

THINKING CITIES

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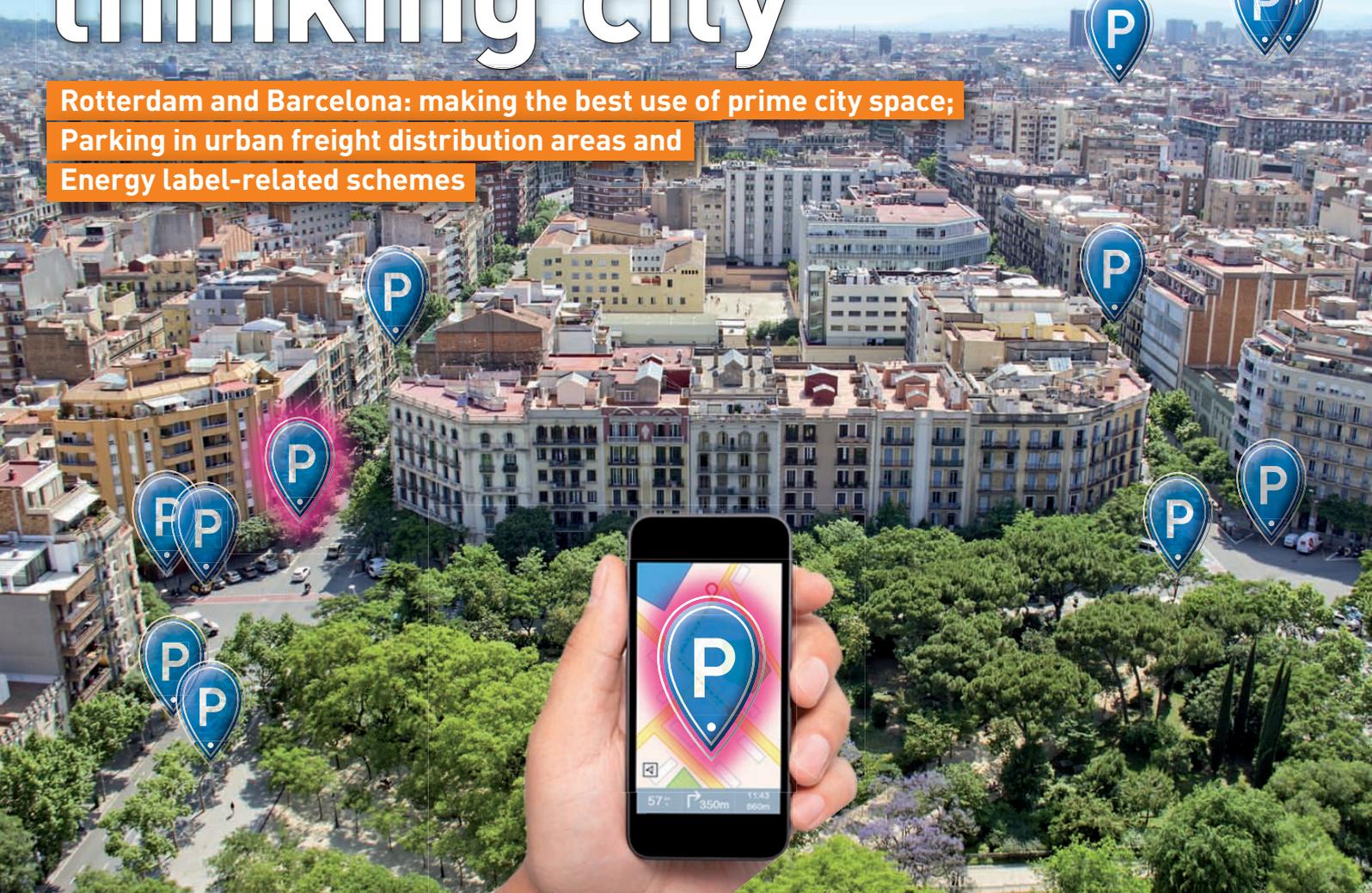
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The race for space

Karen Vancluysen and Kevin Borrás on the proliferation of intelligent parking technology at our disposal

Throughout the last few years, sustainable and innovative parking policies in cities have become a priority topic within Polis. This is also reflected in the recent creation of a dedicated Polis Parking Working Group, chaired by Nick Lester-Davis from London Councils. Implementing integrated parking strategies is challenging, both for local authorities and parking operators. The year-long strategic partnership between Polis and the European Parking Association aims to create a better understanding between different parking stakeholders and to bring local and regional authorities around the table with parking industry and operators to discuss the interaction between urban transport and parking.

Parking has a visible effect on urban mobility, traffic flows, accessibility and the environment. European cities have addressed this issue through parking space management, dedicated parking policies and regulations. In the past, the major focus was on managing parking problems by increasing parking supply that still did not meet the ever-increasing demand. Therefore, stakeholders turned their approach towards a better and more sustainable management of parking, taking account of its effect on mobility and environment and making parking into a smart tool for urban transport demand management

Intelligent parking systems have proven to be an important enabler in the efficient management of parking space and the parking sector has seen a growing uptake of technology. Cities choose technologies in view of accomplishing policy goals. The most efficient smart solutions are aimed at managing parking rights (permits and temporary parking), payment and enforcement, while management information and information for the parking client are still under-developed. Still, these intelligent systems also collect various kinds of digital data on the user and on parking locations. For instance, SMS parking databases deliver very rich information about travel patterns (day-week-seasonal effects) that could be used for targeted information and

“
Parking has a visible effect on urban mobility, traffic flows, accessibility and the environment
”



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mobility management actions. This also links in with the topic of opening up parking data. While some urban authorities fear that releasing real-time data on parking space occupancy will encourage people to use their car, those cities opening up parking data claim that truly multi-modal journey planning and information should cover all modes, including private cars, and that it is better to engage with the market now.

It is in any case assumed that, while having a lot of potential, such valuable parking data are currently under-used. In cooperation with the University of Hasselt, Polis is therefore currently conducting a study to understand which types of organizations collect parking data and to what extent they are being used. The focus is on three types of organizations, i.e. authorities/managers/regulators, service providers and industry, and operators. We'll keep you posted on the results of this ongoing survey.

We are also proud to have Polis members Barcelona and Rotterdam among the latest winners of the European Parking Association's European Parking Award. Read more about these two cities' smart parking approaches in this issue of *Thinking Cities* on pages 56-58.

This truly is a varied issue. The cities featured in this issue are listed on the cover but the names alone, impressively varied as they are, only tell a fraction of the stories. Our regular focus on cycling, a mainstay of our Environment and Health in Transport section, looks at how Aarhus has taken massive strides towards encouraging its citizens to leave the car at home and provide a viable option for doing so, and the European Cyclists' Federation's Ceri Woolsgrove implores that in what is becoming an increasingly digital age that those that favour two-wheeled, self-powered transport don't get left behind.

We are very pleased with this issue and we hope very much that you enjoy reading it. If you would like to contribute to the next one, out in time for the Polis Annual Conference in Rotterdam in December, then please get in touch with either of us. [📧](#)

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Cityview

- o **Leuven** – Mohamed Ridouani, deputy mayor, tells Abigail Martin about the city's smart thinking policies
- o **SLoCaT** – The Partnership for Sustainable, Low Carbon Transport has a global voice, as SLoCaT's general secretary Cornie Huizenga explains



A well thought-through and decisive land use policy has enabled Leuven and its economy to undergo a process of rapid development in recent years

That Leuven feeling

Polis Project Officer **Abigail Martin** spoke to Leuven's deputy mayor, **Mohamed Ridouani**



Photograph: Debby Termonia

With nearly 100,000 inhabitants, a major university and hospital, the presence of spin-off's and large companies such as multinational brewery AB Inbev, the proximity of Brussels and some major urban development, the city of Leuven has developed into a very dynamic, bustling city over the past few decades

A well-thought-through and decisive land use policy has enabled the city and the economy to undergo a process of rapid development in recent years. In addition to the science parks and an expansion of the hospital, the city also boasts a series of new growth areas located in what used to be industrial areas, and large-scale urban development projects that are conducive for enhancing the many attractive historical buildings and squares. The beautiful medieval city centre is a regional attraction point for shopping, cultural and business activities and the integration of many university buildings and student areas creates a unique atmosphere in Leuven.

The high growth in numbers of inhabitants, students and employment brings along an increase in traffic, which is one of the biggest challenges the city has to cope with. Mohamed Ridouani, alderman of Leuven, explains how Leuven is in pole position to face those challenges, along with the ambitious plan to make the city climate neutral by 2030.

Thinking Cities (TC): What exactly are the challenges Leuven has to deal with?

Mohamed Ridouani (MR): We are heading towards a lot of challenges in a time where cities will play an ever-increasing role in our society. More people than ever will live in urban areas. This means we have to provide and enable more public and private services. Housing, child care, education, ageing, migration, mobility and so on are domains that will have extra needs. Having said this, it is my belief

As our city isn't the largest in square meters, we chose to limit the space we give to cars and parking. In our new traffic circulation plan, we combine the livability for citizens with accessibility for visitors

we can combine the conservation of open space, a sustainable mobility and energy supply, a safe and social environment for every citizen with the ambition of a city that wants to grow and excel.

TC: How do you unite the need for housing, offices and services with the need for more open space?

MR: Within the city we're creating smaller, local hubs, so people have everything they need nearby, like supermarkets, grocery stores, schools and day care centres. Those principles of core consolidation will be the outlines for our spatial structure plan. In the last decades there were a lot of big city developments projects. We redeveloped the area around the railway station, making it a new hub for living, working and business. As it is near the railway station, we withheld any plans generating more car traffic and parking lots. Instead, we have the space for a large public park. The largest development area in our city is the former harbour. That used to be the kind of place where industry died out and nothing came in its place. Now it's a lively neighborhood, with thousands of people and room for green space, arts and creativity.

It is a difficult balance. We do need more bricks and concrete to meet the needs of our population. But we also may not suffocate the city, erasing all open green space. More urban development, housing, offices, economic growth means more traffic in our city. As our city isn't the largest in square meters, we chose to limit the space we give to cars and parking. In our new traffic circulation plan, we combine the livability for citizens with accessibility for visitors. Cars will have limited access to certain areas in the city, a larger car-free city center and will be guided to underground parking lots, escorted by a smart parking management system that will direct cars to the nearest available place. It is my dream in the long term: no more parking for cars in public space above the ground in the city centre. That way we reclaim streets and squares for pedestrians and cyclists and we will have more space for trees and plants, sitting areas and social encounters. Regarding city logistics there are different

market players who prepare a business case on a city distribution centre for Leuven.

TC: People are attached to their car, though. Won't they still prefer to ride to Leuven?

MR: Not only within the borders of our city we try to engage people to use different means of transportation. Over the past 20 years we've seen a five-fold increase of public transport users. At this moment Leuven is rethinking its public transport network with a focus on a high level regional public transport network which forms the basis for future urban developments in the whole region. This project, called RegioNet Leuven, has the ambition to make the whole region of Leuven easily accessible with high-end public transport and increase the use of public transportation even more. At the same time we invest in a high-end cycle network, with cycle highways and a fine-grained local network, bicycle parking facilities and bicycle parking management. At the moment there is a high share of cycle use with 17-20 per cent of the modal share. We don't want to make it impossible to come to Leuven by car, but we want to make the other options more preferable for everyone. The car is still an option, but we need to look at it differently. Not the ownership of the car should be the standard, but availability of a car. Car-sharing is perfect for our city. We already are the number one car-sharing city in Belgium, but the potential is even bigger.

Our ambitions regarding a sustainable urban transport system are framed within the project of Leuven Climate Neutral 2030 (LKN2030). The goal of LKN2030 is to realize a mobility shift to 30-30-30 for car, public transport and cycling. In the LKN2030 project we have a cooperation of more than 300 local partners such as the biggest companies in Leuven, the University and citizens. Public participation in the project is one of the keystones for its success. 🌱

FYI

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The Partnership on Sustainable, Low Carbon Transport (SLoCaT) is a multi-stakeholder partnership of over 90 organizations (representing UN organizations, Multilateral and Bilateral development organizations, NGOs and Foundations, Academia and the Business Sector). The SLoCaT Partnership was established in 2009 to provide a global voice on Sustainable Transport and here its general secretary, **Cornie Huizenga**, talks to *Thinking Cities* about the forthcoming HABITAT III conference in Quito, Ecuador



Natural habitat



Quito, capital city of Ecuador, is the location for October's HABITAT III conference

TC: How relevant is the HABITAT III process for clean urban transport action in cities?

CH: In 2015 the UN Member States agreed on both the 17 UN Sustainable Development Goals (SDG) for 2030 (11 of which are related to transport) and the Paris Agreement on Climate Change. The real challenge is now to deliver on those agreements. Although these global agreements are signed by the UN Member States – with cities responsible for 80 per cent of greenhouse gasses emission and over 50 per cent of the population (and up to 70 per cent by 2050) much of the delivery needs to take place in cities, where often national governments are not the primary actor.

Global urban transport is already under pressure, with congestion, air pollution and accidents already endemic in large cities throughout the world. Without massive effort and investment in clean urban transport to keep up with expected urban population growth, transport systems will become overwhelmed and the promise of cities in the 21st Century to become attractive and sustainable places to live will not materialise.

If we are to bridge the gap between the ambition in these UN agreements and the current reality in cities we need the New Urban Agenda (NUA), to be agreed at Habitat III, to be a practical, action orientated road map for delivering change – and explicitly include clean urban transport. The SLoCaT Partnership will be working with its partners and the Habitat III negotiators and other stakeholder to ensure the urban mobility is included in the NUA.

TC: What type of actions will HABITAT III generate in the field of urban transport? (financing, goal-setting, knowledge exchange?)

CH: The first step is to ensure that governments and cities to recognise the scale of the challenge and the massive expansion in urban transport systems and services necessary to cope with increasing demand and so set clear numerical urban targets for 2030. For example, as part of the UN SDG's is target 11.2 which is to "provide access to safe, affordable,

We need to ensure broad recognition that investments in urban mobility, while initially expensive, bring significant long-term economic, health and environmental benefits to cities

accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities, and older persons” by 2030. This should be a key metric for cities in the coming years. We need to bring together all actors to ensure the right definitions and methodology are in place to deliver on this target in a meaningful way.

Next we need to ensure broad recognition that investments in urban mobility, while initially expensive, bring significant long term economic, health and environmental benefits to cities. The NUA should commit the International Financial Institutions, governments and cities to redirect the necessary financial flows to urban transport and provide a stable and attractive framework to attract necessary private sector investment.

We also need the NUA to call for much better urban planning and mixed use developments to avoid transport demand.

To deliver on clean, efficient urban transport cities need the right supporting framework; technical capacity, legal framework and sustainable sources of finance, much of which is determined by national governments, so in Quito SLoCaT will be calling on national governments to ensure the right national policy frameworks are in place to enable cities to act.

For socially sustainable urbanisation we need to ensure urban “access for all” to essential services and opportunities – especially those in marginalised groups. This requires the meaningful participation of all stakeholders in developing urban mobility policies and plans. The NUA needs to call for the use of open, transparent and fully inclusive urban policy and planning processes.

TC: What will SLoCaT do in the run up to the Quito summit?

CH: The SLoCaT Partners have been participating in the Regional and Thematic meetings held in the run up to Habitat III to articulate the needs of sustainable urban mobility. We are analysing the many

formal submissions from governments and other stakeholders to see how urban mobility issues are addressed (the resulting analysis is available on our website: www.slocat.net/habitatiii-conference).

We have prepared a number of Key Messages on sustainable urban mobility¹ addressed to those preparing the Zero Draft of the Habitat III New Urban Agenda (May 2016)². We will also closely follow the informal negotiations that take place over the summer 2016 and work to ensure the national negotiators realise the importance of action on sustainable mobility. Throughout this period, we will also make sure to keep the transport community informed about the Habitat III processes and what is at stake.

Finally, in Quito SLoCaT and its partners will support a number of transport events to raise discussion and interest in the transport dimension – and to highlight the very many on-going transport initiatives with private and public partners that could be contributing to delivering sustainable urbanisation in the 21st Century.

The extensive SLoCaT resources and activities are freely available to the sustainable transport community – we hope you find them useful. If you do – why not join us? 

