road transport will be at least a major part of the solution towards sustainable transport it is key to support the different technological solutions to get there. Although currently the contribution of both BEV and FCEV in reducing fossil fuel consumption is virtually zero, we are now entering a phase whereby the technologies are getting mature for BEVs and are in the commercialisation phase for FCEV.

With zero emissions technologies becoming more mature, cars that are acceptable for consumers start appearing on the road. While this will take several car generations to really materialize, the development from the supply and demand point of view is set in motion and in this phase the role of our political decision-makers is crucial in providing the incentives to overcome the problems in terms of deployment, including the realisation of new charging and fuelling infrastructures.

For BEV, charging can take place at different speeds: at home typically a standard (overnight) charging is sufficient and only small and in some cases no adaptations are required. In practice for BEVs most charging takes place at home or at the workplace and a fast charging network is installed in order to assure that BEVs do not get stranded somewhere and can cover large distances. The installation of fast chargers at, for instance, just 10 per cent of all 200,000 EU gasoline stations would cover virtually every major road in Europe at an estimated cost in the region of €300m–500m.

In time we will probably see this changing into a wireless charging infrastructure offering an easier charging option. Tesla is not even waiting and has put up its own supercharging infrastructure in the US and certain parts of the EU and is now starting in Asia. Tesla opened its 249th supercharging station on 12 November 2014.

In the EU, the FCH JU proposes for transport to realize large-scale hydrogen for fuel pilot in one country by installing 100 stations by 2015 and 1000 by 2020 while putting 500,000 FCEVs on the road.

While the costs for filling stations is estimated at around €1m each, this would be a €100m cost for the first phase, a limited amount bearing in mind at what is at stake. California is already implementing a hydrogen filling station network so perhaps we can state that the infrastructure issue is one that is no longer the major hurdle it was previously thought to be.

NO EMISSIONS, NO NOISE

Nobody can foresee which technology will ultimately be more successful in which area but most likely both BEVs and FCEVs will find areas where they can each contribute substantially to the realization of zero emission and silent transport. Although I personally believe that for road transportation of people battery-powered vehicles will become the mainstream solution, I also believe that truly clean hydrogen can become an important building block towards zero-emission transport, for example in the storage of energy and providing a solution for heavy duty freight transport on roads or perhaps water and air as well.

Regulators and politicians should be challenged to make the mind-set change that it is the combination and synergy of the battery and hydrogen (fuel cell) technologies that will reinforce each other when well exploited.

Looking at road transport, BEVs and FCEVs have far more plus-points from a technology point of view but they also both provide a zero emission, low noise solution in the city environment, not to mention a potentially fossil fuel-free transport solution – something that, inarguably, we need urgently.

FYI

Bert Witkamp is Secretary General of AVERE, the European Association for Battery, Hybrid and Fuel Cell Electric Vehicles. AVERE is *Thinking Cities'* partner on the topic of electromobility.

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REFERENCE

1 Wesseling, J.H., et al. Car manufacturers' changing political strategies on the ZEV mandate. Transport. Res. Part D (2014), http://dx.doi.org/10.1016/j.trd.2014.06.006

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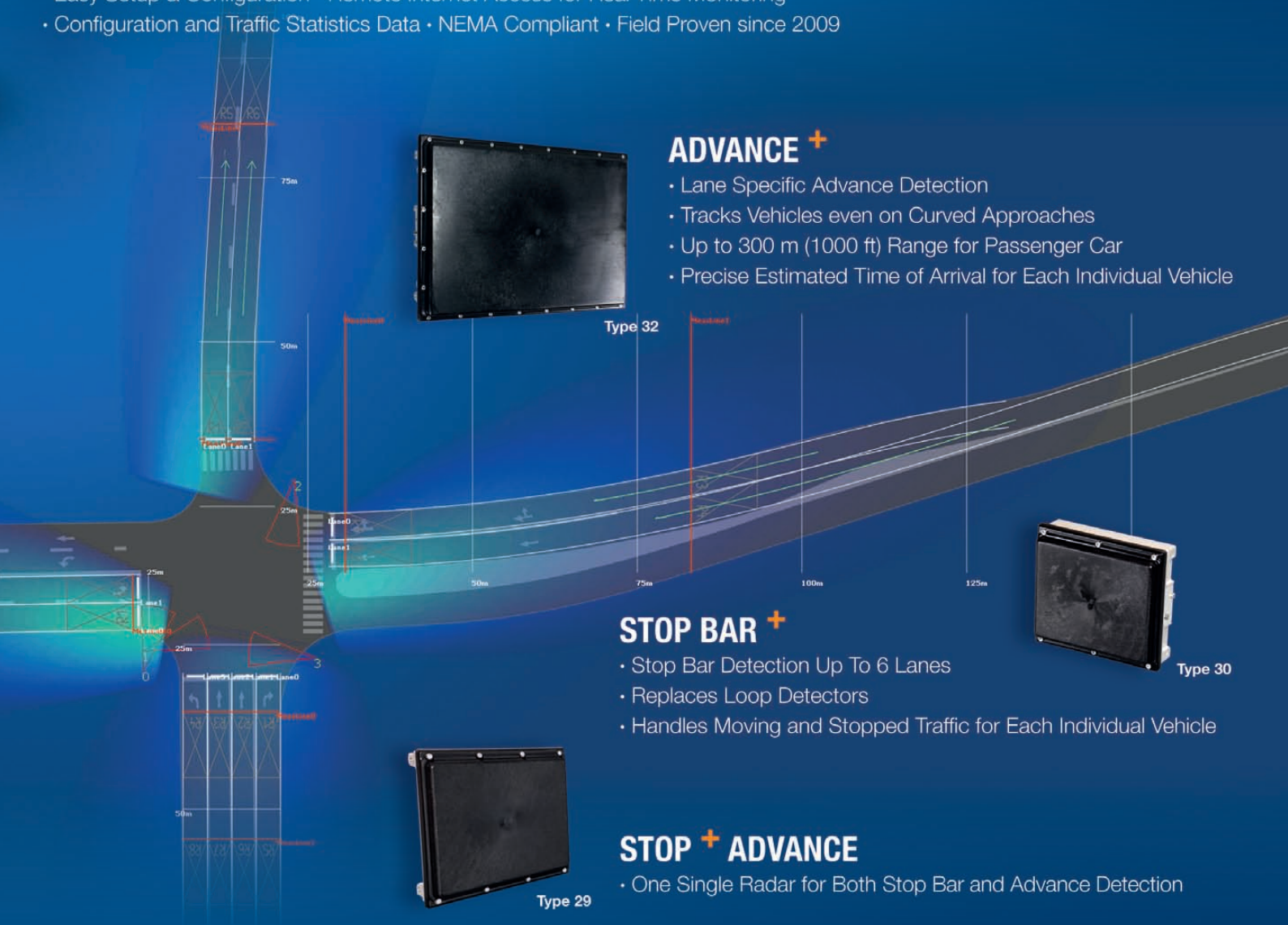

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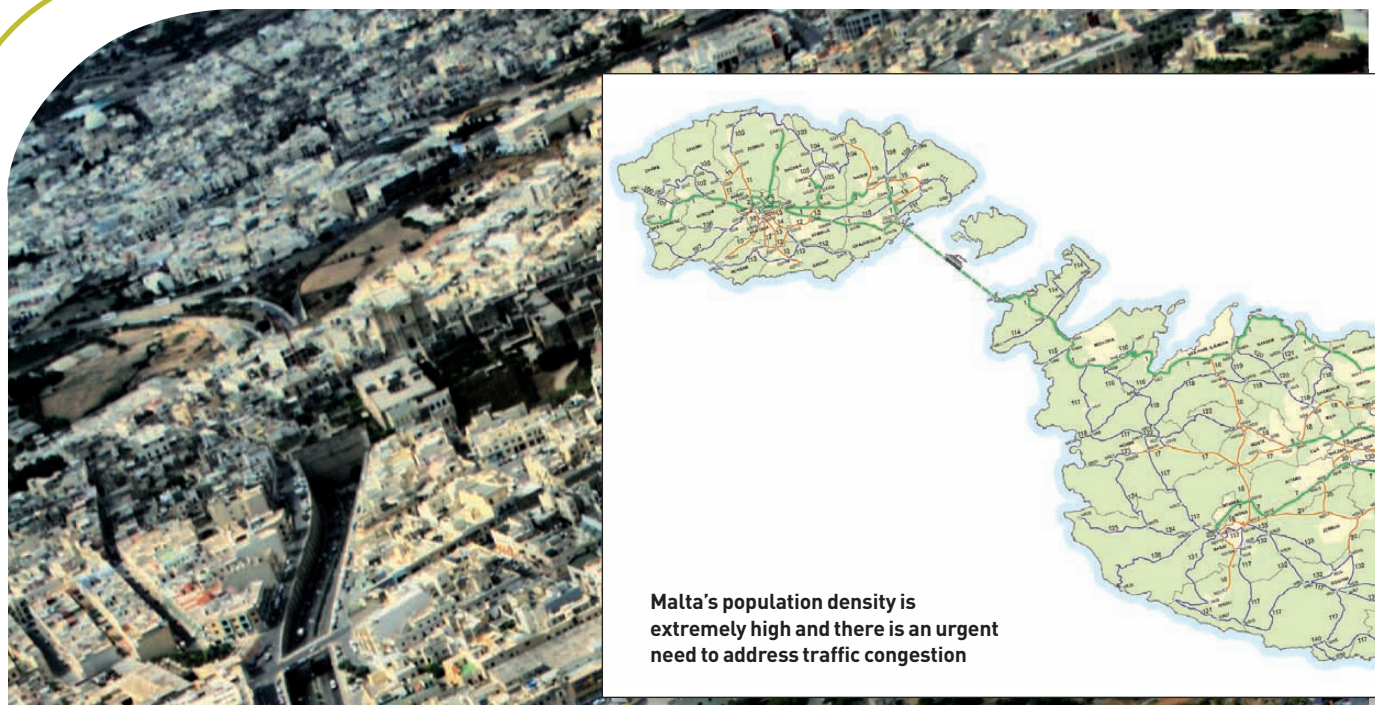


Malta's population density is extremely high and there is an urgent need to address traffic congestion

Electric island

Peter Paul Barbara examines why Malta's far-reaching National Electromobility Action Plan has created so much interest

Malta's National ITS Coordinator Peter Paul Barbara

Being such a small island, we are convinced that due to the short distances travelled in Malta, electric propulsion gives us the right solution to address most the environmental targets that need to be achieved

Malta has recently published an extremely comprehensive and highly detailed National Electromobility Action Plan. The formulation of the 76-page report was driven by a number of contributary factors. Among these factors are, notably:

- To address the need to improve national air quality levels;
- To address Malta's national Climate Change and Energy 2020 targets;
- To prepare Malta for the new propulsion technologies being introduced on the market;
- To lay down the necessary infrastructure and support that such technologies entail to make them successful;
- To make people aware of the new technology on the market;
- To assist in the market entry of the new technology;
- To try and achieve carbon neutral transportation;
- To address traffic-generated noise pollution;
- To start an education campaign and change in driving behaviour and journey planning.

Being such a small island, we are convinced that due to the short distances travelled in Malta, electric propulsion gives us the right solution to address most of Malta's environmental targets that need to be achieved both in the short and medium term. It is to be noted that the Maltese archipelago consists of two main islands, Malta and the smaller island of Gozo whose economy is predominantly agriculture-based. Both islands have their own economic branding, Smart Malta and ECO-Gozo. The Smart Malta brands come from the high level of Internet connectivity and extensive e-government services, (one of the highest in Europe) and from the fact that Malta is hosting a smart city based on the models of the Dubai Internet City and the Dubai Media City. On the other hand the ECO-Gozo Brand comes from Government Policy to conserve the unique characteristics of Gozo and sees it as an opportunity to make it an Ecologically Smart Island.

THE LAY OF THE LAND

The size of Malta, and the short distances between its major conurbations, Valletta, Sliema and Rabat mean that battery "range anxiety", often cited as a major sticking point in the take-up of electric vehicles across Europe, is entirely eliminated from the equation so the only hurdle remaining is the high price that one needs to fork out to purchase an electric vehicle.

With the current financial and economic situation as it is, the high cost of the vehicle will not help much in this regard. The Maltese Government is trying to address this issue by providing financial grants (which are available on first-come first served basis) for the purchase of Battery Electric Vehicles as well as Battery Electric Quadricycles which can go up to €5000.

Besides the number of grants available for the purchase of Electric Vehicles, there are other incentives available including a very low annual circulation tax of €10 per year which is negligible when one compares it to the hefty ICE propelled vehicles Annual Circulation tax which at times can even go up to over €1000 on certain vehicle models. In addition, even the registration tax of a Battery Electric Vehicle is considerably lower

Government is in the process of forming partnerships with the private sector to assist in market penetration for EVs

when compared to ICE vehicles. The Maltese registration tax, which is applicable for registering new and second hand vehicles put on Maltese roads is made up of a number of factors such as vehicle age, carbon emissions and length, the latter regarded as the congestion element. It is the latter segment of the tax that is only applied for Electric Vehicles. In addition for the short term, the Government is also considering other means of how to incentivise the purchase of electric vehicles in Malta.

Besides these measures, the Ministry for Transport and Infrastructure together with Transport Malta have started the implementation of a very ambitious programme for the deployment of Malta's National Electric Vehicle Charging Infrastructure which is being installed in a phased manner over a period of six years until a total of 500 charging units are installed nationwide. The composition of the national network will be made of both very fast charging stations as well as medium charging stations. This is part of the Malta National Electromobility Action Plan (MNEAP) that was published by Government in December 2013.

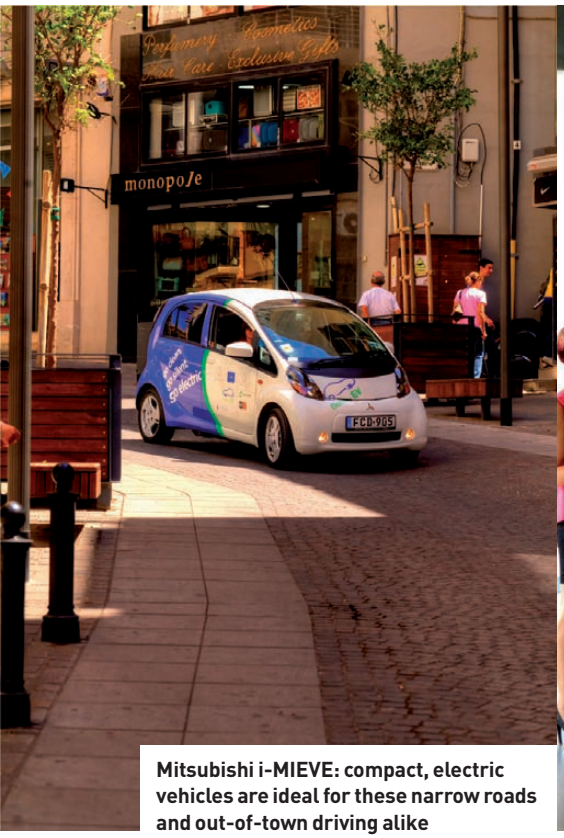
To implement this ambitious programme, the Ministry for Transport and Infrastructure together with Transport Malta has set up the Malta National Electromobility Platform (MNEP) of which I am its National Coordinator. The MNEP is chaired by the Minister for Transport, Hon Joe Mizzi himself, a strong signal by Government to show its commitment towards Electromobility in Malta. The main stakeholders of the platform are the Ministry and the Transport Authority being represented by the Permanent Secretary of the Ministry, Mr Joseph Callus and the Executive Chairman of the Transport Authority, Mr James Piscopo.

The MNEP is the largest stakeholder transport forum to be set up on the island, where each possible stakeholder is represented in the Stakeholder forum, forming part of the National Platform. These range from other Government Ministries such as the Ministry for Energy and the Ministry for the Environment, Sustainable Development and Climate Change, Public Authorities, Energy Service Providers and Transport Operators, Car Importers, Social Partners as well as Research and Vocational Institutions.

ISLAND STATE OF THE ART

The main scope of the MNEP however remains the implementation of the MNEAP that is made up of more than 22 concrete projects to be implemented over the coming six years.

These projects include lighthouse and demonstration projects as well as the deployment of the latest



Mitsubishi i-MIEVE: compact, electric vehicles are ideal for these narrow roads and out-of-town driving alike

Part of the PORT PVEV Project: new BMWi3 at Muscat's showroom

technologies as they emerge on the market. In addition the MNEP is also promoting Malta as a test-bed for new technologies to be tested at the concept stage due to the fact that besides being regarded as a normal country, Malta also considers itself to be a city in some respects, with the difference that it is a country with a specific topography, climate and particular urban design not usually common in most cities.

Considering the very short distances travelled in Malta, the BEV charging infrastructure is being deployed mainly to provide electric car charging facilities for those owners who do not have their own garage or parking spaces at night, but would still want to avail themselves from the use of an electric vehicle as well as for emergency charging.

The car-charging infrastructure being referred to above will be deployed in a phased manner so as to enable us to have the very latest technology as it is available for the market. The phased deployment is also being done in this way to see how the Electric Vehicle market will develop and new in-vehicle technologies which would be put on the market.

Considering the fact that this drive for Electromobility is in its infancy, it is still an aggressive approach and the Government is also working to encourage the automotive industry to make the cars available in Malta as well. It is for this reason that Government is in the process of forming partnerships with the private sector to assist in market penetration for those companies who are willing to assist the Government in the implementation of its electromobility policy.

In addition the Government is also in the process of starting the deployment of a number of solar car charging stations or car ports, with the capability of energy storage in batteries, grid connection as well as charging capabilities. Hopefully this will contribute towards Malta renewable energy targets, especially the 10 per cent RES target for transport fuels by 2020.

Both Transport Malta and the Ministry for Transport and Infrastructure are currently implementing two important demonstration projects funded through EU funds, namely the DEMO-EV Project funded under the Life+ Action Programme and the PORT-PVEV project funded under the Italy-Malta Cross-Border Cooperation Programme.

INTEGRATING ITS AND ELECTROMOBILITY

The integration of ITS with Battery Electric Vehicles and its respective infrastructure is a priority as future vehicles and infrastructure will have the driver at the centre of the city ecosystem; the idea of the

CONNECTED CITY, with the difference that in Malta's case it would be a CONNECTED COUNTRY.

This is where we want to go and what we want to achieve. This has become a major priority for the Government and the Malta National Electromobility Platform in its work to fuse both ends of the equation.

We sought to include both areas under one platform because of the synergies that exists between Electromobility and Intelligent Transport Systems. This include the relationship between the car of tomorrow and ITS in general. It is evident where technology is heading.

The core relationship between the two, through the use of Information and Communication Technologies, software applications and in-car built-in sensors in-between the cars themselves and transport infrastructure is already with us and in the near future, this will continue to expand into complex ecosystems.

Future developments in core communications in these relationships as defined in ITS, that is direct communications V2V, V2I and I2V is set to take major leaps forward, as the car will become more dependent on ITS and more intertwined with the infrastructure. One must not forget to mention the human interface in this relationship, where the user, being a driver or a commuter, is in the centre of this complex ecosystem.

For the normal average user, a full charge covering 140km of road is more than enough while for a heavy user such coverage should be enough to cover a day's work. The latest BEVs put on the market such as the BMW i3 can also cover up to 190km on a single charge.

We intend to be the first country to have a fully fledged national car-charging network that would cater for consumer demand. Besides a planned phased deployment strategy, Government will also provide such infrastructure to meet future demands if this arises, in places and areas where there might not be enough car charging infrastructure coverage.

Charging infrastructure is being installed over a period of six years – 500 charging units will be installed nationwide

CONTRAST AND COMPARE

In my position as National Coordinator for Malta's National Electromobility Platform and Intelligent Transport Systems at Transport Malta, I was recently interviewed for an article in *Thinking Cities*' sister title *Thinking Highways* about out equally thorough ITS Implementation Plan. I was asked if there was any other island state that could benefit from Malta's level of enthusiasm towards electric vehicles and one of the suggested countries was Cyprus.

Being small islands, one may think that both Malta and Cyprus have similar challenges, which is not the case as Cyprus doesn't have the same land restrictions as Malta does, as Cyprus is far larger.

Similarly however, accessibility to both islands is via seaports and airports and hence one can argue that they have some restrictions especially with respect to accessibility to the European mainland and European markets. Similar challenges do exist with seasonal influx of tourism especially during the months of Summer where in Cyprus in the months of summer this exceeds 3m tourists while in Malta this exceeds 1m tourists per year.

Cyprus, like Malta, is working a lot to give ITS the necessary push and extend ITS beyond their main cities and urban cores such as Nicosia. I believe that due to their specific situations, both Malta and Cyprus would be rapidly taking up ITS in the near future, much more rapidly than at present once the necessary ITS building blocks are put in place in each respective country. With respect to Electromobility in Cyprus, I am not that informed as to how much the electric car charging infrastructure is beimng developed, however according to the Second National Energy Efficiency Action Plan of Cyprus, Electromobility features high on the agenda.

Malta may be a small country in terms of land mass, but there's no question that we think big.

FYI

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Talking back

Göteborg, Sweden wants to get to know its cyclists better. **Noel Alldritt**, project manager for ITS at the city's Urban Transport Administration, explains to **Karsten Marhold** how his department is using its new Cykelstaden app to track cyclists' behaviour – and to develop a new and user-centric bicycle plan for the city

Göteburg's Cykelstaden app allows users to search for servicing points, pumps, sharing stations, etc

There's no denying the Urban Transport administration of Göteborg is trying to make life easier for the city's cyclists. The administration has deployed 17 bike pumps in the city centre near to convenience stores and petrol stations. They are free to use and work well with local cyclists: the first-ever pump deployed at Vasagatan has been used more than 350,000 times during its first year of existence. Göteborg also offers free bike servicing points at local bike shops with a basic toolset that can be used free of charge. These points are marked with a yellow bike symbol to make them easily discoverable. Another point in their favour is that they can be found using a smartphone as well.

Göteburg wants to become known as a cycling city

From 2011 to 2013, the city offered *Punkapp*, an iPhone app that allowed users to discover pumps and servicing points as well as the nearest station of the Göteborg bike sharing system Styr & Ställ. But the success of both the city's services to cyclists and the application called for a relaunch with a new and more all-around smartphone app for cyclists, explains Noel Alldritt, project manager for ITS at the city of Göteborg. "We needed an app that provided all the information for cyclists in Göteborg in one place," Alldritt says.

THE CYCLING CITY

What the city came up with is *Cykelstaden*, an app whose name can be translated to "cycling city" – precisely what Göteborg wants to become. The app was launched in 2013 on both the iOS and Android platforms, and the city plans to extend it over time to provide as many bike-related services as possible. Basic features include searching for pumps, servicing points and bike sharing stations, as well as a database of all cycling lanes in the city including information about who is responsible for them.

The most important feature, however, is the possibility to enter into dialogue with cyclists, as Alldritt explains. "When developing Cykelstaden, we realized that in order to improve the cycling experience in our city, we must provide a means for cyclists to talk to us. All too often, city administrations only provide information and awareness-raising, but they do not listen too much to what cyclists themselves have to say."

As a first step, the city integrated an error-reporting feature into Cykelstaden that was available starting with the launch of the app. Using this option, a cyclist can directly report problems on the road to the city. Using his smartphone, the user provides a short description of the

> ***All too often, city administrations only provide information and awareness-raising, but they do not listen too much to what cyclists themselves have to say***

problem and is given the option to take a photo. The photo is then geo-tagged with the GPS coordinates sourced from the phone's location services and sent directly to the city's support desk. With both the photo and the coordinates it is much easier to locate and understand the nature of the problem.

PLANNING FOR THE FUTURE

Yet the city's ambitions for the app do not stop there. Noel explains, "We not only want to use the app to improve the maintenance of existing infrastructure, but as a tool for future planning. This is why we have integrated the *Min cykeltur* function in 2014." *Min cykeltur* is a feature of Cykelstaden that lets users track their journey and send it back to the city's servers in the form of an anonymized GPX file and after they have given permission to upload the data.

The city hopes the data generated this way can be used as a basis for the development of its new bicycle plan in late 2014. "One of the problems with data is of course what do you do with it and how to turn it into information," says Alldritt, cautiously. "Therefore we not only need the app, but also a tool to analyse the data generated by *Min cykeltur*."

This job was undertaken by Johanna Aalto and Johanna Nyström at Chalmers University of Technology in Göteborg as a part of a Masters' thesis. Under the supervision of Noel

"We not only want to use the app to improve the maintenance of existing infrastructure, but as a tool for future planning"

"Bikes are flexible and cyclists use paths and shortcuts that we may not know about"

A cyclist can directly report problems on the road to the city. Using his smartphone, the user provides a short description of the problem and is given the option to take a photograph

Alldritt, Aalto and Nyström developed a method for analysing the generated data using Excel and the free and open-source data visualization program QGIS.

"We wanted a way to analyse the data that can be done with standard and free applications, and that is what we achieved," Noel explains. As part of the research project, 72 tracks were analysed with a focus on Nya Allén, a main street in the city centre. The researchers concluded that *Min cykeltur* could indeed be a useful tool in order to develop a bicycle plan based on users' needs. However, as the function has only been launched in early 2014, not enough data is available yet to draw conclusions for the entire city.

PULLING OUT THE STOPS

Noel and his department are confident that *Min cykeltur* will allow them to get a greater insight into the behaviour of cyclists and ultimately build better cycle paths. "We need to know where and how cyclists are actually cycling and not the way the city thinks they do," he explains. "A simple fact that makes cycling hard is having to stop all the time. One of the objectives was to identify where cyclists stop and how often, so that we can use this information to reduce the number of stops and increase the flow. The GPX data allows us to see this."

Other useful insights the app provides is how fast people actually cycle, and whether they use shortcuts. "Bikes are flexible and cyclists use paths and shortcuts that we may not know about," Noel explains. "By tracking their paths we can see how they cycle and hopefully make it better. This should be a win-win for all involved."

FYI

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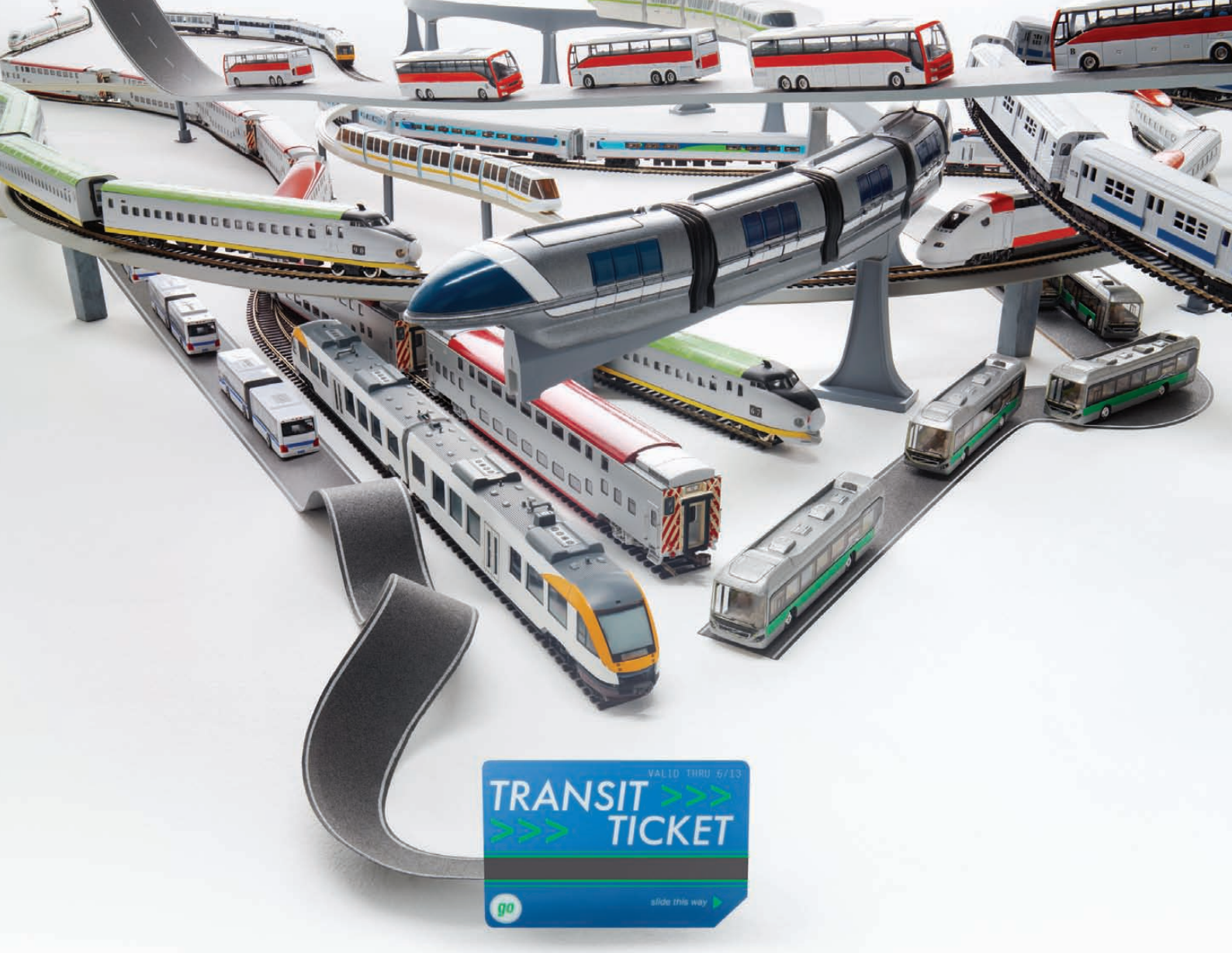

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Active benefits

The transportation of people and goods has a number of negative side effects, but the social and environmental impact of transport is not always adverse. On the contrary, active travel benefits citizens' health. **Dagmar Köhler** looks into the potential of active travel and health for transport policies

The daily commute to work, school, the supermarket, to the sports club, theatre or restaurant is not usually considered the brightest part of the day, whether it is the usual traffic jam, the crowded tram or overheated bus, the cyclist's fear of a driver's inattentive right-turn, or the noise and diesel exhausts of the truck that the pedestrian inhales. Air quality reports regularly prove the need for action, major accidents trigger political commitments, and rankings of the most congested cities illustrate the density of road traffic.

In other words, there are many negative impacts that transportation has on the local economy, on the environment and on people's well-being and health. However, transport can also have positive side effects, yet actual individual benefits: everyone who decides to cover the distance between home and work or school by an active travel mode, including walking and cycling, gets an extra dose of exercise, which benefits their health. All healthy people together benefit the entire health system. Making a trip via an active mode is the one transport solution that benefits our health even in absolute terms (while also reducing emissions, energy consumption, congestions, use of public space and supporting job creation in healthy and green transport).

COMMUTING FOR EXERCISE

Studies suggest that people who walk for at least half an hour per

> ***"The benefits of cycling or walking outweigh by far any possible increase in exposure to pollution."***

day live on average two to nine years longer than those who don't. Active travel prevents obesity and reduces the risk of certain diseases such as cardiovascular diseases, cancers, chronic respiratory diseases and diabetes. Hence, active travel can generate major economic benefits through large public health gains.

According to the World Health Organisation (WHO), of the 10 million deaths per annum in Europe, nearly 1 million can be attributed to lack of physical activity (WHO 2013). This means that the lack of physical activity to be among the four major causes of death in Europe.

Paul Curtis of the London European Partnership for Transport (LEPT) is actively involved in the Polis Working Group on Environment and Health, and calls upon policy makers to better link transport and health policies: "By replacing motorised trips with walking and cycling, citizens can attain the recommended amount of daily exercise, thereby improving their health. This is just one example of the intrinsic links between transport, health and environmental policy", he says. That health and transport are usually governed in separate sectors and responsibilities doesn't make it any easier.

PROVING THE BENEFITS

To help authorities make better decisions for public health through investments in sustainable transport WHO's Transport, Health and Environment Pan-European Programme (THE PEP) has created a set of resources and tools. Among those is HEAT, the health economic assessment tool which monetises health benefits of transport measures. HEAT is an online tool modeling the health benefits from cycling and from walking by estimating the value of reduced mortality that results from specified amounts of regular physical activity.