REFERENCE

- 1 http://www.slocat.net/sites/default/files/slocat_key_messages_-_final.pdf
- 2 <https://www.habitat3.org/bitcache/3d1efc3b20a4f563ce673671f83ea0f767b26c10?vid=578792&disposition=inline&op=view>

FYI

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HABITAT III, otherwise known as the United Nations Conference on Housing and Sustainable Urban Development, to be held in Quito, Ecuador, on 17-20 October 2016.

<http://citiscopescope.org/habitatIII/explainer/2015/06/what-habitat-iii#sthash.ynOdHKGT.dpuf>

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

Environment and Health in Transport

- o **Aarhus:** Thinking people, thinking city
- o **European Cyclists' Federation:** Technology to keep Europe's cyclists as smart as possible
- o **Datasets** The OPTICITIES approach to urban multimodal datasets
- o **Malta:** Leading the way for small islands



The Maltese Government has launched a number of measures to promote sustainable mobility, address air quality and traffic congestion



Alva and Thorvald
get fresh air
on their way to
school

Photos: City of Aarhus // Smart mobility

Thinking People in a Thinking City: Smart mobility in Aarhus

Getting people to use alternatives to the car does not only reduce congestion. By leaving the car and doing something else, people can achieve a better quality of life such as more time with the family, more exercise, a less stressful work life and also the opportunity to experience nature in a new way. **Liv Maria Stender** and **Gustav Friis** take up the story

The Smart Mobility project based in the City of Aarhus in Denmark has been running for two out of three years and is working towards changing travel behaviour amongst citizens to reduce congestion in the city. For the Smart Mobility project, however, the key messages do not entirely concern mobility, traffic and transport – how to make a day work well is, on the other hand, crucial for the way people live their lives, and therefore what the project is focusing its communication around.

Benefits in people's everyday lives is the first thing the Smart Mobility project is thinking of while working with the citizens of Aarhus. Instead of promoting mobility options via

campaigns, the project is in direct contact with test people that volunteer for various mobility solutions. Smart mobility inspires them and provides the necessary framework that makes it possible for the participants to make real behavioural changes and hence doing the real promotional work for less car-intensive lifestyles. This article and its accompanying images will give examples on this way of working with mobility management.

WHY SMART MOBILITY?

The City of Aarhus is, like many other European cities, growing. In 2030, around 50,000 people will have been added to the current population of

325,000 – a growth of more than 10 per cent. Some 30,000 more work places will move to the city and if nothing is done about the mobility patterns the City will need to find room for 20,000 more cars. This is a challenge, since the road network on certain stretches at certain times of the day already suffers from congestion. According to the 2016 annual TomTom Traffic index launched in March 2016, Aarhus has a congestion level of 21 per cent – the same level as Copenhagen. Therefore, we need to find new solutions to deal with this. The Smart Mobility project works with the mind-sets of the citizens in order to find innovative solutions to an already well-known challenge.



USER DRIVEN INNOVATION

The citizens of Aarhus are in the centre of Smart Mobility's user-driven innovation. The goal is to fulfil their needs and dreams of a good life while at the same time providing solutions that generate a direct benefit for the people who are changing their travel behaviour. A good example of this will be that the test person in one project replaces their car with something faster and thereby gets more time to spend with the family.

The projects forming this article all represent a specific way of thinking in the Smart Mobility project. The project wants to investigate what is happening with people's mindsets and routines when they actually change their travel behaviour. The user-driven projects in Smart Mobility answers many interesting questions in relation to behavioural change. These questions are:

- What is motivating the person to change their travel behaviour?
- What is the expected benefit?
- Does the person get the benefit from changing their travel behaviour?
- What disadvantages do people encounter after changing their travel behaviour?
- Is the benefit worth the disadvantages of the changed travel behaviour?
- What barriers does the individual need to overcome in the changing process?

With these questions at hand, the following paragraphs will give a short overview of a few of the Smart Mbility projects.

365 DAYS ON THE BIKE

In April 2015, Smart Mobility started the project "365 days on the bike". Thirty car commuters from a suburb of Aarhus replaced their car with an electric bike. For one year, they committed themselves to cycle as much as possible in return for bi-monthly

A man in a dark jacket and black shirt stands in a bike library, looking off to the side. He is surrounded by several bicycles of various colors (black, red, white). The setting appears to be an outdoor or semi-outdoor storage area for bicycles.

Christian gets speed and exercise for free at the bike library

Lene and Per recharge themselves on their bikes to work



health measurements, free bike service and maintenance, and the possibility to participate in competitions based on their tracked trips.

The participants all stressed that experiencing nature in a new way, courtesy of the bike, is one of the key motivators that keeps them going. Benefits in the form of fresh air, new smells (that might even compete with the new car smell), the changing of season and peace of mind are mentioned in relation to their daily bike rides. Secondly, the participants are motivated by competition in relation to the number of kilometres they travel and active days on the bike; they can measure themselves up against each other on www.365.smartmobilitet.dk. The feeling of getting time to exercise is also an important motivating factor.

Barriers to maintaining the new habits are bad lighting on dark cycle paths, poorly maintained roads and the lack of winter salting. The project gave the participants the opportunity to give this feedback to the maintenance department at the City administration, which afterwards solved the problems.

SUPER COMMUTERS

For three months in autumn 2015, 15 car commuters replaced the car with a folding bike and free public



transport. This project aimed at testing how a combination of sustainable modes of transport could fit into the daily life of the commuters. Many of the participants were parents, looking for a flexible alternative to the time-consuming car trip. However, this solution did not pay back enough value in terms of the expected benefits: health and economy. The participants were blogging every week during the project in order for the Smart mobility project to collect knowledge about drivers and how the drivers changed during the project. Many participants were part of families with small children and since their new habits were more time-consuming and did not give them more time with the family or exercise on the bike it was not a habit they wished to maintain. Time is for this particular target group of the essence. If the new habit takes too much time it is not a habit that will be a part of their everyday routines.

EARLY BIRDS

In December 2015, six dedicated people from the suburb south of Aarhus participated in the Early Birds project. The participants agreed to drive to work earlier than normal in order to avoid the morning peak hour for three weeks. During that time, they



blogged about their experiences. The participants all pointed out that they gained valuable time with the family in the afternoon and that they felt less stressed and became more productive at work in the early hours before colleagues started to show up and office hours started. The greatest concerns were related to the fact that it can be hard to leave work early even though you arrived early. It seems that driving early is a frictionless intervention that mostly was perceived as a positive and rewarding habit for the participants. Smart Mobility is now in the process of upscaling the Early

Birds project in collaboration with businesses in Aarhus.

VALUABLE RESULTS: UPSCALING AND ANCHORING OF THE PROJECTS

In 2016, the Smart Mobility project will work specifically on two aspects. One is to create a road map for upscaling of the projects based on effect evaluation – does this measure work and will more of it reduce congestion? But we will also include the knowledge based on what the participating citizens have reported. How can people be motivated to change their travel behaviour and what benefits are important to them when they choose their mobility? And finally is there something that needs to be fixed before we can even think of upscaling the projects?

The second focus is anchoring of the projects in other organisations. Many results are lost when a project ends, so during the lifetime of a project, it is important to hand it over and facilitate the anchoring of it in an organisation that will carry on. Already the pedibus project has been anchored in another department in the city and in spring 2017 a workshop concerning six of the Smart Mobility projects will kick-off this process. ☺



2030



Thomas gets a cheaper ride by combining the train and a folding bike

Aarhus Smart Mobility project

- With a population of 325,000, Aarhus is Denmark's second-largest city and the fastest-growing in the country. <http://www.aarhus.dk/da/omkommunen/English.aspx>
- The Smart Mobility project started in April 2014. Smart mobility finds new solutions to the congestion challenge as the city grows. Follow the Smart mobility project on www.facebook.com/smartmobilitet
- The Smart Mobility project aligns with some of the key objectives and ways of working in the Smart Aarhus principles (<http://www.smartaarhus.eu/>):
 - Solve or address societal challenges
 - Challenging the traditional roles of citizens, the public sector, and private enterprises
 - Being open and involving stakeholders
 - Being experimental by using pilot projects
- The City of Aarhus has been a member of Polis since February 2016. Learn more: <http://www.polisnetwork.eu/members/93/26/Aarhus/>

FYI

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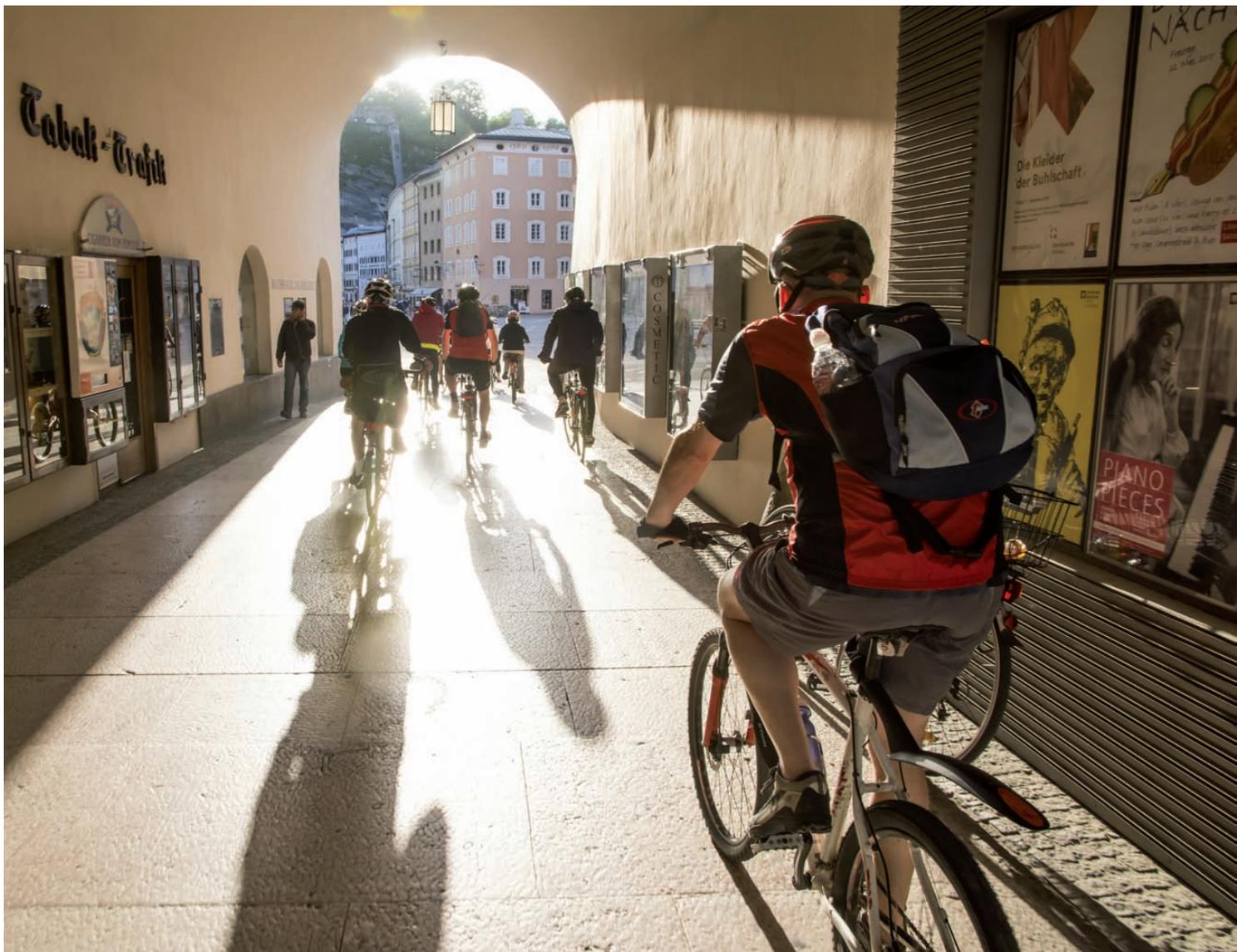
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A revolving revolution

Ceri Woolgsrove on why it's imperative that, in this veritable goldrush of smart transport technology, the cyclist isn't left behind



Sometimes our technological expertise can run away with us and it can be a challenge of building our Smart Cities of the future with the human element in mind. Let's ask the question – what is it that cities want?

When the European Cyclists' Federation started dipping its toes into the at-first seemingly deep and swirling waters of new transport technologies, we were interested in seeing what is happening with smart cities, connected vehicles, electric mobility and what this means for the humble bicycle.

We have actually ended up happily swimming and splashing in the waters that weren't as cold or deep as we had feared. We see plenty of scope for bicycles to be included within the present technology trends, in fact we would say that cycling should be at the forefront of many of the new transport technologies as a way to really realise the desire of city public authorities to move cars away from cities and promote active modes.

Public authorities are beginning to think about transport and mobility as becoming more than just a way of getting from A to B, local authorities and indeed national governments are seeing the potential in active modes of transport to help deal with other important policy issues. CO₂ emissions are still a major black mark made against the transport sector, and urban transport being one of the main culprits. Trying to solve this by sticking with carbon fuelled cars but tinkering with their emissions like shifting to diesel has led to our current worries with air pollution. Obesity, diabetes and other health problems can be traced back to our sedentary lifestyle with 50 per cent of car journeys being

under 5km (30 per cent under 3km!). We are forgetting to move.

We want our cities to be bustling, but with people, business, shops, entertainment, we want our cities to be liveable, healthy, and interesting places to explore, to be able to walk around a city without being interrupted by streams of traffic, but we also need to move around them.

Active modes of transport like cycling and walking in combination with a good public transport system, using modes of moving where we do actually move, cut across many of these policy problems. They are environmentally beneficial, challenge our sedentary lifestyles and create pleasant environments that still allow us to move efficiently from one place to another.

WHAT DO WE WANT...AND WHEN DO WE WANT IT?

Sometimes our technological expertise can run away with us and it can be a challenge of building our Smart Cities of the future with the human element in mind. Let's ask the question – what is it that cities want? And what is it that their citizens want? The promotion of active modes and public transport means that infrastructural technologies must be at the fore of smart city development, how can we use the incredible technologies that we now have available to manage the traffic sensibly, to shift motorised traffic away from city centres and make cycling, walking and public transport more comfortable. This will mean concentrating on infrastructure

developments and not focussing only on car-centric technologies.

So we need supply side congestion busting rather than demand side, incentivising motorised traffic out of the cities rather than making their route through the city more comfortable, technologies to do both exist but we should invest and promote wisely to stay true to our aims.

But we know all this, so let's focus on the bike itself!

What has the current crop of white heat technologies to do with a machine that has not fundamentally changed for 150 years? Well quite a lot actually. Let's look at the new form of public transport that only has two wheels. Public Bike Sharing (PBS) systems have really taken off around the world but particularly in Europe. Every city that sees itself as a modern, forward thinking city either has or covets a PBS whether as a way of getting tourists around the sights, getting locals to work and the shops or putting out the signal that this here city likes cycling! Their growth has been staggering, there were only about 10-20 basic systems a decade or so ago, now we have around 850 worldwide, with Europe holding the majority.

The systems have evolved from basic, stand-alone, easy-locking systems to now the majority being 'third Generation' systems with automated credit card payments, integration into universal public transport cards, and mobile apps showing available bikes and docking station availability. But some are moving on to fourth

and fifth generation. Here we are talking about bikes being free from any docking infrastructure, ticketing and docking info all being held on the bike or in centralised data centres. If you want to grow a city's tourist dollar how's about bikes with a tablet device bringing instant internet access, on-bike GPS tracking and an electric power source, providing tourist guided tours of the city supplying the user with full dashboard capabilities; step forward Copenhagen's Bycyklen electric bike share system.

We need to have a vision of how to use these systems, complex and basic, as a great strategy to fill the missing piece of the public transport last mile puzzle. We should see PBS as the final piece in the puzzle to bring to a closed loop all areas of sustainable public transport to make the decision to leave the car at home for cross town journeys an even easier decision. This also goes for technologies like multi-mode ticketing and journey planners.

Currently we are seeing the European Commission and

standardisation bodies coordinating the standardisation and harmonisation of the different technologies and data messaging which are connecting user, vehicle, service, payment and travel information. It is important that we include all different modes of transport including those that are less easy to connect. Public Bike Share has to be included in this discussion, is there a gap in the technology that stops PBS from being included in public transport planners and ticketing? Are we missing a trick with full incorporation of last mile PBS use to complete the public transport network, especially with the development of electric assisted bikes? How can we collect this data to understand cycling in urban areas to promote and create better conditions for cyclists and help take the load of other public transport modes?

POWER SHIFT

Which brings us to electric mobility. At a German mobility conference last year German Chancellor Angela Merkel talked about her

Government's aim of getting a million electric vehicles onto German roads, until someone from the bike industry piped up at the back of the hall reminding her that they already had them in the shape of a million pedelecs; all this with zero funding and zero state backing!

Pedelecs are electrically assisted bicycles where you pedal but you also get an electric boost. They enjoy all the benefits for bicycles on the road but with a constant breeze at your back. These vehicles increase the range and distance of the bicycle with (almost) zero CO₂, zero air pollution, contribution to lower congestion and still providing the rider with a healthy dose of daily exercise. They bring the bicycle to traditionally difficult areas like hilly areas, longer commutes, for those with less mobility, and yes, to those that can't be bothered with cycling because it's too much like hard work (I'm sure they exist) but who still want all the other aspects of cycling like the environmental benefits and the low cost.

With all these benefits as well as



Copenhagen's Bycyklen electric bike share system



Public authorities are falling over themselves to promote and throw money at electric cars that, though a step forward from polluting petrol/diesel vehicles, will not solve problems of congestion, health, or create liveable buzzing cities

currently existing models of growth like Germany and the Netherlands, it raises the question as to why there has been such little focus on these vehicles from public authorities, bringing us back to the original anonymous questioner at the German electric vehicles conference. Why so much fuss over electric cars? Public authorities are falling over themselves to promote and throw money at electric cars that, though a step forward from polluting petrol/diesel vehicles, will not solve problems of congestion, health, or create liveable

buzzing cities. With a fraction of the cost we have the opportunity to utilise these small electric muscle driven vehicles to help keep elderly people on bikes, to move smaller freight and express delivery packages and shopping, to overcome hilly terrain, and bring suburban areas within reach of city centres; all on an active non-polluting form of transport.

Finally, a quick word on connected and autonomous vehicles. These technologies are staggering but we should be careful of over-hyping them. We will not have autonomous

vehicles any time soon, and we will certainly not have urban-ready autonomous vehicles any time soon. We need to be careful about weighing up the costs and benefits of promotions and funding and look at where we want to target funding opportunities for urban areas.

Forgive the scepticism of driverless car claims; the industry maintains that autonomous vehicles are just around the corner and the transport system is going to undertake revolutionary change. Well perhaps we can introduce as standard Intelligent Speed Assistance and blind spot sensing and braking on trucks as standard first? Even though these technologies are essential to autonomous vehicles they tend to elicit more cautious responses; the tech isn't ready, too many false positives, too expensive, the driver doesn't want to protect those outside the vehicle. Let's make vehicle-ready those technologies that are needed for autonomous vehicles, those that are ready now, and that could slash cycling and pedestrian casualties; that really would be a transport revolution. 🚲

Pedelec tour with artificial heart patients, Essen, German: the health benefits are not to be underestimated



FYI

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Solving the puzzle

Peter Staelens describes the OPTICITIES approach to an Urban Multimodal Dataset



Madrid city centre: collection and harmonization of information is a complex task in cities with dozens of different public transport operators

The OPTICITIES project aims to help European cities tackle complex mobility challenges. OPTICITIES' ultimate goal is to optimize urban mobility from a user perspective, serving urban mobility public policies and triggering autonomous information services business models.

From the point of view of the technical challenges posed, the major aspects to be covered are:

- Consolidation of multiple sources of urban mobility data from all modes (network topology; theoretical, real and predictive schedules).
- European interoperability of urban mobility data and mobility solutions. Based on an open ITS system, the standards developed in OPTICITIES will provide cost

effective and seamless multimodal services.

- Provision of real-time information for all modes, available anytime, anywhere. The application integrates all available mobility solutions and addresses their effectiveness regarding time, cost and CO₂ emissions.

OPTICITIES also aims at reducing the dependence on data silos, in which each entity that operates in the city holds the data. This is an obstacle in relation to the development of a common application/service platform, and there is a need to address issues such as data quality and collection methodologies to ensure that applications can make use of this data in an equally meaningful way regardless

of the city and the application domain.

Particular activities performed in the context of this task are:

- Select a reduced number of cities as a reference on which the interoperability framework will be experimented and validated.
- Identification of systems and services for city information platforms and the corresponding supporting standards for their data management requirements.
- Development of a smart city interoperability framework which includes the identification of data sources available and necessary to be exchanged, the related interfaces and the relevant services and systems.
- Involvement in standardization activities, addressing those issues

This layout also helps in identifying supporting standards, connections between data elements of similar scope and maybe more importantly, will make it easier to define complete service profiles including all types of relevant data

that prevent the development of a consistent homogeneous data management platform.

A LAYERED APPROACH

Taking into account the variety of data available at the cities, and the urban mobility services considered, from traffic information to freight management, results in a complex data categorisation, an outline of which can be seen in Figure 1. The layered structure has been defined to convey the idea of data that could be used as reference at the lower layers and increasingly time-dependent and dynamic data in upper layers. This layout also helps in identifying

supporting standards, connections between data elements of similar scope and maybe more importantly, will make it easier to define complete service profiles including all types of relevant data.

As undertaking a complete implementation of any service considering all the proposed data categories does not make much sense, the idea in OPTICITIES is to address the specification of partial implementations of data management systems, which would focus in certain applications or groups of applications with certain shared characteristics. These partial implementations are supported by a number of standard profiles,

annexes to the full standards which specify a set of options and parameter values to fulfil a set of particular requirements.

Thus the applications considered in OPTICITIES for the development of the multimodal dataset are:

- Decision Support Tools, aiming at the integration of traffic prediction data, real-time traffic data and public transport data into the Traffic Management Center.
- Multimodal Urban Traveller Information Systems, which respond to user trip requests via personalized interfaces, display of results in a clearly structured, intelligible format and provide

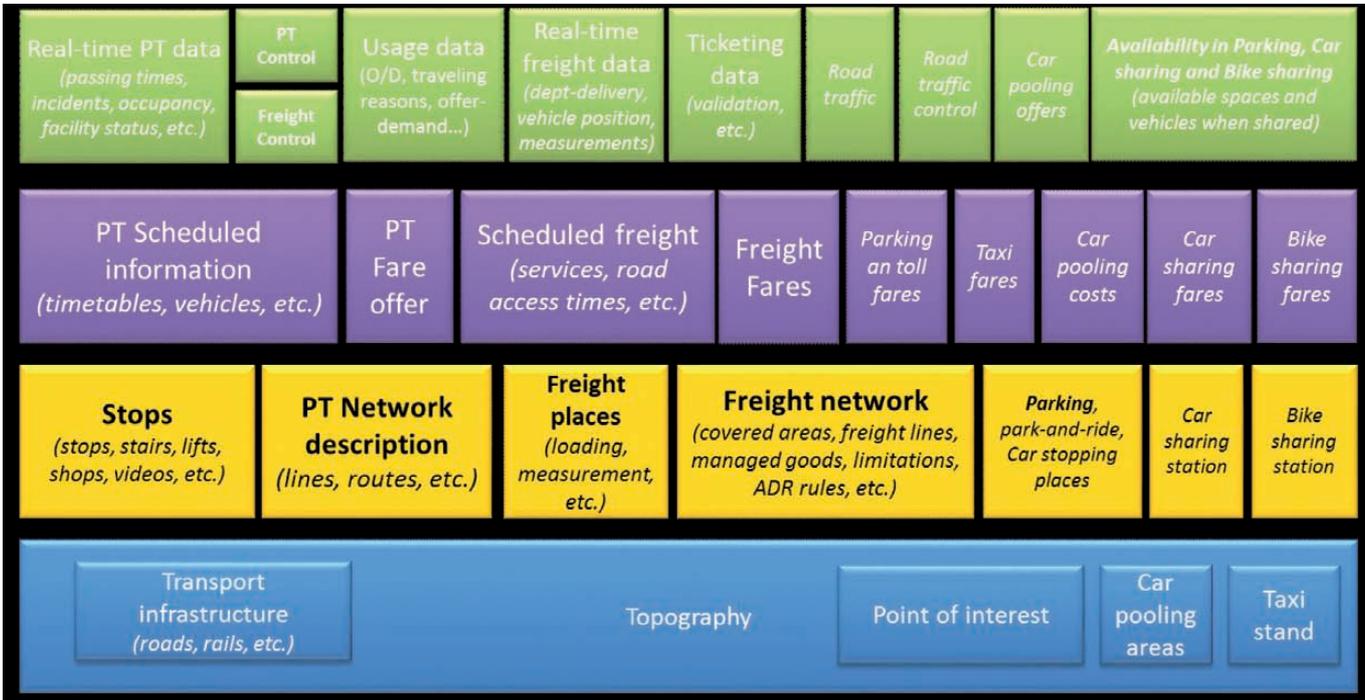


Figure 1: General overview of mobility related data categories

In cities like Torino and Madrid, with dozens of different public transport operators, collection and harmonization of information is a complex task

re-routing advices and real-time car pooling support.

- Freight Transportation Systems, providing freight vehicles management and driver assistance.

While this is easily understood, only the issue of integration of public transport data poses an interesting challenge. In cities like Torino and Madrid, with dozens of different public transport operators, collection and harmonization of information is a complex task. OPTICITIES WP2 has identified the different systems and has established a knowledge of data currently available/considered at each city, with a detailed view of the technical starting point in implementation terms for each city and use case. See figure 2.

However, it is important to realize that the implementation of use case data management elements is a complex task that depends on different aspects of varied nature, amongst others:

- Technical
 - Is it necessary to change the current implementation? To what extent? Which could be the technical migration difficulties? Is it necessary to add new elements to the existing systems/services?
- Standardization issues.

Category	Class	Description	Description II	LC	City	Related standard	City	Related standard	
Topography					STA				
Transport infrastructure		Animated road segment definition	GL.CRITER	STA	GLY	ESRI CSV			
		Speed limits	Normal values, special values	SPEED_CAT	STA	GLY	ESRI-Shapefile		
		CCTV / CamJams	Location and types of cameras		STA	GLY		TITAN Proprietary	
		Bike sharing	Bike tracks	GL.VELOPIST	STA	GLY	ESRI	ESRI NavTeg	
POI	POI	POI	POI Categorisation, opening time, description...		STA	GLY	CSV Proprietary	TITAN Proprietary	
	POI	POI	SITRA.POI	RT	GLY	JSON Proprietary		TITAN Proprietary	
Car availability / Parking, Park&Ride, Car stopping places	Car parking	Car parks		RT	GLY	XML WFS			
	Car parking	Car park pos	PAR.STAPOS	STA	GLY	XML WFS		TITAN	
	Car parking	Street park place	PAR.PARKDISP	RT	GLY	XML Proprietary		XML Neptune	
	Car parking	Car park place	GL.PARKDISP	RT	GLY	XML Proprietary		XML Neptune	
	Car parking	Park occupation historic	GL.PARKHIST	HIS	GLY	CSV		XML Neptune	
Bike sharing station	Bike sharing	Bike station pos	VELY.VELOPOS	STA	GLY	XML WFS		SIRI	
PT Real-time data		Regional train RT arrivals/departures	TER.TERHOR	RT	GLY	XML Proprietary			
		RT PI Urban	EDY.TCHOR	RT	GLY	CSV			
	Timing links	Current RT travel times over link			RT	GLY	XML Proprietary		
	Timing links	Historic RT values aggregated by day type / timeband			HIS	GLY			
	Timing links	Predicted RT data			PRE	GLY			
		Station equipment	TCLEQUIP	RT	GLY	XML Proprietary			
Usage data									
PT control data			Journey patterns		HIS	GLY	TITAN Proprietary		
					PRE	GLY	SIRI		
Road/PT Events – Public Events		Road works					Events active in a given future time	PRE	GLY
		Public Events	GL.TRAEVT				Description of time, location and expected consequence	RT	GLY
		Public Events						PLA	GLY
		Public Events	Current public events					RT	GLY

Figure 2. Partial view of urban mobility data available at the OPTICITIES test-sites

- Organizational
 - Are there changes in staff necessary to undertake the needed technical changes (if any)?
 - Is specific additional formation necessary to manage the new deployment elements and operating them?
- Policy-related
 - What are the current policies in urban mobility services in the city?
 - How do potential policy-related issues may be handled and what could be the impact on the actual implementations?

GUIDING STAR

OPTICITIES WP2 focuses on data management solutions corresponding directly to the requirements of

a given use case/deployment scenarios. It also considers different implementation scenarios, and is working currently on the preparation of a detailed guidebook to support deployment of urban mobility data management systems/services respecting the city’s policies and currently implemented elements, while also taking into account the trends in the EU standardization efforts, and in any case, looking beyond the OPTICITIES timeline. 🔄

FYI

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The evolution of intelligent traffic management

Aimsun Online simulates each vehicle inside a lane-based road network faster than real time to evaluate traffic management strategies and predict travel times.

Now operational in San Diego (Interstate 15) and suburban Lyon; soon to be deployed region-wide in two major EU countries.



www.aimsunonline.com



The VMC Pole

KEEPING OUR ROAD WORKERS SAFE

The VMC Pole™ can be rotated from over the carriageway and then lowered to ground level to gain access to the mounted equipment for repairs and regular maintenance.

The VMC Pole™ delivers huge safety benefits by eliminating the requirement for lane closures, this reduces the exposure of operatives to a live carriageway, decreasing the risk of serious injury or fatality. It also provides significant cost savings over fixed posts, removing the need for lane possession and additional safety and access equipment when maintenance is required.



ZERO EXPOSURE TO A LIVE CARRIAGEWAY ELIMINATING TRAFFIC MANAGEMENT

COMFORTABLE **GROUND LEVEL ACCESS** REMOVES THE NEED TO WORK AT HEIGHT

REDUCES THE COSTS OF MAINTAINING THE MOUNTED EQUIPMENT

BESPOKE SIZES AVAILABLE TO SUIT MULTIPLE APPLICATIONS

FAILSAFE OPERATING PROCEDURE

SINGLE MAN, HAND OPERATED ROTATION AND LOWERING MECHANISMS

MULTIPLE APPLICATIONS MATRIX SIGNS, TRAFFIC SIGNALS, CCTV, TOLLING, ANPR



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The air we share



Peter Paul Barbara discusses how Malta is leading the way in improving, among other things, air quality for small islands

Representatives from a number of small islands met in Malta at the tail end of 2015 to discuss ways of promoting their islands to act as a test bed for new technologies. This was the second iteration of the Greening the Islands conference, where high on the agenda were topics relating to mobility, energy and water. One of the main objectives of the Greening the Islands initiative is to

promote small islands to be used as the aforementioned test-beds for new technologies, a concept which the Maltese Government fully supports.

Back to back with this conference Transport Malta organised its second national conference on Electromobility in which results were published on how just much is going on in Malta since the launch of the Malta National Electromobility

Platform. This has the main role of implementing a number of demonstration projects on new technologies such as electric vehicles and related infrastructure, promoting the use of Electromobility as well as promoting market uptake of the new electric mobility technologies.

The theme for this year's event was "the Air We Share" with the main topic discussed being the contribution that



All photographs © Peter Paul Barbara

Greenhouse Gas Emissions, improve energy efficiency and make more use of renewable energy sources.

- 2 A full feasibility study on the latest technology providing on-shore electricity supply for berthing ships, which technology, if applied, would reduce drastically air and noise pollution in maritime harbours to the great benefit of residents living adjacent, and close to, our port areas.
- 3 The official results of the PORT-PVEV project funded under the Italia-Malta EU funding mechanism and of which Transport Malta was project leader.

The 30 November 2013, the day that the MNEP was launched, was a very important milestone in the Government of Malta's efforts to promote sustainable mobility and the latest green transport technologies on the local market.

Since then a number of developments have taken place. Although not at the pace that we were wishing for, still the results are encouraging considering from where we have started and especially when considering that we are operating within budgetary constraints. Despite this we still found the support from Central Government, the Ministry for Transport and Infrastructure, Transport Malta and those local car-importers who decided to be on the forefront in this long and challenging journey.

THE DEPARTURE

Prior to 2013 there was no developed electric car charging infrastructure in place on the national road network. The number of registered battery electric vehicles on the road totally just 43 cars, which pertained to the older type of electric vehicles.

As at November 2013, there were two local car importers who were importing electric vehicles, one of

Electromobility gives to localised air quality levels in urban centres.