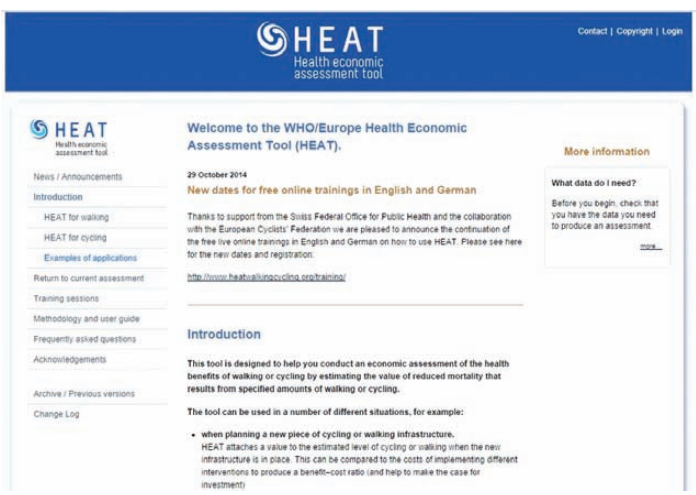
The tool can be used, for example, when planning a new piece of cycling or walking infrastructure, to value the reduced mortality from past and/or current levels of cycling or walking, or to provide input into more comprehensive economic appraisal exercises, or prospective health impact assessments.

"With the help of HEAT, we estimated that a €40,000 investment to complete our cycling network will have a return on investment of €414,000 in financial savings in public health over a period of 10 years", says Simona Arletti, in charge of health at Modena City Council and president of the Italian Healthy Cities Network. "Quantifying public health gains is crucial to justify decisions towards my city planning department and to demonstrate the importance of promoting active travel among citizens" she concludes.

Still, there is a need to continue documenting the economic benefit of health and measuring active travel. The European Commission has identified this need and DG Research invests to help upgrade HEAT via the PASTA project. PASTA (Promoting physical activity through sustainable transport) brings professionals with expertise on health, physical activity, transport modeling, safety and air quality to one table and studies

What is meant by active travel?

Active travel/active mobility relates to regular physical activity undertaken as a means of transport. It includes travel by foot, bicycle and other non-motorised vehicles. Use of public transport is also included in the definition as it often involves some walking or cycling to pick-up and from drop-off points. Active travel does not include walking, cycling or other physical activity that is undertaken for recreation purposes.



HEAT is a World Health Organisation online tool that models the health benefits of cycling and walking by estimating the value of reduced mortality that results from WHO-specified amounts of regular physical activity

individuals' health status in relation to their transportation choices. Results will be available in 2016.

HEALTH BENEFITS VS POLLUTION EXPOSURE?

Given current emission levels one may now wonder how much pedestrians and cyclists suffer in return being exposed to air pollution and a higher risk to accidents compared to within a vehicle. Does the extra daily exercise still pay off if it takes place in traffic? Researchers explore this question to shed light on the overall balance of health benefits of active travel against possible risks.

Within the TAPAS project for example, researchers concluded that the benefits of cycling or walking in terms of the effects of physical activity on the body outweigh by far any possible increase in exposure to pollution. Bicyclists' exposure to air pollution is extremely variable with local conditions and the higher frequency of fatal accidents that occur whilst cycling also strongly depends on the local context and existing provision for cycling. Hence there is a need for local authorities to take action and reduce accidents that occur when cycling through providing adequate infrastructure for vulnerable road users.

LINKING THE TWO: CROSS-SECTOR POLICIES

Although the health benefits of active travel are clear and well-accepted, this is not always translated into concrete actions and funding on the local or national levels for active travel, and not yet at the European level.

On the local level, a few forerunner authorities have touched upon linking health benefits with their transport policies:

- Wales' Active Travel Act 2013 is considered to be a world first and makes it a legal requirement for local authorities in Wales to map and plan for suitable routes for active travel. This includes building and improving the infrastructure for walking and cycling every year. It creates new duties for highways authorities to consider the needs of walkers and cyclists and make better provision for them. It also requires both the Welsh Government and local authorities to promote walking and cycling as a mode of transport.
- Transport for London (TfL) published the world's first transport health action plan. It sets out how TfL aims to improve the health of Londoners by making streets greener, safer and more inviting to pedestrians, cyclists and public transport users.

There is a need for effective cross-sectoral action also on the European

Polis Position Paper "Securing the benefits of active travel in Europe"

Polis' position paper highlights health benefits of increased physical activity for individuals, but also argues that promoting a shift towards more active travel offers huge potential economic benefits, to society as a whole.
The paper suggests concrete actions to be taken at European level:

- Identify a leader in the European Commission for active travel and health.
- Align European policy documents to improve health through transport along shared objectives, work programmes and investments.
- Enhance collaboration with pan-European policy platforms, such as the Transport, Health and Environment Pan-European Programme (THE PEP).
- Systematic internalisation of health costs in road transport is needed, notably linked to air emissions and physical inactivity
- Integrate the health dimensions into Sustainable Urban Mobility Plans (SUMPs).
- Support Transit-Oriented Development (TOD) strategies and the design of inclusive neighbourhoods for liveable communities.
- Further research the links between active travel and health, but do not use the need for further research as an excuse to delay action.

http://www.polisnetwork.eu/health

Active travel leads to major individual and public health gains, but needs to be made more attractive and accessible

level and including the European Institutions, and the local level calls upon the Institutions.

Representing more than 60 cities and regions across Europe, the Polis network issued a position paper, in which cities and regions call to secure the benefits of active travel. "We call for strong integration and coordination between transport and health policy, notably at European level", explains Polis' Dr. Florinda Boschetti, who is in charge of the working group on transport and health. "In the paper, London and other cities are calling for greater cross-sector cooperation within the European Institutions to invest in active travel, making it more attractive and accessible", says Paul Curtis.

What is needed to work across sectors is a vehicle or a platform, which brings the authorities in charge together, and that facilitates that transport planners consider health benefits as a policy objective.

"Sustainable Urban Mobility Plans (SUMPs) are a valuable policy framework that has the capacity to integrate health considerations in transport planning", explains Boschetti. A SUMP is a strategic plan designed to satisfy the needs of people and businesses in a specific city and its surroundings for a better quality of life.

Concretely, integrating health in SUMPs can mean to include health indicators in land use plans to increase accessibility to active travel modes and to reduce population's exposure to air pollution. "We need to include health considerations into transport planning and systematically internalise health costs, including physical inactivity. This should therefore be part of the future European initiatives which will be taken to ensure the full internalisation of external costs as foreseen by the European Commission's White Paper on transport", concludes Boschetti.

Photos: Harry Schiffer, Eltis (right); Transport for London (far right)

Cities all over Europe are actively encouraging their citizens to be more active

A WALK A DAY...

"An apple a day keeps the doctor away." In addition to the gastronomic benefits of eating an apple, just 30 minutes of physical activity on the way home can improve everyone's health and reduce the risk of becoming overweight and developing diabetes. In contrast to sports or exercise, active travel requires less time and motivation. As such it has potential to reach parts of the population that have not been receptive to the appeals and benefits of sports and exercise.

At the same time it can also help make our transport systems safer, cleaner and healthier - and the daily urban commute somewhat more bright...

FYI

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Polis activities on transport and health: **polisnetwork.eu/health**

Delivering active travel through transport policy and planning is the topic of session 4C at the 2014 Polis Conferencen, Friday, 28 November, 0900.

WHO HEAT tool: **http://www.heatwalkingcycling.org/**

The Active Travel (Wales) Act 2013: **http://wales.gov.uk/topics/transport/integrated/walkingcycling/activetravelact/?lang=en**

Improving the health of Londoners, Transport Action Plan. Mayor of London, Transport for London, 2013: **http://www.tfl.gov.uk/assets/downloads/ businessandpartners/improving-the-health-of-londoners-transport-action-plan.pdf**

PASTA project - Physical Activity through Sustainable Transport Approaches: **www.pastaproject.eu**

The chance of a lifetime

David Bonn wonders if news that a new sustainable and environmentally friendly city in England is going to be built is the start of a whole new wave of smart city thinking

Hold the front page! Plans have been announced for a new Garden City in Kent in South East England – so could this be a Smart City in the making? A Garden City with an initial 15,000 homes will be built in Ebbsfleet and the Government stated that the site was chosen because there was "fantastic" infrastructure and it's therefore imperative that we maximise the potential this opportunity provides to showcase all that is good with UK design and technology in a Smart City environment.

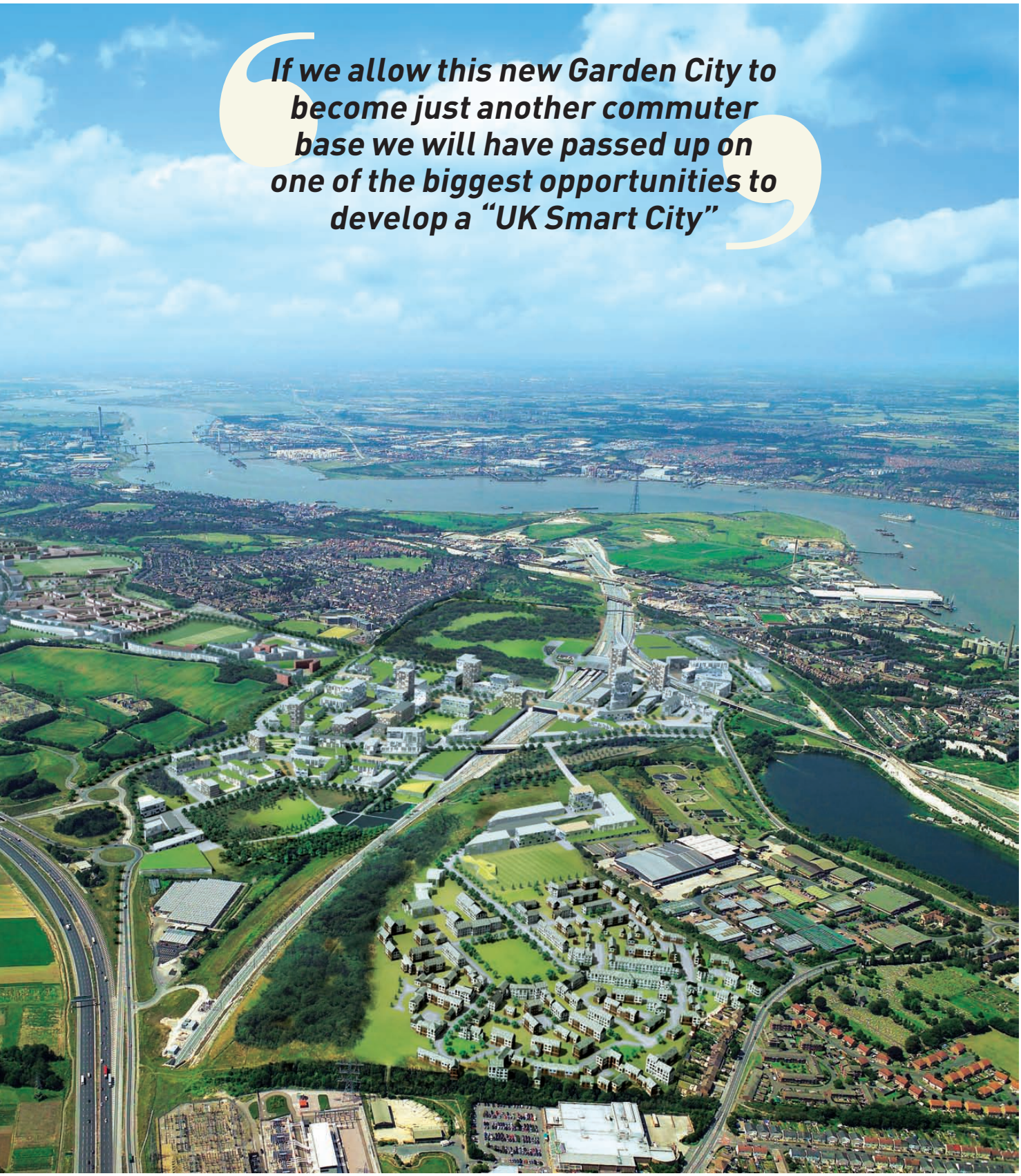
As someone who 30 years ago lived and worked in Welwyn Garden City in Hertfordshire for a number of years I can well understand the attraction of building Ebbsfleet Garden City. After all living in a community like this should be as enjoyable an experience as it was for me in Welwyn.

There was a significant amount of local employment when I lived there and there was a large number of people commuting into London, even back then, but nowhere near the current levels. This increase in commuting has coincided with the reduction in local employment – did one cause the other? How then in today's working environment will this new Garden City be anything else other than a housing estate to accommodate the "workers" of London? If we allow it to become just another commuter base we will have passed up on one of the biggest opportunities to develop a "UK Smart City". Is it not incumbent upon us in the industry to try to develop a living and working environment that embraces all that is good in current Smart City thinking?

BUILD IT AND THEY WILL COME... WON'T THEY?

Some "Smart" elements can be implemented without the need to consider the working environment. The building industry has moved on significantly with materials, construction methods, designs that minimise the cost of construction, heating and lighting while providing a safe living environment supported and monitored by technology which is used for the benefit of the residents. The houses themselves would be smart, the residents would have an unparalleled access to information on which to base their decisions on how to best manage their cost of living. The use of technology would support managing down the long term cost to the environment by supporting a carbon neutral environment. Smart grids for electricity, gas

Artist's impression of Ebbsfleet Garden City in Kent, featuring 15,000 new homes


"If we allow this new Garden City to become just another commuter base we will have passed up on one of the biggest opportunities to develop a "UK Smart City"

and water, effective waste management would all be part of this bright new city. These elements are part of any new city today but the integration of these for a key part of a smart city.

Within this new city why can't we put in place a working environment that negates the need for travel on a daily basis such as travel into an office in central London just to process information on a computer screen, to meet the demands of the growing service industry that dominates the City of London office blocks? Why can't we create an environment where the people living in the Ebbsfleet Garden City work for the same London companies but in accommodation local to Ebbsfleet? Using technology currently available today such as high-speed data networks, video conferencing or virtual meetings can surely make working without the need to commute a more realistic possibility. This local working would have a major benefit on family life, reduce a family's carbon footprint and reduce the cost of the delivery for the employers through reduced rental in London.

Can we support the needs of the residents with a number of reasonably sized "big name" shops grouped around the city? Let's not set out to build big out of town shopping centres that have such a detrimental impact on the heart of many cities across the UK. We need to also consider in detail how we get goods to the local shops during the design phase.

Yes the initial Master Planning for this new city will have a major impact and should not follow the "let's just build houses model". Why not implement a scheme where the city has a fleet of solely electric vehicles to deliver stock outside normal office hours to the shops from central distribution points around the perimeter of the city. These same vehicles could then support the delivery of shopping to the local residents later in the day. This would provide an opportunity to support improved road safety and a reduction in the overall carbon footprint. Could we use a similar distribution model for deliveries to residents to reduce vehicle miles within the city? Such schemes have made favourable reviews when piloted in the Rotterdam, as evidenced in Issue 1 of *Thinking Cities*.

Many people like the convenience of taking the car to do their shopping so we need to cater for reasonable car parking facilities at these local shops channelled into the shopping area in a way that minimises circulating traffic within the built up area. Easy access for buggies and wheelchairs, along with walking stick-friendly pavements and low-rise kerbs should be included around the shopping areas along with rest facilities.

If, around the shopping clusters, we can include office accommodation that supports different sized teams of workers with the technology to enable them to work seamlessly with colleagues in London, provide supporting childcare facilities, health centres and eating facilities we can start to restore a feeling of a community again where people who live locally will work and socialise locally. Having open space in these mini work centres where people can relax outside, where cycling to work is widely adopted and where those who need to use a car are encouraged to share it with others to reduce journey miles overall. Vehicle charging points would be widely available around the mini centres.

SAFETY IN NUMBERS

With security being a major issue for families these days can we design and install a smart security management solution that makes people feel safe? One would like to think so. This would also include the ability to, should an event occur, obtain suitable, readily available evidence that can lead to prosecution.

Traffic management around the housing is part of the security aspects and as such can we consider putting a multi-agency operations room in place as part of the overall build. With the design of the city minimising the amount of through-traffic, deliveries being coordinated into a single delivery partner, priority being given to Active Travel options the traffic management can be well-managed using existing technology.

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Local working would have a major benefit on family life, reduce a family's carbon footprint and reduce the cost of the delivery for the employers through reduced rental in London

The access to local public transport will be a key consideration in the design. The design will need to ensure those who do need to commute are able to use local park and ride facilities, shopping locations should have provision for parking but the shops should also be services by a fleet of electric buses. Perhaps the exchange of the cost of the bus tickets as part payment for a coffee would encourage the uptake of local bus travel. To ensure a good uptake of the bus services the timetable needs to be frequent and with as short journeys as possible.

We have seen a number of financial awards to cities around the UK to encourage them to adopt Smart City approaches and apply them to existing infrastructure. What this build project provides is a living demonstration site for UK design and technology approaches that can then be taken around the globe as a real life Smart City experience. We should encourage product suppliers to work with the designers and builders to incorporate the best of British Smart Design and then showcase it to the world.

We are continually told that city dwelling will continue to expand in the coming years so it is likely that expansion of this and other areas of habitation will be required. Ebbsfleet Garden City simply has to be built with expansion capability factored in. We should also be willing to trial new products and approaches that are then monitored and in the case of items or approaches that are not effective change them using the lessons learned.

The economics for early adoption of new approaches and products will, in some cases, be at a cost premium but unless we financially support the private sector in the adoption of these new approaches then the through-life cost of ownership of the houses and the local environment will not be fully achieved. The longer-term business model could be made to work but it does require a slightly different economic model to be adopted. If say the Technology Strategy Board or some suitable funding body bought into this concept by providing targeted funding and the establishing of an independent team to oversee the project to ensure the opportunity to showcase UK business is taken. This would also ensure that the actual lessons learned from the project are fully disseminated in an unbiased way.

FYI

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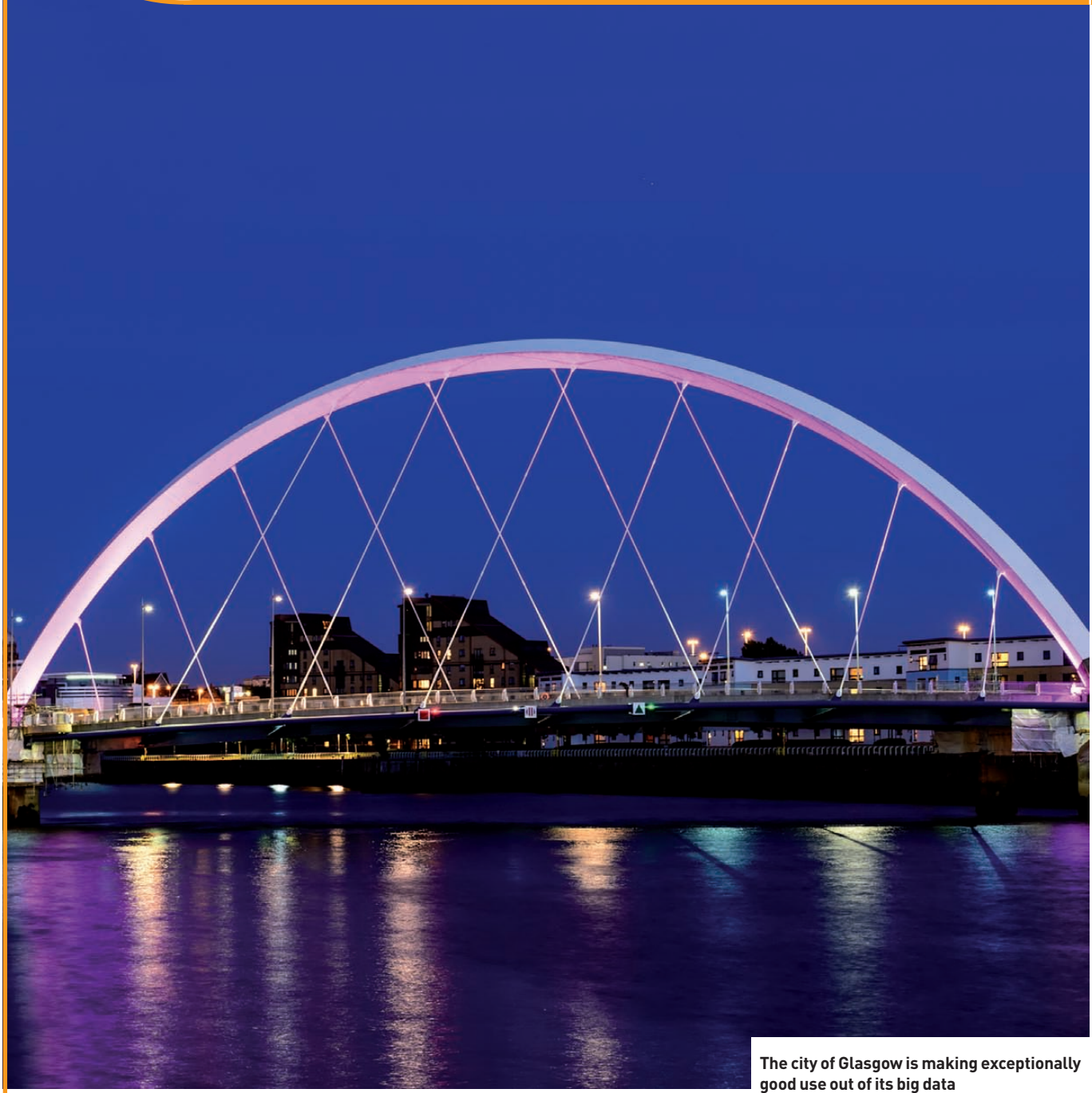
Mobility, Multimodality and Traffic Efficiency

The section on Mobility, Multimodality and Traffic Efficiency addresses issues related to network management, network efficiency and innovative services, with a particular focus on Intelligent Transport Systems



The city of Glasgow is making exceptionally good use out of its big data

What's mine is yours

Is it even remotely possible for a city the size of London to ever be completely car-free? If not, could car clubs be the answer to getting at least some of the ever denser traffic off the roads? In the first of two articles, Zipcar's **Mark Walker** highlights some of the UK capital's boroughs that are doing their level best to make the seemingly unachievable achievable; while **Kevin Borras** talks to the company's general manager about the culture of sharing and how it's thinking electric

The London Borough of Hackney has recognised that car clubs can provide an excellent alternative to the private car and in 2013 Hackney launched its City Car Club. Car Club drivers on average generate less than half of the carbon dioxide emissions and local air pollutants compared with the average London household with at least one full car license holder. Therefore, increasing car club membership can assist Hackney Council in achieving its modal shift and its carbon dioxide and local air pollution targets.

Car ownership has continued to drop in Hackney, one of London's poorest boroughs, where the proportion of households that are car-free has risen to 64.6 per cent, up from 56 per cent in 2001, with just 170 motor vehicles per 1000 inhabitants. Despite the population of the

Increasing trips by car clubs can assist Hackney Council in achieving its modal shift and its carbon dioxide and local air pollution targets

borough increasing by 44,000 during this period the actual number of cars owned by Hackney residents has decreased by 3200. Hackney believes that this is partly as a direct result of the expansion of car clubs throughout the borough. Currently Zipcar, the world's largest car sharing club, operates from 95 locations with 147 vehicles and has had a growing presence in the borough for several years.

City Car Club now occupies 12 bays with 13 vehicles. Car club membership in the borough reached 8800 for Zipcar in May 2014, representing a 48 per cent growth in the last 2 years. There are a total of 160 vehicles in the borough with 80 per cent of residents now within a 3 minute walk of a bay and 90 per cent within a 5 minute walk of a bay.

Hackney's Mayor Jules Pipe made a political commitment in his 2010 Mayoral Manifesto that every resident should have easy access to a car club bay. As a direct result of this political commitment it meant that the Council's Transport Team saw car clubs as a key priority and ever since they have been proactively

Car clubs condensed

Currently, the UK has one of the highest car club memberships in the world with more than 160,000 members. The majority of these are in London, with the greatest density being in Inner London boroughs such as Westminster, Islington, Wandsworth, Lambeth and Hackney.
Of the 33 London boroughs, 25 have car clubs, and many have incorporated them into their transport infrastructure in innovative ways.

London has the largest Zipcar network in the UK, with more than 1,500 cars across many of the London boroughs. Zipcar members benefit from: 60 miles of free fuel, insurance, maintenance, roadside assistance, road tax and the Congestion Charge when travelling in London.
Car clubs are one of the most cost effective and simple measures that will help solve London's congestion, pollution and carbon challenges. They help with the drive for cleaner air and reduced carbon emissions, because they operate newer cars with the latest technologies and increasingly offer ultra low emission or electric vehicle options.

From local use to day trips, holidays and when your business needs requires some extra capacity

working with operators and ensuring coverage continues to expand.

BAYING FOR MORE

What Hackney has been doing to progress car clubs in the borough:

- New promotional signage – bi-directional signage has been installed, facing pedestrians on the footway at each bay in the borough. The sign is double-sided and positioned to face the footway, therefore viewable by pedestrians walking by the parking space. The promotional signage is placed at each existing bay operated by Zipcar and City Car Club to raise awareness of car sharing as an alternative to private car use, to encourage use by local residents.
- Installed cyclehoops on all bay signage to enable residents cycling to the bay to securely park their bicycles
- Waived parking permit fees to all operators that occupied new bays during the 2013/14 financial year
- Ensured that all new developments over a certain size secure contributions to new bays and membership for all residents.

CAR CLUBS IN ISLINGTON

The London Borough of Islington, to the north of the city, was one of the UK's car club pioneers, helping to establish the first permanent on-street car club bays as part of the London City Car Club in 2003. Growth was rapid, and Islington soon boasted one of the highest market shares of any car club city in the world. There are currently over 9,000 members using 169 Zipcars.

Islington's main impetus for establishing a car club was to reduce the negative impacts of car use, and to relieve the borough's parking pressures. Car clubs represent a positive parking story, which is rare in such a dense urban area. Elected members were strongly supportive from even before the launch, and have remained enthusiastic. The success of Islington's car club network has no doubt made a substantial contribution towards reducing car ownership in the borough – 65 per cent of households in Islington do not own a car (2010 figures), up from 48 per cent in 2001.

The popularity of Islington's car club undoubtedly owes much to its central location, making travel to work and leisure destinations easy. A high-quality public transport network

A brief history of car-sharing

Stakeholders from across London and the Car Club industry convened at London's City Hall earlier this year to discuss how London can continue to grow the number of car club members. The event built on the incredible growth of car clubs in the UK capital in recent years, with 86 per cent of the UK's 164,000 car club members now in London.

London is already the leading car-sharing city in Europe but now wants to lead the way in developing and promoting car clubs to set an example for all other global cities to follow. Encouraging further use of Car Clubs was a key recommendation from the Mayor's Roads Task Force, which was set up in July 2012, to help deliver a template for world-class streets and roads fit for the future.

London's roads are already under pressure, and maintaining a highly functioning road network is central to ensure it retains its position as a world-renowned economic capital. With the population forecast to grow by 14 per cent, potentially bringing thousands more cars on the road in the next decade, car clubs are a part of the solution to this challenge.

MAKING SPACE

Previous research carried out by CarPlus earlier this year showed that every car club car effectively removes around 17 privately owned cars from the streets. Car club members also tend not to commute by car or drive so much during rush hour, helping them save on average £3,000 (€3,600) per year. Therefore, by encouraging more boroughs to include Car Clubs into their transport planning, boroughs can help reduce the number of short car journeys, reducing congestion and vehicular emissions from their roads. To help expand the number of car clubs further across London, boroughs that already have successful car clubs have published new best practice guidance to help other London boroughs. The best practice guidance covers a range of ways in which boroughs can further encourage Car Club use, including:

- Using new build and refurbishments as an opportunity for installing more car club bays;
- Installing more bays that are in locations that are more visible and easily accessible to residents and local businesses;
- Promoting car clubs in their local boroughs in partnership with operators to enable greater take up.

Forecasts from the Car Club industry suggest that, with sustained investment by all stakeholders, including the Car Club industry, London could see up to 1 million car club members by 2020.

Transport Minister Baroness Kramer said: "Car clubs can help reduce congestion and carbon emissions through less private car ownership, whilst still giving people

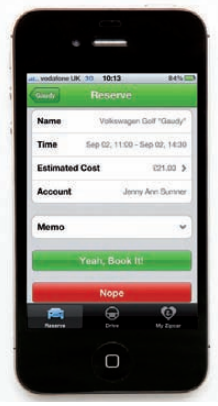
makes owning a car unnecessary for most people, and traffic congestion makes it usually faster to travel by public transport (or even by bicycle or on foot!) than by car for many journeys. But occasional access to a car is useful for many, and the car club has provided a more convenient and more affordable alternative.

Another part of this success has come from strong transport and planning policies at both the local and regional levels. In the early days, financial support from Transport for London allowed Islington not only to establish a basic borough-wide network of bays, but also to implement a number of innovative marketing activities such as the production of booklets to promote the car club to residents and businesses. This basic network made it possible for Islington to require Section 106[1] contributions from developers to pay for additional car club bays and subsidised membership for new residents of car-free housing, who would be ineligible for on-street residential parking permits. Section 106 contributions have formed an ongoing funding stream Islington has used to expand the initial spattering of bays to the current comprehensive network where every Islington resident has a car club vehicle within a five-minute walk of their home.

Over the years, Islington has fine-tuned its car club parking management to reduce the costs of expanding the network and to assist the operator in providing a high-quality service for its members. Initiatives include:

- Car club information boards to draw attention to car club bays and reduce illegal parking;

From finding the nearest vehicle...



...reserving it there and then...

...and unlocking the car at the roadside – all from your mobile phone

the freedom and flexibility to use a car when they need it. The success of car clubs in London has shown how these clubs can offer people more choice about how they travel."

MAYORAL APPROVAL

Mayor of London, Boris Johnson, is also fully behind the concept: "London has one of the biggest Car Club markets in the world and the potential for further growth is huge. Our Roads Task Force is fully supportive of this forward-thinking industry, one which offers massive benefits in terms of reducing congestion, improving air quality and reducing competition in the battle for kerbside parking. We know that just one car club vehicle can reduce up to 17 privately owned cars, and that car club users tend to make smarter travel choices such as cycling, walking and public transport. This is a really exciting time for the Car Clubs industry in London and I urge all London boroughs to get on board and support its development."

Leon Daniels, Managing Director of Surface Transport at TfL, has first-hand experience of the benefits of car sharing: "The use of Car Clubs in London has grown massively in recent years and we continue to support car clubs across London as a way to help reduce congestion. I am a regular user and welcome this positive action to further encourage use across the capital."

Nick Lester, Corporate Director of Services for London Councils, concludes: "The success of car clubs in many London boroughs shows how effectively they can meet Londoners' transport needs, and reflects the partnership work of councils and car club operators. We hope boroughs will be inspired by the best practice framework launched today to position car clubs as an integral part of their transport infrastructure for the future."

NOTE

1 Under S106 of the Town and Country Planning Act 1990, as amended, contributions can be sought from developers towards the costs of providing community and social infrastructure, the need for which has arisen as a result of a new development taking place.

- Allowing car club vehicles to park in residential bays within the parking zone where they are based;
- Avoiding objections by knowing where proposed bays are likely to be most suitable;
- Short-term offer of 'Vouchers for Permits', where residents could swap their parking permit for £200 (€252) worth of car club membership and use (or towards a bicycle).

The final important success factor has been Islington's partnership with Zipcar as the borough's exclusive operator of dedicated on-street car club bays since 2006 (when the company was called Streetcar). Working together as partners, the two have not only managed to overcome challenges, but have also proactively pursued innovations to improve the service and increase membership. This work led to London Transport Awards for Partnership of the Year (2008 with Streetcar) and Innovation (2010 – Vouchers for Permits), as well as a 'Highly commended' at the National Transport Awards (2010 – Vouchers for Permits) and a Gold Award at the Green Apple Awards 2010.

From April 2015, Islington will need to commence a new car club contract after the current exclusive contract with Zipcar has expired. Islington is currently considering whether the borough can sustain multiple car club networks, and it is hoped that electric vehicles will be made available to Islington car club users.

CAR CLUBS IN SOUTHWARK

In 2010, with cross party support, Southwark Council launched an ambitious programme to roll out a car club network within the borough. There are currently 120 Zipcar vehicles in Southwark that provide a more sustainable alternative to private car ownership for an increasing number of members. Southwark has seen a 40 per cent increase in membership in the past two years and, currently, there are over 7,700 members in the borough.

For maximum positive impact on making London more liveable, car club use needs to be mainstream

The reasons for the network are obvious to Southwark:

- Reduced vehicle emissions from cleaner vehicles and fewer car trips mean improved air quality leading to streets that are more attractive for walking and cycling;
- Reduced congestion and parking pressure as a result of fewer cars and trips equates to liveable streets for residents, businesses and visitors;
- Less pressure upon space means greater opportunity to reallocate road space to the majority of households who don't have a car;
- They provide a highly economic alternative to owning a private car, therefore saving residents money.