During the conference three important documents were launched for public consumption. These are:

- 1 A Study on the carbon footprint of the Airport region whereby, "for the first time, we have a clear indication of the carbon emissions produced through ground operations taking place at the airport

and transport access to and from the airport; and their impact on our air quality". The study also puts forward a number of recommendations for consideration of the various operators active in the airport region. Transport Malta, as one of the main stakeholders operating within the region, will do its utmost to see these measures implemented in an effort to reduce

By the end of 2016 Malta would have almost the entire range of BEV models currently on the European market

which was importing two-seater models of the older type and the other was importing the new generation of Battery Electric Vehicles.

To date on the local market, customers have a total of nine different models of BEVs to choose from. Not only this, but we also have the first Plug-in Hybrid Electric SUV that was launched in mid-2015, as well as the newly launched Range Extender Electric Vehicle imported directly from the manufacturer which is, one should say, the pinnacle of electric hybrid technology on the international market.

In 2016 we are expecting to have at least three additional new BEV models on our market. This will mean that by the end of 2016, we would have almost the entire of BEV model range currently on the European market.

GRANTS

In January 2014 the first grants for the second generation of Electric Vehicles were made available by Government. These grants were as follows:

- €5,000 for a BEV with scrappage scheme
- €4,000 for a BEV without a scrapage scheme
- €1,500 for an Electric Quadricycle

The grants were also open for electric hybrid plug-ins as well as range extender electric vehicles with a minimum threshold of battery autonomy.

By the end of 2014, the number of registered BEVs was at 87 units meaning a 102 per cent increase over 12 months. As of October 2015, the number of registered BEVs rose to

179 vehicles, an increase of 105 per cent (table 1).

Although these figures might be considered to be on the low side, it might be appropriate to take a look at the take up of electric vehicles abroad.

Taking the UK as an example; in 2013 the total population stood at 64 million people. In 2011 the UK government introduced a £5,000 grant. The total number of BEV and Hybrid Electric vehicles stands at 36,000 units, or 2.5 per cent of all vehicles sold in the UK.

From the above it is evident that plug-ins still hold a tiny fraction of the car market. Even when including

sales for hybrids, the number of “alternatively fuelled” vehicles was just 2.5 per cent of the registered vehicles.

TWO YEARS OF INTENSIVE ACTIVITY

During the past 24 months, Transport Malta and Ministry for Transport and Infrastructure has successfully closed two important EU funded projects which were drafted and designed by my unit. These two projects were fundamental to kick-start the electrification process of land transport in Malta.

These two projects, DEMO-EV and PORT-PVEV, were running almost in parallel and were complimentary to each other.

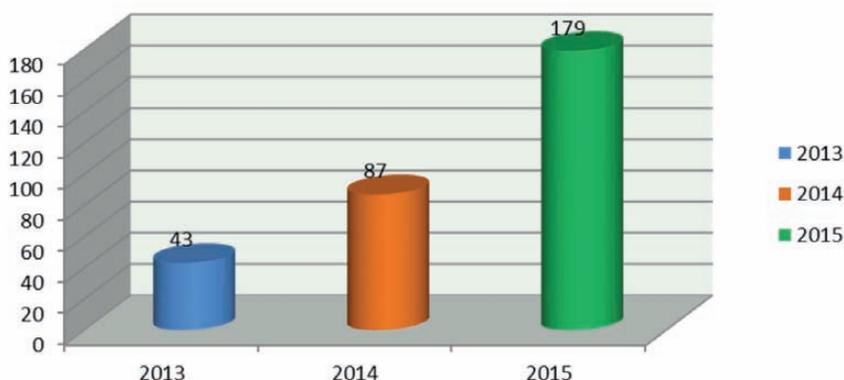
The DEMO-EV project was crucial because through it, the first 24 Battery Electric Car fleet owned by Government was put into service, while the foundations of our national electric car charging infrastructure was put in place.

In addition, through this project

		FEVs	increase
end	2013	43	
end	2014	87	102.33%
Oct	2015	179	105.75%

Table 1 shows the percentage increase in BEV take-up compared to end 2013

Registered FEVs 2013-2015





Malta now has its first fast charger, capable of charging electric vehicles in less than 20 minutes

solar carports were, and are, crucial to demonstrate whether transport can in fact become carbon neutral. To date they carports are used 1.5 times per day per charging point, meaning 3000 charging events per year in total and savings of 95 tonnes of CO₂ per annum.

FIRST EVER ELECTRIC CAR TO DRIVE FROM MALTA TO CATANIA IN SICILY ON JUST ONE CHARGE:

Another important milestone of this project was that we managed to venture overseas with one of our pure electric vehicles. A Transport Malta BMW i3 managed to drive from our head office in Marsa up to the BMW service centre in Catania in Sicily on one single charge with 15km to spare.

This experiment was important to defeat the oft-quoted negative press associated with “range anxiety” and prove that, with careful journey planning, EVs can not only be used as normal conventional vehicles, but also that the energy generated through electric propulsion goes back into its drive system; thus extending the battery range.

CLEAN PORTS

Another important deliverable of this project was the realisation of a study to gauge the feasibility of on-shore supply for berthing vessels in our maritime ports in a bid to power ships berthing in our ports using electricity, thus minimising air pollution as well as noise pollution.

CHARGING INFRASTRUCTURE

To date through the DEMO-EV project there is a total of 50 charging pillars providing a total of 90 charging points available to the public. In 2015 six additional public dual-point charging pillars were installed in the three solar car-ports built, thus upping the total of charging points to 102.

This means that we have one fifth of the 500 public charging points

a considerable number of individuals and companies could try out for themselves what Electromobility was all about. DEMO-EV also launched an extensive educational and promotional campaign that helped push the concept into the public’s mind.

PLUG-IN PORT

The PORT-PVEV project on the other hand, went a step further and through it Transport Malta together with its

project partners demonstrated how maritime ports could become more energy efficient.

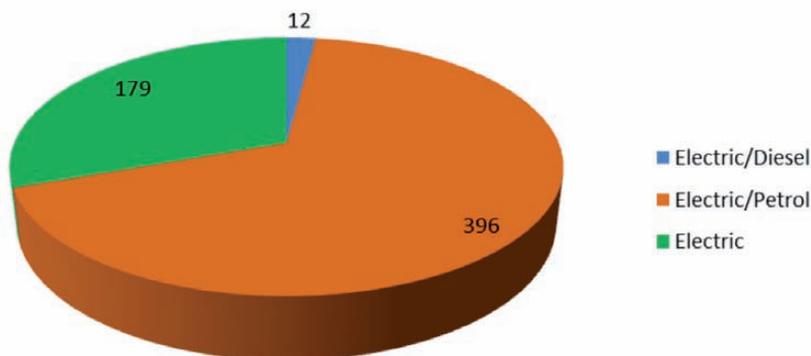
Through this project, Transport Malta changed two-thirds of its vehicle fleet to electric vehicles thus bringing to Malta additional Battery Electric Vehicles, and also, different models not yet deployed. This was coupled by the installation of a solar power plant on the roof of the Malta Transport Centre and an array of different types of car charging points, including Malta’s first ever fast charger, capable of charging the latest electric vehicles from 20-100 per cent in under 20 minutes.

However, the most important deliverable of this project was the installation of three solar carports which was implemented by the Ministry for Transport and Infrastructure. These

Electric/Diesel	12
Electric/Petrol	396
Electric	179

Table 2 shows the total number of Battery Electric Vehicles as well as total hybrid electric vehicles registered, totaling 587 vehicles

Electric / Hybrid Vehicles as at 2015



requested by the respective EU Directive in place, a target that will be met by 2020.

During the last two years, electric vehicles were also being commercially used. One project is running in the Cottonera area where electric quadricycles are being used for sight-seeing purposes, while more recently, the first electric chauffeur-driven service, greenR, was also launched.

2016 – THE SUSTAINABLE MOBILITY PACKAGE

For 2016, the Government has launched a number of measures to promote sustainable mobility, address air quality and traffic congestion. Building on the success of the Electric Vehicle grants over the past two years, the Maltese Government decided, not only to re-introduce these grants but also improve on them.

As from 1 December 2015 of this year the grant for the purchase of a BEV on the scrappage scheme will go up from €5,000 to €7,000. This amount is applicable only for new M1 and N1 battery electric vehicles. This scheme is open for both private individuals, companies and businesses as well as non-government organisations.

In addition, additional grants are also allocated as follows:

- €3,000 upon registering a new (plug in Hybrid Electric vehicles) with CO₂ emissions of 1-50g/km
- €2,000 upon registering a new hybrid vehicle with CO₂ emissions between 50-65 g/km.

In addition, electric motorcycles shall be exempt from the payment of registration tax. Also, companies wishing to invest in electric vehicle charging points will be given a grant to part-finance the installation of a charging point.

In addition grants are also available for Electric Car Importers who would like to upgrade their garage

to service electric vehicles and train their staff for this new technology.

We also know that other local car importers are finding it difficult to convince the remaining electric car manufacturers to start exporting their vehicles to Malta. This is for two reasons, namely:

- 1 Certain electric car manufacturers cannot keep up with the demand
- 2 Others prefer to export their vehicles to larger markets such as the United States where volumes are high.

Secondly, electric car manufactures need to be convinced that new potential electric car markets need to be ready to entertain the technology.

For this end we have been putting in place the necessary conditions to overcome any barriers for the introduction of the remaining electric car models on our market.

THE INTRODUCTION OF THE CONCEPT TO SHARE TRANSPORT INFRASTRUCTURE

As from next year we will be introducing for the first time the concept of infrastructure sharing and the idea that personal mobility may not necessitate owning a vehicle or a bicycle. The introduction of car-sharing services in Malta as from next year will definitely include the deployment of additional electric vehicles on our roads as well as additional public electric car charging infrastructure. This is a very important project because through it we will be promoting another mode of transport which can compete with personal car ownership. Secondly, we will also be working to address car driving behaviour in Malta which we believe will also contribute to lessen traffic congestion on the one hand and the improvement of air quality levels on the other. This project is just one on the to-do list of projects indicated in our Electromobility Action Plan.

Similarly, plans are well underway

to implement a project to include e-bike sharing in Malta. This will include 43 electric bicycle stations, strategically placed in specific locations in Malta and Gozo, through which we will be promoting cycling as an alternative mode of transport. This project will be part and parcel of the National Cycling Strategy which will be published by Transport Malta in the second quarter of 2016.

As far as new technology is concerned, we will also be working on an EU funded project to introduce in Malta the latest electric buses which are taking major European Cities by storm. The project will also include new electric car charging technology.

Over the next few years we will be working to put in place two hydrogen stations and run a pilot project using the latest fuel cell technologies. Towards this end, we already started discussions with petrol station owners through on-going bilateral meetings.

By 2020, we envisage that technology on our roads will contribute towards the creation of a new urban ecosystem made up of various technologies which will be communicating with each other – Vehicle to Vehicle, Vehicle to Infrastructure and vice versa.

Malta's roads will indeed become Intelligent for the benefit of everyone, especially to the environment which in turn will make the air we share cleaner. 🌱

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

- o **EIB** – Smart urban infrastructure investment focus
- o **ITS** – How to build the ultimate smart city
- o **Gelderland** – How a Dutch province became a mobility pioneer
- o **Smart City Standards** – Optimising urban mobility
- o **Poland** – Gdansk, Gdynia and Sopot are blazing a trail



ITS has proved to make a substantial difference in facilitating seamless, comfortable and cost-effective mobility in cities such as Warsaw, Szczecin, Poznan, Gdansk, Bydgoszcz and Wrocław

Smart finance for smart infrastructures

Mario Aymerich on how the European Investment Bank supports ITS projects through intelligent financial instruments

The European Investment Bank (EIB) can finance Intelligent Transport Systems with its conventional forms of financing, but ITS may also be eligible for funding as part of the Bank's special facilities under the Investment Plan for Europe.

According to a widespread accepted definition, intelligent transport systems are advanced applications which, without embodying intelligence as such, aim to provide innovative services relating to different



Human intelligence is a mental quality that consists of the abilities to learn from experience, adapt to new situations, understand and handle abstract concepts

modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated, and 'smarter' use of transport networks.

Although ITS may refer to all modes of transport, EU Directive 2010/40/EU defines ITS as systems in which information and communication technologies are applied in the field of road transport, including infrastructure, vehicles and users, and in traffic management and mobility management, as well as for interfaces with other modes of transport.

Therefore, the basic components of any ITS system are: smart infrastructures and their operators, smart vehicles and smart consumers (either drivers or passengers). But, what does 'smart' actually mean in this context?

ITS IN HIGH DEFINITION

According to the Royal Academy of Engineering (UK, 2012): "Smart infrastructure provides the evidence of informed decision-making...and responds intelligently to changes in its environment, including user demands and other infrastructure, to achieve an improved performance". This can be applied to both infrastructure and vehicle systems. Moreover, vehicle-road Information exchange is the key to improve management and operation of the transportation network. The key element is the integration of informed decision-making and intelligent response, namely those based on the capacity of processing data extremely fast, provided enough background situations are modeled and efficient algorithms programmed.

Looking at the third component, an intelligent person has the ability to think, understand, and learn things quickly and well. This is because human intelligence is a

mental quality that consists of the abilities to learn from experience, adapt to new situations, understand and handle abstract concepts, and use knowledge to manipulate one's environment. On top of that, humans can use feelings, intuition, common sense, creativity and beliefs to generate critical thinking and communicate effectively.

In summary, although several crucial differences between human and artificial intelligence exist, it is possible to find common grounds that can be translated into the infrastructures' operational field. An intelligent system/person must be capable of: (i) processing various data and external interferences; (ii) understanding the situation and making accurate forecasts; (iii) generating efficient responses on the basis of a certain managerial strategy; and (iv) monitoring the effects of the outcomes in order to provide valuable feedback. In other words, efficient adaptation to actual demand, highest quality of service and vehicle/user's intelligent behavior are the best means for efficiently managing infrastructures (provided that most advanced technologies are used).

INTELLIGENT FINANCE

Against this background the EIB can and, indeed, wishes to provide financial support for the implementation of ITS on roads and highways in the more than 150 countries in which it operates. The EIB is the European Union's financial arm (signatures during 2015 reached some €70 billion) to



finance sound projects (either promoted by public or private investors) implementing the EU policy goals.

The due diligence the EIB carries out for financing projects follows the same principles as the intelligent decision-making process described before. It consists of four elements: (i) borrowing money at international capital markets; (ii) appraising the project (from many different standpoints); (iii) preparing the financial structure of the loan (or another best suited financial instrument); and (iv) evaluating the outcomes of the project and providing feedback. It can be represented in the following picture, which condenses the functional principle of “intelligent finance”.

The project appraisal process (the most interesting for the purposes of this article) is based on three pillars: (i) quality of the project and contribution to sustainable growth and employment; (ii) contribution to EU policy; and (iii) EIB contribution to the financial viability (added value). Aspects to be verified/assessed under pillar one are related to the soundness of scope of works and technical feasibility, costs and their potential contingencies, implementation plan and managerial capability

of the promoter, demand forecasts, production issues and employment generated, operation and maintenance costs, revenue stream and tariffs structure (if any), assets life, economic and financial feasibility.

With no exception, the project must be fully compliant with the principles established by the European Directives in relation to environmental impact regulations (including social aspects) and procurement procedures. Pillar two deals with the eligibility of the project under the policy principles and priorities identified by the European Union and deriving from the EIB Statute. Finally, pillar three reveals to what extent the intervention of the EIB allows the project to be financed/implemented.

EIB FUNDING ITS

Obviously, any ITS forming part of a project consisting of the construction of a new transport infrastructure is, a priori, eligible for EIB finance. On top of that, in general and by principle, the EIB finance neither standard operations nor routine maintenance. However, it can finance investments aimed at the improvement of road conditions, notably in terms of road safety and actions combatting the

effects of Climate Change. In this sense, in 2011, the EIB approved a Road Safety Action Plan that explicitly mentions: “Projects on the TEN-T shall be subject to a road safety audit or inspection in line with the Road Infrastructure Safety Management Directive (plus the Tunnel Safety Directive where applicable). Outside the TEN-T, safety audits or inspections shall also be performed in line with Directives”. This implies the need for: (i) mainstreaming road safety in EIB road infrastructure operations; (ii) scaling up existing EIB activities (namely lending and technical advising) in road safety improvement projects; and (iii) improving monitoring of road safety impacts of the EIB projects.