With an increasing population and thousands of new homes planned to be built, Southwark recognises the opportunity to introduce existing and new residents to the benefits of car clubs when they move in. Most new planning consents, over a certain size, require developments to build a new car club bay that will also be available to the wider public.

Southwark is committed to exploring all new opportunities to expand the car club network through close working with operators and partners across the capital.

Zipcar has long seen the potential for car clubs in London and has played a major part in establishing the strong membership base that already exists today. For maximum positive impact on making London more liveable, car club use needs to be mainstream. To achieve this will require all the relevant bodies – the Mayor's office, TfL, all the Boroughs and the car club operators – to come together, to form and to execute a clear and bold strategy for car clubs – one that all Londoners can get behind. Zipcar is fully committed to working with the city and playing its part in this alliance to make London a recognised leader in smart urban mobility and ensuring the capital becomes an even better place in which to live and work.

FYI

Mark Walker is general manager of Zipcar UK

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http://www.zipcar.co.uk

http://www.tfl.gov.uk/modes/driving/car-clubs

http://www.carlitelondon.org/

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Hybrid theory

Mark Walker, general manager, Zipcar UK talks to **Kevin Borras**

How does the concept of car-sharing fit into the overall concept of the smart city?

Let's take the modern city that we know, first of all. As more and more people more to cities they become increasingly polluted and congested places which if we don't do the right thing and encourage people to make smart choices will make cities less desirable places to live. There's simply too much demand for spaces to park cars in so there's parking stress to deal with as well. What we now know about car club members is that their behaviour changes – the way they choose to get around the city changes. Whereas a car owner might use their car almost by default most of the time, after all they have paid for it and it's sat there outside their house, a car club member, who is paying to use that car only for the time they need it makes much more rational choices on a trip by trip basis as to which form of transport to use.

What that means is, and we have lots of data that proves this, is that their use of the car goes down, reducing congestion and relieving pollution and the use of all forms of public transport, walking and cycling increases. Car club members make seven times fewer short trips, under 5 miles, than car owners. This is really important in a city like London that is actively planning to reduce the space it gives to cars...what we are trying to do is broaden the general understanding of what car clubs can do and take the concept mainstream.

Could you talk about the correlation between car sharing and the upsurge in electric vehicles? What is the market like for EV sharing?

Electric vehicles are a really interesting area and people often think that car clubs and electric vehicles together almost intuitively as they are both seen as "good things," environmentally at least.

However, it's actually a rather complex issue. If you take the car club model we will have several people using the same car for a number of undefined trips every day. At the end of each trip the car has to be ready for use by the next member and that includes having enough 'fuel in the tank'. Some people may only want to go 5 miles to the nearest DIY store, other people may need to go to 200 miles to visit their aunt. With the kind of electric cars that have been available until very recently that has been something of on operational challenge for us and of course a member experience challenge as well. What is increasingly encouraging is that the electric cars that are coming onto the market,

"We think we have a real role to play in getting a lot of people to experience electric car driving for the first time"

particularly plug-in hybrids, are solving the range problem. That means short trips around town can run on the battery and longer trips out of town can use conventional fuels. If the electric engine doesn't have enough charge left you simply flick into the conventional engine.

We are constantly looking for ways to make it work but the economics have been a real challenge for us as electric cars have been so expensive, even with a little subsidy thrown in. We also have to consider the unknown residual value of electric cars as there isn't a second-hand market yet. So up until now it's been rather difficult but we are working hard with the manufacturers and the infrastructure providers for the charging posts and indeed with the cities to build the right kind of alliance to make it work.

We think we have a real role to play in getting a lot of people to experience electric car driving for the first time. The cars are good, so if we can get a good number of drivers experiencing them first hand we believe that they will be converted and they will talk positively about it to their friends and family and that will create a positive atmosphere around electric vehicles generally.

As the largest carsharing company in the UK, could Zipcar become something of a lobbyist for the electric vehicle sector, deliberately or otherwise?

I don't think we will solve the range anxiety part of the issue

but the car manufacturers themselves are doing everything they possibly can to increase their vehicles' range as it's in their interests to, but where we have an interesting role to play is more within the city itself where there are specific short trips that are still best suited to the car. It could be you are carrying a heavy load, taking lots of small children to an event or the trip you want to make is very difficult or complicated on public transport. In that case the car is the best option but wouldn't it be nice if you were able to make that trip in an electric car that has zero tailpipe emissions?

That's where we have a role to play. It is quite complex as you have multiple people using the cars in the course of a day who have to be mindful of the charge...where we have used electric cars in the past we've encountered problems where people just haven't plugged them in and logistically you start to divide up your fleet. You end up with some cars that you can only do short distances in, the remainder have total flexibility, but if you happen to live near to one of the electric cars but you want to take a longer trip you will have to go further to find a car that will allow you to do that. All these things play into how well the service is working for the members, so for us it's a step by step approach and I think this is where the plug-in hybrid may well come into its own, just in getting everyone over the line in understanding how good electric cars can be.

But what about charging points – there quite clearly aren't enough and this is going to have to change. I live in a quite densely populated South London suburb and I honestly couldn't tell you where the nearest EV charging station is. Perhaps more to the point, if you live in an apartment on the second floor, let alone the 10th, how do you charge your electric car?

I have done exactly that –I've had the cord running along the pavement and up through my living room window. In a city like London a lot of people live in terraced houses or flats and the only parking available is on-street so that's just not sustainable. That's how London works and that's how our service works so for us to roll out more electric cars we need charging points on pavements. To date there aren't very many and there are also different plug types for different vehicles and for whatever reason the charging posts can be quite temperamental.

More often than you would like you find they aren't working and you have to report a fault – up until now the charging infrastructure has been somewhat temperamental but I hope that now there will be more reliable infrastructure and of course much more of it.

One of the topics we address in *Thinking Cities* is smart logistics for the smart city. Some cities have tried adopting unconventional time-windows for deliveries but what can a company like Zipcar do to help this situation? You have Zipvan, so are there long-term plans for Ziptruck?

There's a real demand for vans by the hour and whereas most of the existing van and truck rental side of the market is set up for trade users, when it comes to domestic use where people need to take household rubbish or garden waste to the dump or pick up a large piece of furniture from a store, those people will only need that van for a short period of time and often just at the weekend. And yet, most of that market is set up for daily rentals and they close at lunchtime on Saturday! You are basically stitched into a two-day reservation for maybe a six-hour job. We know for sure that there's demand for an hourly rental business, and we know we want to trial an electric van. For a city like London the number of deliveries being made is incredible, especially with the advent of internet shopping so if we can get more of that demand into electric vans we would definitely like to capture that market.

We've talked about public membership of car clubs, but what does Zipcar offer to businesses?

Thousands of business use Zipcar in the UK today and they can be divided into a few different categories: one category we are very popular with is the small start-ups. Less than 10 employees, cash is very tight, and the last thing you want to do is get into a three-year car lease agreement so those business like the idea of paying for transport as and when they use it.

Zipcar for Business is ideal for them and we set up the account in the name of the business with registered drivers. It's a proper business account with a variable cost model and it suits start-ups perfectly. For businesses that are perhaps better established but still don't like the idea of purchasing car fleets or getting committed to a lease, we can offer them an exclusive use period. If they know that every Tuesday morning they go to the market to pick up goods and bring them back again we can guarantee that cars will be available in those slots.

At the bigger end where we can really have impact the case study we always cite is Croydon Council who switched from what we call a grey fleet where people used their own cars and received an allowance and claimed a mileage rate to a scheme where they brought in two dozen Zipcars for business travel purposes.

It's had an amazing effect – the number of employees driving for business has gone down by 50 per cent and the emissions have gone down by 40 per cent, as has the number of business miles travelled. They save £500,000 (€630,000) a year on transport costs. What councils can do is integrate that with a lift share system for commuting to work. This means that you are also getting reduced commute miles into the council offices on top of the reduced council miles driven – they are huge and real savings and Croydon are looking to expand that scheme.

The bigger the better

Cubic's **Dr Kevin Moat** sets off down the Big Data highway alongside *Thinking Cities'* **Nathan Dwyer**

As city populations grow, transport infrastructure has to cope with new demands and increased pressure on existing resources. Mining 'Big Data' makes cities smarter and helps predict future transport trends that can bring real benefits to transportation networks by making Big Data real.

"Cubic Transportation Systems recognises that cities are waking up to the power of data – data that is already being captured and stored – but not used," explains Cubic (ITMS) Project Manager Dr Kevin Moat. "With more than half the world's population now living in urban areas, we need to work to make cities better places in which to live and work. It is an important milestone – for the first time in human history more people live in cities than outside them. It is a trend that will continue with predictions that by 2050 more than two-thirds of the world's population will be city dwellers."[1]

With a finite level of resource, it is imperative that transport planners make better use of existing infrastructure. We can't widen the roads, or make train platforms longer, or bridges bigger, without massive investment. That isn't going to happen overnight. So, faced with an increased demand on our existing assets, our cities have to become smarter. Cubic's NextCity vision provides both operators and travellers with real-time, dynamic information that will make journeys faster and more reliable.

Says Moat: "Glasgow is an example of how it is making Big Data work. The city recently won funding in a contest run by the Technology Strategy Board, the UK Government's innovation agency, to demonstrate how technology makes life and transport in the city smarter, safer and more sustainable. Cubic has been at the heart of many of the transport improvements in Glasgow, as part of its Future Cities Programme, most notably the newly opened Glasgow Operations Centre. The high-tech facility brings teams together from the Community Safety Glasgow's (CSG) CCTV operation and Traffcom, the council team responsible for managing the flow of traffic in the city."

With the facilities now pooled, CSG and Traffcom have joint access to the city's entire network of live and recorded CCTV footage. The centre will also oversee the installation of advanced digital cameras across the city.

"Smart cities are no longer the next coming thing; they are here today and Glasgow is leading the way. It has become the 'Future Cities Demonstrator' to showcase how integrating its service can enhance the local economy and the quality of life for all. With health, transport, energy and public safety at the heart of its strategy, it is a test-bed for UK businesses to export their solutions around the globe. Driving all that is Big Data and Cubic is central in deploying the solutions to achieve transformational results."

SHAPE OF THINGS TO COME

Big Data may be a hackneyed phrase but it is here to stay. With the Internet of Things (IoT), information sensing devices such as mobile phones, microphones, cameras and RFID readers have given us greater insight into everything from transit trends to healthcare needs. The convergence of social, mobile, cloud and information, referred to by Gartner as the 'Nexus of Forces'[2], can be leveraged

REFERENCES

1. From the Technology Strategy Board, www.innovateuk.org
2. Gartner: Transform Your Business With the Nexus of Forces, 2014

> ***Large enterprises are often met with the challenge of determining who should own Big Data initiatives that encompass the entire company***

Glasgow is a prime example of a city making Big Data work to its advantage

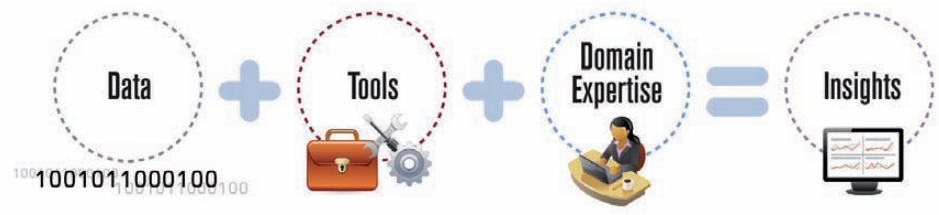
to make life easier for us all. Mined intelligently, data insights can lead to improvements that are immediately felt, from ensuring people's journey's go as smoothly as possible to making sure a hospital has enough medicine in stock to cope with an epidemic.

For transport solutions this can result in a reduction in travelling time, reduced fuel consumption, operational efficiency improvements and improved revenue management. Travellers can also benefit from more responsive transportation systems providing them with the information they need to make their journey more satisfying.

However, NextCity recognises that data is only one part of the equation: making best use of transport assets against a backdrop of burgeoning urban populations will require some behavioural change by the travelling public. Given that human beings can be notoriously resistant to change, psychology is a key component of NextCity. Using data to gain an understanding of what will motivate each individual to make small changes that collectively make a big difference enables operators to offer meaningful personalised incentives.

"All these benefits are only reaped if the challenges of Big Data – and there are many – are handled correctly," insists Moat. "There may be more devices collecting intelligence than there are people on the planet, but considering its current popularity, its curation, storage, analysis and visualisation are far from easy. To be interpreted correctly, Big Data needs personnel with the domain expertise to mine the information effectively. The data and the tools on their own don't do much unless they are in the hands of experienced personnel with deep industry knowledge."

Large enterprises are often met with the challenge of determining who should own Big Data initiatives that encompass the entire company. If this is hard enough for a multinational providing IT services, imagine what it is like for transport authorities in major cities with millions of citizens. They would benefit hugely from Big Data principles being applied to their transport needs, but



multiple privatised operators and fare policies make this difficult.

PREDICTIVE PATTERNS OF BEHAVIOUR

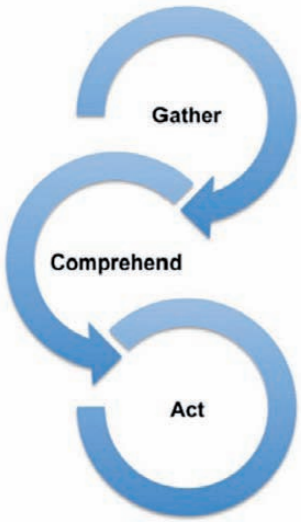
As Big Data begins to come to transportation, road planners can now combine volumes of transportation fare and vehicle information with even larger sets of information from other sources. They can apply a new generation of analytics and visualisation tools to get insights into what the massive amount of information is telling them.

The upshot is they will actually be able to predict what is likely to happen under different scenarios, making them far more effective at restructuring their transportation networks than they are today, as Dr Kevin Moat explains.

"NextCity is Cubic's vision of a fully integrated, whole-of-transport journey and payments management system that will enable operators to regulate demand by setting fees across all modes within a region, as well as empowering their customers to manage how they travel. By incentivising users to make minor adjustments to their travel patterns, at a macro level they can help spread demand to gain much-needed additional capacity at peak times.

"Cubic has a number of tools that can interpret and configure Big Data and provide dynamic, integrated, configurable and real-time information in all journeys occurring within each city. We not only prescribe the reporting and data warehouse functions for information, but can apply data science and predictive analysis to the information. By creating a holistic view of a city's transport journeys, we can remove the information silos that currently exist within the different operators, agencies and regulators. It also empowers these transport stakeholders to understand the demand for, and use of, the existing transport infrastructure to best determine where excess capacity exists, and where new capacity is required."

From an analytic point of view, Cubic has the power to gather information, comprehend its meaning, and act on the information presented. The data, combined with the tools and domain experience, provides us with the insights transport planners need. This information can be used to anticipate travellers' response to service changes by predicting the impact on journeys or identify the stress points in a transportation network and propose the potential remedies.



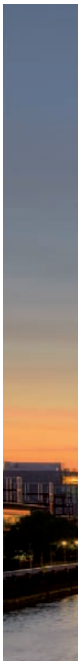
"Imagine, for instance, receiving a phone call or text message first thing in the morning. It is from your local transport agency," elicits Moat. "They know today is a workday and you are due to set off on your drive to work at 7.30am, a journey that usually takes 45 minutes. But today there has been an accident and a critical junction on your route is closed. The message informs you that you need to set off 15 minutes earlier and provides an alternative route so that you can get to work on time. This is an example of predictive travel information. Because the user has chosen to let the transport agency know their travel patterns, and understand their regular movements, they can apply that knowledge to an intelligent response to the users' situation. The fact is that everyone who uses that route can receive personalised messages geared to them and their routine, or used to influence their travel behaviour to make sure the network runs at its optimum efficiency."

This is the essence of Big Data in being able to interpret, predict and respond to situations in real-time. Big Data can also be used in other ways; if there is a transport delay and travellers have to wait for their next ride, operators can lessen the impact by providing incentives for other services, such as discount vouchers to buy a morning coffee or a local offer at a book store – dependent upon their previously stated choices. It is about understanding and interpreting customers as individuals.

THE TECHNOLOGY SHIFT

Over the past 10 years, there have been two great shifts in the use of technology that has enabled authorities to track passenger movements much more accurately. The first is the ubiquity of web-enabled mobile handsets, which has put an input (and output) device into the hands of most travellers and operators. Allied to this is the emergence of reliable high-speed networks and Cloud technology, which has allowed an almost instant two-way flow of information.

Dr Moat says: "Connecting the in-vehicle Controller Area Network (CAN) bus with smart phone technology has enabled sensor information, such as vehicle position, speed, air temperature and rain detection (via automatic wipers) to be collected and presented as Big Data. Cubic has the vision, knowledge and experience to capture this data and aggregate it into meaningful intelligence that can be exploited by traffic authorities and other interested parties and



> *Over the past 10 years, there have been two great shifts in the use of technology that has enabled authorities to track passenger movements much more accurately*

Just as Glasgow has started to use data to improve the city's service provision, other cities will follow suit

delivered back directly to motorists. This dramatically reduces the cost of sensor and drive technology needed at the road side; but it does call for a change in practice in how the user can support the supply and receipt of Big Data information."

For the road user, this will help them avoid delays, increase access to the transport networks and a wider range of journey choices and deliver capacity to carry more people. In the future, we should start to look at viable alternatives to the use of personal automobiles, such as car sharing schemes, in order to free up more space on the roads.

In the same way that we need to understand who travels where and when to improve travel times, we can also use the data in other ways. A better understanding of who is travelling and when and where they are doing it provides invaluable opportunities for targeted advertisements. Location based advertising can identify when a potential customer is in the vicinity and send a personalised sat-nav message, SMS or banner ad, for instance. It provides a potential new revenue stream for both travel operators and retail partners.

This kind of transformational thinking means governments and operators need to analyse their existing infrastructure, current events, and market demand in radically new ways. It will require a highly flexible information management technology solution.

BIG DATA IS BIG

To do so will require a completely different mind-set in the way companies handle data. This 'new' data needs to be augmented with existing data, such as highway traffic loads, the weather, special events, CRM, demographics, real-time positioning, etc. to give a fully rounded view of travelling conditions. All the advantages that derive from the use of Big Data come at a cost and the volume of data must be managed accordingly.

Data is also not a one way traffic flow. Travellers can provide information from mobile devices, web sites, social media posts, or from real-time traffic sensors. These data sets often provide an accurate read on the transport network and infrastructure status. The ability to manage and integrate these and other types of unstructured data is the way to differentiate a truly great future city service.

"In the past we have focused our attention towards objective data received via sensor technology," Moat points out. "But as our youth of today transitions towards a heuristic control of information (for example, crowdsourcing), we need to develop cleverer means of managing conflicting information and to exploit the benefits of techniques used in other business environments such as the gaming industry. Encouragement will be provided by receiving a useful service in return for the supply of information and through the receipt of virtual benefits, for example a score against your own profile like in online games. These capabilities allow transit agencies to refine the way they serve passengers, perform

planning, support operators and help other stakeholders, such as advertisers."

Discovering insights that will drive transport agencies to change the way they do business will require using data much more intelligently and apply next-generation technologies that have been successfully applied by companies such as Google, Facebook and Yahoo to perform sophisticated analytic routines against very large data sets.

THE MARKET CONCEPT

Transport operators across all modes face one distinct challenge: it's very difficult to improve what we can't see or can't measure. The transport sector often throws up complicated cross-functional challenges and decisions are frequently based on intuition, rather than cold hard facts. When operators do have access to information, it is difficult to collate or takes too long with which to do anything meaningful. The need to provide better passenger information often takes second place to the drive for cost efficiencies and overhead reductions.

Data helps to cut through the information fog. It enables operators to see all the transactions made and creatively analyse what has happened during the course of the journey. Over time, and through predictive analysis, it turns this into an increasingly reliable forecast of what will happen in the future. It also provides system-wide visibility, insight and decision support to a business' back office.

"Data analytics accurately record transport activities, transactions and journey movements," Moat explains. "From here, Cubic's data analytic abilities allows transport authorities and agencies to better understand operational drivers, and make more well-informed decisions. Predictive models can be implemented to support process improvement within

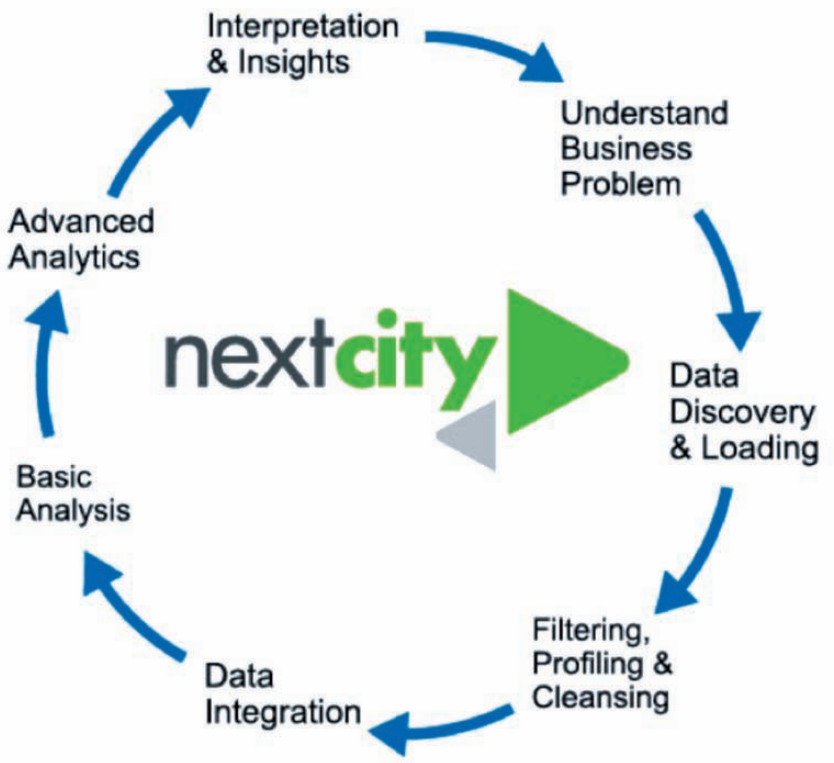


Fig 1.1

1. **Understand the business problem**
2. **Data discovery and loading**
3. **Filtering, profiling and cleansing**
4. **Data integration**
5. **Basic analytics**
6. **Advanced analytics**
7. **Interpretation & Insights**

a business or transport model and feeds directly into Cubic's NextCity vision, where travellers use one integrated account for use across all modes of transport in a city, whether road, buses, trams, cabs, car share or rail."

Data can be used for a variety of predictive planning. On the macro level, it can record passenger density levels for routes across the city, or the flow of passengers into and out of transport hubs. This information is vital for effective city planning measures. Below ground, on the Metro network, data can be used to capture and record passenger movements using travel card information; this in turn can model the demand and compare that to the supply of services. An understanding of travel patterns across the network also leads to a prediction of the response to change.

Data visualisation is vital in interpreting these patterns. Through the application of innovative state-of-the-art visualisation techniques, analysts and planners are better able to get actionable insights from massive data sets. They can also model different scenarios and then more effectively and rapidly communicate the conclusions to other stakeholders, making them far more effective at measuring citywide transportation networks than they are today.

Dr Kevin Moat takes up the story: "Armed with broader perspectives and deeper insights, planners can more effectively balance demand against capacity when restructuring services. For example, knowing the

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See the possibilities

origins and destinations of passengers' journeys lets planners determine not just how many people will be impacted by a schedule change, but what their re-route possibilities are. It can determine the actual time impacts on their journey, letting planners assess the real customer travel implications of the changes they make. It also helps regulatory reporting, where an agency or regulatory authority can present information in a way that supports larger national planning initiatives and directs funding to where it can serve the higher purpose."

On a micro level, an understanding of people as individuals will give transport agencies an edge at providing the personalised information people need to make their lives easier. It is what will lead to the early morning warning call about transport delays, or influence individual travel behaviour by offering personalised incentives for choosing a particular mode of travel – by offering a discount at a coffee store for travelling on a certain road rather than a 'normal' route for instance. It is what makes travel individual and personalised for every single user on the network.

GAME-CHANGING DATA

A conventional database is quite inflexible to change. However, Cubic's solution, says Moat, keeps pace with the rapidly changing requirements, size and granularity of data. Whereas other suppliers house data outside of mode or specific 'silos' that are not integrated, Cubic's solution stores and manages data in a single, central database. This enables raw data to be synthesised to provide meaningful insights across a whole city or region, regardless of the multiple operators.

"In particular, our solution applies predictive analysis to reveal the subtle factors that impact cost, revenue and customer satisfaction. Combined with historic trends, predictive analytics leverages new insights into what is likely to happen in the future under different scenarios, helping planners achieve the optimal allocation of resources."

It must also be able to handle the sheer number of disparate sources of data that need to be accommodated in a typical transport network. The analytic model (fig 1.1) shows how a transport operator will typically go through each of these stages to maximise the benefits derived from the data they capture and use.

The way data is used transforms the way transport operators use and think about data. It has a game changing capability to influence the ability of transit agencies to become more customer focused, raise additional revenues and realise a central core of Cubic's NextCity vision.

"Just as Glasgow has started to use data to improve the city's service provision, other cities will follow suit. Cubic has been instrumental in providing the technology in the new Glasgow Operations Centre, which acts as a platform to collect, validate and analyse data in order to make real-time decisions on the city's infrastructure network," Moat proudly points out.

The information feeds into Glasgow's city dashboards, a shared operational management platform accessed via mobile phone. It alerts users to traffic incidents, live rail updates, corridor travel times, emission alerts and energy consumption levels across the city on a real-time basis.

The accompanying 'My Glasgow' app monitors street lighting conditions, A&E waiting times, water levels, people movements and crime risk spots across the city, all of which is customised to the needs of the user.

The public can also access an interactive map portal to explore and contribute to spatial datasets based on various themes, such as Active Travel, food growing networks and public safety. The map portal empowers communities to provide additional feedback with access to reporting tools. Open portals, such as OpenStreetMap, and GIS software allow environmental, social and economic information to be updated by Glasgow's citizens.

"Glasgow has become a pioneer of Future Cities, providing a two-way flow of information to keep people moving," concludes Moat. "Its use will be closely monitored by many other cities over the next few years as a potential road-map for how to effectively manage resources now and in the future. Glasgow is just a snapshot into the power and potential of data – as systems develop and evolve around the world, the sophistication and capability of information has the power to transform the way we live and enhance the quality of life for everyone in a city environment."

FYI

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Academicians and business executives with a broad international experience share their knowledge with the Programme's students through a combination of online learning sessions and in-class residential periods in London (United Kingdom). This learning approach allows a high degree of flexibility and time optimisation to high-level professionals with limited time availability.

The GEMBA-TREN targets primarily at experienced professionals active in the transportation and energy industries holding a University degree and a good command of the English language. However, up to 25% of the seats are available to recent graduates with a brilliant academic record.

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Connecting communities

Dubai's Smart City Vision is winning admirers from all over the world. How it fits into the Internet of Everything is at the same time fascinating and, ultimately, crucial

It's a widely held view that the principles of openness that have made the Internet a thriving ecosystem over the past 20 years can be applied to create and grow the networked platform for connecting people with products, services and information. This same network can also provide a means for cities to manage services, provide citywide information, learn more about how their citizens use managed services and provide business opportunities as well.

By drawing on their experience from current strategic partnerships in smart city initiatives such as those in Barcelona, Nice and Hamburg among many others, experts and analysts from Cisco collectively agree that Dubai's Smart City plans could create one of the world's most connected and sustainable urban centers.

Having secured Expo 2020, Dubai's rapidly accelerating Smart City bid comes at an opportune time. Frost & Sullivan estimate that the global market potential for smart cities - infrastructure development, technology integration, and e-government, energy and security services - could reach US$3.3 trillion by 2025.

"The way we will move around in and interact with the city of Dubai is being revolutionized, and companies like Cisco are working very closely with both government and businesses to guide and support this momentous change,' said Rabih Dabboussi, Managing Director for Cisco in the United Arab Emirates. "The era of inert buildings, unresponsive citizen services, and lack of logistical transparency is over, and Dubai has everything in place to become an exemplary smart city pioneer, not only throughout the region but also on a global scale. The global need for cities to adapt is intensifying. Research from the Massachusetts Institute of Technology (MIT) predicts that cities in the future will account for nearly 90 per cent of global population growth, 80 per cent of wealth creation, and 60 per cent of total energy consumption."

According to analysis by McKinsey, one billion people will enter the global "consuming class" by 2025 – a rise of 70 per cent from today. Cities will need to construct floor space equivalent to 85 per cent of all of today's urban building stock – an area the size of Austria.

SMART+CONNECTED COMMUNITIES™ – A REALITY TODAY

Cisco is currently involved in over 90 Smart+Connected Communities (S+CC) projects worldwide, all of which feature an open-architecture platform that enables Cisco, its partners and

The era of inert buildings, unresponsive citizen services, and lack of logistical transparency is over, and Dubai has everything in place to become an exemplary smart city pioneer

customers to create and deploy new smart services and applications. To learn about cutting-edge smart city technologies in action, a delegation of Dubai government representatives recently visited Barcelona, one of Cisco's most prominent S+CC engagements.

The city of Barcelona is currently showcasing a Cisco WiFi Mesh network in the Born District that provides connectivity to different metropolitan devices, such as sensors, cameras and actuators. The Wi-Fi Mesh network is also the foundation for infrastructure-based management services. For example, environmental smart sensors report in real-time on temperature, noise, humidity, gas and dust-particle concentration, for example. The data gathered helps to paint a picture of the city's overall livability, while serving as "watchdogs" capable of detecting levels outside of set thresholds and triggering alerts back to the city situation room.

Dubai needed a carefully considered, robust plan structured to benefit residents, businesses and visitors – emblematic of its receptivity to cutting-edge technology

Smart parking sensors, for instance, help citizens find open parking spaces via smartphone app. Smart waste sensors installed in waste containers signal when they become full or are emitting odours above a set threshold for optimized pickup routes. Smart street lighting sensors in smart light poles can detect moving objects, including people and animals, in the street and adjust light levels accordingly. Cisco's reputation is already well-established in the technologies, standards and experience in having supported the development and growth of the Internet. The Internet of Things – and its next incarnation, The Internet of Everything – take this revolutionary achievement to the next level. The Internet of Everything could connect 50 billion people, processes, data and things by 2020.

"We can deliver the intelligent network to make it happen – a network that listens, learns and responds – on a scale like never before," explains Dabboussi. "The rise of the smart city is intimately linked to Cisco's Internet of Everything (IoE) strategy, which Cisco estimates has a value of US$14.4 trillion."

CONNECTING EUROPE

Cisco also recently helped launch the "Connected Boulevard" in Nice, France, an ambitious proof-of-concept project built to demonstrate the benefits and value of the Internet of Everything for both residents and city leadership. The project includes four types of city services – smart circulation (traffic), smart lighting, smart waste management and environmental monitoring. The applications gather information from about 200 wireless devices and sensors deployed along the 800m-long Boulevard Victor Hugo. The shared network platform makes it possible to transform raw data from these sensors into the actionable intelligence that, when scaled, has the potential to transform Nice into a smart city.

In the city of Hamburg, Germany, Cisco is also using Smart+Connected City Wi-Fi to improve service delivery to mobile citizens, to boost the

A VISION FOR A SMARTER CITY

Thinking Cities **editor-in-chief Kevin Borras asks Rod Halstead, Managing Director, Public Sector and Ian Foddering, Chief Technology Officer, Cisco UK & Ireland, to explain their company's position in the smart city environment**

What is a smart city to Cisco?

Ian Foddering A smart city is one that has the ability to adapt to the way its citizens use it. We're seeing an increasing number of people moving to cities and that's giving the cities themselves, or rather the local authorities that run them, some real challenges. So the question as we see it is how can technology play a part to make it more efficient and an easier environment for the people that live there to get around, whether it's travelling or commuting from a personal or professional point of view. It's a number of different elements coming together in scalable, sustainable fashion.

If you look at the way that cities run today, transport is relatively isolated from the rest of the city. It has its own infrastructure, the roads themselves and the technology that supports those roads, but typically transport is separate to the broader system around it so to bring those together in a secure, cohesive manner is going to be critical going forward. The technical element is less of a challenge, it will be more a challenge of governance and culture.

How does Cisco play its part in following or even implementing those societal changes?