The EIB offers a wide range of products falling into three categories: lending, blending and advising. Lending is by far the principal activity of the EIB, accounting for around 90 per cent of its total financial commitment. The EIB lends to clients of all sizes to support sustainable growth and jobs. This support is often central to attracting other investors. The lending products cover loans (either direct or intermediated), venture capital, microfinance, equity and fund investments. Blending means the EIB can complement funds from other institutions (namely EU grants) by a lot of different financial instruments, like guarantees, project bonds, SME funding, EFSI and many other. Providing advisory services for the preparation and/or the successful implementation of projects has proven in recent years a very powerful tool to accelerate and optimize the entire process, in particular outside the EU.

NEW (ADDITIONAL) CHALLENGES

After the economic crisis that tremendously restrained the investment capacity of public administrations and restrained the private sector from mobilising investment worldwide,

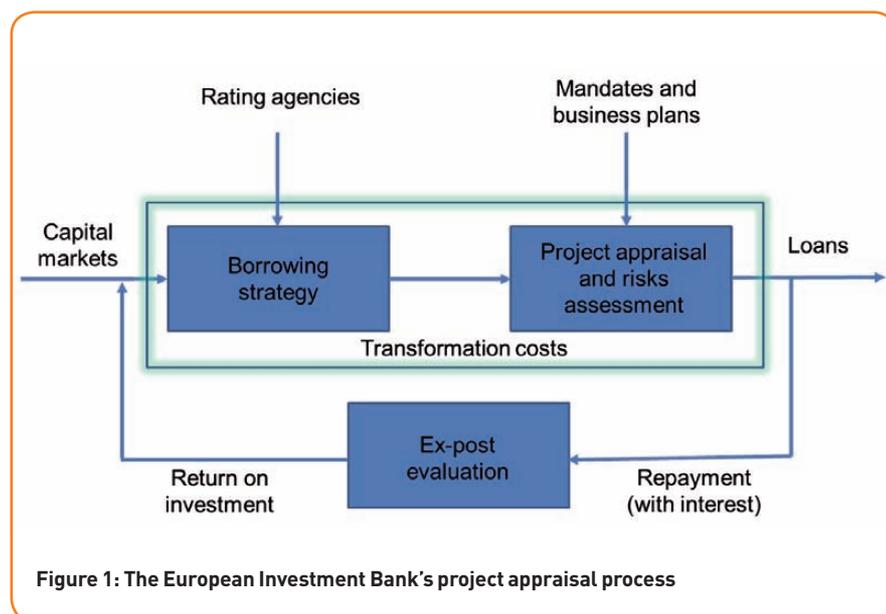


Figure 1: The European Investment Bank's project appraisal process

The project must be fully compliant with the principles established by the European Directives in relation to environmental impact regulations (including social aspects) and procurement procedures

it became necessary to give a new impetus to the financial markets. When Jean-Claude Juncker was appointed President of the European Commission, he launched a new initiative, called “the Juncker Plan”. It consists of four elements with four major goals, as follows:

- Addressing market gaps: creating the European Fund for Strategic Investments (EFSI). This is actually the key driver for funding new projects by assuming higher risk and strongly attracting private capital.
- Increasing the share of Financial Instruments (up to 10 per cent) under Cohesion Funds (€386 billion in total for the period 2014-2020)
- Creating an Advisory Hub, helping promoters in the preparation of bankable projects, from both financial and technical standpoints
- Setting up a Projects Platform (website disclosing information about EFSI supported projects).

EFSI was launched jointly by the EIB Group and the European Commission to help overcome the current investment gap in the EU by mobilising private financing for strategic investments. EFSI aims to revive investment in strategic projects around Europe to ensure that money reaches the real economy and should trigger additional investment of at least €315 billion over a three year period.

EFSI is a €16 billion guarantee from the EU budget, complemented by a EUR 5 billion allocation of the EIB’s own capital. EFSI has been integrated into the EIB and projects supported



by EFSI are subject to the normal EIB project cycle and governance. In addition, EFSI has its own dedicated governance structure which has been set in place to ensure that investments made under EFSI remain focused on the specific objective of addressing the market failure in risk-taking which hinders investment in Europe. In doing so, EFSI will also increase the volume of higher risk projects supported by the EIB Group.

With EFSI support, the EIB will provide funding for economically viable projects where it adds value, including projects with a higher risk profile than ordinary EIB activities. It will focus on sectors of key importance where the EIB Group has proven expertise and the capacity to deliver a positive impact on the European economy in the following priority areas: (i) strategic infrastructure including digital, transport and energy; (ii) education, research, development and innovation; (iii) expansion of renewable energy and resource efficiency; and

(iv) support for smaller businesses and midcap companies.

EFSI is demand-driven and will provide support for projects everywhere in the EU, including cross-border projects. There are no geographic or sector quotas. Projects will be considered based on their individual merits.

In conclusion, both conventional funding and EFSI instruments offer a wide range of possibilities to finance sound ITS projects. Promoters (either public or private) interested in obtaining intelligent finance for ITS projects are kindly invited to contact the EIB. 

FYI

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For more information, please refer to the EIB website

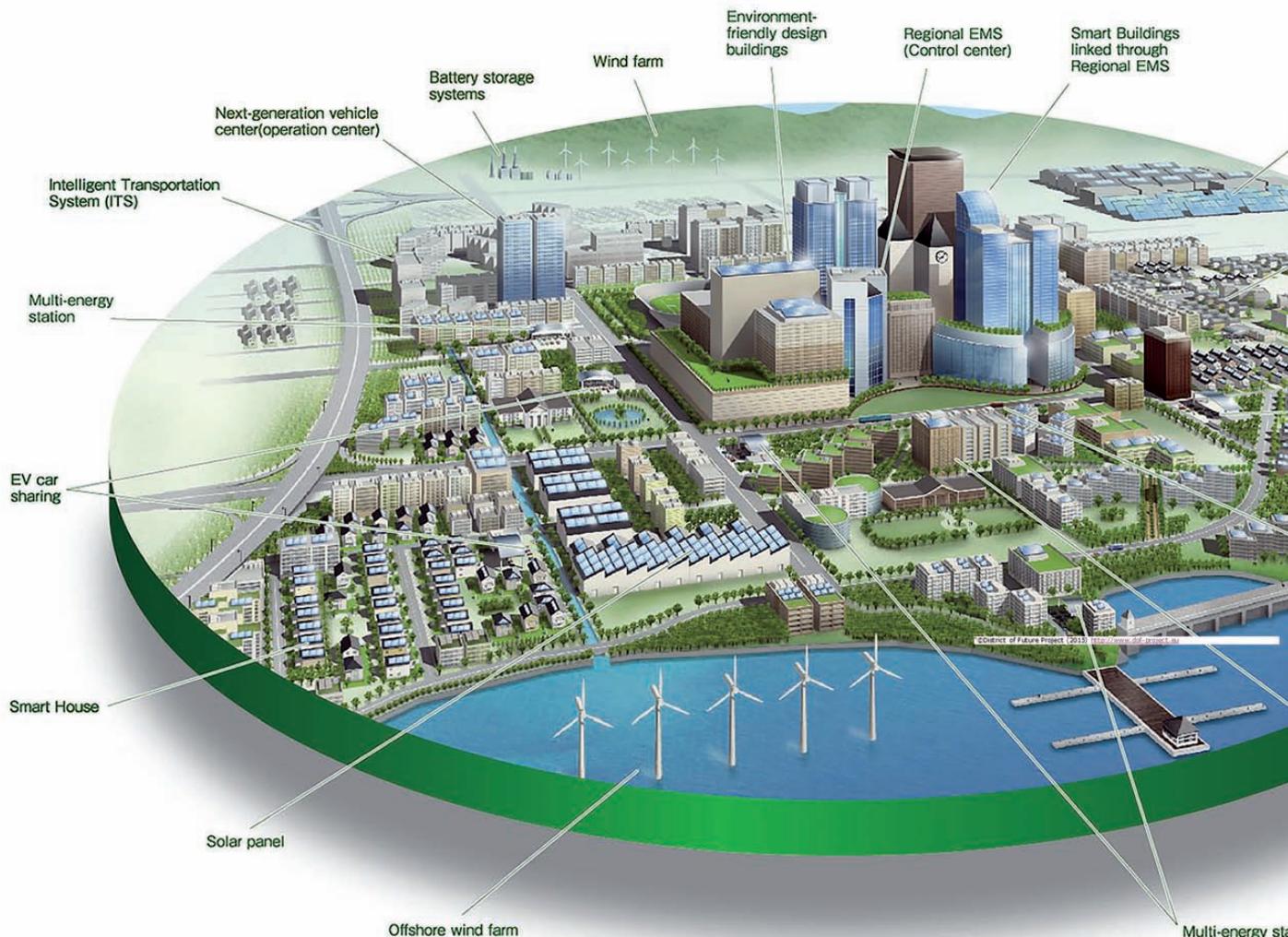
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Building smarter cities with ITS

Rapid population shifts from rural and suburban areas, especially in developing countries, represent an emerging set of challenges for public transport professionals within these new urban metropolises, says **Tim Hall**. So how do we go about facing those challenges head-on?

By the year 2030 world urban population will increase to nearly 5 billion people. The majority of this urban growth will occur in developing countries. Between now and 2030, the world will need to build the equivalent of a city of one million people every five days.¹

For city planners and transit



Talented and creative people are drawn together, resulting in people of differing cultural, educational, and economic backgrounds living in near proximity

officials, the challenge isn't just how to survive the flood of people moving to urban areas, but rather how to manage this urbanisation so that it is sustainable, and provides a quality living environment.

URBANISATION: SHAPING THE REALITIES OF PUBLIC TRANSPORT PROFESSIONALS

Rapid urbanisation is shaping political, cultural and financial realities on every continent, with positive and

negative effects for both developing and developed nations.

On the positive side, cities in developing countries can provide the possibility of a higher standard of living, with better employment, education, housing, and health care opportunities. Transport costs are reduced, skilled labor pools are available, capital is aggregated, and infrastructure may be compact and efficient.²

Talented and creative people are drawn together, resulting in people of differing cultural, educational, and economic backgrounds living in near proximity, encouraging a powerful energizing diffusion of ideas and cultures.

But there are also potential negatives to this mass urbanisation.

If not planned for, this growth could result in overcrowded slums, poor sanitation, disease outbreaks, unemployment, water and air pollution, clogged roads, and the social ills of crime and substance abuse.

Transportation networks choked with cars will stifle access to jobs and education, while businesses will suffer from inefficiencies in transporting raw materials and finished goods.³

Given that often the built environment is in place and cannot be modified for increased traffic, ITS solutions offer another way to make better use of the existing roadways.

In a survey conducted by the Urban Land Institute, it was found that the following were considered to be the key attributes of a livable city:

- Access to public transportation

- Proximity to friends and family
- Accessible shopping and entertainment
- Walkability
- Proximity to work and schools

In short, people want the best parts of village life within the matrix of opportunities offered by a large city.

THE BENEFITS OF ITS

By implementing ITS systems, cities can lower road congestion, air pollution and greenhouse gas emissions.

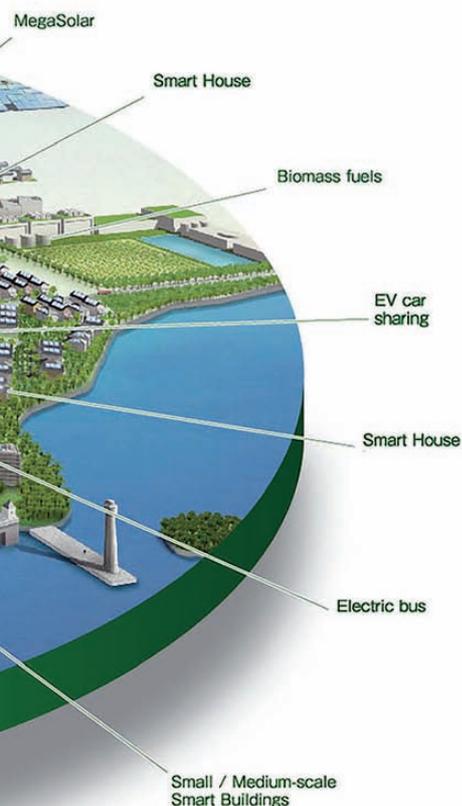
Technology solutions are vital to make a public transport system work, and as transit professionals we must use these Smart City ITS tools to leverage resources.

In addition to schedule and status information, digital tools can make it easy to plan trips, adjust travel plans and pay fares across all modes of public transport. Scheduling and status applications can give travellers choices in real time on their mobile phones, helping them make travel decisions that utilise public transport rather than personal cars.

We may become connected advisors by using social networking sites to providing information to users, interacting with them in a comfortable online environment.

Providing coaches with Wi-Fi, and offering charging facilities for mobile devices, can make journeys more enjoyable and productive.

Public transport providers can work with traffic authorities to utilise real-time traffic data, collected from roadway sensors, to optimise traffic



Transit signal priority allows public transport vehicles to stay on schedule by extending or allowing an early green signal phase, without disrupting overall traffic coordination

flow along public transport corridors, by adjusting intersection signal timings.

TIMING IS EVERYTHING

To ensure that multiple modes of transportation can provide a seamless path for a traveler from origin to destination, schedules can be synchronised to minimise travel times and frustration.

A lack of schedule or headway reliability is a big problem for synchronisation. A schedule may state that a bus will arrive every 10 minutes, or at a specific scheduled time, but if the bus is delayed and arrives later, the result may be a missed connection for passengers.⁴ Riders are often less inclined to use public transport if there is uncertainty in arrival times, inclement weather, tight schedules, or concerns about safety while waiting at a stop.

To keep buses on schedule and to prevent improper headway, the use



Traffic control rooms play a vital role in managing smart city traffic flow

of active transit signal priority on buses and light rail systems/trams can help to ensure they run predictably and with lowered costs. Transit signal priority allows public transport vehicles to stay on schedule by

extending or allowing an early green signal phase, without disrupting overall traffic coordination.

Finally, frequent headways and increased travel speed of public transport vehicles can both be used to improve transit operation reliability. But for the public transport provider, increased frequency means additional costs, as there are more buses on a route, while only bus speed improvements such as are provided by a TSP system actually save operations money.⁵ ©

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FYI

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ROAD

BRIDGE

METRO

RAIL

Journeys of discovery

“Scan the future because work on mobility is never done!” **Darius James** on how the Dutch Province of Gelderland is bringing tomorrow ever closer

The Province of Gelderland is responsible for fast, safe and healthy means of travel. That in turn contributes to a pleasant living environment, good access to jobs, facilities, and a favourable climate for both national and international businesses. The Province is responsible for the infrastructure and its management, and for the awarding of concessions for public transport.

In total, the network comprises some 1,200 km of road, 1,400 kilometres of cycle paths and parallel carriageways. The total budget for mobility in 2016 is more than €400 million. Gelderland, with 2 million inhabitants, is located in the eastern part of the Netherlands, along the important corridor to North-Rhine Westphalia (Germany)

WHY HAS THE PROVINCE OF GELDERLAND LAUNCHED A STUDY?

In the words of Conny Bieze, member of the Provincial Executive for Gelderland, “We aim to stay in front and keep innovating. With that in mind, the Province of Gelderland is examining trends and developments, in order to respond to the needs of the future, also in the interests of investments. We deliberately made the first move to start this study programme because we aim to base policy on more than just consultation reports. The study is to be undertaken



Conny Bieze, member of the Provincial Executive for Gelderland

not only by the province but together with a series of partners.”

Conny continues: “By studying the future together, you gain a clearer picture of what you need to do today and tomorrow. That knowledge forms a solid foundation and for example provides an answer to questions about what we need to invest in and how we can improve mobility. After all, mobility is not only an issue that affects us but also other levels of government, citizens and industry.”

A STUDIED APPROACH

“We recently interviewed 35 partners,” she says. “These included providers of mobility services, academics and experts for example in the field of sustainability. We asked them to identify for us the trends and developments they see in the field of mobility. To start the discussion we used a drawing as an interview guide. We asked: what do you see on this drawing and how do you see the future of mobility?”