Rod Halstead Well, Cisco has a very interesting motto which is "helping people live, play and learn" and the smart city is pretty much at the hub of that. How do you help people living in a conurbation, be that a city or a community to live, play and learn – in other words how do you change their options? You ask about society – it's having more access to information, informing them more quickly about issues regarding travel, an emergency situation, or entertainment, or traffic conditions...the more informed we are becoming, largely through the advent of social media, the more integrated we become, the more efficient and concise we become in terms of our movement. This will of course mean an improvement in traffic flow but it also impacts positively on our work flow. It will enhance the way people cohabitate in cities.

In terms of your smart cities strategy, how do you ensure that people get information that is relevant to them?

RH The technology exists, depending on what smart devices they are using, for people to be get that feedback loop you are talking about and they can opt in or not. They can receive tailored information, specific to their needs if they are in a city, a community, a store or whatever, depending on to what level they have opted in to people knowing their preferences, their travel methods and patterns of movement. The feedback loop can tailored to fit their needs and expectations and things that are important to them.

local economy, and to provide smart parking via the Hamburg Port Authority. City Wi-Fi also provides the foundational platform for enabling Internet of Everything innovations such as traffic congestion management and automated water metering, resulting in greener and more efficient city infrastructure management. On the public safety and security front, the City Wi-Fi solution improves situational awareness by accelerating incident detection, and it can trigger a combination of automated response, real-time collaboration, and escalated decision support for optimal city operations and planning.

Amr Salem, Cisco's Dubai-based Managing Director for Global Smart+Connected Communities, notes that Dubai's strategy was "a carefully considered, robust plan structured to benefit residents, businesses and visitors – emblematic of Dubai's receptivity to cutting-edge technology." The fiber optic networks, high-speed wireless Internet and sensors set for deployment across the city will mean a continuous flow of improvements – in everything from education, healthcare, and transport to utilities and general security.

Salem goes on to explain that Cisco's approach to addressing these needs – the same ones challenging most cities today and into the future – is to leverage the network as the foundation for

In Hamburg, Germany, City Wi-Fi provides the foundational platform for traffic congestion management and automated water metering

IF A real world example of that is a project we have been working on with an organisation called Intu who run a number of shopping malls in the UK, the Trafford Centre in Manchester for example, and we provided some wireless infrastructure for them, via our Connected Mobile Experiences (CMX) that lets you tap into this connected lifestyle and provide relevant mobile content while gaining meaningful analytics. It allows Intu to gain some insight into how people use their malls and it does that by following customers' mobile phones as they walk around the real estate. Building on Rod's point, the customers get free Wi-Fi access but Into get information about customer footfall and dwell time so they can apply a high degree of intelligence around where they need more security, potentially charge more rent, target marketing campaigns and so on.

Where do you stand on the gamification and incentivisation of travel within the Thinking City?

IF Gamification is certainly an interesting one for us, but on a personal level I have one of these wearable technology devices from a health point of view and that certainly adds a degree of gamification to my life as I earn points and it works for me.

From a Cisco point of view we are a strictly B2B company, but what we can do is provide the connectivity to allow these types of applications to be run over them so if an organisation wants to do that through a traditional Wi-Fi infrastructure or mobile capability that's something that is definitely possible but it's not an area that we necessarily focus in on.

RH There is a recognition with our technology that where we can inform people, whether it's dynamic message signs or information as they move towards stations or airports or malls, or points of congestion, we can help them make informed decisions.

I use public transport a lot and I'm delighted with the information I get from Transport for London that explains to me what is happening on the network. It tells me not to take the Victoria Line today or not to get off at a certain stop. It's real-time information, they know what time I usually catch the Tube so they target their communications to me at that particular time.

I leave every day before 7am and I get a text in good enough time that informs me of which way I should go. The more we can facilitate that, through our underpinning technology or enhancements of that technology through devices, that will enhance how a city works and how people can more efficiently through it, using that city's infrastructure. The same applies to parking – smart parking apps can tell drivers of space availability, or lack of it, before they get anywhere near their intended environment within the city limits. Enabling smart decision-making in real time is a wonderful spin-off from this whole debate around communities and smart technology.

Cisco recently helped launch the "Connected Boulevard" in Nice, France

managed city and business services. "This foundation layer will then incorporate all manner of mobility, security, cloud computing, virtualization, collaboration and video – and other evolving technologies – and rely on and accommodate a diversity of cross-functional, open-architecture applications that package and distribute information and services."

FYI

For more information about Dubai's Smart City Vision contact **Nik Jefferies**, Good Relations Group at **Nik.jefferies@goodrelationsgroup.com**

http://www.cisco.com/web/about/ac79/innov/IoE.html

The 'rurban' challenge of Île-de-France

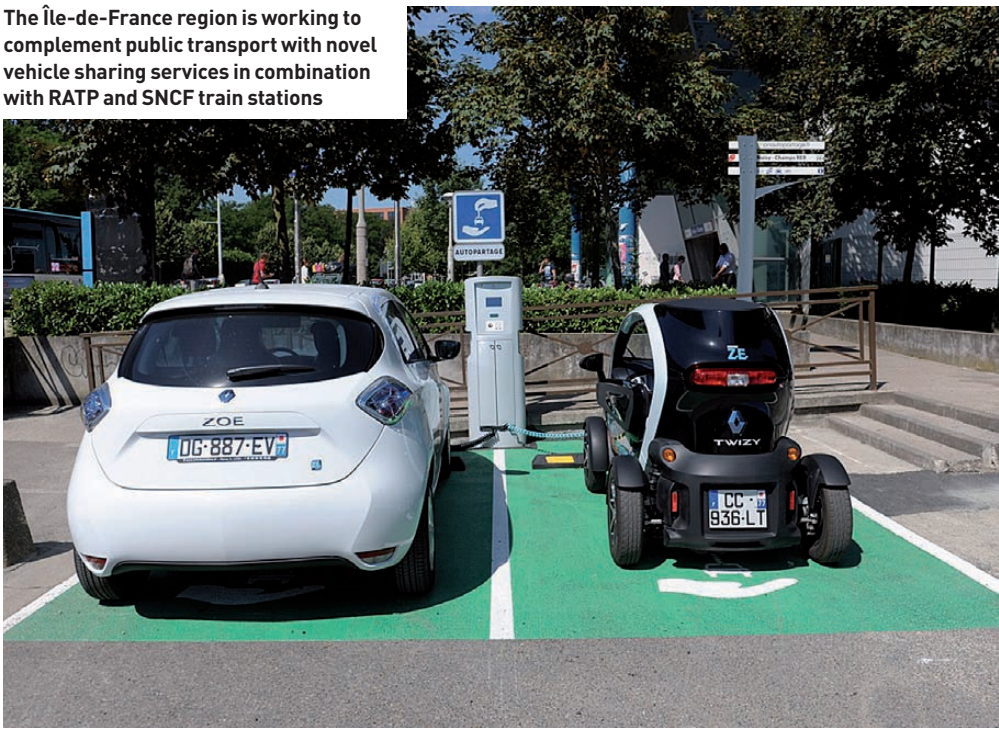
Florinda Boschetti reports how one French region is deploying clean vehicles in a smart and multi-modal manner

Today more than ever European cities and regions are competing on a supra-regional scale to attract companies and skilled workers by providing them with suitable environments for business, liveable places in which to settle down and a good quality of life – while at the same time ensuring that economic development and growth meet resource efficiency targets and sustainability goals including environmental objectives.

Undoubtedly transport contributes greatly to regions' growth, benefiting the local economy and helping access jobs and education. Nevertheless, commuting to work, study or for leisure represents a large amount of time spent in traffic for many and huge costs for individuals, businesses and society as a whole. This is more true for densely populated regions where transport authorities are faced with an increasing mobility demand and saturated road network.

To keep up with the pace of a fast changing society, European regions are requested to deliver services adapted to people's new mobility needs and, at the same time, meet more stringent environmental targets, notably on air emissions and noise.

Region Île-de-France is a good example of how to combine sustainable transport planning and energy saving principles by offering innovative mobility solutions with electric vehicles based on a multi-modal and integrated approach with the regional public transport system.



The Île-de-France region is working to complement public transport with novel vehicle sharing services in combination with RATP and SNCF train stations

THE REGIONAL CONTEXT

Region Île-de-France is home to 11.8m residents and offers 5.6m jobs, its territory spread over 12,000 km^2 with a very dense urban core: 75 per cent of the population live on 20 per cent of the land. The remaining 80 per cent is of rural character. Some 41m trips are made daily, mainly on short journeys: 82 per cent are less than 10km in average. The private fleet numbers 4.8m vehicles, of which 60 per cent are diesel-engined.

"Under these circumstances there is a high potential for the development of electro-mobility programmes to improve people's mobility and air quality by introducing cleaner vehicles" says Nathalie Granes, Head of unit for Strategic Mobility Planning

There is a high potential for the development of electro-mobility programmes to improve people's mobility and air quality by introducing cleaner vehicles

Electric vehicle charging point, Chartres

and Eco-mobility with Île-de-France Region. In particular, her unit has looked into complementing public transport with novel vehicle sharing services in combination with RATP and SNCF train stations, notably France's national state-owned railway company and the public transport operator in the Paris area.

"Over the past few years Île-de-France has engaged its main strategic master plans for Climate, Air and Energy; Land use planning; and Sustainable mobility. Consequently it was possible to outline a holistic framework based on a strong and coherent strategy at the regional scale" continues Granes. The new regional policy framework supporting the introduction of cleaner vehicles aims to implement 16,000 public charging points on public spaces and introduce 400,000 electric vehicles on the road by 2020. These figures are based on the national recommendations, the aim being to have 2m electric vehicles in France by 2020.

Île-de-France is supporting both the development of infrastructure and promotion of new mobility services. To reach its objectives the region has partly benefited over the past three years from the pilot launched by the MOLECULES project in Marne-la-Vallée, an area located 24km east of Paris and comprising 26 communes.

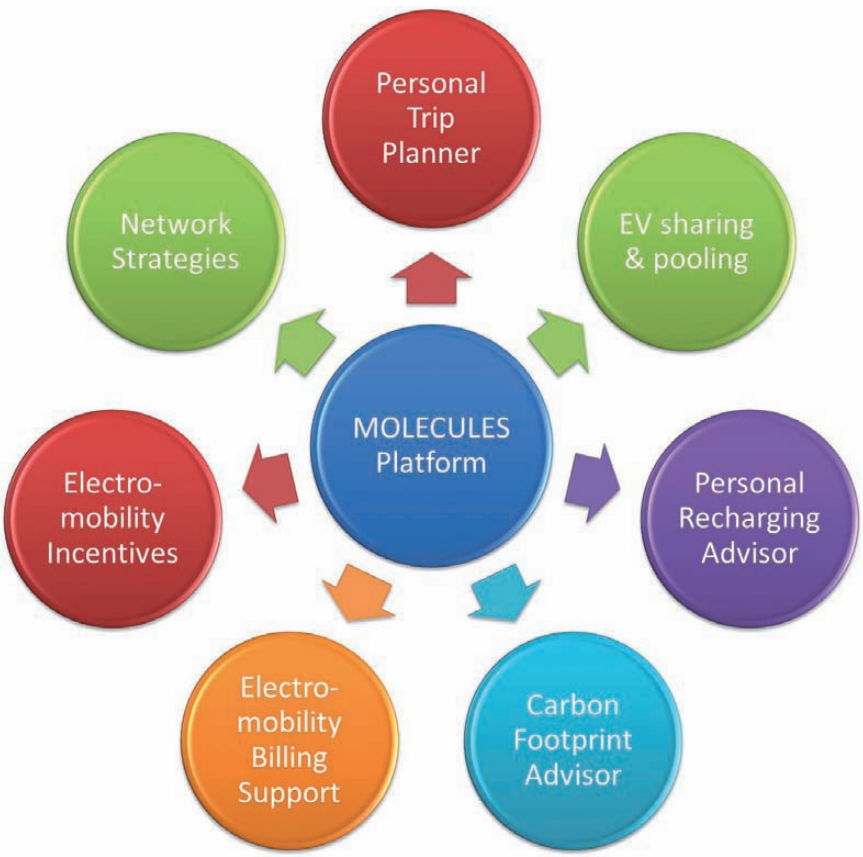


Figure 1 : The seven services for smart connected electro-mobility integrated into the MOLECULES Platform

EUROPEAN SUPPORT FOR INTEGRATED ELECTROMOBILITY SERVICES

MOLECULES stands for "Mobility based on electric connected vehicles in urban and interurban smart, clean environments". Since the project launch in 2012, MOLECULES has supported the deployment of integrated services for electromobility in Barcelona, Berlin and the Grand Paris area. The project has received European co-funding under the Competitiveness and Innovation Framework Programme (CIP) and will terminate in December 2014

after having tested the use of fully electric cars and scooters, and their integration in the existing transport network.

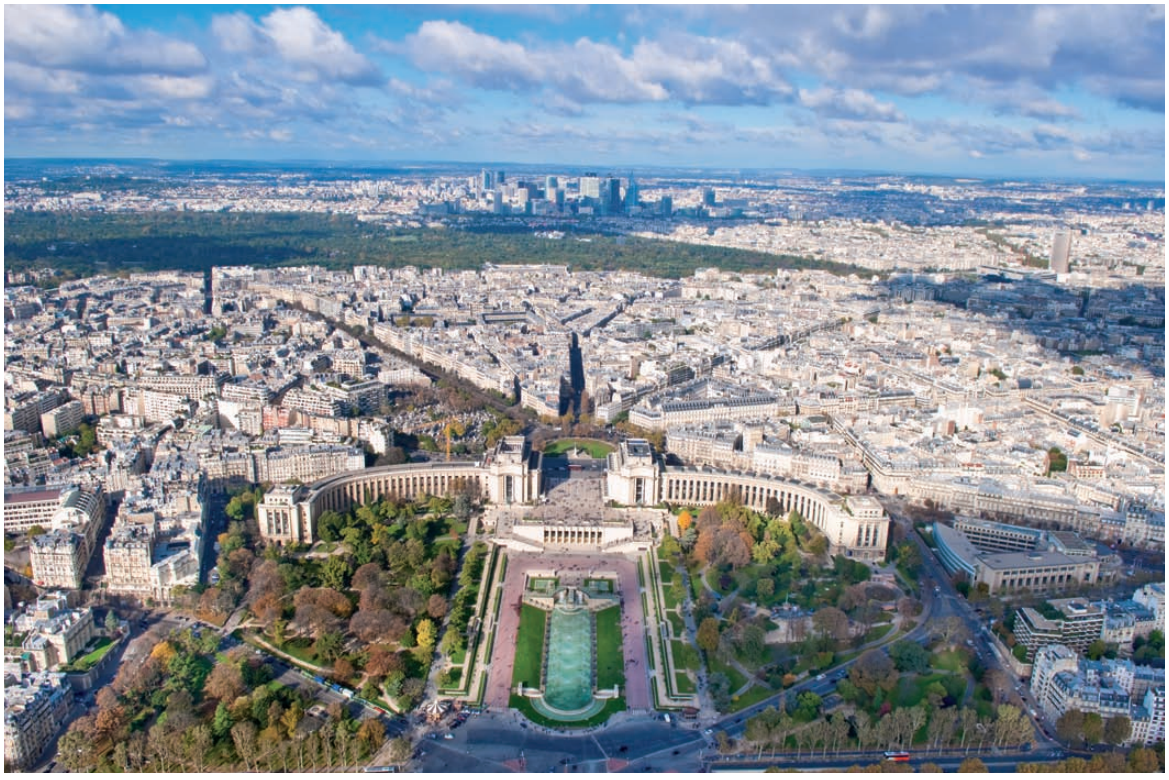
The aim of MOLECULES is to use state-of-the art technologies and improved ICT-based services supporting electromobility to enhance the user experience and encourage a shift to cleaner modes of transport. The project consortium comprises experts in the field of mobility and transport, together with stakeholders from the public and private sector who have developed an online ICT platform for smart connected electromobility. The Platform provides a centralised web-based tool offering seven categories of services for electric vehicle users (see image).

The MOLECULES Platform serving the Grand Paris areas is supported by MOPeasy, an innovative company expert in car-sharing and car-pooling. "We operate a solution for 'rurban territories' which is a complementary solution to Autolib', the global project operating in Paris", says Bruno Flinois, CEO of MOPeasy. "Thanks to MOLECULES, the project in Marne la Vallée – Grand Paris is the first one for 'rurban territories' that has been deployed at a large scale."

The area of Marne la Vallée is coping with the lack of both public transport services outside rush hours and inter-mobility systems thus entailing severe pollution problems due to private mobility. MOPeasy and EpaMarne la Vallée (a public organisation in charge of land-use planning) have established a public-private partnership to develop electric car sharing solutions in the cluster Descartes reaching out to numerous workplaces.

This is just one of the electromobility initiatives that have taken place in the area to reduce CO_2 emissions and tackle mobility problems. In that respect, Île-de-France has integrated alternative car ownership schemes, i.e. vehicle sharing and pooling, with public transport in a multi-modal approach benefiting both services' users. For example, SNCF and RATP users can access the electromobility platforms which are available at certain stations, take a pre-booked electric vehicle or can book a vehicle on the spot, then reach their final destination not serviced by local public transport. After the use, cars are returned to the origin point. Recharging points at platforms display real time information on train connections hence making it easier for users to know when to catch their commuter train after having used an electric car.

The deployment of new clean fleets in the Region is co-funded by ADEME (French Environment and Energy Management Agency), Île-de-France and local authorities. MOLECULES set the framework for an innovative cooperation between private companies and local authorities: management and infrastructure remain under public control, and vehicle sharing services are operated by private companies under their own responsibility and risk. Where



Since the project launch in 2012, MOLECULES has supported the deployment of integrated services for electromobility the Grand Paris area, among others

Presentation

The successful cooperation between Île-de-France and the European funded project MOLECULES for the deployment of electric vehicles in Marne la Vallée will be presented at the 2014 Annual Polis Conference in Parallel Session 1B Electric Vehicles, 27 November 2014 at 9.30h

http://www.polisnetwork.eu/2014conference

pilotcities.eu

A public-private partnership has been established to develop electric car sharing solutions in Marne la Vallée

Autolib' is a public service delegation combining public funding for investments with a temporary use authorisation of public space.

What makes Île-de-France a global reference for a smart connected transport system

With several ongoing initiatives in its territory, Île-de-France is the leader among European regions in the deployment and take-up of electromobility.

- Autolib' counts 2,500 vehicles, 871 stations representing more than 5,000 charging points, with more than 40,000 subscribers. The service is available in 63 municipalities with potential perimeter extended to 402 municipalities of the urban core.
- EPAMARNE, the Local Planning and Development Authority has 100 vehicles, 85 stations with 256 charging points, combined with a car sharing and eco-mobility platform offering information about public transport network and carpooling service reservation.
- EPAMSA (public establishment for the development of Mantois-Seine Aval) has 46 charging stations and has plans to extend the existing network to 53 charging stations in the near future.
- The city of Paris counts 300 charging stations with total 900 charging points, in addition to Autolib's.
- SDESM (energy provider) has a network of 100 charging points. The project is led by a Syndicat of energy and co-founded by ADEME.

Alhough the numbers speak for themselves, Nathalie Granes acknowledges that "the Region had to face two main difficulties in this process: on the one hand is the complexity of the juridical and political contexts, with a large variety of stakeholders sitting at the table, and on the lack of expertise at the local level on the other hand."

"Today we can identify three main conditions that have contributed to the success of a 'Smart Region'" says Granes. "These are: the definition of a comprehensive vision for mobility policies to integrate electric vehicle sharing projects as part of a real intermodal and multimodal public transport strategy; organising governance in stakeholders management and setting up a cooperation platform to share information; and managing the demand and setting up tools and services which will contribute to promote new behavior."

FYI

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Give the travellers what they want

Mark van Hagen, principal consultant for the Netherlands railways, NS, gives *Thinking Cities'* **Cleo Davies** an insight into the innovative approach to station design that he has helped develop in the Netherlands and is now bringing to other European cities through the NODES project on urban interchanges

As cities are growing and becoming more crowded, interchanges are set to become more important features of the transport networks of the future. Co-modality is the paradigm underpinning transport systems now and for the future.

We are moving from a mode-by-mode approach to a multimodal, integrated approach to transport networks. Interchanges are crucial in bringing forth the shift from the traditional use of individual private car to wide scale collective public transport and active modes of travel such as cycling and walking.

The urban environment is transformed whether it is in densely populated and retail intensive areas or in peripheral areas. As this transformation in transport networks takes place, interchanges are features of innovation for new policy approaches.

Mark van Hagen is principal consultant for the Dutch Railway organization, NS. He has developed pioneering work on an innovative approach to design policy in interchanges through his applied research on waiting experience at train stations. The results have prompted a shift in policy approach to interchange design from a functional approach only to one based on emotional experience of customers at stations.

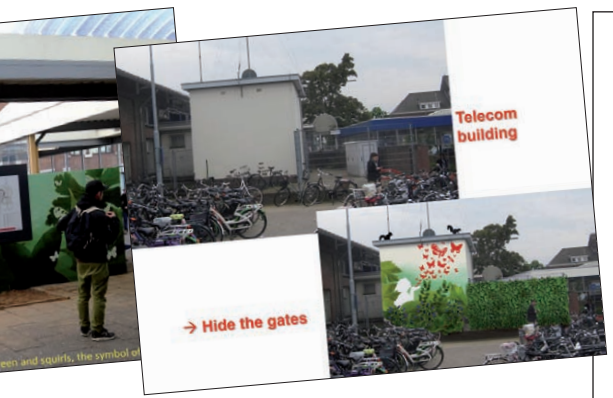
With ongoing refurbishment of big and small interchanges and stations in the Netherlands, this approach has been put into practice over the last few years. It is now being transferred to other European cities thanks to the NODES project in which NS is a partner, with three stations in the Netherlands as testing sites.

A DESIGN FOR LIFE

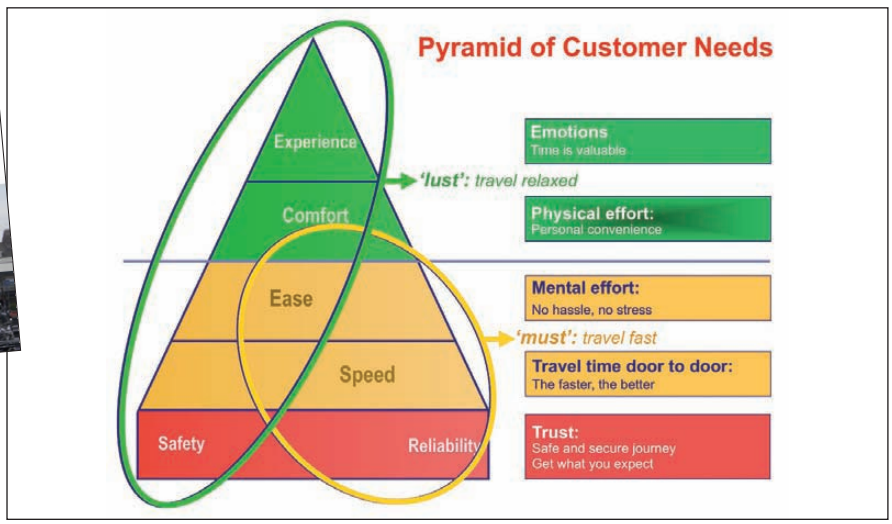
"Evidence-based design is the key difference to the old way of proceeding", says van Hagen. "Before, architects would get a briefing from companies on functionality of the interchange that would give indications on platforms, stairs, dimensions, etc. The design was left up to the architects. They had carte blanche on esthetical elements." This approach disregards the importance of design for the experience of the customer during his or her journey beyond the functional aspects.

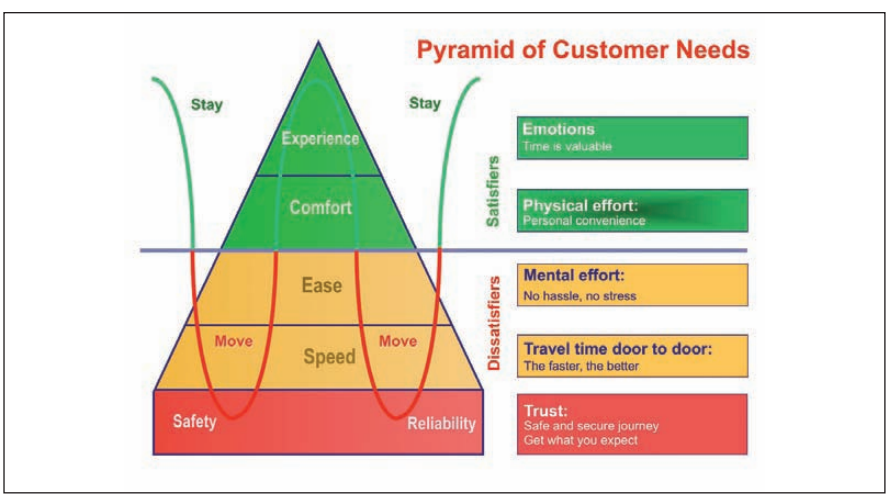
"We developed an approach that starts with the customer, their needs and what they want. Customer behaviour becomes the driver behind policy making. Customers invest time, money and effort and expect good travel quality for their investment. Depending on the balance

Before, architects would get a briefing from companies on functionality of the interchange that would give indications on platforms, stairs, dimensions, etc. The design was left up to the architects



Roermond, old and new – the process to improve things gives precedence to travellers' needs





between these three, they will choose to use collective public transport or the private car or even stay at home when the investments are too big compared to the quality they get. We translated this into policy and into a new design. Nowadays we are living in an experience economy and design is not only functional anymore but also about ambience and how people experience their time at a station.

"The way we proceeded was to develop design based on customer needs, then have the building phase and then introduce the experience monitor, to check if we have done a good job or not. The experience monitor is a tool that makes it possible to measure how the new station operates from the customer's point of view."

A HIERARCHY OF NEEDS: STAYING IS AS IMPORTANT AS MOVING

"There is a hierarchy of customer needs and wishes. First of all, the station and the journey must be safe, clean and reliable, if not customers will simply not use the service," says van Hagen. Then, speed and easiness are the second criteria that customers expect. This has to do with short distances, escalators, real-time traffic information. "Speed and easiness are related to the primary function of the stations which is to provide connections in the fastest and easiest way possible for the customer. If these basic expectations are not at a satisfactory level, then customers are dissatisfied.

"But at the same time, people don't just move in stations, they also stay in stations, for example waiting on

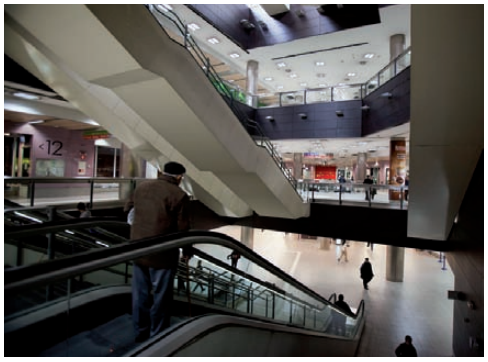
The aim of the station experience monitor is to assess customers' perception on how the station operates, bringing in factors that relate both to functionality and ambience

their connecting mode. People spend more time waiting in an interchange than moving to get their train, tram of bus (or connecting mode). If moving is the primary function of stations, staying is a consequence and a secondary function, but it's equally as important for customers' perception of the service."

Much of the focus of policy makers in transport has been on the moving aspect of a journey and not enough on the experience of staying. "Whilst staying, people look for comfort and a nice experience". Hence the fact that ambience and comfort play a crucial role in the perception that customers have of how a station operates and on how satisfied they are with the service.

"The results of the Experience Monitor showed that feeling safe and being in a clean environment only accounted for 20 per cent of the experience of customers in the stations. Ambience is more important in the eye of the customer than cleanliness and safety. That is only true of course if safety and cleanliness are at acceptable levels. If these go down then so does everything," van Hagen suggests.

When the basics are right, then experience and ambience have a much stronger importance from the point of view of the customer and account for more then half of the total score travellers give to the station. This has huge implications in terms of service delivery and the perception of the quality of the service delivered.



Madrid's Atocha station is particularly customer-friendly and would score high on the station experience monitor

"There is still a need to convince management that this is the case though. Though it is often a very small investment, it is of high importance for the customer", van Hagen explains before giving an example of what this new approach could mean for station design and for station managers. "There were graffiti problems in a waiting area on one of the stations. Instead of the grey wall, we placed all over the wall a warm image of a library and a fireplace with a surface that absorbed smell. It was a minor, up-front investment that was more than compensated for by the fact that graffiti no longer had to be removed and saved a lot of costs in this way. Moreover, customers now use the waiting room and are happy to be there. The whole idea is to make people happy, not only deliver a satisfactory service", he points out.

Other measures that can help improve the perception people have of a station include the use of music. This helps to lessen the feeling of emptiness and therefore increases the perception of safety. So the customer enjoys the journey more and feels safer. Putting shops in a station helps the rating too. "Customers rate stations with shops more highly than those without," comments van Hagen.

THE STATION EXPERIENCE MONITOR: A TOOL THAT ENABLES BENCHMARKING

The aim of the station experience monitor is to assess customers'

The project

The NODES project: New Tools for Design and Operation of Urban Transport Interchanges is a three-year research European project, focusing on the efficient integration of public transport services.

Photo: NODES

Culemborg station in the Netherlands features a faux fireplace and bookcase to enhance the customer experience

Photo: © Digikhmer / Dreamstime.com

Leiden was tested for a wide variety of customer experiences, including colour and smell

perception on how the station operates, bringing in factors that relate both to functionality and ambience. Customers rate the different services and journey element. "The power of the tool is to make it possible to compare different measures on functionality and atmosphere." So how was the experience monitor developed?

"Leiden station, which is the fifth largest station in the Netherlands, was used as a pilot. We tested all kinds of customer experiences and measurements: colour, smell, design, sound, art, etc." The experience monitor was developed using testing in the real Leiden station and a virtual station. "Using a virtual station gave the same results as in the real world", says van Hagen, before adding that "this is interesting for managers who can't or don't want to invest in real testing of measures. Testing in a virtual world is not only cheaper, but you can measure more situations". So in practical terms, the experience monitor is a series of questions that were drawn up based on the testing done at a pilot station.

"We were able to use the pilot station before refurbishing the larger stations in the Netherlands. The station experience monitor also enables benchmarking", he continues. "This was hugely important because it means we were able to benchmark all kind of experiences from Leiden station refurbishing and redesign other, sometimes much larger stations, in the Netherlands. We were able to use the experience monitor to rate different aspects of how the station operates."

What was done for many stations in the Netherlands is now being replicated in other European cities.

NODES: DISSEMINATION AND BENCHMARKING OF INNOVATIVE POLICY

"The experience monitor puts customers in the lead," says Mark van Hagen. "We wanted to bring this type of thinking into the NODES project. Because the station experience monitor is a standard tool it makes it possible to benchmark between European cities too. "

The New Tools for Design and Operation of Urban Transport Interchanges (NODES) is a three-year research European project, focusing on the efficient integration of public transport services. The project's ambition is to deliver a toolbox that would be the European reference on interchanges. The Station

Event

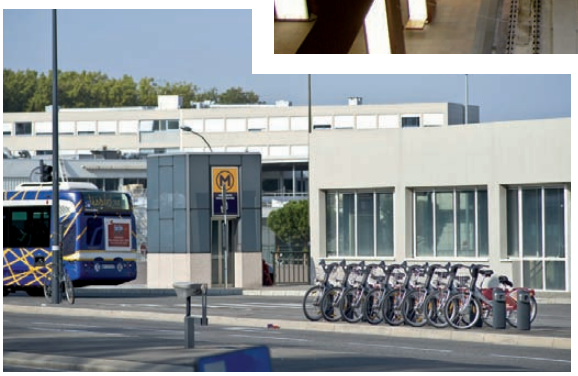
Tools for improved interchanges is the topic of session 2B at the 2014 Annual Polis Conference, 27 November, 14.00.

http://www.polisnetwork.eu/2014conference

Four steps in evidence-based design:

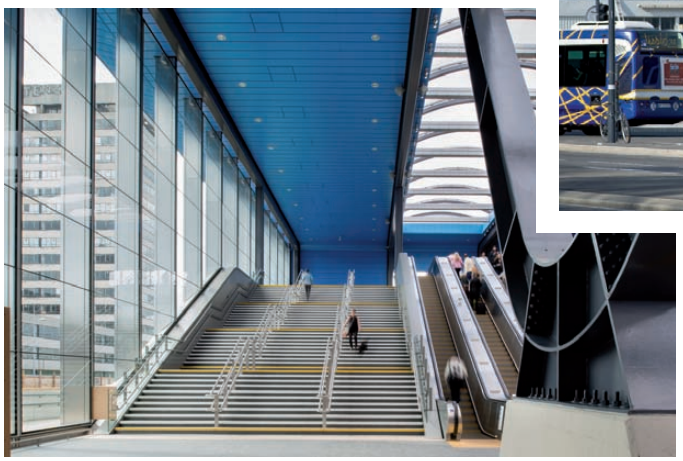
1) Start with customer needs and wishes to achieve evidence-based station design
2) Use the hierarchy of needs where staying counts as much as moving
3) Use the station experience monitor: a tool that enables benchmarking and is able to measure the impact of any change (process, staff or environment).
4) Last but not least, disseminate the knowledge and benchmarking of this innovative policy approach through the NODES project.