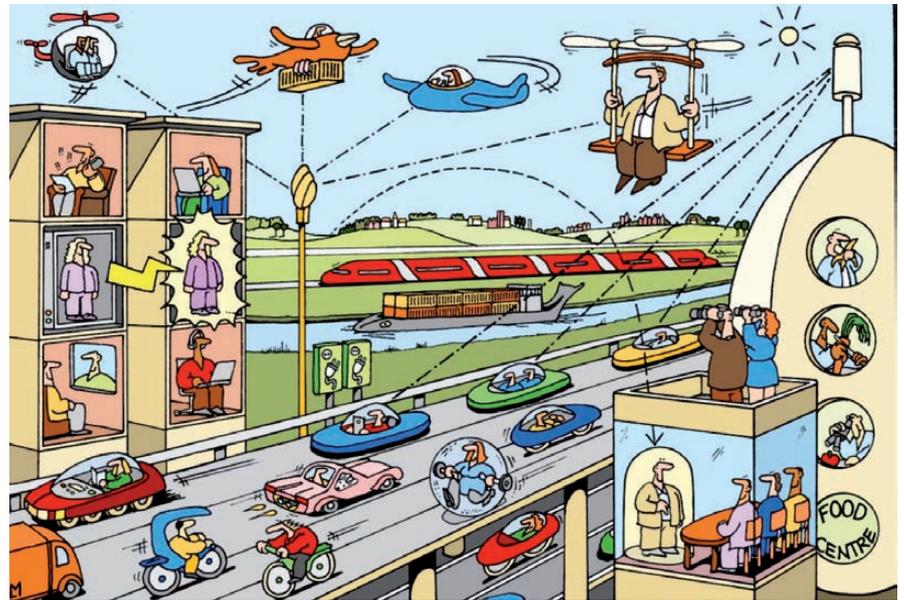
By studying the future together, you gain a clearer picture of what you need to do today and tomorrow. That knowledge forms a solid foundation and for example provides an answer to questions about what we need to invest in and how we can improve mobility

The trend scan generated a broad picture of what we can expect to happen between now and 2030-2050. The study is based on the method derived from the International Certified Future Strategist programme (see <http://www.certifiedfuturestrategist.com/>). As part of that programme, a working session with the interviewed experts, administrators and politicians is a vital element. In its most ideal form, the study is a joint journey of discovery.”

TRENDS AND IMPACTS

Regarding the outcome of the working session, Gelderland took the trends and translated them into developments in the Province. “For each trend we then discussed the consequences, threats and opportunities with 70 aldermen, members of the provincial council and experts,” she says. “The impact will vary depending on the trend in question, and some trends are more certain to actually come about than others. Some trends will have a multiplying effect on others, and all must be viewed in a broader context. Developments in the environment, for example in the labour market or the housing market can have a major influence on the demand for mobility.”

What does the province intend to do with these trends? Bieze explains. “We are elaborating these trends in the form of scenarios, so that we are well prepared for the future. We will consider each trend from five different angles, ask ourselves a series of questions, and wherever possible



Result of trend scan Province of Gelderland; in brief the trends listed in random order:

1. Continued urbanisation
2. More diversity in vehicles
3. Blurring of boundaries between public and private transport
4. Emergence of other fuels, CNG/LNG/Electric
5. Major upturn in cycle traffic
6. More mobility services
7. Growing importance of last mile
8. More air traffic between metropolitan centres
9. Growing influence of information society (data)
10. Growth in mass transit
11. Rapid technological developments (physical)
12. Growing importance of health and the environment

Gelderland interviewed 35 partners and asked them what this picture represented - was it the future of mobility?



The WEpod autonomous vehicle

already combine the answers with the work in progress. Work on mobility is never fully done.”

Approaches:

1. In the future, how will we organise our travel? Will the smartphone have outpaced transport in terms of importance by 2040? When they complete their studies, young people no longer automatically purchase a car. Does our personal diary determine what means of transport we will be using, each day? We are now involved with Intelligent Transport Systems (ITS) and are working to develop public transport with a solid regular network and a flexible transport network, in order to respond to this development.

Together with Minister Schultz van Haegen, the first test run was recently made in the WEpod, an autonomous vehicle with no steering wheel and no traditional driver. The WEpod will be carrying out test runs between Ede-Wageningen railway station and Wageningen University, and will help develop a wealth of knowledge about the way in which autonomous vehicles behave in our traffic systems, and what we need to do as public authorities to make this development possible. In this respect Gelderland is a frontrunner.

2. Congested roads: Will we still be facing traffic jams in the future? Will we in the future all be

travelling by car or will we leave our car at home? In inner cities increasing amounts of space are being set aside for water, public transport, pedestrians and bicycles. Will we in the future leave our car at home and instead travel to work by rapid cycle routes? With these ideas in mind, we have given high priority to urban accessibility in the programme aimed at making better use of existing mobility systems and good public transport. We are frontrunners in terms of cycling, in this region. Take for example the completion and laying out of seven rapid cycle roads, and of course the start of the Giro d'Italia in Gelderland in May 2016 and the Velo-city event in 2017.

Gelderland organised a 30-hour "Mobihack" in Nijmegen



3. Goods transport: Gelderland is located between the Randstad and Rhine Ruhr conurbations. What form will goods transport take in the future? Who knows; in 30 years time we may only see autonomous electric trucks on the roads. Perhaps we will no longer need trucks to transport products, because we will be manufacturing our own products at home with 3D printers. These are all questions we are currently considering. We are hard at work on the corridor between the Randstad and Rhine Ruhr conurbations (expanding container transport by water, the connection with the Betuwe route by establishing a new rail terminal), improving the train links from Düsseldorf to Arnhem, and cross-border cooperation on the Rhine Alpine corridor project, involving 15 European regions and ports.

4. New providers: We may see new providers emerge in the future. Who will they be? Will we be faced with more operators that just offer services or will public transport in fact only still exist in large towns and cities, leaving it up to us to organise our other transport needs? Is

transport in rural areas a special service tailor-made to meet individual needs and wishes? Our new public transport vision is already responding to these questions.

5. Safe and sustainable: Big data and the Internet of Things can contribute in many ways to safe and sustainable transport systems, and both are very important trends. A fully personalised system can make transport faster and more efficient. Will we be using such a system? A hackathon is just one example of what you can do with big data to solve traffic and transport problems. We recently organised Mobihack, a hackathon in Nijmegen.

Computer experts spent 30 hours tackling data, in order to identify new, innovative solutions for improving access. The winner produced an app which calculates the contribution your school, university, company or hospital makes to total traffic volume. By improving harmonisation between users, we can prevent congestion. In terms of sustainability, we also plan to continue focusing on cleaner transport and in practice we are already involved in a series of pilots with Liquid Natural Gas and green gas.

"In short, concludes Conny Bieze, our study is already helping bring the future closer to hand, because work on mobility is never done." 

FYI

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<http://www.gelderland.nl/4/Home/The-province-of-Gelderland.html>

<http://mobiliteit.gelderland.nl/default.aspx>
about the mobility study (in Dutch)

<http://wepods.com/> about the first autonomous vehicle on Dutch public roads

<http://www.mobihack.nl/> learn about the 30-hour competition

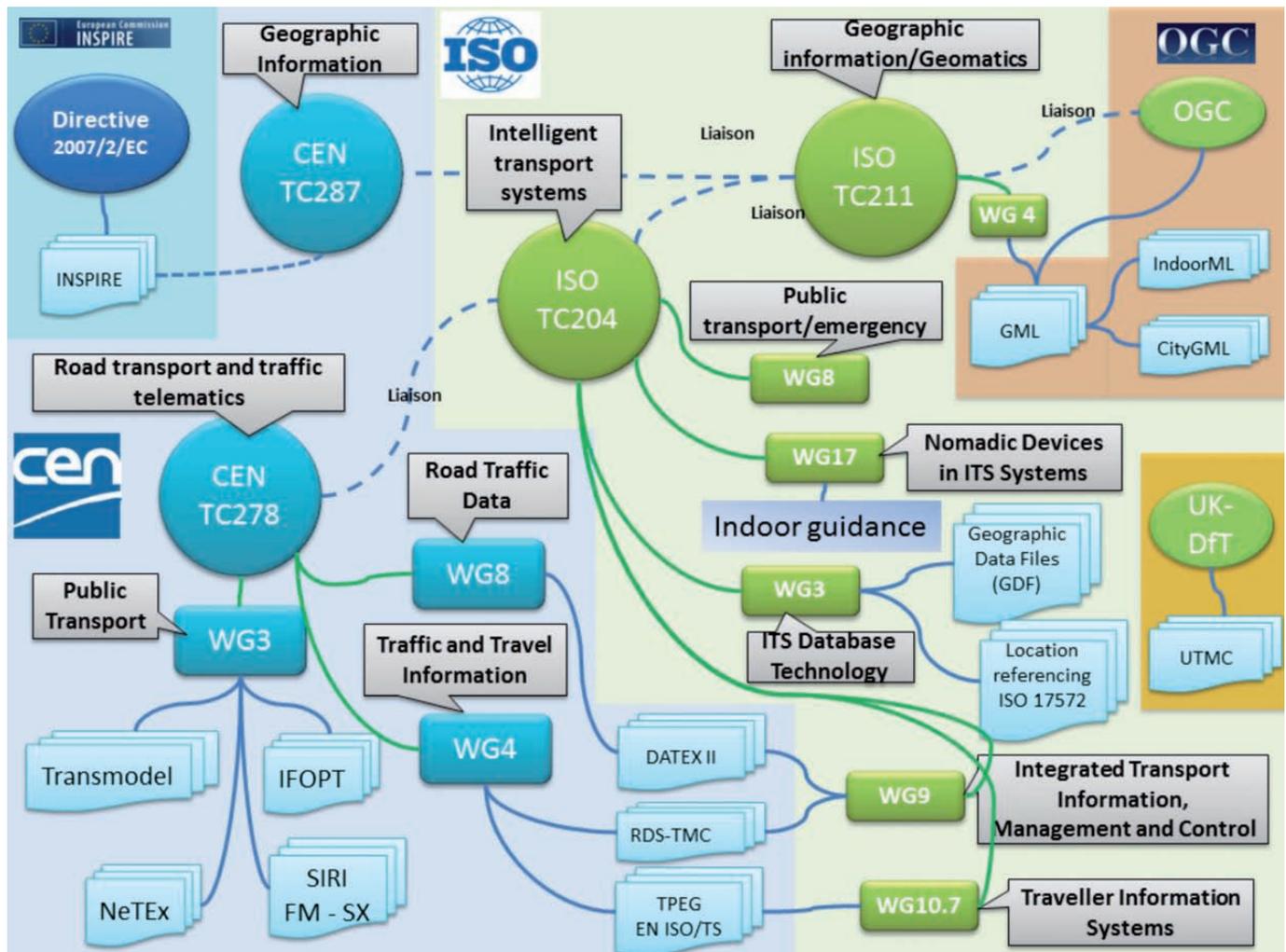
Standard issue

The OPTICITIES project aims to help European cities tackle complex mobility challenges, with the ultimate goal of optimizing urban mobility from a user perspective, serving urban mobility public policies and triggering autonomous information services business models. Standards, as **Peter Staelens** elucidates, play a crucial role

The mission of the OPTICITIES project is to help European cities tackle complex urban mobility challenges, focusing on the optimisation of transport networks through the experimentation of innovative ITS services. Its WP2 Open ITS System is one of the backbones of the project. More specifically, within WP2, T2.1 Data Standardisation for Multimodal Urban Mobility focuses the identification and development of standard data sets, with associated exchange format, for deployment of advanced multimodal services. This is one of the long-term goals of OPTICITIES.

A standard provides a reliable basis for people to share the same

Figure 1: Available standards overview



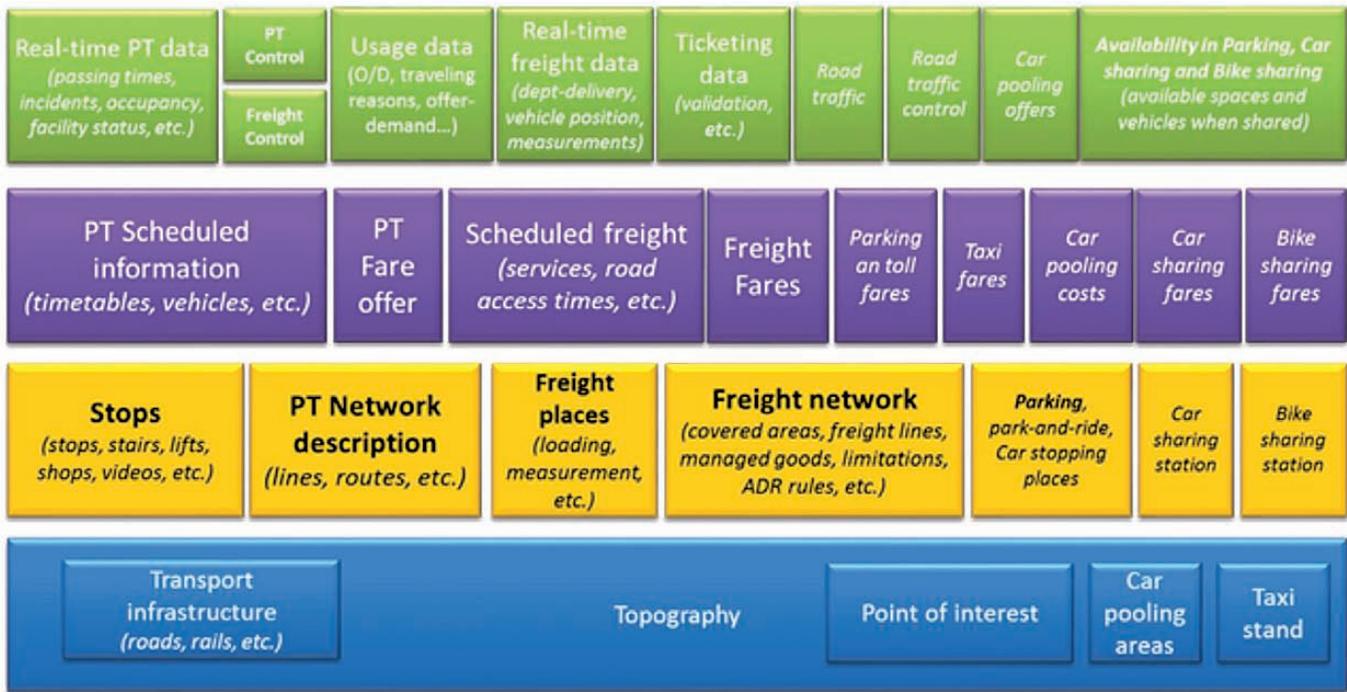


Figure 2: General overview of mobility related data categories

expectations against a product or service, helping to:

- Promote economic growth (competitiveness, facilitating trade);
- Provide a framework for achieving economies of scale, related efficiency gains, compatibility as well as interoperability;
- Enhance consumer protection and confidence in societal progress at large;
- Provide environmental integrity and sustainability.

OPTICITIES also aims at reducing the dependence of data silos in which each entity operating in the city holds the data. This is an obstacle in relation to the development of a common application/service platform and there is a need to address issues such as data quality and collection methodologies to ensure that applications can make use of this data in an equally meaningful way regardless of the city and the application domain.

The idea is then to facilitate development of standards that will allow

city administrations and service providers to make available data on a homogeneous and common basis to all the interested parties, ensuring at the same time that security and privacy concerns are addressed.

GATHER AND CONNECT

The basic prerequisite for Multimodal Information Services is the setting up of a standardised multimodal database including its interface with information services. This database shall gather and connect all urban mobility information already existing from the various transport operators and service providers and shall provide this information via standardised interfaces

The state of the art was therefore one of the important task in OPTICITIES, first identifying relevant standard and then, comparing them with the project’s functional needs, selecting the useful sub-parts of standardized models and exchange standards, and proposing and harmonised and consistent view of this selection (adding

additional “connecting concepts” when necessary).

The following picture provides a global overview of available international norms possibly of interest for OPTICITIES. For obvious readability reasons, this overview doesn’t include national standards, neither de-facto standards, but they will also have to be considered.

One of the key points of OPTICITIES is, once all the different types of mobility related datasets have been collected, to provide services making a combined use of several of them. The datasets usually focuses on a specific data category (or on a few categories) of data, and standards usually do so. Therefore it is important to have a sufficiently precise knowledge of the main mobility related data categories: the following figure provided a synthetic overview of these categories.

As the ‘State of the Art report’ has permitted to identify all the available standards that could be used for OPTICITIES, it was possible to set up a selection of standard to be used.