TU Dresden



Above, Antwerp, Belgium

Left, Toulouse, France



Left, Reading Station, UK, one of the stations using the customer experience monitor

experience monitor is the kind of tool that helps achieve this. It is a tool that derives from an innovative approach to transport and journey experiences with customers needs and wishes as the driver behind policy development. And it is also a tool for benchmarking between stations across Europe. It makes it possible to get an overview of what customers score as good or bad in stations on different measures related to functionality or atmosphere. On top of the experience monitor, "using photos is a way to share and learn from each other too and to foster European benchmarking" says van Hagen. He hopes to develop this more in the future within the NODES project.

Today, Madrid, Birmingham, Rome, Reading, Thessaloniki and Budapest are using the station experience monitor. These cities are all part of the NODES project, as testing sites for the tools or as topic leaders for developing the toolbox and the tools. All these cities have translated the experience monitor into their national language and are using it to collect input from customers at the station on the experience they have and on how they value different aspects of the station.

CONCLUSION

In the future, this type of approach could be essential to make sure that people choose public and collective transport above the use of the private car. Competition with the use of the private car isn't only about infrastructure and functionality of the transport service, ie speed, safety and reliability. It is also about the experience of travelling and enjoying an agreeable journey. In fact, what makes stations attractive, what really brings a cutting edge over the use of the private car is as much about speed and easiness in getting from one place to another as about the experience of the journey. Being able to buy a coffee and a newspaper during your journey in an environment that is comfortable and relaxing is as important as the transport being on time, the surroundings being safe and clean. In the future a wide range of services could be integrated into the journey and located at interchanges on top of shops and other amenities, such as childcare facilities or libraries.

FYI

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Social and Economic Challenges of Transport

This section focuses on mobility for urban economic development and social policy. This includes accessibility of transport for the mobility impaired and accessibility to basic services for everyone; the financing of public transport and transport projects generally; and regulation, planning and governance.

- **Middle East** – What's behind the thriving smart city culture?
- **Madrid** – Smart parking in the Spanish capital
- **Frankfurt, Germany** – Improvement instead of reinvention
- **Public Transport** – Planning to provide the perfect service
- **Madrid, Lisbon, Parma** – Parking for the mobility impaired
- **Germany** – The (chequered) history of mobility

In terms of the thinking city, the Middle East is one of the most forward-thinking and innovative regions in the world

A new dynamic

Paul Doherty on how the combination of economic growth, societal needs and human aspiration is establishing a Smart Cities culture throughout many of the urban centres of the Middle East. Dynamic Middle Eastern cities – including Dubai, Abu Dhabi, Jeddah and Doha – are creating Smart City projects and programs, setting a rapid pace of development and implementation

Four drivers are influencing governments in the Middle East to plan and implement Smart City projects and programs, not by choice, but out of necessity

Smart Cities are designed and developed to provide citizens, workers and visitors with a safe, healthy and sustainable environment in which to live and work. With strong government policies and programs that have been developed over recent years to move cities away from a dependency on hydrocarbon energy and into clean technology energies like solar and wind, the cities of the Middle East are emerging as the global benchmark for alternative energy generation, transmission and consumption. These cities are using their move toward clean technology as the foundation to a larger Smart Cities strategy.

As a key part of their energy infrastructure development, Middle Eastern cities are developing smart grids to help better manage their energy needs. Smart grids will not only improve network resilience and reliability, but they will also result in better energy efficiencies and overall savings. In the context of Smart Cities, the use of smart grids enhances a city's quality of life, creating an environment for innovation. The Middle East can leverage emerging smart grid infrastructure as an opportunity to create a better educational experience, higher-level jobs, a more efficient transport system and improved healthcare in a cleaner environment.

Although the UAE has a national Smart Cities plan, Abu Dhabi and Dubai are planning and implementing two different approaches, explored here in detail, along with King Abdullah Economic City (KAEC and pronounced 'cake') and Kingdom City, two new Smart Cities on the West Coast of Saudi Arabia, each with its own strong identity and different Smart City needs. Finally, Qatar is examined in advance of the 2022 FIFA World Cup, which has been a catalyst for Qatar's capital of Doha to emerge as a Smart City.

Four drivers are influencing governments in the Middle East to plan and implement Smart City projects and programs, not by choice, but out of necessity. First, these cities want to move their collective economies from fossil fuels to alternative energy sources. The Arab Spring uprisings have forced all Middle Eastern countries to re-evaluate their governance, economic policies and communications with citizens, leading to fundamental changes in job creation, greater educational opportunities and the creation of more transparency in government program goals, processes and results.

Second, the populations of most Middle Eastern countries are very transient, prompting a move from nation-state to city-state countries. In Qatar, where migrant workers comprise a majority of the population, the government is making accommodations for guest workers by providing housing, healthcare, transportation and education. Qatar needs these migrant workers to stay to build massive infrastructure projects in time for the 2022 FIFA World Cup.

Third, regional security and religious conflict are always a risk in the Middle East, but through policy and action, the more secure and flourishing regions of the Middle East, such as the Gulf Cooperation Countries (GCC) of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates are emerging as examples of stability throughout the rest of the Middle East.

Finally, the Middle East's large youth population and the education and job creation necessary to accommodate these citizens is another primary concern that has found its way into the planning discussions of Smart Cities throughout the region. The young, educated and well-connected population of the Middle East is demanding change and they want it now.

The urban population of the Middle East averages 88 per cent of the entire population for all countries in the Middle East, and estimates show the population of the Middle East will double by 2050, with the urban population percentage rising even more. With the four drivers of influence growing at an unprecedented rate, the cities of the Middle East cannot afford to fail at their Smart City strategies, projects and programs.

United Arab Emirates

The United Arab Emirates (UAE) – made up of the emirates of Abu Dhabi, 'Ajman, Al Fujayrah, Ash Shariqah, Dubai, Umm al Qaywayn and Ra's al Khaymah – has an urban population comprising 84.4 per cent of its total population and enjoys stability in its society, economy and political system.

The UAE's per capita GDP is on a par with those of leading Western European nations. Its high oil revenue and moderate foreign policy stance have allowed the UAE to play a vital role in the affairs of the region. For more than three decades, oil and global finance drove the UAE's economy. However, in 2008-2009, the confluence of falling oil prices, collapsing real estate prices, and the international banking crisis hit the UAE especially hard.

The UAE has essentially avoided the Arab Spring unrest seen elsewhere in the Middle East, though in March 2011, political activists and intellectuals signed a petition calling for greater public participation in governance that was widely circulated on the Internet. In an effort to stem potential further unrest, the government announced a multi-year, US$1.6 billion infrastructure investment plan for the poorer northern emirates.

The UAE has an open economy with a high per-capita income and a sizable annual trade surplus. Successful efforts at economic diversification, a key component for Smart City development, have reduced the portion of GDP based on oil and gas output from 55 per cent to 25 per cent. Since the discovery of oil in the UAE more than 30 years ago, the country has undergone a profound transformation, from an impoverished region of small desert principalities to a modern state with a high standard of living. The government has increased spending on job creation and infrastructure expansion and is opening up utilities to greater private sector involvement.

The country's Free Trade Zones, offering 100 per cent foreign ownership and zero taxes, are helping to attract foreign investors.[1] Within this framework, two of the emirates of the UAE, Dubai and Abu Dhabi, are not just leading in transforming into Smart Cities but are emerging as global leaders in strategy, projects and programs of Smart Cities worldwide. Incentives for foreign direct investment, regional headquarters and tax free zones are attracting foreign companies to the UAE, creating a strong foundation for a sustainable economic future while creating a market need for Dubai and Abu Dhabi to introduce smarter ways of conducting business, servicing citizens and nurturing a society that thinks of its environment in a holistic manner.

Downtown Dubai: since the discovery of oil in the UAE more than 30 years ago, the country has undergone a profound transformation

CHALLENGES

The global financial crisis, tight international credit and deflated asset prices constricted the economy in 2009, creating a difficult environment for Smart City development. UAE authorities tried to blunt the crisis by increasing spending and boosting liquidity in the banking sector, but those measures were not enough.

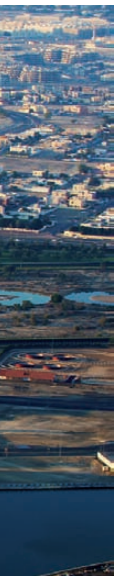
The crisis hit Dubai hardest, as it was heavily exposed to depressed real estate prices. Dubai lacked sufficient cash to meet its debt obligations, prompting global concern about its solvency. To avoid this crisis, the UAE central bank and numerous Abu Dhabi-based banks bought the largest shares of Dubai's debt. In addition to this bailout, in December 2009, Dubai received an additional US$10 billion loan from the emirate of Abu Dhabi that has stabilized Dubai's finances and created the opportunity for Dubai to continue its growth.

Dependence on oil, a large expatriate workforce and growing inflation pressures are significant long-term challenges to Smart City development. The UAE's strategic plan for the next few years focuses on diversification and creating more opportunities for nationals through improved education and increased private sector employment.[2]

NOTE

1 US Central Intelligence Agency, The World Factbook https://www.cia.gov/library/publications/the-world-factbook/geos/ae.html

2 US Central Intelligence Agency, The World Factbook https://www.cia.gov/library/publications/the-world-factbook/geos/ae.html



The close relationship that has emerged between Abu Dhabi and Dubai in the wake of the financial crisis has also highlighted the differences between each city. Since the bailout, Dubai has been regarded as an open city that is more tolerant of foreign customs and behaviors, allowing its tourist industry to thrive in the region. However, Abu Dhabi has been seen as having more influence over social issues, and certain tightening of rules has been put into place, slowly, since 2010. Aside from this, the differences are noticeable since each city is acting as its own city-state in how it prioritizes urban issues and delivers Smart City solutions.

For Dubai, the awarding of the 2020 World Expo, is serving as a catalyst for many projects, including the new Dubai Airport and the expansion of the Port of Dubai and other programs that will further transform this former fishing and trading outpost into a world-class Smart City. Meanwhile, as the capital of the UAE, Abu Dhabi is transforming itself as a leading global example of sustainable design, construction and operations with projects such as the US$27 billion Saadiyat Island multiuse sustainable development and the US$18 billion Masdar City development, positioned to be the flagship global center for renewable energy.

Dubai Silicon Oasis

As the setting for the 2020 World Expo, Dubai aims to incorporate as many Smart City solutions as possible. In late 2013, Dubai's leader Sheikh Mohammed bin Rashid Al Maktoum announced an ambitious Smart City initiative that includes more than 100 projects in transportation, communications, infrastructure, electricity, economic services and urban planning. Some of these projects include a physical address system, an expansion of their urban rail system, a new airport and the development of Smart City real estate projects like Dubai Silicon Oasis. The strength of this program will help position Dubai to advance Smart City development. The emirate has also recently made a strong push in terms of citizen engagement by providing key services and smartphone apps. It is also building its partnership ecosystem by working closely with service providers, technology vendors, and Information and Communications Technology (ICT) leaders, such as SAP, Schneider Electric and Advanced Micro Devices (AMD), within the UAE and abroad.

Dubai aims to incorporate "smart" initiatives into six key pillars: the economy, the lifestyle of its population, transportation, governance, the environment and future generations (in terms of communication, integration and cooperation). The goal is to transform Dubai into the smartest city in the world between 2014 and 2017.

The Dubai Silicon Oasis Authority (DSOA), established in 2004, is one pilot project of the Smart City Dubai initiative. The DSOA is owned by the government of Dubai and is the only technology park in the region that provides an integrated living and working community. Silicon Oasis is a free zone authority that provides a full package of incentives and benefits to companies operating within the free zone.

DSOA opened the US$299 million Silicon Park, its first integrated Smart City project, in April 2014. The project comprises over 1 million square feet of office space, 270,000 square feet of retail space and approximately 215,000 square feet of residential space along with a 115-room hotel. The Smart City development will also include lifestyle amenities such as running tracks, cycling trails, prayer rooms and underground parking for 2,500 cars.

Electric-powered vehicles and smart rechargeable bikes will be the primary means of transportation throughout Silicon Park, with charging

Dubai's Silicon Oasis headquarters

stations widely available. Smart light poles are being equipped with digital signage that can be remotely controlled with apps, along with free Wi-Fi and charging stations for personal devices. Another example is the implementation of advanced technologies to control water consumption through recycling procedures in the home and at the office. These developments at Silicon Park are raising the bar on what it means to shape an intelligent environment that provides maximum comfort and well-being for its visitors, workers and residents. The goal of Silicon Park is to provide the best Smart City solutions and systems so it becomes the model for future Smart Cities throughout the Middle East North Africa (MENA) region and a benchmark worldwide.

Abu Dhabi

Abu Dhabi is the capital of the UAE and uses this leadership role to lead by example in areas such as economic development, job creation, security, safety, sustainability and Smart City solutions. Abu Dhabi has a growth framework called "Abu Dhabi 2030" that has its roots in *estidama*, an Arabic term meaning sustainability with a focus on energy and water efficiency. The Abu Dhabi municipality also understands the role it must play in improving energy efficiency and reducing carbon emissions while moving away from fossil fuels toward clean energy and a more diversified economy. Abu Dhabi 2030 is a coordinated citywide effort to address these issues in combination with focused Smart City strategies. The Abu Dhabi municipality has allocated US$4 billion to be used for Abu Dhabi 2030 with initial projects focused on technology that will make it easier to live, visit, navigate and do business in Abu Dhabi.

One major project that is being coordinated with the Department of Municipal Affairs is the modernization of its streets, in terms of addresses and signage. Abu Dhabi, along with most major Middle Eastern cities, does not have a system for street addresses in line with international best practices. To deliver mail, food, appliances or furniture, a resident must give the delivery person directions using landmarks. This often leads to errors and wasted time, money and resources. The safety and well-being of residents are increasingly at risk since emergency services also rely on landmarks to navigate around Abu Dhabi.

A Smart City initiative, currently being implemented, will digitally map addresses, rename (and geo-name) streets, and tie the system to a digital signage program. This municipal project, called *Onwani* (Arabic for "my address"), will provide tremendous value to Abu Dhabi by improving both emergency response times and utility services by accurately identifying defective water pipes and electric outages; it will also monitor neighborhood consumption. This can also boost the economy by increasing the likelihood of online shopping. The emergence of smarter solutions for delivery, distribution and navigation for residents and visitors is also expected to spur more tourism.

Francisco Anzola

The Abu Dhabi municipality has allocated US$4 billion to be used for Abu Dhabi 2030

Saudi Arabia

Since King Abdullah of Saudi Arabia ascended to the throne in 2005, he has worked to incrementally modernize the Kingdom of Saudi Arabia (KSA). This modernization has involved a series of social and economic initiatives that expand employment and social opportunities for women, attract foreign investment and increase the role of the private sector in the economy.

In early 2011, in response to unrest, King Abdullah announced a series of benefits to Saudi citizens, including funds to build affordable housing, salary increases for government workers and unemployment entitlements—the foundation of Saudi Arabia's Smart City programs.

The country remains a leading producer of oil and natural gas and holds about 17 per cent of the world's proven oil reserves. The government

The Kingdom of Saudi Arabia has undergone something of a modernisation since 2005

continues to promote foreign investment and pursue economic reform and diversification, particularly since Saudi Arabia's joined the World Trade Organization (WTO) in 2005.

Saudi Arabia's urban population is approximately 83 per cent of its total population, making its transformation into a Smart City a critical domestic challenge for future growth and social stability. Saudi Arabia has an oil-based economy with strong government controls over major economic activities. It possesses about 16 per cent of the world's proven petroleum reserves, ranks as the largest exporter of petroleum, and plays a leading role in the Organization of the Petroleum Exporting Countries (OPEC).

The petroleum sector accounts for roughly 80 per cent of the country's budget revenues, 45 per cent of GDP, and 90 per cent of export earnings. Saudi Arabia is encouraging growth of the private sector in order to diversify its economy and to employ more Saudi nationals. Diversification efforts are focusing on power generation, telecommunications, natural gas exploration, and petrochemical sectors.

Over 6 million foreign workers play an important role in the Saudi economy, particularly in the oil and service sectors, while Riyadh is struggling to reduce unemployment among its own nationals. Saudi officials are particularly focused on employing its large youth population, which generally lacks the education and technical skills the private sector needs. Riyadh has substantially boosted spending on job training and education, most recently with the opening of the King Abdullah University of Science

and Technology – Saudi Arabia's first co-educational university. As part of its effort to attract foreign investment, Saudi Arabia acceded to the WTO in 2005. The government has begun establishing six economic cities in different regions of the country to promote foreign investment and plans to spend US$373 billion between 2010 and 2014 on social development and infrastructure projects to advance Saudi Arabia's economic development.[3]

CHALLENGES

A burgeoning population, water aquifer depletion, and an economy largely dependent on petroleum output and petroleum prices are ongoing challenges in Saudi Arabia. Another challenge is the Arab Spring – a series of revolutionary protests and demonstrations that have been happening in the MENA region since 2011. In some cases, the overthrow of governments has occurred while in other cases civil unrest and wars have erupted. The driver for many of these protests and demonstrations is poor economic conditions for many young males living in MENA.

The Arab Spring is reverberating in Saudi Arabia, driving King Abdullah to make changes to maintain peace and control. The Kingdom of Saudi Arabia has more than 13 million citizens, half of whom are under 20 years old. King Abdullah has set goals to create more than a million new jobs and 4 million homes within the next 15 years. He has a vision to develop an economy less dependent on oil and run by a new class of professionals, including architects, doctors, engineers and businessmen who can thrive in a global marketplace.

If the Kingdom of Saudi Arabia does not achieve its goal of creating Smart Cities, there could be more intense clashes with militant forces that could ripple across the entire region, causing instability in the markets. Conversely, resistance from the country's conservative religious establishment to the government's Smart City projects could also slow down progress.

Two new Smart Cities under construction – Kingdom City/Kingdom Tower and King Abdullah Economic City – are in the area surrounding the port city of Jeddah on the Red Sea, a relatively stable area of Saudi Arabia near the Holy Cities of Mecca and Medina. The success of these projects will be the framework for future new cities throughout the region.

NOTE

3 US Central Intelligence Agency, The World Factbook https://www.cia.gov/library/publications/the-world-factbook/geos/sa.html

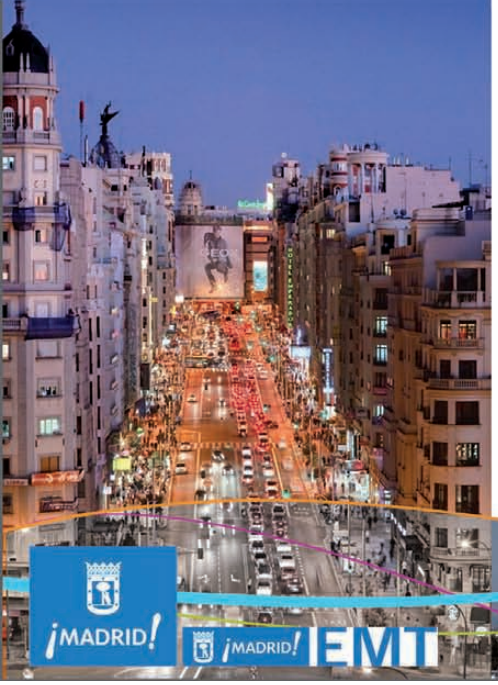
Kingdom City and Kingdom Tower

In the northern area of Jeddah, near the existing King Abdulaziz International Airport, construction of the iconic Kingdom Tower is now underway. When completed in 2017, the estimated US$1.23 billion tower will surpass the 827-metre high Burj Khalifa in Dubai as the tallest building in the world. It is part of a US$20 billion development by Kingdom Holding Company, a firm owned by Prince Al-Waleed bin Talal city. The tower will have 200 floors and require about 5.7 million square feet of concrete and 80,000 tons of steel. It will host mixed-use commercial, residential and resort facilities, including offices, residential units, a school, hotels and retail facilities. A bridge under construction across Obhur Creek links the site to the city center and airport. Both Kingdom City and Kingdom Tower can be viewed as two cities in one location; one is vertical, and the other is horizontal, but both are designed to be Smart Cities. The tower will be one of the first to be built as a vertical city, incorporating Smart City fundamentals into a Smart Building entity.

Smart City fundamentals that will be employed in development of Kingdom City and Kingdom Tower include:

- Maintaining/Enhancing Quality of Life
- Information and Communications Technology (ICT) Management
- Safety/Security
- Resource Management (Natural and Man-Made)
- Energy Management

When complete the Kingdom Tower, north of Jeddah, will be the world's tallest building



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2014 Annual POLIS Conference 27-28 November 2014, Madrid

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- **Ana María Pastor Julián** (Minister of Public Works and Transport, Spain),
- **Maurizio Lupi** (Italian Transport Minister (EU Presidency)),
- **Magda Kopczynska** (Director, European Commission DG MOVE),
- **Francesca Racioppi** (Senior Policy and Programme Adviser WHO Europe),
- **Pierre Serne** (Vice-President Ile de France Region),
- **Gerrit Riemer** (Director of Future mobility, General Motors),
- **José Viegas** (Secretary General International Transport Forum),
- **Pascal Smet** (Minister for Transport, Brussels Capital Region),
- **Sir Albert Bore** (Leader of Birmingham City Council and member of the Committee of Regions),
- **Pascal Smet** (Minister of the Brussels Capital Region Government in charge of mobility and public works), and
- **Christine Revault D'Allonnes Bonnefoy** (Member European Parliament Transport Committee).

SUPPORTED BY

- Waste Management
- Air Quality
- Education
- Healthcare
- Economic Sustainability
- Internet of Things Management (People, Places & Things)

Within each of these Smart City categories, the Kingdom Tower is exploring the opportunity to integrate Smart City solutions as part of the construction of the building. Regarding ICT management, Kingdom Tower has critical decisions to make concerning connectivity. Traditional structured cabling is one option for a vertical asset like a skyscraper, but there are new types of ICT that move beyond traditional horizontal solutions (Wi-Fi, iBeacons and Personal Networks). Among them are Apple's operating system that iPhones and iPads employ; these choices are less expensive, more flexible and allow for multi-use.

How can ICT be used in the tower as a vertical solution? Communications, data, life safety, security, ecommerce, social media and a multitude of Kingdom Tower apps will all run on the tower's backbone, making the tower not just a city in the sky but a building that serves as a computer. Designed as a Vertical City, the Kingdom Tower will be used as holistic lifestyle environment, meaning that some people will not leave the building for days at a time, as they will work, live and play inside the Kingdom Tower. Taking this into account, the building needs to be more than a shelter or a machine; the building needs to become intelligent.

In the same way Siri has become a talking and responsive personal assistant for smartphones like the Apple iPhone, designers of the tower are exploring how the building can become a companion to its inhabitants. Tools like Siri are based on Pattern Recognition and Machine Learning (PRML), which has been in the market for many years, but now that the Internet of Things (IoT) has emerged, the value of PRML has become clear.

Universal Robotics, based in Nashville, Tennessee, has developed software called Neocortex – a form of artificial intelligence (AI) software that is independent of specific hardware and discovers patterns in chaotic environments relevant to an assigned task. It then analyzes those patterns to understand complexity and improve processes.

Neocortex can allow facility managers to measure optimization of space usage based on multi-dimensional variables; it can sense the number of people in a specific space and learn their movements during the day, optimize and anticipate their needs. It can know you need a conference room at 2pm and automatically reserve the proper conference room, then inform you that this task has been completed.

Neocortex has the ability to anticipate your behavior. It can learn your actions, role, responsibilities and resources, and then provide you with a personal assistant for many tasks, such as note-taking during meetings, making and receiving calls on your behalf, taking care of email/text/video messages, ordering lunch/coffee, and searching and delivering proper documents/data for meetings. By using Apple's iBeacon technology or Google's Nest networking equipment, Neocortex helps make Kingdom Tower Smart City-efficient.

While Kingdom Tower is a vertical Smart City, the traditional horizontal Smart City of Kingdom City is incorporating the same technologies as the Kingdom Tower with the benefit of pervasive computing. The estimated cost of Kingdom City is US$18 billion, with the majority of the money devoted to sustainable infrastructure and buildings.

For instance, Kingdom City will have:

- Buildings with the intelligence to perform preventive maintenance and repairs on themselves based on real-time measures like normal wear and tear over time, incident damage and sabotage.
- Constructors will have many potentially hazardous building systems built in the field by drones that seamlessly adapt to ever-changing field conditions based on immediate feedback from materials, people and environmental conditions.
- Nanotechnology that is built into building products that allow surfaces of a bathroom, for example, to "gang up" and begin to lobby to be cleaned as a social group, not according to a set schedule, but on a needs basis, saving time and money for facility managers.

Artist's impression of the Kingdom City masterplan

The implementation of these types of solutions is meeting a market need that until now resided in research and development silos. The unleashing of these solutions into high profile projects like the Kingdom City/Kingdom Tower urban system is a fascinating experience because for the first time, both vertical and horizontal cities are working as one entity, providing the environment for innovative solutions to thrive.

King Abdullah Economic City (KAEC)

The US$86 billion King Abdullah Economic City (KAEC) development is one of six special economic zone cities in Saudi Arabia designed after similar economic zone models in the People's Republic of China. KAEC has delivered approximately 15 per cent of its development thus far, including a working port, residences and community support projects like schools, hospitals, markets, commercial buildings and life safety. Planned as a port city, KAEC will cost approximately US$86 billion upon completion in 2020. When fully developed, KAEC will have a projected population of 2 million people, encompassing 66 square miles. Like Kingdom City, KAEC resides on the Red Sea but is 100 kilometers north of Jeddah.

The project is being built by the international arm of Dubai-based Emaar, the developer behind the Burj Khalifa and the surrounding downtown Dubai development, and is partnered with the Saudi Arabian General Investment Authority (SAGIA) as the prime investor.

Phase one development of KAEC, completed in the fall of 2013, has produced a modern shipping port meant to ease the pressure of the existing, old Jeddah shipping port and streamline logistics of transporting goods from North America and Europe to and from the Middle East.

In phase two, a high-speed rail link to Dubai from KAEC is planned for construction. The development will change the dynamics of shipping and logistics throughout the region, as KAEC becomes a major port and hub for sea, land and rail. Implementing "smart" transportation systems and solutions is the initial focus for KAEC's Smart City strategy. Pilot tests of shipping container sensors are underway as a method to gather a vast amount of data from numerous sources.

From the shipping palettes and containers to the trucks and trains that distribute the shipped

King Abdullah Economic City is one of six special economic zone cities in Saudi Arabia designed using similar economic zone models to developments in the People's Republic of China

goods, sensors are assisting KAEC with cost savings related to security, safety, quality assurance and efficiencies of knowing where assets are at all times. This Smart City implementation with a focus on transportation also has the potential for use throughout KAEC, employing sensors to assist in data gathering that can be used and reused to assist with traffic management, public transportation schedules, congestion pricing, and driverless car systems through the implementation of smartphone apps.

App creation for KAEC is in development, using a series of online app challenges run by KAEC. Independent software developers are developing their apps and competing for use in KAEC; this will drive innovation by leveraging use of captured sensor data as a primary requirement. One initial idea suggests using sensor data of street parking spaces to develop an app that allows a person searching for a spot to quickly see what is available in a specific area, saving an enormous amount of time, energy and effort to find a parking space in KAEC.

The King Abdullah Port (KAP) has allowed KAEC to emerge as a direct foreign investment destination, helping diversify Saudi Arabia's oil-based economy. As the next phases of KAEC become operational, the city will create up to 1 million jobs, relieving some of the pressure to employ the youthful population of Saudi Arabia.

Saudi Arabia also has the need to build 190,000 new homes a year, and KAEC's next phases will address this need with a 48-square-kilometer residential district. Unlike other cities in Saudi Arabia, the design of residential areas will include more open public spaces, such as waterfront promenades, parks, recreation areas and plazas meant to be part of a cultural diversity program that will require Smart City strategies and solutions to achieve success. In addition to the port and residential district, KAEC has planned an education district, a resort district fitted with luxury villas, an industrial park to host over 2,500 manufacturers and logistics companies, and a central business district of 13.5 square kilometers.

KAEC is also exploring the creation of its own social media system for the development that will allow interaction with government agencies and officials to take suggestions, complaints and ideas. Smart City social apps are under consideration, including an online video app for hosting town hall-style events that rely on interactive communication, coordination and collaboration. Another suggested energy-consumption app will encourage people to reduce their carbon footprint by asking users questions about their everyday life and offering suggestions for improvement.

Qatar

Qatar is embracing Smart City projects and programs in order to meet the delivery of the 2022 FIFA World Cup and leave a legacy after the event has ended, but its aspirations are challenged by autocratic bureaucracy, world crises and reliance on a workforce comprised primarily of expatriates.

As of 2007, oil and natural gas revenues enabled Qatar to attain the highest per capita income in the world with the lowest unemployment, paving the way to Smart City development. Qatar has not experienced domestic unrest or violence like that seen during the Arab Spring, due in part to its immense wealth. Since the outbreak of regional unrest, however, Doha, the capital of Qatar, has prided itself on its support for many of these popular revolutions, particularly in Libya and Syria. In mid-2013, Hamad transferred power to his 33-year-old son, Tamim bin Hamad, a peaceful abdication rare in the history of Arab Gulf states. Tamim has prioritized improving the domestic welfare of Qataris, including establishing advanced healthcare and education systems and expanding the country's infrastructure in anticipation of Doha hosting the 2022 FIFA World Cup.

Qatar's urban population is 98.8 per cent of its total population, one of the highest in the world, making Smart City initiatives essential. Throughout the financial crisis of 2008-2013, Qatari authorities sought to protect the local banking sector with direct investments in domestic banks. GDP is driven largely by changes in oil prices and by investment in the energy sector. Economic policy is focused

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on developing Qatar's non-associated natural gas reserves and increasing private and foreign investment in non-energy sectors, but oil and gas still account for more than 50 per cent of GDP, roughly 85 per cent of export earnings, and 50 per cent of government revenues.

Proven oil reserves in excess of 25 billion barrels should enable continued output at current levels for about 57 years. Qatar's proven reserves of natural gas exceed 25 trillion cubic meters, about 13 per cent of the world's total, and the reserves are the third largest in the world. Qatar's successful 2022 FIFA World Cup bid is accelerating large-scale infrastructure projects, such as Qatar's metro system, a light rail system, the construction of a new port, roads, stadiums and related sporting infrastructure. The new Hamad International Airport is expected to open in mid-2014 with an annual passenger capacity of 24 million on initial opening and 50 million when complete[4].

CHALLENGES

Qatar understands its immediate and long-term challenges. In its "Qatar National Vision 2030" plan, Qatar identified five main areas of concern:

1. Modernization and preservation of traditions
2. The needs of this generation and future generations
3. Managed growth and uncontrolled expansion
4. The size and the quality of the expatriate labor force and the selected path of development
5. Economic growth, social development and environmental management.

Weaving through these issues are three priority challenges that the Qatar Foundation is addressing:

1. Renewable energy: raising the production of solar energy to 1GW by 2020
2. Fresh water: promoting scientific research in the area of water desalination
3. Cyber security: strengthening information security management .

In addition, the FIFA World Cup in 2022 will require social and legal reforms in Qatar, most notably around workers' rights and the construction of the soccer stadiums for the tournament and new Smart Cities where its large expatriate population will live, work and play. The biggest challenge with hosting the FIFA World Cup is how to achieve a balance in developing enough infrastructure to host the event but not so much that it becomes unsustainable after the event.