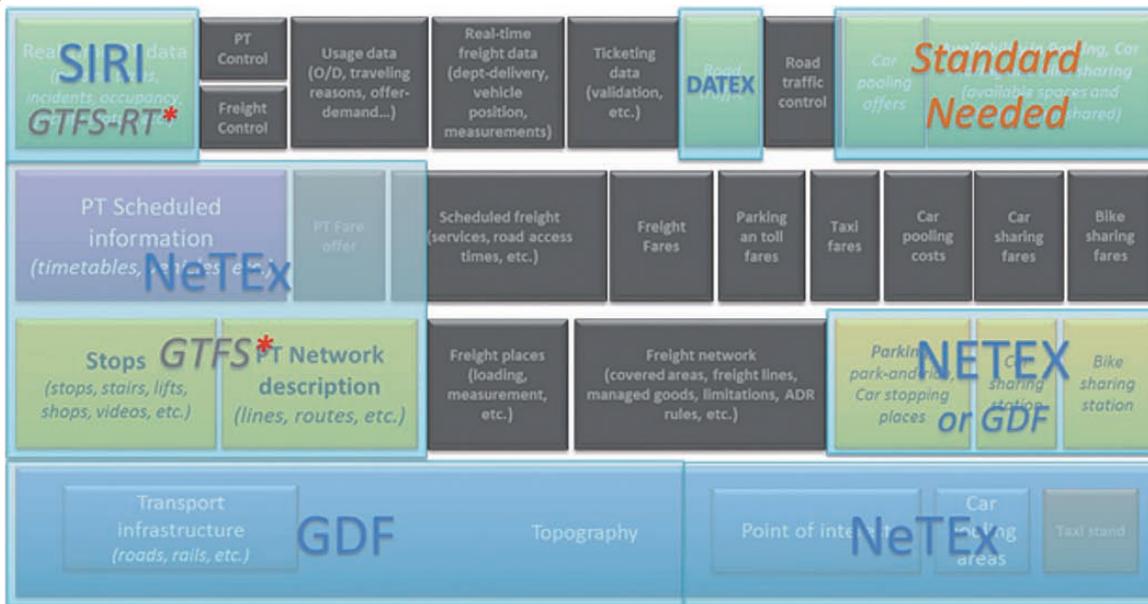


Figure 3: Supporting standards proposal for OPTICITIES

* As a possible complement for open-data; may temporarily be used alone in a transitional phase

This selection has been discussed with involved cities and stakeholders, and updated to fit the reality of needs and constraints, resulting in the selection presented in Figure 3 below.

ON THE SAME TRACK

It has to be mentioned that the European Commission has adopted new rules to improve EU-wide traffic information services for road users¹ and the selected standard for real-time traffic information services is DATEX II. Additional future complementary rules for public transport are expected to select NeTEx and SIRI (Transmodel based), in accordance with the standard already selected by the ERU (European Rail Agency).

This analysis also raised the fact that there were still some uncovered fields (mainly car cooling, car sharing and bike services)

Similarly, as OPTICITIES aims to identify a model and exchange means for a whole urban dataset, several standards need to be used at the same time to cover all the

needs. However, even if things are improving, standards have often been developed in a “silo mode” and are not always easy to be connected together. The need for connection between standards is quite obvious if you have a look to some real-life use cases.

For example, the road is used at the same time for cars and public transport vehicle like buses. An AVMS (Automated Vehicle Monitoring) is monitoring the buses, and Control Centre in monitoring the road traffic. If a car accident occurs, the resulting traffic jam will of course also have consequences on the bus. So the AVMS needs to be connected to the road control centre, but he will also needs to understand that the road on which the accident occurs is the one on which the bus is running. With all these consistent information together, the AVMS will be able to anticipate and reroute the bus in order to avoid the blocked section of the road.

Another example comes from the journey planer of a vehicle. More and more cities want to keep cars out of

the city centre as much as possible. To help drivers avoid entering the city, the vehicle’s journey planner needs to know in a fully consistent way, a whole set of different information:

- What public transport lines are running to the city centre (close to destination)?
- Where are the stops of these lines outside of the city?
- How can I join these stops by car (so stops needs to be connected to the road)?
- Where can I park my car near these stops and what is the real-time availability (so car park entrances needs to be connected to the road)?
- How can I walk from the car park to the stop point (so car park pedestrian outs need to be connect to the road and walking path, who themselves need to be connected to stops)?
- What are the schedules of the corresponding lines (including real-time connections)?

CONSISTENCY IS KEY

One final example is the simple situation where you just want to make a paper or digital map with all consistent data (eg, no bus stop in the middle of a building). So for the standard

REFERENCE

1 http://ec.europa.eu/transport/themes/its/news/2014-12-18-rtti_en.htm

selections OPTICITIES also provides a synopsis of what would be expected as the main connections between the most relevant standards (see figure 4 opposite).

To start from the beginning, it was very important to be able to connect the road infrastructure (and all data needed for description and vehicle guidance) to the public transport offer.

With Transmodel being the European standard to model all public transport related data (CEN ENV12896, reference model for other standards like NeTeX and SIRI) and GDF being the worldwide standard for road description (ISO14825 which, unlike GIS formats, like INSPIRE, provides detailed rules for data capture and representation, and an extensive catalog of standard features, attributes and relationships, targeting vehicle and pedestrian guidance and navigation), it was a normal course to start by connecting these two standards.

OPTICITIES' work team comprising active standardisation body members (Kasia Bourée, CEN Transmodel workgroup leader and French representative at ISO and Christophe Duquesne, CEN NeTeX workgroup leader) a contact was established with the TC 204-WG3, and taking advantage of the beginning of the renewal of GDF, a new work item was proposed to define de connections between GDF and Transmodel. This work item was drafted by the OPTICITIES team, proposed to ISO TC204 in Vancouver in October 2014 and accepted.

From that starting point, a worldwide work schedule has to be performed (meeting in Canada, France, China, Germany, etc.) involving OPTICITIES members and ISO TC204 WG3 members:

- Deep analysis of Transmodel and GDF models
- Model proposal
- Formal GDF Change Request
- GDF documents editorial and

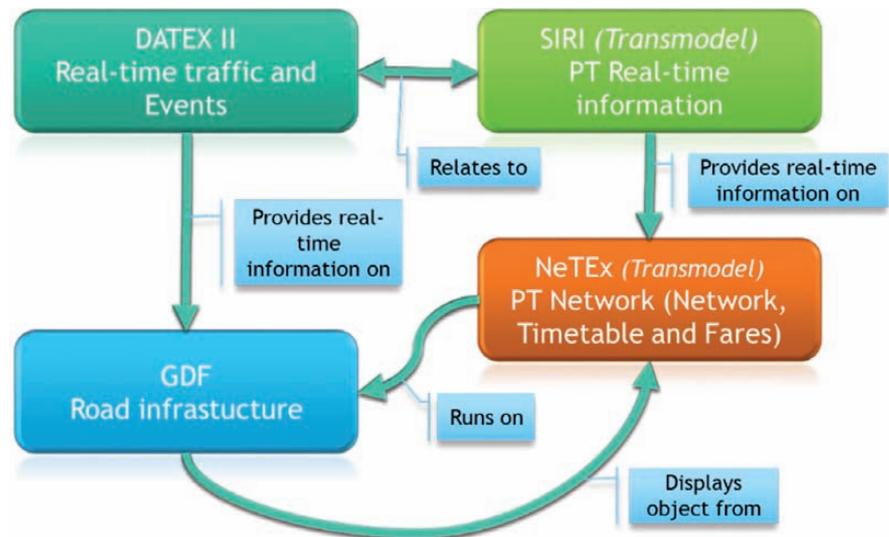


Figure4: OPTICITIES also provides a synopsis of what would be expected as the main connections between the most relevant standards

technical updates should start from the Potsdam, Germany meeting in October 2015

It has to be noted that Japan is very active in this ISO working group and is actively contributing and challenging the OPTICITIES proposal. The work should last up to the end of 2016 and into the beginning of 2017.

The result of this work will be a formal description of how to connect the road infrastructure and services with the public transport offer (how to “connect” a bus stop to a road, how to differentiate a bus shelter from a multimodal stop on the road, how to identify the road segments used by a specific bus journey, etc.) and as a consequence, how to exchange these connected road descriptions and public transit offer in a consistent and comprehensive manner.

A STARTING POINT

Being the departure point of such a standardisation process is obviously a great achievement for OPTICITIES. However, standardisation is a long lasting process and, as being at ISO level, it implies numerous travels and associated availability and costs which will need to be managed with

a long term point of view in order to make sure that all expected results are actually carried out. This will probably lead OPTICITIES to establish further contact with some national standardisation bodies in order to make sure that actions can be supported after the initialisation provided by OPTICITIES.

In addition, connections have been made with EU and CEN in order to clearly identify OPTICITIES in the upcoming European Commission Urban ITS request to CEN TC 278. If this is accepted, OPTICITIES WP2 will be in a good position to provide good starting materials for the first steps of the work (Use Cases, Urban ITS Architecture and Implementation) that will be carried out within the new CEN TC278/WG17.

All these actions will probably lead OPTICITIES to be, among other European projects, one of those very actively involved in European and International standardisation.

FYI

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Blazing a mobility trail

Intelligent Transport Systems (ITS) are not a novelty in Polish cities. Yet, the current scale of deployment of DPIS, traffic and fleet management systems across all bigger urban areas in Poland is staggering. The availability of EU funds and the growing importance of mobility on the political agenda have often shifted ITS projects to the top of investment priorities. This article attempts to give an overview of some of the most interesting systems and solutions currently being installed. **Artur Perchel** reports



The Tricity bypass, linking Gdansk, Gdynia and Sopot, Poland

It is a widely acknowledged fact that ITS – defined as all telecom, digital and measuring technologies and management techniques deployed to increase the overall effectiveness of transport systems – is at the cornerstone of smart cities and smart urban mobility. Providing a plethora of benefits, including increased road capacity, better traffic safety, reduced energy consumption costs or lower fleet management and infrastructure maintenance expenses, no wonder that intelligent transport systems are gaining in importance at all tiers of competent organizing and transport authorities. One of the flagship examples of the ITS revolution is Poland, the biggest Central and Eastern European country where urban and metropolitan decision-makers have been heavily investing in smart and long-term ITS solutions.

Coping with issues ranging from congestion and pollution to road fatalities and public transport fleet management, the majority of ITS investments in Poland are funded by a €82.5bn financial package in the framework of the 2014-2020 EU Structural Funds and the Cohesion Fund assistance. And although there are cities where the implemented ITS architecture is still far from optimally synchronizing all new solutions and devices, in the majority of cities like Warsaw, Szczecin, Poznań, Gdańsk, Bydgoszcz or Wrocław ITS has proved to make a substantial difference in facilitating seamless, comfortable and cost-effective mobility. This article focuses on analysing two major ITS solutions deployed in Trójmiasto (Gdańsk-Gdynia-Sopot) and Szczecin where the maturity and innovativeness of the projects have been widely acclaimed.

TRÓJMIASTO

Since late 2011, Trójmiasto (Tricity), a 750,000-people strong agglomeration composed of three cities of Gdańsk, Gdynia and Sopot has been implementing the biggest and one of the most complex systems of urban traffic management in Poland, called TRISTAR (Tricity Intelligent Agglomerational Transport System). Worth noting is the fact that Tricity features 1400km of roads, more than 2000km of daily public transport lines and nearly 300 junctions. All this has made ITS not only a highly complex, but also urgently needed solution, particularly given the increased individual motorization ratio over the last years and systematically decreasing modal split of public transport in the area.

The key idea behind the TRISTAR system is to improve metropolitan traffic indicators by increasing the attractiveness and the share of public transport in the overall market of urban mobility. It is generally achieved by both strict and relative traffic priority (the latter taking into consideration a number of different traffic indicators and traffic variability) that public transport modes enjoy on intersections and across the traffic lights' network. This system has been designed by German company Gevas, which deployed its two flagship traffic management solutions, the adaptive network control system BALANCE (algorithm at the area level) and the priority intersection control system EPICS (algorithm at the local level) that synchronizes traffic light drivers. Both systems are interconnected with on-board computers provided by Spain's GMV and installed on 675 buses, trams and trolleybuses, that allows them – being first detected by EPICS drivers – to enjoy priority on strategic crossroads. The ultimate goal of the global system is to reduce the travel time with public transport by 6.5 per cent and with all other vehicles by 5.5 per cent.



Gdynia is playing an integral role in the implementation of the TRISTAR traffic management system



The coastal town of Sopot will also benefit from TRISTAR

The tools provided by the system are generally composed around two main systemic modules: traffic management, and public transport and fleet management. The former includes subcomponents such as road traffic management, monitoring and supervision, drivers and parking information systems and road safety management and weather parameters measurement tools. The latter is composed of subcomponents like a passenger

information system and a public transport fleet management system.

It is interesting to note that the project's leading company, Polish firm QUMAK, was additionally asked by the contracting authority to deliver innovative traffic micro-simulation and traffic modelling tools, based on a+ software delivered by PTV (VISSIM and VISUM) and Gevas (CROSSING). Moreover, Gevas was also subcontracted with providing a dedicated traffic and traffic lights

The key idea behind the TRISTAR system is to improve metropolitan traffic indicators by increasing the attractiveness and the share of public transport in the overall market of urban mobility



Gevas has deployed its BALANCE and EPICS control systems in Gdansk

management software, including the whole operational system (TRENDS kernel) to make TRISTAR compatible with different traffic light drivers both now and during future extensions of the system.

Currently, this €31m project – 85 per cent co-financed by the EU – is nearly completed and under final calibration, while its subsystems, including two brand new Traffic Management and Coordination Centres, 161 fully equipped junctions and nearly 100 DPI and VMS screens are gradually being launched. It is also much hoped that TRISTAR will be once synchronized with a newly launched national traffic management system by the General Directorate for National Roads and

Motorways (GDDKiA). It is of significance given that a number of national roads and highways run through or around Tricity, making the potential of TRISTAR yet to be fully optimized.

SZCZECIN

The Central Public Transport Management System (CSZKM) in Szczecin has been implemented since the late 2000s under a working name “The improvement of public transport operations within the Szczecin agglomeration through ITS deployment”. With the total price tag of €13m, the project was divided into two phases: the deployment of the public transport fleet management system (completed in 2011) and the installation of ITS-driven traffic management

system (ongoing). Similarly to Tricity, the authorities in this coastal city with 407,000 inhabitants have pretty early come to the conclusion that absorbing EU funds solely for vehicles purchases or transport infrastructure investment is not enough to combat congestion or increase public transport ridership. It is where ITS should take over and so was decided, not least because the politicians strove to optimize city’s mobility expenditures and to better hold transport operators to account.

In the first phase of the project, based on the development of the PT fleet management system, all 441 public transport vehicles (buses, trams and maintenance vehicles) were equipped with on-board

computers featuring, for instance, an automatic vehicle location system. The auto-computers were also synchronized with the first 15 DPIS screens with information updated in real time. Moreover, the screens have been interconnected with the central managing system and additionally designed to provide passengers with actual departure and delay information when requested via SMS. The novelty was that all the commissioned screens have been also equipped with a loud speaking device for persons with limited sight. Besides, in some of the vehicles the contractor, company UTI Grup, has deployed CCTV and passenger counting systems. In the near future, 100 per cent of the public transport fleet is to be equipped with five CCTV digital cameras each, while 10 per cent will be equipped with passenger counting systems.

The currently ongoing second phase of the project envisages the deployment of 80 LED DPI screens on the main public transport stops. Next to informing about departures and delays, the system will be updating passengers about emergencies and schedule changes, but also about a type of the approaching vehicle, whether it is a low-floor and/or air-conditioned bus or tram. Furthermore, a brand new electronic and contactless ticketing system, including the e-wallet-like Szczecin Agglomeration Card is being installed with all related ticketing infrastructure and software. Although technology-wise, the GMV-designed CSZKM system is not extraordinarily innovative – particularly when compared with other mid-size European cities – it is nevertheless a groundbreaking project as it encompasses 11 interdependent systemic components that all together allow the reaping of full benefits of the system. The further development and evolution of CSZKM is planned based on the currently ongoing implementation



Szczecin has launched a new e-payment scheme, the Szczecin Agglomeration Card

For smart and competitive cities, particularly in Poland, but also other Central and Eastern European countries, there is no way back from ITS

of a metropolitan railway system in Szczecin that will form a backbone of the local mobility network.