Skyline of new downtown Doha with the harbour in the foreground

With nine stadiums, tens of thousands of new hotel rooms and thousands of new restaurants are planned for Qatar, a country of 1.8 million people (280,000 citizens and the rest foreign nationals); the concept of sustainable infrastructure is a critical discipline to adopt and follow. Qatar is expecting approximately 500,000 visitors to attend the FIFA World Cup. A major challenge is determining what to do with the surplus of infrastructure once they leave. The Supreme Committee for Delivery and Legacy, the Qatar government authority in charge of the FIFA World Cup, is working on the following key areas based on sustainable infrastructure best practices:

- Tourism: Create a long-term appeal for tourists by creating the Qatar experience using online and in-person continuous marketing after the world sees a successful FIFA World Cup.
- Dual-use construction: Identify community needs and develop creative adaptive reuse of surplus facilities.
- Temporary and moveable facilities: Design and build removable facilities. The Supreme Committee has already booked ocean liners for the period of the FIFA World Cup for use as hotels to accommodate the visitors, limiting the amount of hotel construction needed. Another plan is to float some of the stadiums to poor countries in areas like Africa after the event has concluded.

Doha – Host City of the FIFA World Cup 2022

With the rare opportunity to reinvent itself by hosting the FIFA World Cup, Doha, the capital of Qatar, is embracing Smart City strategies and projects to meet the objectives of hosting the event and having a sustainable future after the event. Since the majority of the population lives in Doha (population: 1 million), it is a priority to improve the lives of its inhabitants and drive the economy beyond its wealth-producing Liquid Natural Gas (LNG) industry. Known for its high-quality institutional framework, stable macroeconomic conditions and efficient goods market, Qatar wishes to also achieve sustainable development that safeguards natural resources, including delivering a carbon-neutral FIFA World Cup. There are over US$120 billion worth of projects that lead up to the World Cup, with exponential growth in ICT, product innovation, smart grids for water and electricity, all having Smart City connections for Doha.

Education City, a new district on the outskirts of Doha, is projected to have a population of 66,000. It will have research labs, educational facilities, student housing, offices, athletic facilities and physical plant utilities, such as district cooling plants (DCP). In order to follow Smart City strategies, an optimization plan was adopted to utilize eight planned DCPs to connect into a ring network and provide cooling to connected customers. Under a traditional plan, DCPs would connect only to different primary substations. This subtle design shift of employing a ring network ensures that each customer is capable of receiving energy from one of two district cooling plants.

The DCP network is then managed by an Intelligent Operations Center (IOC) that monitors the DCP sensors indicating which customers are being served by which DCP. The IOC can also communicate what final energy sources are carrying the significant load based on real-time DCP loadings. The IOC also allows the physical plant manager to make informed decisions on which connected buildings can be served from which DCP to relieve energy usage on the primary substations during times of coincidental peak load. The IOC can also analyze the captured data and communicate results to a Smart City Green Energy Dashboard app, so a customer can see how they use energy throughout the day and potentially change their behavior.

This Smart City initiative will also avoid the need to build additional expensive energy substations as Education City grows. Under the plan, the physical plant manager will be able to move DCP loadings from one energy substation to another during peak times where energy usage in a particular area is impacting the operation of that energy substation, saving vast amounts of resources.

Stadium construction, Doha, Qatar

Lusail City

Lusail is a US$5.5 billion ambitious waterfront city development currently under construction. Located about 15 kilometers north of Doha, on the Qatari coast, it is 35 square kilometers (377 million square feet) in size and will have an approximate population of 260,000 when completed in 2019. Innovation is the key at Lusail for construction of marinas, island resorts, residential and commercial districts, luxury shopping, leisure facilities and an entertainment district. Lusail is also home to the new 90,000-seat Lusail Iconic Stadium, which will host the 2022 FIFA World Cup opening ceremonies and the finals. As the largest development in Qatar, Lusail is under development by the state-owned enterprise Qatari Diar Real Estate Investment Company. The investment firm is developing Lusail with the Smart City principle of a three-layer system:

1. Network Layer: OCT infrastructure that connects people, places and things. Also referred to as the Internet of Things (IoT).
2. Control Layer: Using an Intelligent Operations Center, a city can manage and maintain service delivery.
3. Service Layer: Human and machine interactions are conducted using Smart City apps to deliver services to residents and visitors.

Lusail has built-in environmentally responsive protection policies and a controlled development strategy that is meant to transform an existing raw tidal basin into a Smart City with sustainable features (such as building design) that use the building's mass and shade to reduce heat and the need for cooling mechanisms.

The waterfront development of Lusail City is 15km north of Doha, Qatar

CONCLUSION

These Smart City innovations can only transpire with adequate investment. As more people migrate to cities, increased financial investment in Smart City technologies and initiatives is needed to ensure completion of these projects. This capital can come from a multitude of sources, whether the private or public sector, research grants, or sponsorships.

The world's population continues to grow, especially in the Middle East, and more and more people are relocating to urban areas, straining the infrastructure of the world's major cities. It is therefore vital that technology is utilized to create effective, innovative ways of making urban cities "smarter" to improve standards of living.

Urban populations in these Middle Eastern cities will only continue to grow, due to the encouraging factors of employment, a better lifestyle and social support. Citizens, visitors and migrant-worker guests need an urban experience that is safe, secure and improves the quality of life. The municipal governments of the Middle East are using the stimulus of hosting world events like the World Expo and the FIFA World Cup as delivery milestones that create legacy opportunities when implemented in a Smart Cities framework.

To create smart cities, it is necessary that city planners and governments have the vision to drive change, and a strong overarching vision is ultimately required. Technology can help create ways of making cities work better, and collaboration across the public and private sector can bring endless possibilities.

In order to assure this transformation, the cities of the Middle East will need to provide:

- More local digital knowledge content.
- Lower prices for connectivity.
- Business-to-business market structure, competition and governance.
- Higher mobile and fixed broadband penetration.

The Middle East is leading by example by aggressively implementing Smart City solutions in both its new and existing cities. A Smart City strategy of developing a Smart Grid using CleanTech energy sources is a fundamental first step in the Middle East. This sustainable foundation is creating the opportunity for urban environments throughout the Middle East to improve the lifestyle for its citizens, workers and visitors. The world has definitive benchmarks for Smart Grid planning and management in addition to learning from the best practices of the design, construction and sustainable maintenance of the world's tallest vertical cities.

There is much to learn from the Middle East as its biggest cities create leading sustainable environments. Given a growing demand for efficiency and resources, these cities must increase reliance on innovative measures and new technologies to meet the needs of a large and growing urban population. The Smart City initiatives discussed in this article will help these countries manage their resources more efficiently, improve the quality of the services provided to citizens, facilitate new approaches to driving efficiencies, promote innovation and improve transparency by providing information in real time. Perhaps most importantly, the initiatives will cut energy use and generate income – making the cities leading global competitors and role models for other smart city developments around the world.

FYI

Paul Doherty, AIA, is a fully licensed architect and the president and CEO of the digit group, inc., a market-leading Cloud software incubator for Smart City products and co-founder of the critically acclaimed AEC Hackathon. He is an author, educator, analyst and advisor to Fortune 500 organizations, global government agencies, prominent institutions and architectural, engineering and contracting firms.

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Parking in Madrid gets Smart

Madrid is the first city in the world to implement a variable parking rate based on vehicle emissions. In the current discussion about standardised approaches for on-street parking service provision, Madrid is a shining example, so could this be a way forward for other cities as well? **Ivo Cré** reports

The key objective of Madrid's SUMP is to promote more sustainable transport in the city and to reduce the use of private cars in favour of more sustainable modes. The parking strategy helps to accomplish this goal

Parking is important for the redefinition of the role of cities, between the "motorway" culture and re-urbanisation. Centralised parking in cities has been proven to decrease the dependency on car trips and improve the urban public space. However, implementing integrated parking strategies is a challenging task, for both local authorities and parking operators.

To create a better understanding between the different actors in parking activities, the European Parking Association (EPA) and Polis have established a partnership to discuss the interaction of urban transport and parking activities. The current focus of the cooperation is standardised approaches for on-street parking. Off-street parking practice is moving towards a standardised operational framework: users meet the same information and payment technologies across Europe. Would a similar approach be possible for on-street parking?

PARKING AS PART OF A STRATEGIC FRAMEWORK

The city of Madrid has developed a Sustainable Urban Mobility Plan (SUMP). This is a strategic document that sets the framework for all urban transport policies. The key objective is to promote more sustainable transport in the city and to reduce the use of private cars in favour of more sustainable modes. The SUMP has set the framework for several innovative schemes and measures, such as the public bicycle scheme,

the pedestrian plan, low emission zones etc.

The Madrid SUMP is there to implement EU policies such as air quality legislation and the Urban Mobility Package as well as national policies (National energy efficiency strategy, National transport infrastructure plan etc.). The SUMP itself relates to to different urban transport policy documents: the road safety plan, the energy strategy, the air quality plan, and so on.

Since 2008, the city is taking an active approach to deploy clean vehicles, starting with greening its own fleet. Madrid City Council is aware of its leadership for the development of the market for clean vehicles and fuels and has launched several initiatives in close collaboration with the economic and social actors in the city. In this framework, the city engaged in a close cooperation with the business sector, organ sing the ProClima Forum Madrid.

FROM STRATEGY TO OPERATION: ON-STREET PARKING THREE TIMES SMART!

The city established a low emission zone (LEZ). The city will deploy 100 per cent clean buses in this zone by 2015. By 2025, only zero-emission vehicles will be allowed in the city centre for goods delivery and the presence of cars in the city centre will be discouraged by increasing the price of parking by 10 per cent.

By 2025, only zero-emission vehicles will be allowed in the city centre for goods delivery and the presence of cars in the city centre will be discouraged by increasing the price of parking by 10 per cent.

But there is more: the on-street parking policy is a crucial element to persuade people to either choose cleaner vehicles or to shift to another mode of transport. The Madrid parking strategy, which manages 156,000 parking spaces, is smart in three ways:

1 Those who park on-street pay according to the level of environmental friendliness of the technology of the vehicles (in Euro-class): when a car is parked the driver is asked to submit its licence plate number. This is checked against a reference database that includes the eco-performance of the vehicle. This determines the cost of parking. Madrid is the first city

> ***More holistic planning and management, with one leader integrating different services, leads to a richer and more balanced approach to public space management***

in the world to implement such a scheme, which includes all vehicles, and is not only giving incentives to hybrid or electric vehicles.

2 Within the parking system, the most advanced intelligent transport systems (ITS) are deployed. These ITS systems include all possible ways of payment.

3 Parking management does not only helps to regulate the traffic but also helps to contribute to the air quality policy.

GETTING IT ORGANIZED: THE MADRID INTEGRAL MOBILITY TENDER

The service provision with regards to the smart parking approach is part of a package of management issues related with the urban realm. The city of Madrid has brought various aspects of street management together in one call for tender. The objective is to get benefits from synergies and economies of scale. More holistic planning and management, with one leader integrating different services, leads to a richer and more balanced approach to public space management.

The services rendered through the tender are the smart on-street parking services (see above); restricted areas control, road signage and marks; and the bike-sharing scheme. The tender was offered in five lots: four for the different zones, and one for the ITS back office.

REQUIREMENTS FOR SUCCESS

The Madrid smart parking approach has a lot of advantages to all user groups:

- The system ensures parking rotation, and increases the probability for residents and visitors of finding a public parking space.
- The system ensures the dynamic use of public spaces: it streamlines the use of areas of high commercial potential.
- The use of ITS and the high level of digitalization of the parking process liberates resources for parking management closer to the citizen.
- The presence of controllers gives citizens confidence about the parking situation.

Madrid shows that a coherent parking strategy can serve different policy goals: air quality, traffic management, energy use and clean vehicle deployment. It combines this with a very innovative integrated tendering process for urban transport services. Madrid starts from building blocks that are available to all cities in Europe: the national vehicle register, parking hardware, parking regulations, and so on and it also offers good practice ready for transfer. So, who is going to be next?

Madrid's coherent parking strategy serves different policy goals such as air quality, traffic management, energy use and clean vehicle deployment

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FYI

Ivo Cré is senior project manager at Polis

This article is based upon a presentation by Maria Elisa Barahona of the City of Madrid at the EPA Polis workshop on standardised approaches for on-street parking, Lisbon, 19 September 2014

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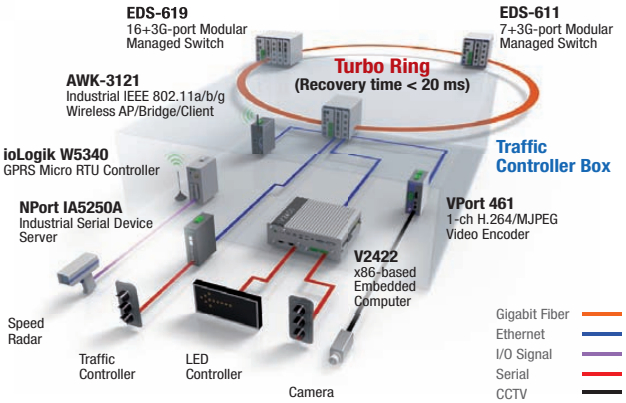

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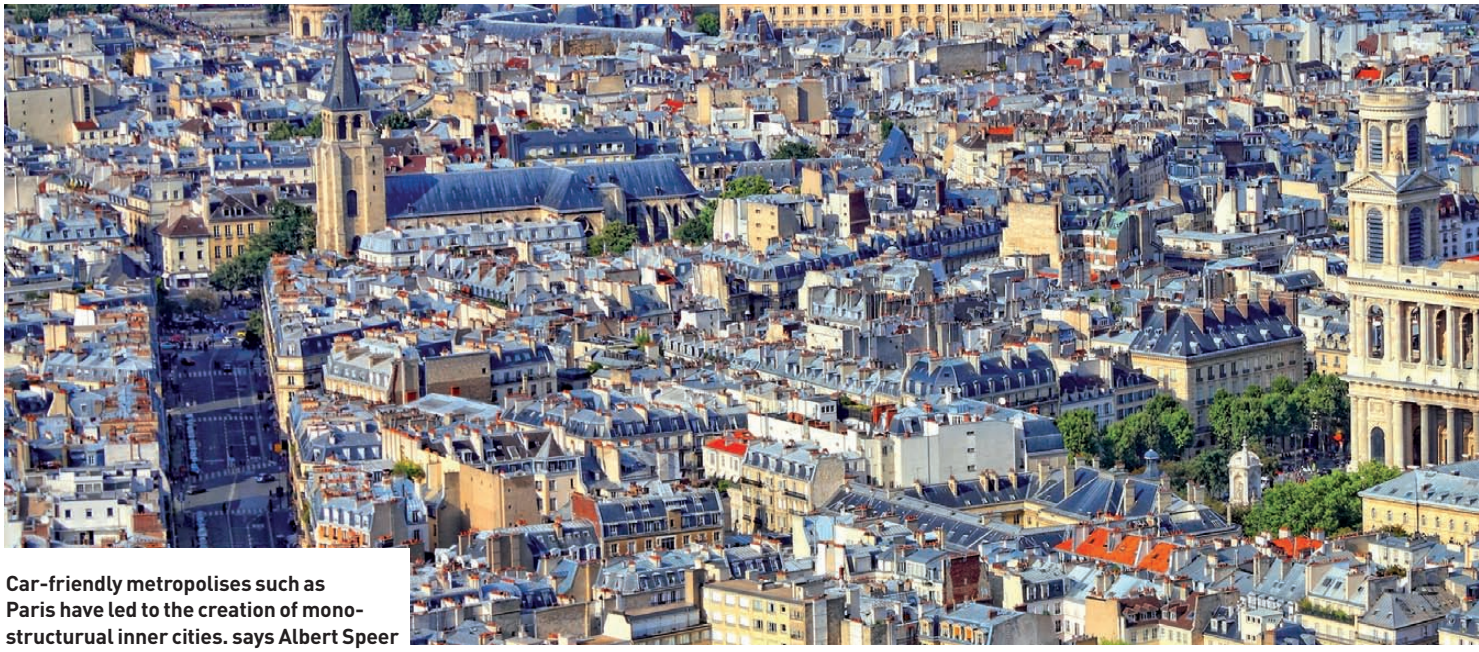

Car-friendly metropolises such as Paris have led to the creation of mono-structurual inner cities. says Albert Speer

With booming populations and increasing transport problems part of everyday life in many cities, does this mean cities need to be redesigned from the bottom up to continue providing a decent quality of life in the future? Architect and city planner **Albert Speer** and mobility planner **Michael Dinter**, in conversation with **Eberhard Buhl**, argue that we don't need to reinvent the city, rather identify the strategies to make the ones we have better

It has become widely accepted that the so-called car-friendly city of the 1950s, with its wide traffic lanes and intersections, is not really fit for the future. Do we need to completely rebuild Europe's cities, or can we move forward with the structures that are already in place?

Albert Speer (AS): You have to ask yourself how this car-friendly city actually came about. Looking at Germany in particular, we had lost most city centres in the war. It was more or less wasteland. This created space for the vision of a car-friendly city, and most city planners yielded to this vision. Today there are many roads that didn't even exist before the war – the north-south axis in Cologne, Berliner Straße in Frankfurt and Theodor-Heuss-Straße in Stuttgart, for example. Entire street sections were simply cleared and paved over rather than being rebuilt.

Michael Dinter (MD): This wasn't the case in other European cities. That's why you still see the old, densely built structures in London and Paris.

AS: This car-friendly city has caused a lot of harm, leading to the creation of monostructural inner cities. That's why the mixed function of working and living directly in the city center, which was previously the case, has sharply decreased. It was also part of the spirit of the Wirtschaftswunder to promote suburbanization and to create satellite towns outside the city. That's how the established city of short distances became a city of long distances.

Because the city center has been turned from a living space into a business space with transport routes?

MD: Precisely – arrive by car, work, drive home again. The business district here in Frankfurt,

Monmartre, Paris – while many German city centres were destroyed in or as a result of the Second World War, Paris escaped relatively unscathed

with its banks and offices, is a typical example. In the 1970s and 1980s hardly anyone wanted to live in the city center. People began to desert the inner cities – a trend that has now clearly reversed.

As early as 1963 the Buchanan Report addressed all the major criteria that we intend to implement today – the failings of the car-friendly city – but also suggested solutions such as car-free environmental zones. Why has it taken so long for such measures to be put in place?

AS: You can't reverse social processes from one day to the next. People simply wanted to get out into the open,into the fresh air, away from ramshackle city centers and exhaust fumes...

These processes didn't take place in the megacities of Asia or Africa. How is the situation there?

AS: Well, you can't lump all these megacities together – there are some big differences. Chinese megacities are seeing rampant outward growth, but this happening under the organizational structures of a centralized government that has been stable for many years.

MD: And they have the money to really make things happen, especially when it comes to public transport. Shanghai, for example, has now become a city with public transport structures comparable to Paris or London.

That's a process I've observed over quite some time. In just two decades Shanghai built up a subway network that now has 13 lines. For Expo 2010 there were already 10 routes.

There is no such thing as a blueprint for a city that can simply be taken and applied anywhere in the world

Albert Speer

Whereas no one wanted to live in the centre of Frankfurt in the 1970s and 80s, that trend has most definitely been reversed of late

The theme of Expo 2010 was "Better City – Better Life"...

AS: Exactly, and people were quick to adopt the metro system. It's cheap, it works and it has improved the flow of road traffic in the city center. Naturally, the monofunctional living structures of high-rise blocks on the outskirts are not ideal. That's exactly what we used to have on a smaller scale in Germany: satellite towns without their own identity.

And often without functioning infrastructure...

MD: This is precisely what causes additional traffic, from these pure housing developments into the city centers or to other places where goods and services are available. In Egypt and certain other African countries it's hard to take control of this, since growth usually comes about informally. People simply settle where they see fit, without intervention from planners. The growth in China is mostly organized through large-scale plans, and the available administrative structures provide some scope for taking things in a new direction.

Does that actually happen?

AS: Absolutely. We can observe through our office in Shanghai that the idea of decentralized concentration – which means compact settlements around central cities, lots of green space in between, plus the appropriate mobility structures – is finding increasing recognition in China as a viable strategy for the future. For instance, for several years we have been developing a new residential and business district in the industrial city of Changchun in northeast China according to ecological criteria. Here it's all about having a range of sustainable functions, an integrated concept with green axes, parks and space for 500,000 residents, and public transport infrastructure with metro lines, bicycle lanes and sidewalks. This fits with the concept of transit-oriented development – the city is developed along public transport axes.

Is this an idea that works in China in particular?

AS: Not only in China. For decades there has also been a very positive vision in Cairo of creating overflow cities around the core city and connecting them with high-performance public transport axes. Unfortunately, the funds for systematic implementation are often lacking. In 1979 the satellite town Madinat as-Sadis min Uktubar, "6th of October City," was founded on the edge of the desert to the west of the pyramids. It is named after a military operation in the Yom Kippur War. The town is designed for four million people, but the public transport and road links are far from complete. We pressed for a healthy mix of functions as part of a master plan: not just living space, but industry and commerce, administration, a university campus and schools. It has to be an independently functioning town. Otherwise its residents will still be constantly commuting to Cairo, and that only aggravates the transport chaos.

Riyadh is another place where you find small-town satellite structures around the main city. Have the Gulf States managed to take things further?

MD: Riyadh is a typical car-friendly city, laid out like a chessboard with streets at right angles. When I was there for the first time 20 years ago there was no public transport at all, just shabby buses for foreign workers. Now there is a 178-kilometer metro network that was built up within a few years, plus corresponding bus lines with different functions such as shuttles and local buses. So what we see here is an entirely new public

Riyadh, Saudi Arabia, a typical car-friendly city, laid out like a chessboard

transport network being planted in an existing city. That sounds easier than it actually is, as we can observe as planners.

Where is an urban bus supposed to drive on a road with six or eight lanes? Where do we place bus stops, and how will people get to them? But the willingness to embrace a new way of thinking is there.

Is the issue of sustainability generally being well received on the Arabian peninsula?

AS: The sustainability aspect really resonates in Arabia, perhaps because people there have a greater awareness that resources may not last forever. Dubai already has a metro system, Riyadh is building one, and Qatar has opted for rail and metro transport as well. Solar energy is increasingly being used in place of oil and gas, so people are even thinking differently when it comes to fossil fuels.

Is it not simply natural to plan green cities such as Masdar in these regions that receive so much sunlight?

MD: That's right, although planners rarely have the opportunity to build an entire new city – normally it's a question of how to handle existing settlements and make sensible alterations. But we cannot simply apply what we are doing in Masdar to existing cities. I regard it more as a useful laboratory experiment, a model for a city of the future. There's a lot to be learned from it, but of course Cairo or Frankfurt pose quite different challenges.

So is it actually impossible to create the ideal city that people have repeatedly called for over the centuries?

AS: What do we mean by the ideal city? We must always think of a city in combination with its people and its various cultures! There is no such thing as a blueprint for a city that can simply be taken and applied anywhere in the world. There are concepts such as decentralized concentration, but how this can come about depends on the specific case.

MD: For our office we defined seven key elements of sustainable urban planning. First, management and strategy are important for sustainable urban planning – cross-sectional management, where all departments speak with one another, is essential. Citizen participation and transparent planning and ownership guidelines are also part of this. The second element is decentralized concentration: complete, compact settlements in the open countryside. Third, density and mixed use are incredibly important: stable structures, short distances, and an appropriate mixture of residential and commercial use. This is also something that can be achieved through retrospective concentration within a city itself. We have already

Biographies

Michael Dinter studied civil engineering at Darmstadt Technical University. Since 1990 he has worked as a transport planner at AS&P, with responsibility for the transport planning and transport technology departments. He is a managing partner of AS&P GbR.

Albert Speer Jr studied architecture at Munich Technical University and in 1964 founded an office for urban and regional planning in Frankfurt. In 1984 he and his colleagues created the office AS&P – Albert Speer & Partner – which currently employs 160 people. An office was opened in 2001 in Shanghai. Since 1970 Speer has been a member of the German Academy for Urban Development and Regional Planning. In 1972, Kaiserslautern Technical University appointed him professor for urban and regional planning, where he helped to establish the degree in spatial and environmental planning. He was a guest professor at ETH Zurich from 1994 to 1997.

talked about adequate mobility as the fourth point. The fifth is urban technology that takes a holistic approach: a recycling economy, supply and waste technology, energy-saving LED lighting networks for streets, charging infrastructure for electric cars and so on. The urban landscape, as the sixth aspect, has to do with quality of life. It includes green spaces, parks and these days also urban agriculture. Finally, we must consider the actual building technology for low energy use, from passive buildings to climate control. If these criteria are all applied thoroughly, the sustainable city can certainly become reality, and many cities are already heading in the right direction.

Sustainable cities must also be able to cope with growth or decline of the population and an aging society. Is that even possible as things stand?

AS: I don't think we have to reinvent the city, but we do have to modify its structures. One reason why many older people move back into the city is so they can go about more of their daily lives on foot, even when they are not as mobile as they used to be. The baker is just around the corner, so is the cinema, the doctor. One very important aspect for me is that a city with a good quality of life in the future absolutely has to offer easy public transport.

MD: I also see this as a reason for trams to make a renaissance, as they do not involve negotiating as many levels as subway systems.

So is this a paradigm change for you as a planner?

MD: Absolutely, and I believe London Transport was a pioneer in this regard. At the moment when you compile a transport report, the first chapter deals with individual motorized transport, the second with public transport, the third with bicycles and the fourth with pedestrians. London Transport reverses this order: the very first chapter has to tackle pedestrian transport. That doesn't necessarily mean that the content of the report as a whole is different, but as a transport engineer, if I start thinking about pedestrian transport first, I'll approach the planning differently. This certainly makes sense in Germany too, and a few weeks ago I presented the concept to our planning partners in Riyadh – they were really excited.

What could this mean in concrete terms for transport planning?

MD: Up to now when we build a road, we plan it from the inside out. We estimate how many cars will travel on it per hour and we plan the dimensions of the road accordingly: one lane per direction, two lanes or more. Whatever is left we divide up between parking spaces, cycle lanes and sidewalks – from the inside out. If we think of the city as a space for living, we have to plan the road from the outside in, starting with what you might call the peripheral uses. Do cafés need space for tables, or stores to display their goods? How much room do pedestrians and cyclists need? How will we accommodate bus stops, access to trams and subways? Once all these have their space, we can give the rest to the cars.

AS: In reality some compromises always have to be made, of course, but I think that if tomorrow's cities are to remain genuinely worth living in, this is the right approach.

Growth in cities such as Changchun City, Jilin Province in China, is mostly the result of large-scale planning, says Michael Dinter

FYI

Prof Albert Speer is an architect, urban planner, managing partner and founder of AS&P, one of the biggest urban planning companies in Germany.

Michael Dinter is a managing partner at AS&P and responsible for traffic planning and transportation technology.

http://www.as-p.de

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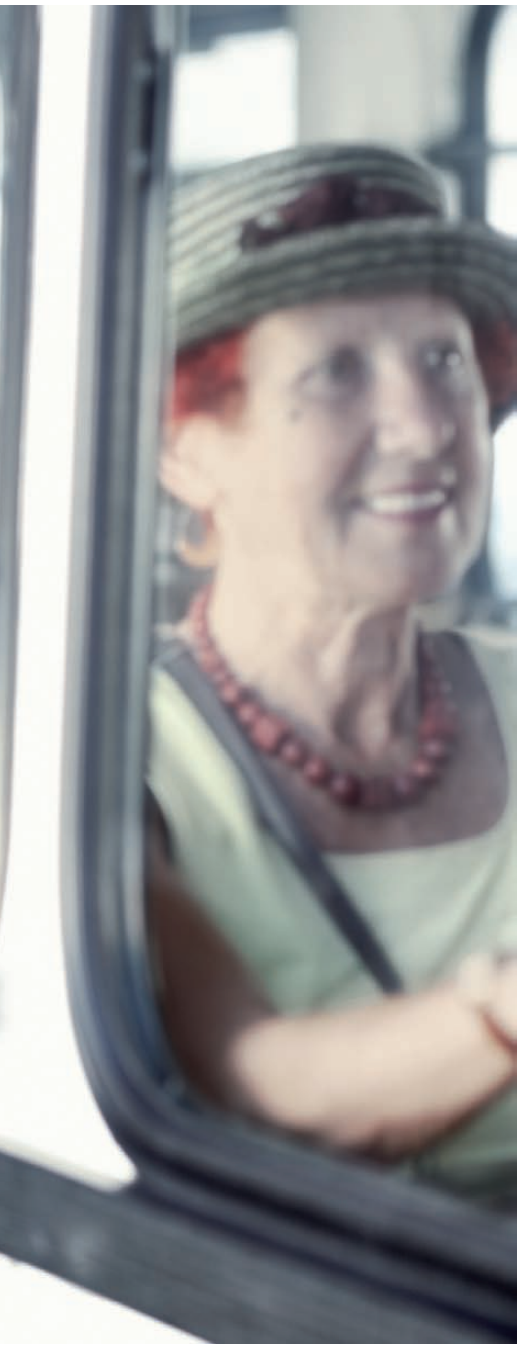
Line drawing

Public transport planning, says **Johannes Schlaich**, needs to provide perfect services all along the line

Today's society has high expectations regarding mobility: It should be powerful, secure, eco-friendly and inexpensive. Public transport has a key role to play in this ambivalent environment[3]. However, not only today's situation is demand, the Public Transport sector is facing major challenges in the future.

A recent survey[2] identified fewer resources and climate change and demographic change as the major drivers for Public Transport in the future:

Therefore, it is important to plan it in an anticipatory and market-oriented manner. However, the design, implementation and operation of public



transport systems are demanding tasks. Professional software tools such as PTV Visum assist planners in coping with these tasks. PTV Visum is a comprehensive planning tool that offers detailed planning and analysis functions, easy-to-interpret display options that cover all strategic and operational processes across public transport planning. Important to note is that it is always required to link the transport demand with the transport supply.

One of the classic tasks of network modelling is to provide passengers with an attractive line network that at the same time is efficient from an operative perspective

DEMAND-BASED PUBLIC TRANSPORT NETWORK AND SUPPLY PLANNING

One of the classic tasks of network modelling is to provide passengers with an attractive line network that at the same time is efficient from an operative perspective. In terms of spatial planning, this means to determine the line routes and transfer points in the network. Temporal planning, on the other hand, focuses on the optimum headway, the coordination of lines and connections between the stops and the analysis of supply in terms of line performance and output.

Users usually import timetable and network data from common systems and use it for modelling the current public transport supply. Network data is imported via interfaces to geographic information systems (GIS) and timetable information systems, such as Google Transit, HAFAS or railML. Moreover, it is possible to import data from different sources, including automatic passenger counting, vehicle tracking and ticketing systems or MS Office. All services can then be displayed and edited in the public transport network editor, in the tabular and graphic timetable.

In order to analyse the quality of public transport services from the passengers' point of view, planners can use transport planning software to combine public transport supply with statistical data of land use, number of jobs and residents. GIS functionalities shall enable the planner to identify how many residents can reach the next long-distance train station within a given travel time, for example. But users cannot only analyse travel times, there are also detailed parameter analyses to visualise transfer frequencies and waiting times for all connections across the entire network.

How attractive new lines, new connections or more frequent services actually are for all passengers and whether these changes will have the effects and impacts desired can best be judged by modelling demand by means of an origin-destination matrix. Such matrices can be created on the basis of public transport survey data or a multimodal demand model, such as the classic four-stage algorithm. The latter models all passenger choices in both private and public transport – from the choice of the destination to the transport mode and transport connection. This also allows planners to calculate the changes in modal split caused by improved public transport services.

ATTRACTIVENESS – A MEASURABLE BENCHMARK

One can differentiate between three assignment methods that identify possible connections of the passengers for each origin-destination pair

and then assign the demand matrix to these connections.

The simplest one is the transport system-based assignment, a quite pragmatic approach to conceptual public transport network planning. It does not include any timetable data and does not even require a line network, however it allows users to differentiate between road- and rail-bound transport. Based on demand matrices it models the desired network from the passengers' perspective. This so-called "what-if scenario" indicates which public transport options passengers would chose to travel from the origin to the destination, if they were not limited in their choices.

If there is a timetable, there are two additional assignment methods – the headway-based and timetable-based assignment. The timetable-based assignment is often used for timetables with high and regular frequency services. Moreover, it enables planners to create impact analyses of long-term planning scenarios, such as transport master plans which, due to efficiency reasons, do not require detailed timetables to be modelled for each scenario. However, precise information on transfers cannot be included in the assignment without timetable modelling. Nevertheless, users can assign pre-defined transfer times to specific transfers. This includes transfers between regional trains and buses, which can usually be scheduled quite precisely.

The timetable-based assignment offers the highest level of detail. It allows for fine-tuned planning and analyses including complex transfers and connections. This means planners can realistically model various effects, such as transfer waiting times and analyse measures for optimising individual stops.

Another important factor for connection choice may be the effects of capacity constraints in the assignment. As a result, overcrowded lines

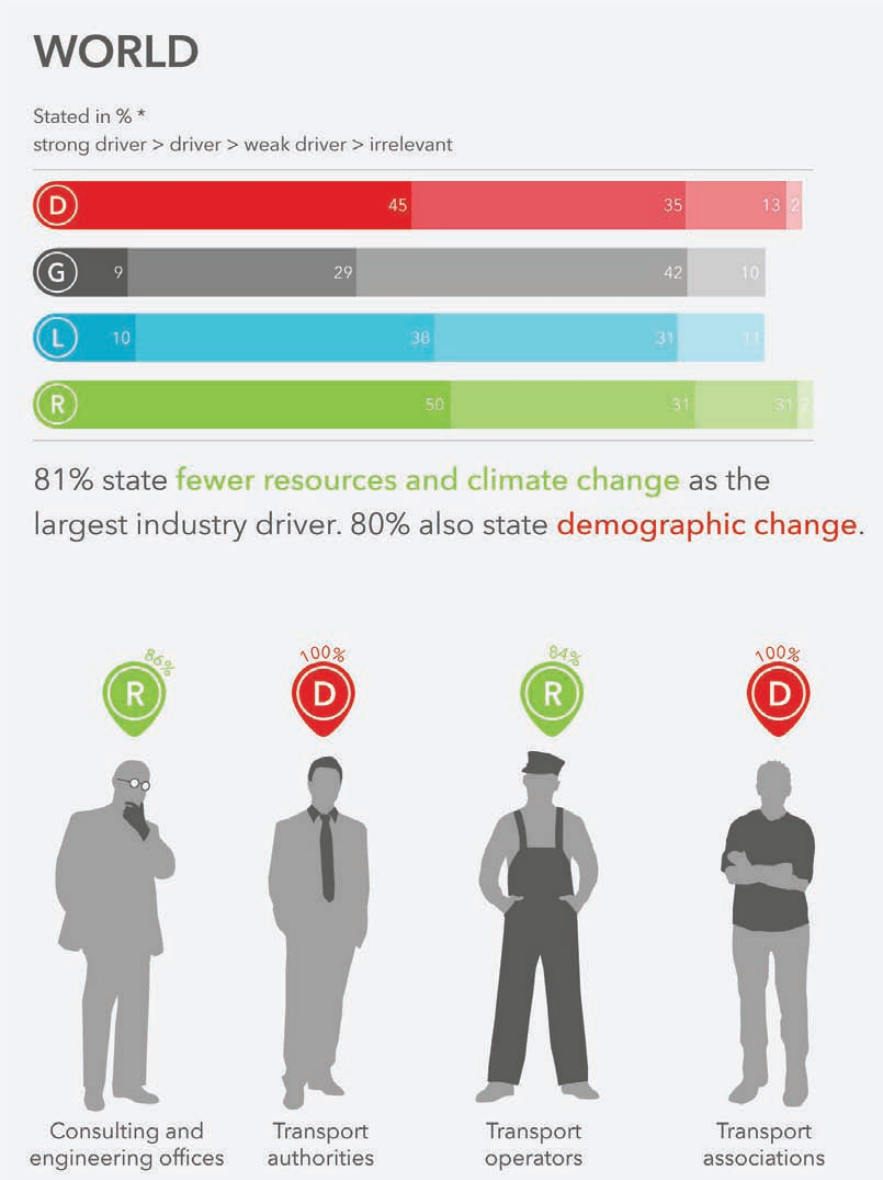


Figure 1: Drivers of future Public Transport planning [2]

REFERENCES

1 Friedrich, M., Schlaich, J., Schleupen, G. (2007), *Modell zur Ermittlung der Betriebsleistung und der Betriebskosten für Busverkehre, Tagungsband der 21.* Verkehrswissenschaftlichen Tage 2007, Dresden.

2 PTV Group (2013), Perspective - Public Transport: What moves the sector?, http://vision-traffic.ptvgroup.com/en-uk/lp/ptv-visum/white-paper/, accessed 26 June 2013.

3 Rauh, W. (2010), *Staukosten: Ein starkes Argument für den öffentlichen Verkehr*, *DER NAHVERKEHR*, Heft 7-8, S. 68ff.

4 Remy, M., Zappe, F., Mott, P (2012), *Komplexe Angebotsplanung beim Verkehrsverbund Rhein-Neckar*, *DER NAHVERKEHR*, Heft 9, S. 68ff.

5 Schlaich, J., Schleupen, G. (2006), *Benchmarking Subsidised Public Transport Services* (poster and abstract), Proceedings of 3rd International Symposium Networks for Mobility, Stuttgart, Germany.

You stopped to look because it's cute

You'll only keep coming back if it's got something to say

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Another important factor for connection choice may be the effects of capacity constraints in the assignment. As a result, overcrowded lines become less attractive due to the large amount of passengers

become less attractive due to the large amount of passengers. Just like in reality, in the model, passengers switch to less crowded modes of transport. From a technical point of view, the capacity constraint is included in the impedance calculation of each connection, in addition to other attributes such as travel time and transfer frequency. This additional component can eg be a function of the assumed standing minutes on a bus or train. The seats are randomly allocated to the passengers for each stop section – a procedure which is quite similar to the popular children's game of musical chairs.

FARE MODELLING

Capacity utilisation of individual connections is not the only parameter that can be included in the impedance calculation during the assignment. In addition to the classic parameters, such as journey time, waiting time and transfer frequency, it is also the fare which may play a major role. As tariff structures are often complicated, a software tool shall allow users to model any type of fare and tariff model in all their facets including dependencies. This, for example, means multiply-counted zones for a city centre can be combined with short-distance tariffs or transitory tariffs for different transport associations.

If fare prices have been modelled in detail, they can be accounted for during assignment. The assignment method then shows how tariffs influence the passengers' route choice. Consequently, only a few people will take an expensive high-speed train for travelling a short distance if they can take a cheaper local train instead. Moreover, users can analyse the impact of fare changes on revenue. It thus allows transport associations and authorities to check how profitable it is to change a fare or introduce a new ticket type and what is the right price of the ticket to secure revenues.

Once fares are modelled, users will expect that the software calculates revenues distinctly. In other words, it should be broken down into different areas (eg transport associations, districts) as well as displayed on the basis of different aggregations (e.g. lines, operators). Flexible revenue distribution models shall enable users to evaluate several performance-based distribution schemes for several operators serving a transport association.

According to a recent survey[2] cost pressure is a major driver or regular modification of the Public Transport network. Beside the revenue estimation with fare and demand modelling, an importation factor for a cost-efficient Public Transport is the vehicle cost. In order to estimate the number of required vehicles for a scenario, vehicle scheduling (also known as line blocking) is required.

For a complete line costing and revenue calculation, which assesses the profitability and cost coverage of an entire public transport network or its service units, it is also necessary to determine the costs of infrastructure and operations[1,4,5]. An important basis for cost calculation is the number of vehicles required. For this the vehicle scheduling process is crucial. There are two approaches for this task.

VEHICLE SCHEDULING

With a basic line blocking, the planner himself defines the vehicle types of his choice. The automatic line blocking procedure completes the process on the basis of the timetable

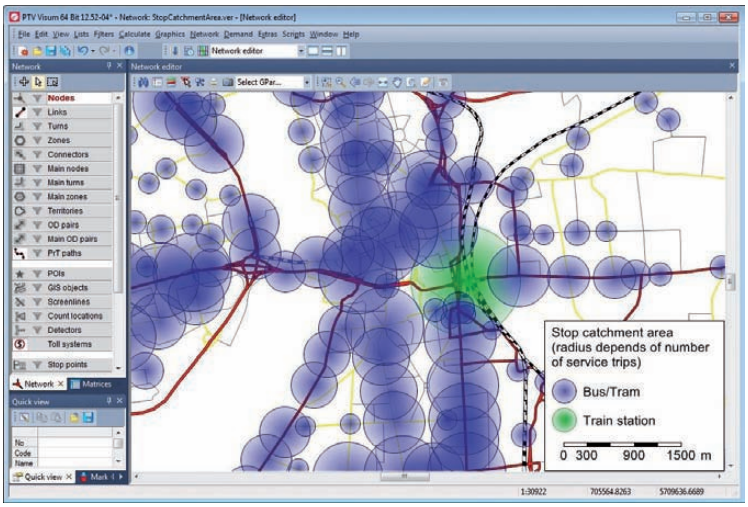


Figure 2: Simple analysis of public transport supply based on stop catchment areas

while following user-defined rules. In this context, depots and their capacities are explicitly taken into consideration. Journey-specific preparation and completion times as well as additional activities such as refuelling or cleaning are included as well.

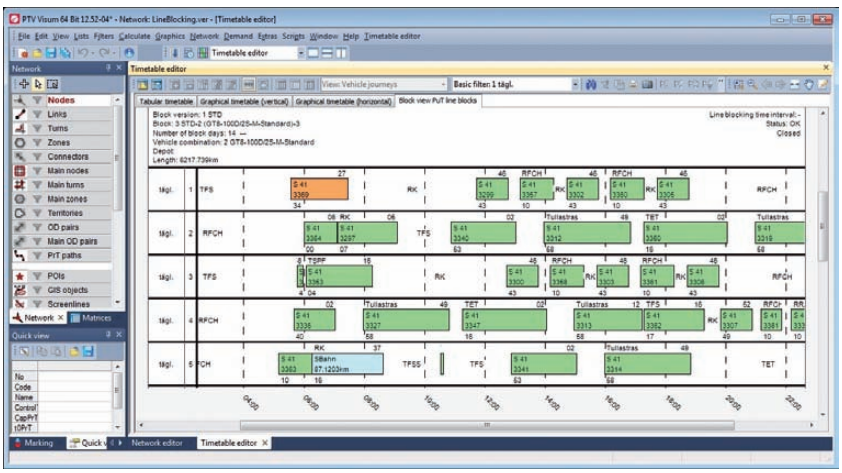
Detailed line blocking provides greater room for manoeuvre. Planners can model forced chaining or optimise the use of vehicles by also taking alternative types of vehicles into account. Instead of selecting a specific vehicle type, planners can then allocate a number of different vehicle types to the trip. The optimisation procedure then chooses the type that ensures a minimum deployment of vehicles. Here, it is again possible to integrate demand. To permit demand-optimised vehicle deployment, the vehicle choice is based on the capacity of each vehicle type in terms of passenger volume generated during assignment or using survey data. At this stage of the planning process, graphical formats such as block diagrams of line blocking results (see eg Figure 3) also assist planners in identifying and developing the network's optimisation potential in terms of profitability.

COMPACT VIEW: THE SCHEMATIC LINE DIAGRAM

Visualisation of results is essential for the success of Public Transport planning. A schematic line diagram provides an important visualisation option (see eg Figure 4). Using the schematic line diagram, planners can abstract the network according to their needs. The schematic line diagram visualises the network relationships and gives users an ideal overview of transfer stops. A wide range of graphical parameters and labelling options provide the information required.

Stops are displayed as boxes to which users may add timetable details. Information on arrival and departure times for all lines is thus provided at a glance enabling planners to ensure services with regular headways across several lines. The links between the selected stops are displayed as edges. Lines, transport systems, and service frequencies can be classified by using bars of different colours and different types of dashed lines.

Flexible revenue distribution models shall enable users to evaluate several performance-based distribution schemes for several operators serving a transport association



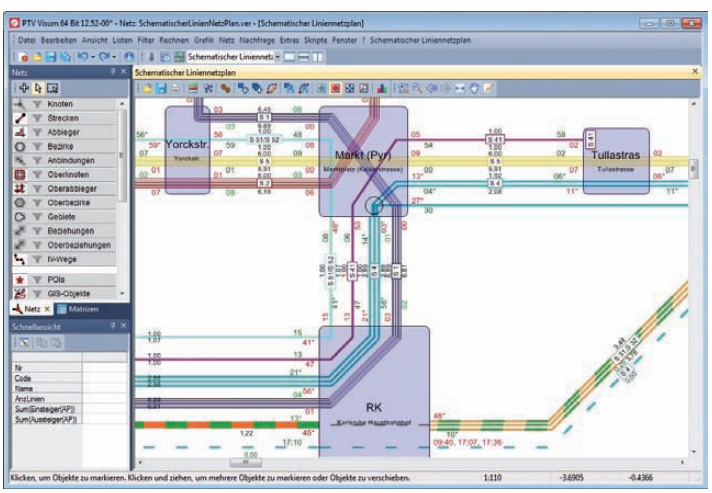


Figure 3: Block diagram: schematic display of the line blocking results.

Figure 4: The schematic line diagram provides users with detailed information on stops and routes at a glance

FYI

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Badge of honour

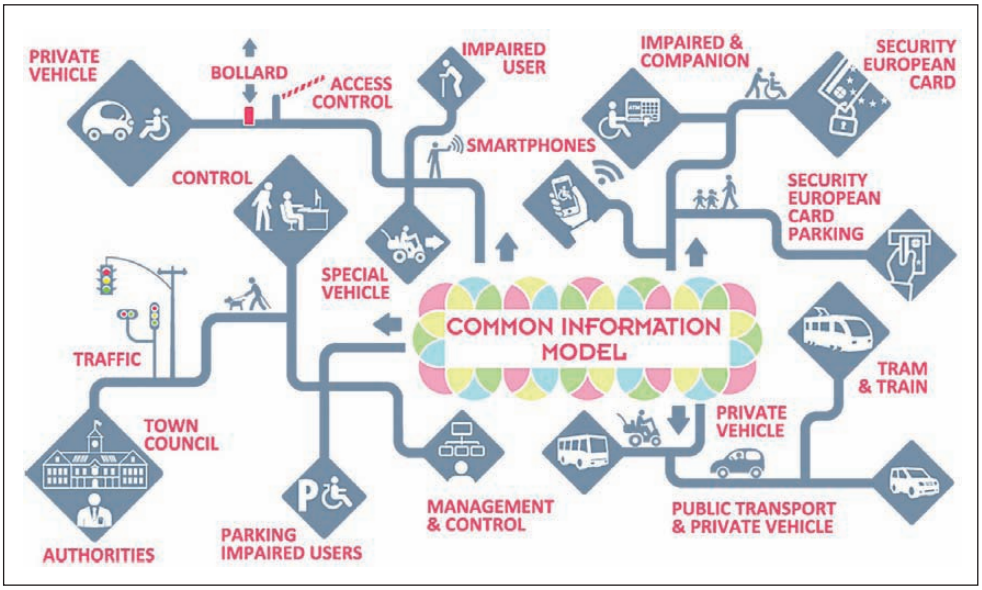
Eva Muñoz on the SIMON Project – an ICT proposal for the EU Disabled Badge

On a regular basis we see news stories detailing the abuse of parking reserved for the mobility-impaired, which in turn just adds to the already disappointing accessibility situation for disabled travellers. Even if they are holders of a Disabled Badge that, theoretically at least, allows the mobility-impaired to park their vehicles in reserved spaces, headlines such as "Workmen caught flouting disabled parking rules on street X", "Drivers are ignoring disabled parking bays in Y" or "Fines for illegal double parking", are all-too common headlines in local and national press.

THE EUROPEAN BLUE BADGE

The European Disabled Badge (EU Blue Badge) is a standardised model of parking card for the disabled that is recognised in all European countries. It must be displayed on the car's dashboard and it allows a disabled person who is entitled to use certain parking facilities in his EU country of residence to move more easily in the territory of another EU country, because he will be able to make use of the same parking facilities granted for that country's own citizens with disability. Nevertheless, parking concessions for holders of a disabled parking card do differ from country to country so it's important to

SIMON is adopting an implementation approach which ensures the integration of access rights management to public parking spaces with the technology available in each city



know where, when and for how long one can park in each country.

The harmonisation of the cards has led to them becoming extremely simplified, allowing them to be forged more easily. Thus, additional security features must be considered to prevent counterfeiting and forgery.

This is where SIMON (asSIsted Mobility for Older aNd impaired users) comes in. SIMON is an EU-funded demonstration project with three large-scale pilots in Madrid, Lisbon and Parma aiming to use ICT services to promote the independent living and societal participation of elder and mobility impaired people in the context of public parking areas and multi-modal mobility.

Two main motivations are the challenges of this project that began in January 2014:

– Reduction of fraud in the pre-ICT implementation of the European Disable Badge for public parking areas: SIMON will demonstrate the use of an ICT-enhanced European Disable Badge, both on the basis of physical – smartcards – and virtual access right tokens – e-access through mobile devices.
– Proposal of specific multimodal navigation solutions for elderly and people with disabilities: the proposal of an urban navigation system starts with the use of open data hubs and pre-existing toolsets that will be populated and exploited with specific information to address the requirements and needs of people with reduced mobility – such as the location of elevators in subway stations.

Both cases require extensive integration of multiple databases with dedicated personal information. Thus, an additional challenge for the project is the instantiation of a proven methodology for data privacy preservation and authentication of users.

TECHNOLOGY OVERVIEW

SIMON is adopting an implementation approach which ensures the integration of access rights management to public parking spaces with the technology available in each city, and the different available public transport modes, etc. and ensures transferability across Europe, not imposing constraints to the already existing policies. This is achieved by means of:

- An Open Architecture that will be used by any authority or service provider willing to deploy SIMON approach.
- Four independent service platforms – SIMON SAYS, SIMON ANSWERS, SIMON BOOKS and

The project

The SIMON Project is coordinated by ETRA Investigación y Desarrollo, S.A. (Spain). The rest of partners in the consortium are IBV – Institute of Biomechanics of Valencia (Spain), Madrid City Council (Spain), Locoslab GmbH (Germany), CRTM – Consorcio Regional de Transportes de Madrid (Spain), Infomobility SpA (Italy) and EMEL – Empresa Pública Municipal de Mobilidade e Estacionamento de Lisboa (Portugal).

About 35,000 disabled badges are estimated to be currently in use at the pilot sites in Madrid, Lisbon and Parma and it is expected that during the life-time of the project 5000 of them will be replaced by the IT version

SIMON OPENS - that will be instantiated at each pilot site, interfacing the current existing IT infrastructure, and complementing it.

- The use of a mobile application addressing the citizens as end-users (SIMON LEADS), a mobile application for the parking controllers in the pilot sites (SIMON CONTROLS) and a BACKOFFICE as an IT framework to support public authorities and transport operators to manage the services.
- The use of standard and accessible technology as security tokens to fight fraud: SMART CARDS, SMART PHONES and SMART PARK METERS.

THE PILOTS AND THE SERVICES

Madrid operates with a state-of-the-art on-street parking management system, which offers high flexibility to be enhanced, and support the specific features that SIMON proposes in order to manage access-rights for users of the EU Blue Badge.

Holders of a parking card for disabled people can park free of charge and without time limit in the green and blue squares of Regulated Parking Service, as well as in loading and unloading bays and in places where parking is prohibited if they follow Municipal Police and/or Mobility Agents indications. They only have to display the card in the vehicle.

Different mechanisms for enhancing this disabled card are being assessed within the SIMON project, trying to keep a balance between the final user needs and the public authority requirements. The main interest for authorities is of course to grant the service for impaired users while fraud-fighting mechanisms are implemented, as they have told us: "high amounts of money are moved in an existing black market for Blue Badge counterfeiting, because what would you be willing to pay if you could park indefinitely anywhere in a city like Madrid?" On the other hand, disabled users of course want to assert their rights, but they are against any solution that could result in compromising their daily mobility, which might happen when we are dealing with technology.

The only way to avoid the use of a disabled badge by a non-disabled user is to uniquivocally identify and locate the legitimate owner of the badge accessing to a specific parking area. The personal smartphone will allow this identification in the system, by means of an app that will exchange different security keys. Some users will also be provided with an IT blue badge that uses NFC technology in order that the disabled

The services definition is not only answering the specific needs of the pilots included in the project, but also to the cities and regions that have similar characteristics in order to try to protect the social rights of impaired citizens

traveller can use their NFC smartphone to validate the badge in the system, and the park controller can later on verify whether the car is correctly parked in the reserved place or not. Smart park-meters as those being already part of the system in Madrid can also be used for validation purposes.

An additional functionality that is of great interest for disabled users moving across the city is the one that will allow them to locate a reserved parking place in a map and to know the possibility of that place being free or occupied. Of course, the app combined with a trip planner that can guide them to reach the selected park place becomes essential for the disabled user.

One of the main objectives of the project is to cross-evaluate the results of the pilot in Madrid with the result in the rest of the cities. Madrid will be the most complex pilot site but some other interesting features are going to be integrated and demonstrated in both Lisbon and Parma.

Lisbon operates a state-of-the-art smart city system for mobility that will be easily adapted. SIMON will be deployed considering the existing ICT infrastructure and disabled users will make use of the EU parking card badge with an NFC tag.

Parma is something of a pioneer city in the modernization of EU parking cards for the disabled and the city makes uses of plate recognition technologies to manage the Regulated Access Control areas. Fraud detection capabilities will be enhanced and users will be requested to authenticate themselves through the use of their smartphone.

About 35,000 disabled badges are estimated to be currently in use at the pilot sites (more than 25,000 of those in Madrid) and it is expected that during the life-time of the project 5,000 of them will be substituted by the IT version (physical or virtual) of the current badge. Moreover, SIMON will experiment with different complementary solutions in order to compare them and be able to propose an EU-wide solution based on quantitative assessments. The project will evaluate which of the IT alternatives studied suits better the requirements by citizens, public authorities and parking and transport operators.

The services definition is not only answering the specific needs of the pilots included in the project, but also to the cities and regions that have similar characteristics in order to try to protect the social rights of impaired citizens.

In any case, the project intention is to go beyond national frontiers and even beyond European level. Thus, the IT proposal will be presented to EU representatives of end-users – citizens, public authorities and operators – at the User Group. Actually, SIMON already qualifies in this group with the main associations in Europe regarding disabled and elderly people.

ACCESSIBILITY CHALLENGES

The SIMON project is compliant with the EU Disability Strategy 2010-2020 and can contribute to three main areas of actions defined in it: "Accessibility", "Social protection" and "External action". This enables the transferability of the project results to other cities and European regions.

SIMON aims to act as a tractor project when it comes to the modernisation of the EU parking card. The specific social context and objective of SIMON forces the focus of the project on the citizen, and this means that centering SIMON on public services (IT or not) is the right approach. This citizen approach is already ruling the global Smart Cities initiatives all over Europe.

SIMON services sustainability and further deployment will depend to some extent on the penetration rate of some of the technologies tackled by the project as the basis for the adapted access-tokens complementing the EU-badges. In this context, in 2012, 55 per cent of mobile phones in Europe were already smartphones, with Spain and UK penetration rates higher than 60 per cent. This leads to a quite positive scenario where the smartphone could be included as one of the basic pillars to build a fraud-free, virtual EU disabled badge.

FYI

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Mobility: a German history

Dr Andreas Kossak presents a review of trends, forecasts, scenarios and fantasies in the urban mobility sector in Germany

If the experts (actual ones as well as those "self-appointed") are to be believed, Germany is undergoing radical changes in its mobility choices and behaviour. However, this appears to have been the case for several years.

According to these experts, the changes will take place in the short term and will see a fundamental change for the future structure of the traffic and thus for the layout of the German transport system, primarily in the major cities and metropolitan areas. It is interesting to note that the year 2030 is frequently stated as the time-horizon for this "new reality".

The time-span from today (2014) to 2030 is just 16 years – looking back by the same time-span we reach 1998. In order to judge the plausibility of the respective "forecasts" it is worthwhile considering the factual changes of urban mobility and the urban transport systems from 1998 until today.

TRENDS BEGAT MEGATRENDS

The respective pictures of the future are commonly based on global and/or national trends, including the oft-mentioned "Megatrends":

- (Re-) Urbanization – pressure on urban areas, emptying of rural areas.
- Ageing population – more elderly, less young residents.
- Climate change – deteriorating environmental conditions
- Increasing global interactivity – regarding the mobility of persons and goods as well as the cooperation in manufacturing processes.

German experts predict that mobility will soon be concentrated on public transit and its 'complementary' services, car-sharing and bike-sharing

The primary "Megatrends" are increasingly overlaid by secondary trends also being labelled as "Mega", for example:

- Connectivity – formation of new worldwide networks of individuals and machines.
- Neo-ecology – ecological focused perception regarding sustainability and efficiency in all areas of life, including in particular mobility.
- Health – besides the increasing importance of the health-industry this also refers to an increasing consciousness regarding a healthy lifestyle, including the consequences for the aforementioned changes in mobility behaviour.
- Mobility – changes in individual mobility, not at least in terms of a substitution of physical mobility by way of non-physical mobility.
- New Work – change from the industrial society to a knowledge society resulting in changing structures of enterprises and workplaces including the tendency of a (partly or totally) shift to home-working.
- Individualization – traditional biographies change to "multigraphies" resulting in an increasing "cocooning" of individuals.

A substantial part of these trends are indeed of potentially reasonable influence on the future traffic demand in cities and thus additionally on the requirements of the layout and design of the transport systems and services. Explicitly referring to that, representatives of the German transit industry stated that urban mobility will soon be concentrated on public transit and its "complementary" services, car-sharing and bike-sharing. These positions are obviously based on the credo of "experts" according to which the individually owned automobile will be a relic of the past in the not-too-distant future.

At the same time we are currently

The scenario regarding the end of privately-owned cars contrast rather wildly with the actual development of car-ownership and the forecasts for the next version of the German Federal Transport Infrastructure Plan

seeing globally intensive activities in developing and testing ever more complex driver-assistance-systems, car-to-car (V2V) and car-to-infrastructure (V2I) communication and automatic accident-avoidance systems, which could ultimately, if the same experts are accurate in their assessments, lead to fully automated road-traffic.

These activities are obviously not driven by the expectation that the future of urban mobility will be more or less exclusively characterized by sharing publicly provided cars and the use of public transit. In contrary there are opinions to be heard according to which the public transit might lose a substantial share of its demand as a result of an increasing automatic control of car-traffic. However, by considering the complexity of the "traffic-reality" one may come to the conclusion that fully autonomous road is not realistic at all, and particularly not in cities.

BUCKING A TREND

The scenarios regarding the end of privately-owned cars contrast rather wildly with the actual development of car-ownership and the forecasts for the next version of the German Federal Transport Infrastructure Plan.

According to that Plan, "motorized individual traffic" will further increase by about 10 per cent until 2030, compared to 2010 – even if all efforts regarding an improvement of public transit will be successful. The increase of the passenger-km of the "public road passenger transit" (including the urban rail-systems) is forecast to be at best 6 per cent in the same time period.

This forecast was based on expectations derived from preparing works regarding the development in the time-span 1997–2015; they were alternatively based on the "trend" and on a positive scenario called "integration". The latter was taken

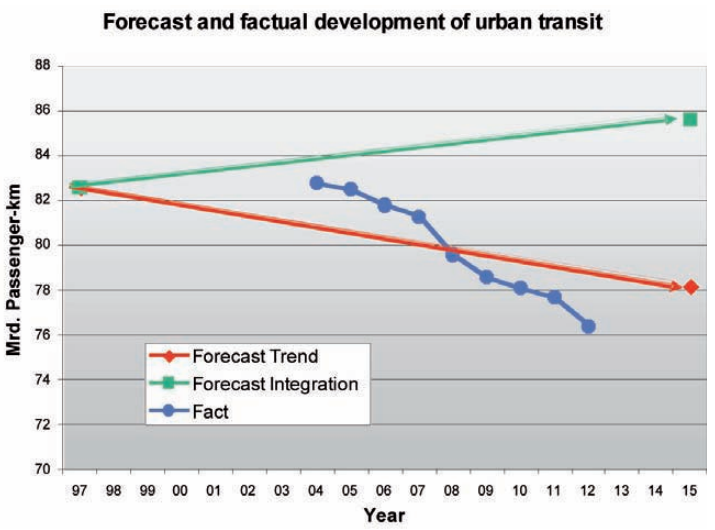

Figure 1: Forecasts/ Scenarios compared to the real development of the passenger transport performance in urban public transport in Germany 1997-2015 [5,6].

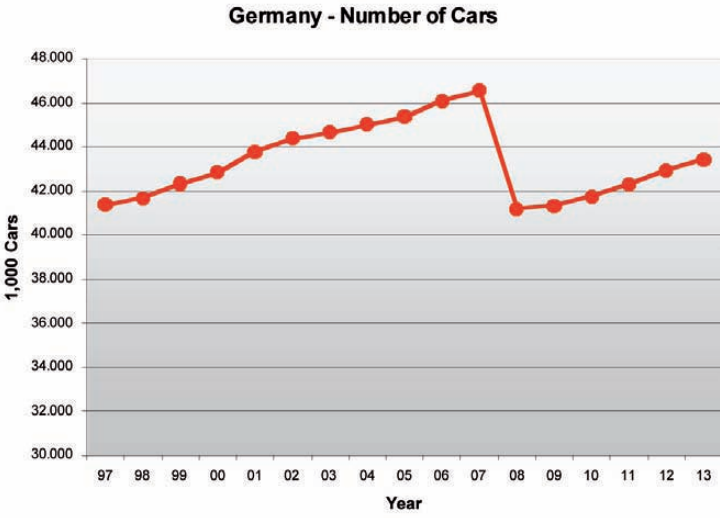

Figure 2: Development of the number of cars in Germany 1997-2013 6; remark: until 2007 the number included cars that were not registered for part of the year

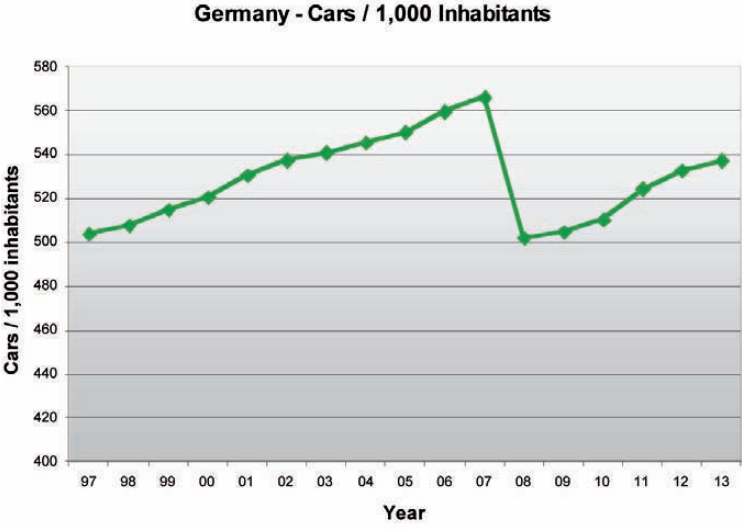

Figure 3: Development of the car-ownership index 1997- 2013 [6]; remark: until 2007 the number included cars that were not registered for part of the year

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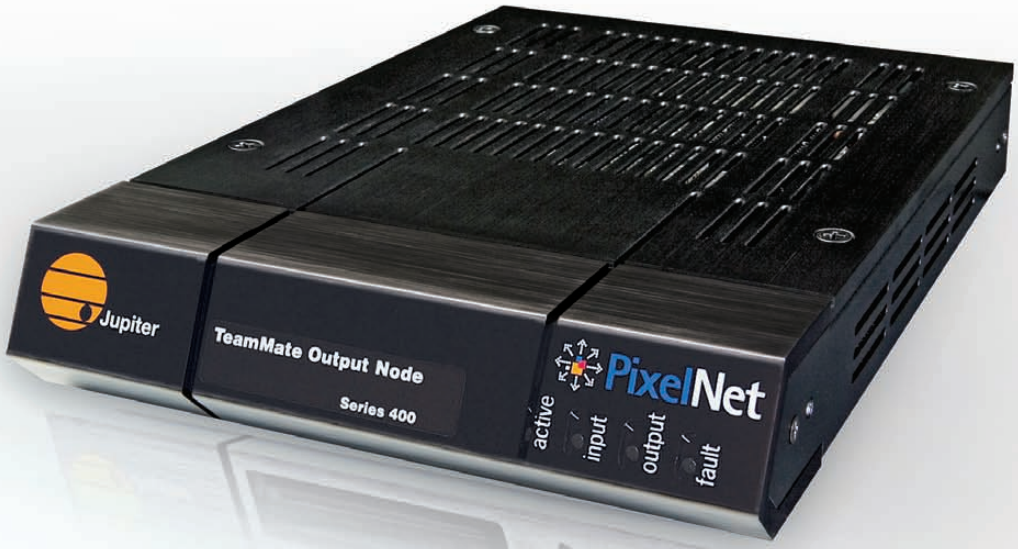

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Berlin is the perfect example of a German city that offers residents and visitors multiple public transit choices

as the basis for the forecasts until 2030. However, the real development meantime has been even worse than the anticipated negative "trend" as seen in Figure 1.

These facts are not at all compatible with the assumption that a substantial number of car owners will give up their cars within the near future and totally change to car-sharing and/or transit – even in major cities. In fact during recent years not only have the number of private cars continued to increase steadily in Germany; the car ownership rate increased even more than was predicted – see Figures 2 and 3.

According to the car-sharing industry in 2014 there will be for the first time more than 1 per cent (1.13 per cent in fact) of German residents old enough to legally drive will use a car-sharing scheme. The spectrum of positions of people being familiar with the subject show a remarkable diversity and, indeed, contradictory positions. An example based on only one newspaper article (in the order of the citation):

- "More and more people abandon owning a private car".
- "Car-sharing will remain a niche-product in the foreseeable future".
- "The topic is even used for marketing purposes by the automobile manufacturers".
- "Car-sharing will be no serious competitor for the traditional automobile selling business".
- "In 2030/2040 the individually owned private car might gradually lose its position".
- "In total the formula for the future will be: use and own a car".

Nevertheless, the idea of a golden future of car-sharing and of the approaching end of privately owned cars resulted in some cities to largely neglect to take appropriate advantage of the conventional instruments with a much higher potential for increasing and keeping the demand for public transit.

This refers in particular to modern Park + Ride and Bike + Ride facilities as well as to an automatic parking management scheme in the inner cities, not to mention the idea that the services, anticipated as being "complementary" to public transit, might even cannibalize it instead of providing it with additional demand.

Nevertheless it remains worthwhile observing these ambitious approaches in closer details. According to the actual plans, the transit-system in Helsinki, for example, will be transformed to a "point-to-point on demand mobility system". In theory it is intended to be so good that no-one will have a reason to own a car anymore. This is judged even by local practitioners to be close to reality in just the relatively small area of the inner city (mostly walking distances). The infrastructure is based on a

Germany operates a 'priority for public transit' policy

well-proven cell-phone ticketing system. The actual status of electronic ticketing in Germany is limited in comparison and still far away from the goals that were formulated about 15 years ago.

TAKING PREVIOUS DEVELOPMENTS INTO ACCOUNT

In light of the factual development of the urban mobility compared to "forecasts" and scenarios proclaimed during the last decades like those mentioned above, it is highly recommendable to analyze the subject realistically in order to come up with useful conclusions.

In this context, the following facts are rather important:

- Since the beginning of the so-called "stormy" increase of private car ownership at the end of the 1950s, "experts" predict the fast-approaching traffic-infarction, in particular in major cities; in fact, it still has not occurred today. In those days the saturation factor of private car ownership in Germany was predicted to be 200 to 250 per 1,000 inhabitants but in truth it has only reached a level of just over 500 cars per 1,000 inhabitants.
- For a number of decades all German Federal governments declared their intent to shift substantial shares of the passenger transport performance from road to rail and transit. In reality the opposite has happened.
- Part of the transit research programme at the German Federal Ministry of Research and Technology in the 1970s was centred on the vision that by the year 2000 motorized passenger mobility would mainly be based on "automated guideway transit systems" (using small or medium size cabins) in all major cities. In 1980 it was announced that the first implementations would happen in Hamburg, but 1981 that part of the programme was cancelled . Recently there has been a revival of proposals regarding such solutions.

THE "FUTURE OF THE AUTOMOBILE" CIRCA 1980

As a result of the first mineral oil crisis in the 1970s, studies were prepared worldwide regarding the "Future of the Automobile" – not least in the United States and Germany. The US study, commissioned by Congress was entitled "Changes in the Future Use and Characteristics of the Automobile Transportation System" and was published in 1979. The title of the German study (commissioned by the Federal DOT) was "Scenario Automobile 2000" and was finished in 1980 [11]. In those days several "experts" were predicting that there would be no mineral oil-based automobile traffic by the turn of the century.

Together with the research chiefs of leading automanufacturers, US congress invited me to an expert hearing on the respective subject. On that occasion some Congressmen asked if it would be possible to reduce the average fuel-consumption of new cars (starting from a level of about 15

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There are numerous trends taking place that are of great importance for the future of urban mobility and the role of the different transport sectors – particularly in the major cities

liters per 100km in the US) to 3 liters per 100km, and if yes, how much time would it take. The answer was yes, it was possible. Without governmental financial support it would take about 20 years, with financial support about 10. "However," it was pointed out, "it has to be mandated". Nobody mandated it anywhere.

Some 30 years later and there are about double the number of private licenced cars in Germany and they nearly exclusively use fossil-based fuel. Highlights of the car shows all over the world are very rarely the small, energy-saving cars or those using alternative energy sources but the large, fast and expensive models with high fuel consumption. The "Use and Characteristics of the Automobile Transportation Systems" have not changed significantly – apart from a dramatic increase of car-ownership in developing countries.

TENDENCIES IN TOWN-PLANNING

During the largely industrial period since the middle of the 19th Century a guiding principle of town-planning has been the traffic generating "separation of residing and working". Since the start of the private car ownership "explosion" it has been coupled by the guiding principle of the "automobile-suitable city". When the negative consequences of pursuing the latter became obvious, it was replaced by a new principle: "priority for public transit". From now on the aim was not making the cities suitable for cars but "making the traffic suitable for the people"; the new guiding principle was the "City for Humans" [13]. More than 40 years later "Urbanists" and mobility experts have been bandying about the same slogans, but now coupled with the idea of realizing those dreams within just 15 years.

In context with moving away from the "Automobile Suitable City" in the late 1960s/early 1970s the first pedestrian roads and subsequently "pedestrian zones" had been established. Their introduction was met at first with massive opposition, in particular from retail business who foresaw visions of the death of the city centre in favour of the supermarkets on greenfield sites. However, the opposite took place. The growing attractiveness as a result of the reduction of automobile traffic and improved public transport services created an increased competitiveness between city centres and out of town retail parks.

Facing a change from an industrial and trading society to a knowledge society, the discussion about town planning became to a reasonable extent stamped by the demand for a comeback of the basic principle of the cities of the Middle Ages: a combination of residing and working, aimed at minimizing motorized traffic. However, the working-conditions and procedures have changed substantially since the pre-industrial ages. People living in quarters with mixed land-use seldom have their workplace in the same quarter and vice versa. The modern demand for mobility and flexibility on the labour market is merely compatible with the assumption that any change of a working place is coupled with a change of residence. Not least because in the Middle Ages working and residing took mainly place in the same building or estate.

CONCLUSION

There are in actual fact numerous trends taking place that are of great importance for the future of urban mobility and the role of the different transport sectors – particularly in the major cities. The potential effects of these trends are partly countercurrent or compensating each other regarding the influence on traffic behaviour. By analyzing the development of urban mobility during the recent decades one will come to the conclusion that most substantial changes in this regard do not occur by means of a revolution, but rather by evolution. However, that does not relieve the stakeholder in the transport sector from continuously observing the factual changes and analyzing the relevance for their area of responsibility. The credo of the American historian Roger G Kennedy is an appropriate guiding principle in this context: "The knowledge of the past is a preposition for an adequate coping with and designing of the present and the future".

FYI

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Safety and Security in Transport

This section addresses road safety and the security of transport systems. It covers road safety policies, addressing all categories of road users and supporting the development of innovative solutions. It also covers technological innovations contributing to the improvement of road safety

- **Smart Enforcement** – Adapting automatic traffic enforcement
- **Stockholm, Sweden & Madrid, Spain** – Smart camera surveillance for added smart city security

Smart camera surveillance systems are ensuring that Stockholm remains a safe city

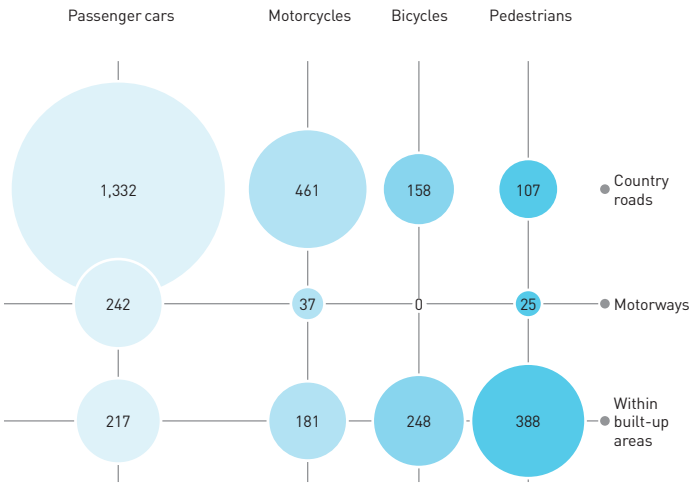
The holistic approach

Boris Wagner assesses the available options for the successful adaptation of automated traffic enforcement to urban requirements

While at 50 km/h eight out of 10 pedestrians will survive a collision with a passenger car, fatalities rise dramatically at higher speeds. At 65 km/h eight out of 10 pedestrians will be killed

Combining red light enforcement and speed enforcement makes intersection safer

Number of people killed in road traffic accidents in 2012
by type of road use and location of accident



Bicycles and pedestrians are the most vulnerable participants in urban traffic

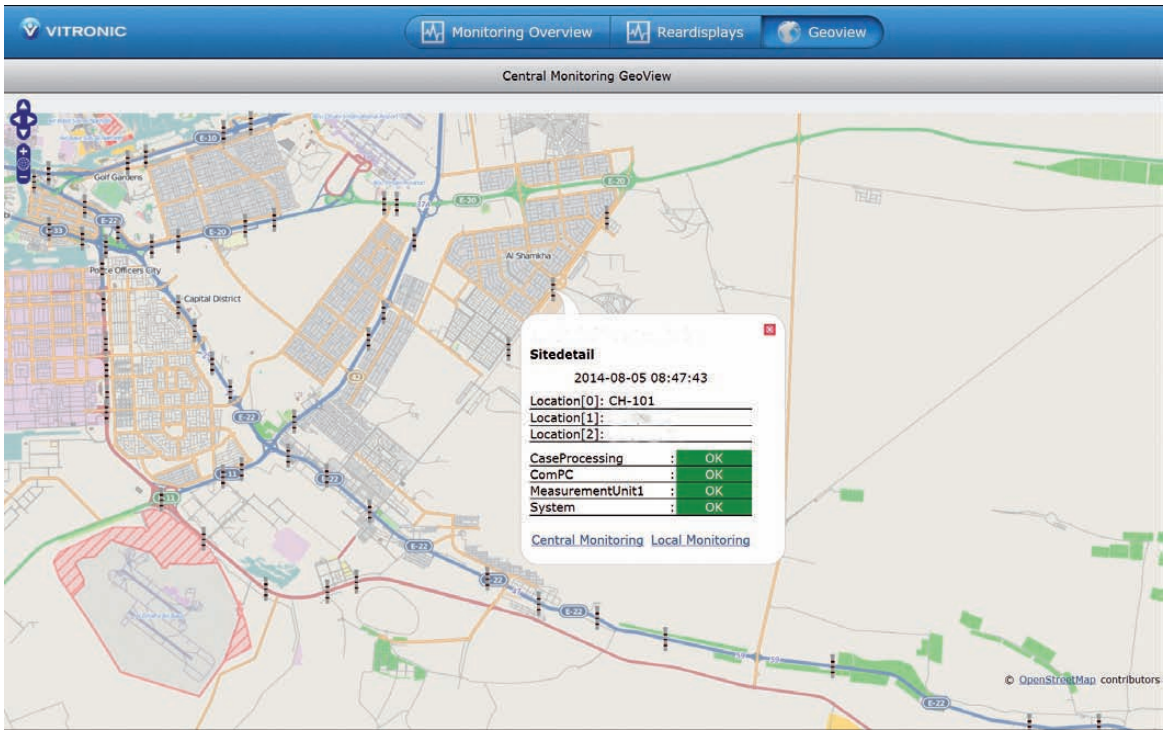
Traffic accident fatalities on urban roads have dropped by over a third in the first decade of the 21st century. This is in itself good news and signifies the progress that has been made in improving road safety. But a closer look at this figure reveals a slightly different picture.

During the same time period the proportion of fatalities in urban areas compared to the overall fatality number has increased to 38 per cent[1]. This indicates that actions to increase road safety in urban areas have been less effective than, say, on interurban roads. There are several reasons for this. For one, while speeding is the number one cause of fatal accidents both inside and outside cities, it is not so predominantly a risk factor as it is for example on motorways. Instead there are other risk factors in urban areas that are a threat to traffic participants. The number of fatalities at junctions is twice as high on urban roads as outside cities[2]. In Germany, crossings and intersections are the number one cause of traffic-related serious injuries within urban areas[3].

Another reason is that urban traffic is more complex, both in terms of participants and in terms of road topography. Cars, heavy goods vehicles, cyclists and pedestrian share one infrastructure with the latter two being especially vulnerable in case of accidents. Plus, urban road systems have a lot more junctions, intersections, and pedestrian crossings than non-urban roads. Add to this lanes reserved especially for bicycles or public transport and you get a mixture that requires an enforcement strategy that is adapted to the specific needs of urban areas.

NOTE

1 European Road Safety Observatory, "Traffic Safety Basis Facts 2012 – Urban areas", http://ec.europa.eu/transport/road_safety/pdf/statistics/dacota/bfs2012_dacota-intras-urbanareas.pdf
2 Ibid.
3 German Federal Statistical Office, "Traffic Accidents", Wiesbaden, August 2013



Networking software like PoliScan connect allows traffic managers to remote control enforcement in real time

PROTECTING INTERSECTIONS AND CROSSINGS

Red light enforcement is common and well established, but it runs short when it comes to protecting intersections and crossings. Consider the following everyday scenario: As a vehicle approaches an intersection, the traffic light turns yellow. In hope of still passing through, the driver speeds up exceeding the speed limit. Even if this extra burst of speed seems only marginal it can have disastrous effects. While at 50 km/h eight out of 10 pedestrians still survive a collision with a passenger car, fatalities rise dramatically at higher speeds. At only 15 km/h higher eight out of 10 pedestrians will not survive the collision.

A very effective way to counter this and change driver behaviour to braking rather than accelerating at yellow traffic lights is combining red light enforcement with speed enforcement. These versatile systems offer all the road safety benefits of traditional red light cameras but add continuous speed enforcement functionality integrated into one enforcement site. They are also able to monitor larger urban intersections as they can detect multiple violations simultaneously across several lanes and in several directions.

TAILGATING ON URBAN HIGHWAYS

Another risk factor that is prominent on urban motorways is tailgating. Especially during peak times drivers often do not keep the required minimum safety distance to the vehicle ahead. According to the National Center for Statistics and Analysis tailgating is one of the major contributing causes for fatal rear-end crashes in the US which result in more than 2200 fatalities and more than half a million injuries each year[4]. Studies conducted on the Rhode Island urban highways reveal that during rush hours more than 60 per cent of all drivers were tailgating with still 40 per cent being too close to the vehicle ahead during non-rush hours[5].

While speed enforcement is widespread on urban motorways, automated tailgating enforcement is

NOTE

4 Wang, J., Song, M., Assessing drivers` tailgating behavior and the effect of advisory signs in mitigating tailgating, in: Proceedings of the Sixth International Driving Symposium on Human Factors in Driver Assessment, Training and Vehicle Design, Lake Tahoe, California, 2011

5 Ibid.

6 Malenstein, J., Implications of innovative technology for traffic law enforcement, Washington, 2009

7 Lodoncyclist, Should HGVs be banned from the city center?, http://www.londoncyclist.co.uk/hgv-ban/

Modern enforcement technology can distinguish between different vehicle classes and allows the definition of time spans, during which HGVs would be banned from entering certain areas

rarely implemented. This is all the more surprising since the technology is available and there are even concepts to include tailgating detection into regular spot speed enforcement with additional video cameras documenting the violation. The positive effect that the deployment of such an innovative enforcement technology would have on road safety has recently been highlighted by road safety experts[6].

ENFORCING TRAFFIC BANS

Heavy goods vehicles (HGVs) are a major cause for urban traffic fatalities of cyclists. In London for example 43 per cent of cyclist deaths involve HGVs even though they constitute only 4 per cent of all roads trips[7] – a strong case for at least partial bans of HGV traffic. Authorities could prohibit through traffic for trucks for selected inner city areas or during certain time periods outside of peak delivery hours in the early mornings. The same applies for the weekends when a lot of cyclists would otherwise share the roads with HGVs. At the same time these bans would also help to improve the quality of life in inner cities by reducing pollution and noise.

A common problem with time variable bans on traffic is its acceptance by road users. As long as controls are random and the chances to get caught are slim there will be an incentive to enter the restricted zones. Continuous physical policing, while in principle effective, would be very costly because of the amount of manpower that it would require. But these limitations could be overcome by installing an automated enforcement network throughout key locations within an urban road system. Modern enforcement technology can distinguish between different vehicle classes and allows the definition of time spans, during which HGVs would be banned from entering certain areas. Connecting the enforcement sites to the traffic management center would even allow authorities to monitor compliance in real-time.

MAKING USE OF NETWORK TECHNOLOGY

Especially this live connection of enforcement sites to the traffic nerve centre of a city provides authorities with a range of new ways to react to changing traffic conditions and improve urban road safety. Vitronic's PoliScan connect networking software for example is used by several cities in the Middle East to remote control their enforcement systems in real time. Besides allowing traffic managers to adapt the enforced speed limit and import violation cases online the software offers extensive statistics on each enforcement site that authorities can use to identify and relief hot spots that have recurring violations or patterns of dangerous driving behavior.

Another example of the benefits of interconnecting enforcement with traffic management is interfacing enforcement devices with traffic information systems like variable message signs (VMS). Statistics from the European Road Safety Observatory show that the distribution of road fatalities inside urban areas varies during the week. The same is true for various times during the day, again with peaks during rush hour times. With connecting VMS and enforcement technology driving behavior can be positively influenced at certain road sections during high-risk times without having to generally reduce the speed limit on this section of road.

CONCLUSION

While speed enforcement is widely implemented and has been shown to have a positive effect on road safety there are other risk factors where automated enforcement could help reduce fatalities and injuries. This is especially the case for urban traffic as it is comparatively complex and reducing speed related accidents is just one parameter on the way to making city roads safer.

To reach that goal, traffic managers will have to adopt a diverse strategy that combines measures aimed at changing individual driver behavior such as tailgating with actions that have a more general effect on traffic like selective bans or variable speed limits. All of this can be achieved by implementing a networked enforcement management system. Instead of targeting only a singular risk factor such a system allows authorities to take a holistic approach to urban road safety.

FYI
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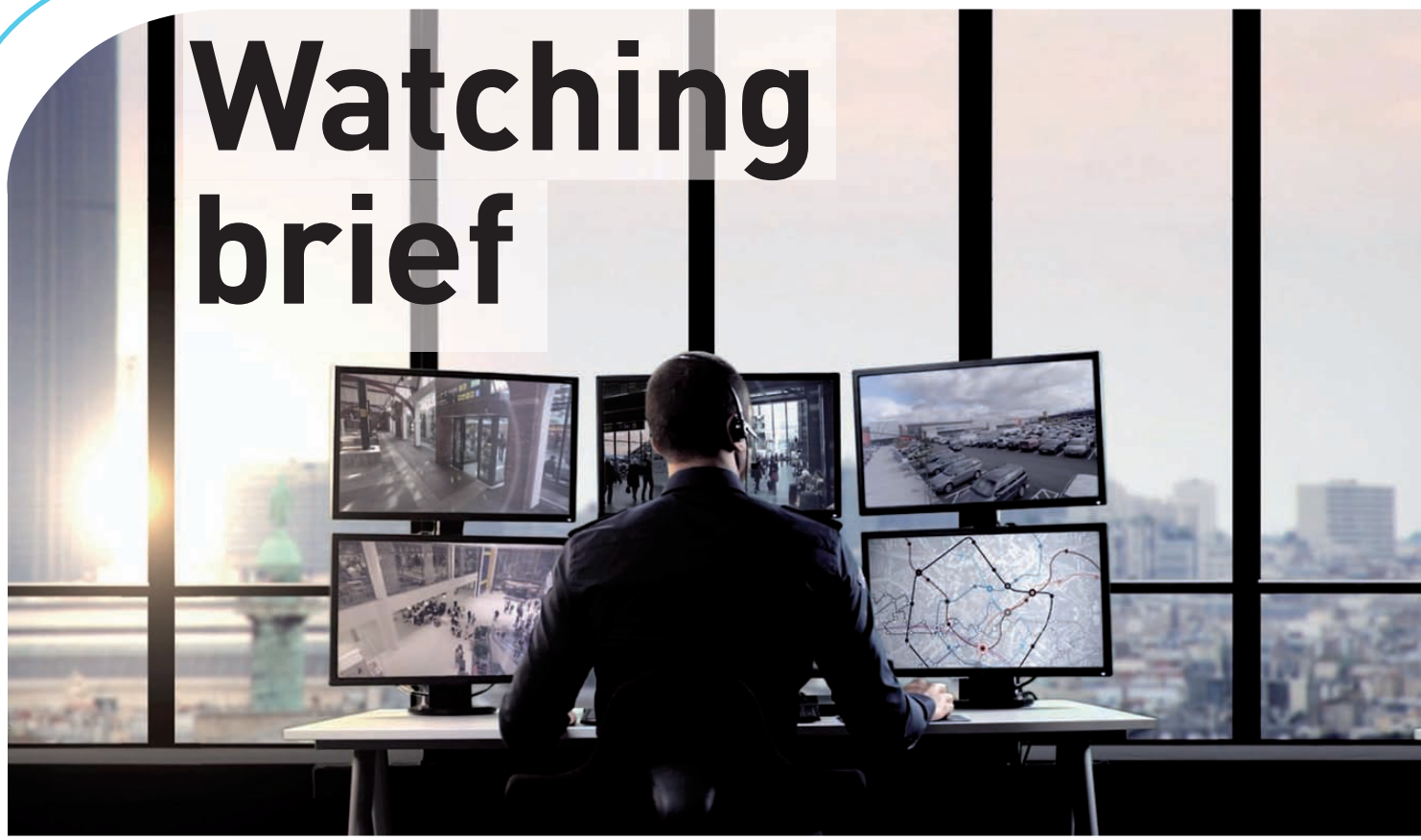
Watching brief



Smart camera surveillance and modern incident management solutions offer a new level of security for public transport, says **Patrik Anderson**

The new surveillance system on Madrid's buses has not only helped to reduce the costs for incident responses. It has also given EMT an efficient tool to prevent crime and to investigate various incidents on board

We all want to feel safe and secure, it's a basic human need. In the hierarchy of needs it comes a long way before self-esteem or self-actualisation. However, we all perceive that security differently. There are cultural and geographical differences in this perception and also a correlation to the actual level of security based on the individual's knowledge of the situation or based on the sequence of events that have occurred historically.

Surveillance is a tool that public transport transit authorities can use to both manage the present security level, in terms of reducing incidents and crime and also to address passengers' fears concerning safety and security on the transport network.

Used proactively in real-time, rather than merely recording the footage, camera surveillance is one dimension for security managers to consider when building a security system.

Another dimension is how camera

If people are aware of the benefits and the level of camera usage and incident reduction, it has an impact on deterring potential criminals

usage is communicated to both staff and passengers. If people are aware of the benefits and the level of camera usage and incident reduction, then this has an impact on both deterring potential criminals and raising the 'perceived' level of security for everyone.

In Sweden, Stockholm's transit authority, Storstockholms Lokaltrafik (SL), worked with the TV channel Kanal 5 for three seasons on a documentary where viewers can follow the operators in the security centre and watch how they interact with the people on the ground responding to the incidents.

Each episode documents how a number of different incidents are dealt with by security operators, private security personnel and the emergency services and how modern network video cameras are at the centre of the response.

In Spain, the Madrid bus transportation authority (EMT), installed a real-time surveillance system that is capable of viewing camera footage remotely from all their buses following an incident. Journalists were invited to a demonstration of the system and they then published details of it across major Madrid newspapers and TV stations so that the public could learn about it and understand all about the increased incident-handling capacity and improvements to the level of security for both passengers and staff.

The main goal in any incident management system is to not overreact or underestimate any incident when it occurs and to use the right resources early on to reduce the number of incidents or avoid them entirely.

AN INCIDENT LIFECYCLE

The lifecycle of an incident can be characterised in six distinct steps:

Detection
↓
Prioritisation
↓
Response
↓
Re-prioritisation
↓
Investigation
↓
Follow-up

Detection

This is the phase where an incident happens and is discovered. Incidents can be discovered manually when for example a passenger reports the incident via phone to the security centre, or it can be done automatically through automatic video analysis by a modern network video camera system. Examples of automatic video analysis could include overcrowding on platforms or entry into a restricted area or entry onto the rail tracks. Other types of sensors can also alert the security centre of an incident, like fire and smoke alarms, access controls and radar or other motion sensors.

Prioritisation

Once the incident is detected, it needs to be prioritised in terms of what the nature of it is. This information is then prioritised against all other activities that response personnel are currently occupied with. By using high quality video from network video cameras, operators can make an informed assessment in real-time of the incident from a remote location and decide on the appropriate action.

Response

Once the incident is fully understood by the security operators, it can be classified to follow a protocol; a set of operating procedures that have been determined beforehand in order to defuse and minimise the situation. The security centre can continually use network video to monitor how the scene potentially escalates and develops.

Furthermore, as modern network video cameras provide crisp, clear HDTV-quality video, not only can operators recognise what is currently happening they can also clearly identify the individual(s) involved. It is vital in a real-time situation to give a clear description of a perpetrator or someone in need of help (ie. clothing, height, body shape etc.) to allow the response to be quickly co-ordinated. With older camera technologies this was not really possible in many situations, but now it is. The handover between the security centre and response personnel can be made via radio, but network video also provides the ability to send live video streams to mobile devices wirelessly.

Network video cameras are based on open standards and run on any IP based network. Specifically, network video compressions like H.264, make

it easy to broadcast video streams from the scene over cellular networks into the response unit's vehicles etc.

Re-prioritisation

Sometimes an initial response to an incident is made with vague or limited information at hand. Sequences of events that have happened shortly before detection of the incident need to be reviewed and operators have to create a picture of the situation.

Another scenario may happen during an incident, when a suspect leaves the scene before responders have arrived. In these types of situations when a new priority or re-prioritisation needs to be established, network video is instrumental in keeping everyone informed.

Furthermore, live and recorded video from other nearby locations can be used to continue the search for people involved and help responders be in the right place. Key to any successful response is the speed of that response and here network video also plays a central role in reprioritisation of incidents.

Investigation

After an incident is dealt with, there usually follows a period of investigation where the facts are established and the sequence of actions reported to the authorities. Video evidence is key as it helps to show the actual scenario from many different angles. By using modern network cameras, the image quality is the same as the HDTV broadcasts we are accustomed to at home. Positively identifying people where there can be no doubt of who did what and when, is a vital benefit to any investigation process.

Especially critical are environments like stations and depots in low-light or very bright-light where traditional cameras have difficulties. Modern network video cameras have the ability to enhance any available light to create a lighter picture

Network cameras make the trip safer and save time for travellers and drivers within the Stockholm area, Sweden. "The surveillance system and the Security Project have been positive changes for us. It has given us more return than we had predicted." says Stefan Danielsson, Project Manager for SL's Security Project

and also to expose the bright light and shadows independently in a very light scene so that all details become more visible. Axis Communications with its Lightfinder and WDR (Wide Dynamic Range) technologies is leading the market in this field.

Follow-up

The final phase is the step of follow-up and learning. Here video can be used to review real incidents with staff and security partners in order for them to discuss and learn from the footage. By working this way, both newer staff members as well as experienced personnel can together create a learning organisation.

PROACTIVE VIDEO USE WITH CENTRALISED SURVEILLANCE IN REAL-TIME

To create a new level of security for public transport, centralised, real-time surveillance and the ability to coordinate response personnel is key to minimising the impact of incidents and increase the perception of security. Network video has a clear role to play in all phases of modern incident management. By carefully applying intelligent video where cameras analyse the video, security operators will also benefit from an additional detection mechanism to detect incidents early and thereby increasing their ability to respond to an incident successfully before it escalates out of control.

FYI

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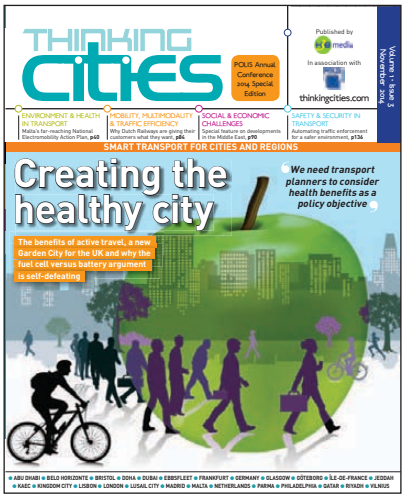

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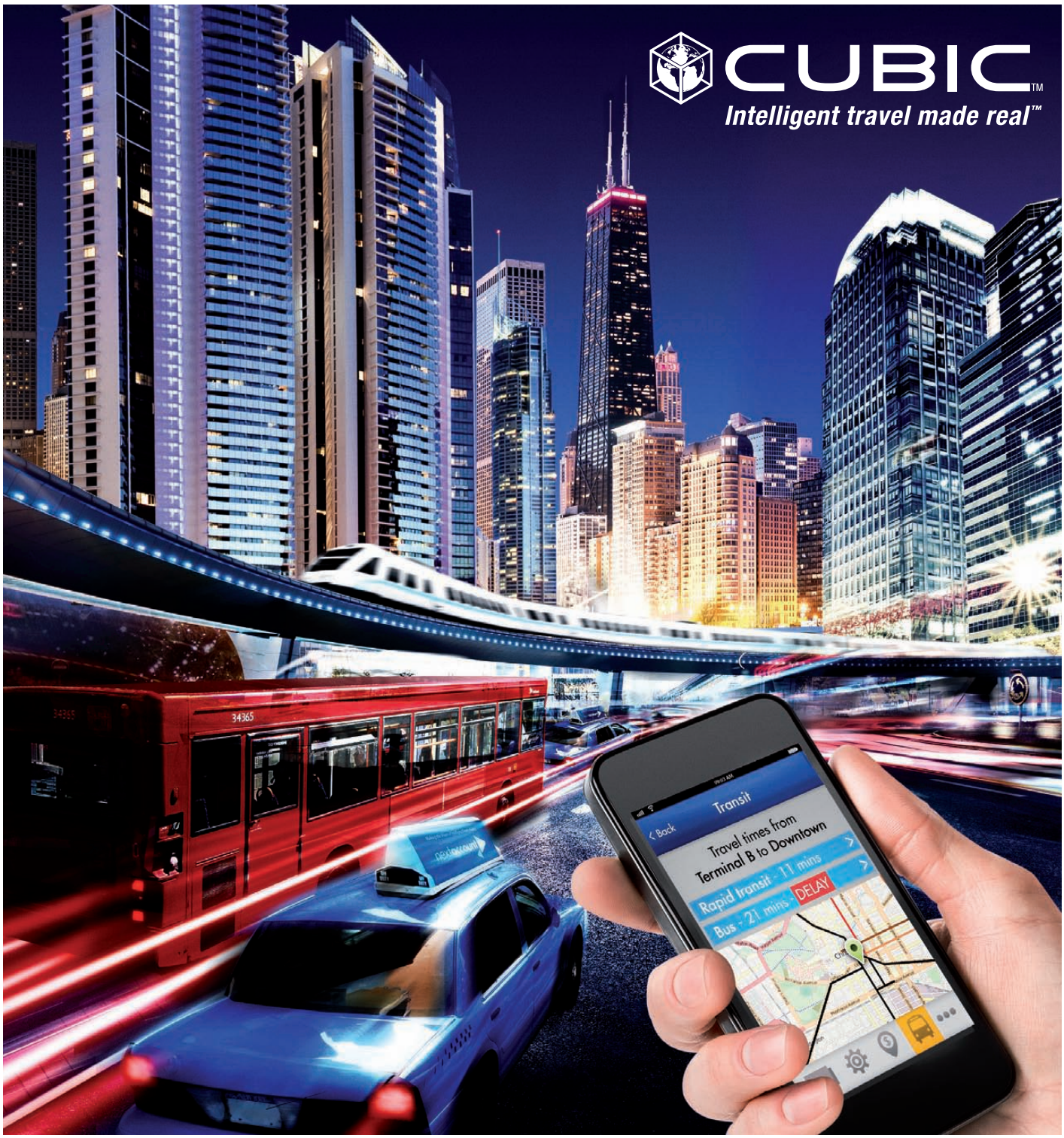

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