SUMMARY

For smart and competitive cities, particularly in Poland, but also other Central and Eastern European countries, there is no way back from ITS. In Poland, the ITS technologies are marching throughout all major cities, improving traffic flows, reducing mobility costs and making sure public transport enjoys priority and a substantial modal share. As seen on the example of Tricity or Szczecin, many ITS projects deployed in Poland

are often complex, pricy and long-term investments. Yet, they are just at the beginning of the way to make our cities more livable and smart, truly thinking cities where travel, particularly with public transport is more of an enjoyable experience. ☺

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

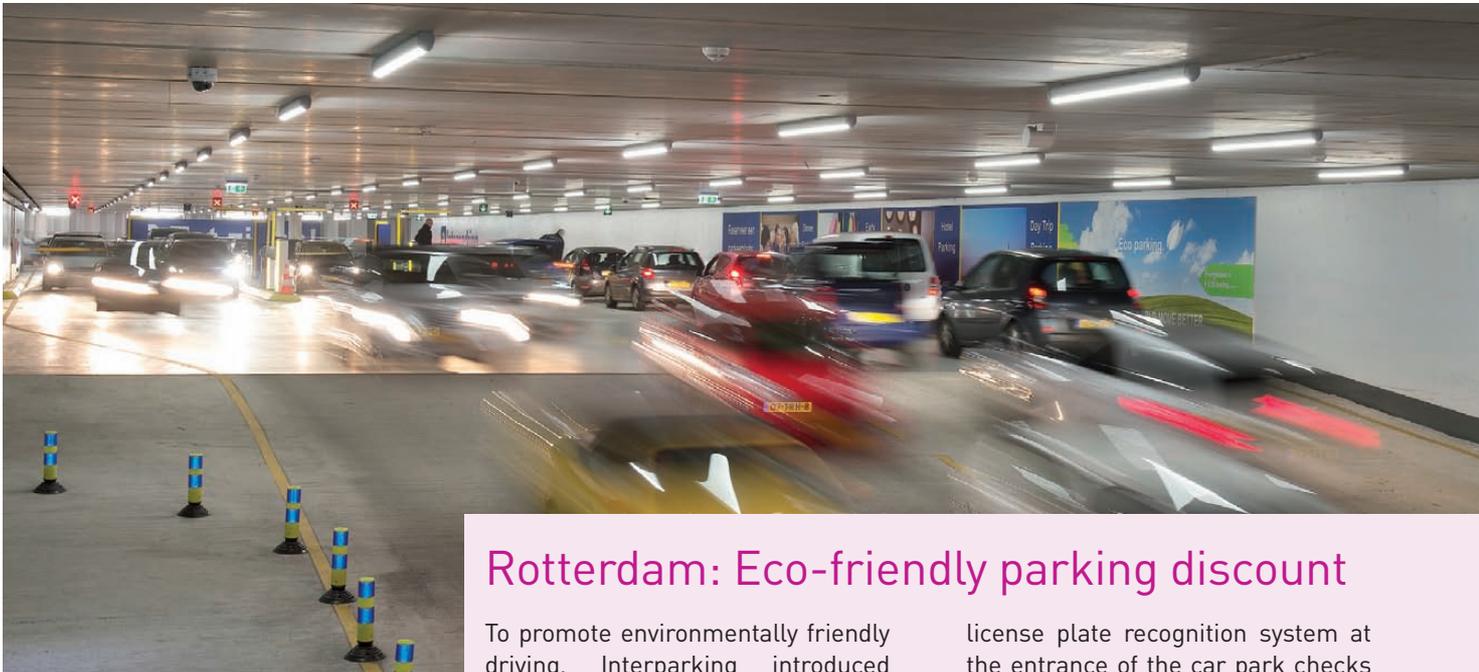
- o **Barcelona, Rotterdam** – EPA award winners
- o **Hamburg and Portland** – Capturing transit's real value
- o **Utrecht** – A textbook SUMP policy explained
- o **SUMP** – How to assess your own SUMP
- o **London** – Smart urban regeneration
- o **Langley Hall Academy** – Smart human asset tracking



Rotterdam's "Eco Parking" scheme operates on the basis of the car's energy label. The license plate recognition system at the entrance of the car park checks this information in real time with the RDW

A tale of two cities

Polis members Barcelona and Rotterdam are among the latest winners of the European Parking Award, presented by the European Parking Association. **Sandra Ziemons** takes a look at the cities' innovative approach to parking



The European Parking Award was established by the European Parking Association (EPA) as a biennial award for excellence in parking. The EPA has instituted two award schemes to set standards, demonstrate the high quality of parking structures and services and to encourage operators to provide good services throughout Europe. The European Standard Parking Award (ESPA) defines a set of minimum standards for a good basic quality in structure and services. The extensive checklist that is applied has been devised by an international EPA expert team and serves as a reference not only within the parking industry but also for local authorities.

Rotterdam: Eco-friendly parking discount

To promote environmentally friendly driving, Interparking introduced "Eco Parking", a new parking rate based on vehicles' energy label. The scheme is currently being used at Interparking's "Lijnbaan" and "Markthal" car parks in Rotterdam, Netherlands.

With "Eco Parking" customers with a car with energy label 'A' can profit from cheaper parking rates. The scheme combines two environmental aspects: promoting environmentally friendly driving and reducing CO₂ emission. Thereby "Eco Parking" is a win-win for everyone. The driver can park at a cheaper rate and the city centre stays cleaner. Drivers also become more aware of the energy label of their car.

"Eco Parking" operates on the basis of the car's energy label. The

license plate recognition system at the entrance of the car park checks this information in real time with the RDW (Dutch Road Traffic Authorities).

The RDW registers all types of general, fiscal, environmental and technical data of cars. If the car can be identified as an energy label A car, the driver will automatically be offered a special "Eco Parking" ticket. The "Eco Parking" discount will automatically be calculated when the driver pays at the payment terminal or Dip & Go machine. The discount is based on a percentage reduction of the normal rate. For the "Lijnbaan" car park it was determined at €0.40 per hour and for the newer "Markthal" garage at €0.20 Euro per hour.

In the Netherlands, the energy label system for vehicles is not based on the carbon dioxide emissions in

Barcelona: Parking in Urban Freight Distribution Areas

The municipality of Barcelona introduced the new app “areaDUM” to manage its Urban Freight Distribution (UFD) areas and parking spaces. Users can download the app for free to book a parking space in certain zones. The app aims to increase parking space rotation and to reduce search traffic.

In Barcelona, Spain, the local municipality service Bcelona de Serveis Municipais SA (B:SM) introduced a new Urban Freight Distribution (UFD) mandatory system to access the loading/unloading bays in the city.

The main access tool is an app based on smartphone and geolocation technologies. It is called “areaDUM” and is meant for all users – commercial, transport, freight, etc. The new system manages more than 9000 parking places and more than 45,000 daily operations. It helps the city to increase parking space rotation and to reduce overall cruising-for-parking time. Users’ easy access to smartphone apps and geolocation technologies offers the opportunity to build a new way of managing UFD areas, overall on-street parking spaces and public space. The definition and programming of “areaDUM” took place from September 2013 until October 2014. In November 2014, the deployment on street started and continued until March 2016. So far the new system has resulted in less UFD vans and trucks cruising for parking. The app also helps to reinforce the image of Barcelona as a Smart City by its citizens and users.

USER-FRIENDLY FEATURES

In addition, the new system’s user-friendly features are oriented to help users and to prevent infringements.

Rotterdam’s suite of parking innovations made it a clear winner



grams per kilometre, but on how efficient a car is compared to others in the same size category. The cars are placed in an energy label category, running from A to G; with A being the least and G being the most polluting. There are three sizes: Small (mini and compact), Medium (sedans and medium MPVs) and Large (large sedans and MPVs).

INSIGHT REQUIRED

Before the introduction of “Eco Parking”, Interparking registered the license plates of cars at the “Lijnbaan” car park for a week in March 2013. This gave an insight into how many cars from the various

energy categories parked there. Based on the study, Interparking started the pilot in April 2014. In this phase, it was tested whether the link to the RDW registration database worked. The new scheme by Interparking is promoted through signs outside the car park “Lijnbaan”, where “Eco Parking” is being used properly and whether vehicles with an A label were actually given a “Eco Parking” ticket. An evaluation of the pilot showed that “Eco Parking” received a very positive response from both customers and municipalities.

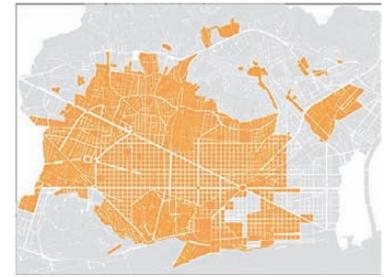
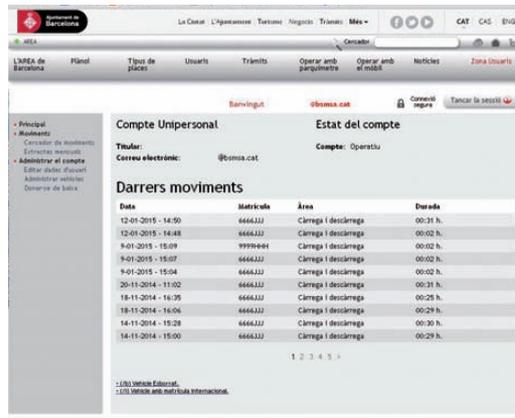
The new system's information is spread through the on-street vertical coded signal in each UFD bay, also personally via B:SM's enforcement and online (website, in-app). Its use is mandatory in all UFD areas. Due to the fact that it is a non-paid system, it is being very well accepted.

Future features would acknowledge users about available UFD parking spaces, guiding them to empty slots. Furthermore, the project's full implementation should allow increasing available parking space for residents when needed.

Motorists can download the free "areaDUM" app in the Apple app store or the Google play store. Then they register themselves and their vehicle. The user's geolocation is determined. When users reach a free parking space, they press the «Start parking» button. At the end of their parking time, they get an alert before the maximum parking time, that is allowed in this UFD area, is reached. Then they press «Stop parking» and leave the parking space.

EXTRA SERVICE: ALARM SYSTEM

Rather than simply evolving from the cardboard parking clock to the "areaDUM" app, several services are additionally being offered to customers: an alarm system, which notifies users to select "iniciar estacionamiento" ("start parking") to start their 30-minute parking time at a UFD bay. At all UFD bays in Barcelona motorists are informed about the use of the new app through signs. The system

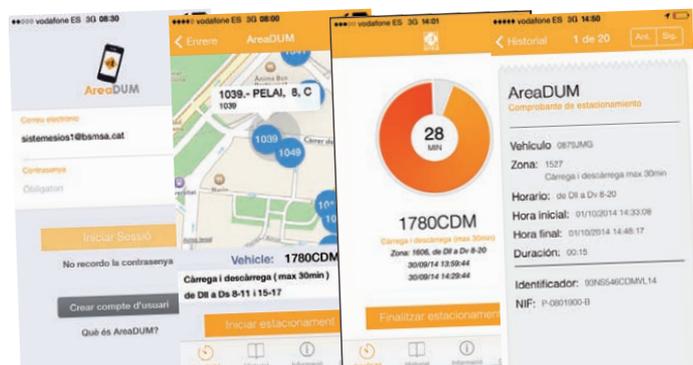


notifies the users from 5-15 minutes before their parking time ends, together with the car's location. Also, the system allows bidirectional communication between on-street operator and users including the ticket summary history; a differentiated account for fleet customers; a dedicated user area on the website; in-app FAQs and direct tech support.

B:SM's customer service team solve almost 99 per cent of all app-related incidences within less than 24 hours. The new app system together

Barcelona has a long history of parking innovations

with an SMS backup system enables "areaDUM" to reach all users. To identify an infringement, a B:SM parking attendant simply checks the vehicle's licence plate and reports back to their supervisors in real time, enabling them to issue fines immediately. When the users' parking time has reached the allowed limit, they end the session by clicking on "finalitzar estacionament" ("finish parking").



Barcelona's AreaDUM app

FYI

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LEADING THE WAY

The backbones of the axes are lines of the urban/ regional heavy rail system. Within walking distance to the stations (<600m) it was intended to gradually increase the density of buildings, depending of the distance to the station

axes. The notion of connecting the Concept of Axes and the Density Plan with the “profiteer pays principle” was neglected from the very beginning. That might be attributed to the comfortable state-subsidizing of public transit in Germany.

WORKING EXAMPLES

An exact replica of the connection of axes and housing density has been practiced increasingly successfully for decades all over the world. The forerunner and a remarkable example is the US metropolis Portland, Oregon where the concept has been practiced since the early 1980s based on a light rail system; the first line of the system opened in 1996.

Inside the borders of the city of Portland are 0.6m inhabitants; the population of the metropolitan area is about 2.3m. Within the next 20 years an increase of the metro area’s population by about 1m is expected, in part thanks to the city’s light rail system and its extraordinarily high standards of passenger friendliness and design^{5, 6, 7}.

The decisive difference compared to Hamburg (1.8m inhabitants inside the borders of the city, 2.5m including

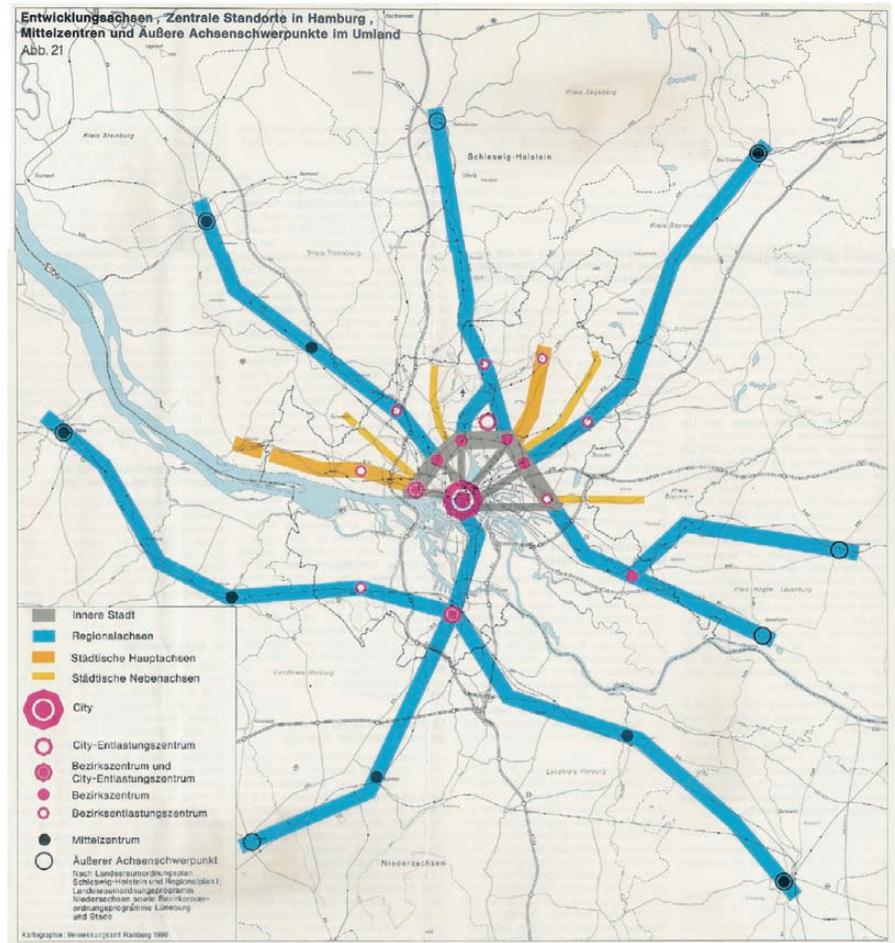


Figure 2: Concept of Axes, “Development Plan for Hamburg and Surrounding”

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the “belt” of neighbouring communities, twice that figure in the extended metropolitan area) is the fact that in Hamburg an extensive urban heavy rail transit network had existed since the beginning of the 20th Century and was in full service again shortly after the end of the Second World War.

In Portland, the historic streetcar system had been suspended and then removed in the early 1950s. The implementation of a modern area-wide rapid light rail system only started in the 1980s. However, A remarkable parallel (albeit 20 years later than in Hamburg) is the fact, that the regional government in Portland took the decision in favour of public transit being the future backbone of the traffic system instead of further supporting automobile traffic, not least by building another highway through the city.

In those days that was a very unusual and bold decision in the US. The federal money having been disposed for the respective highway was transferred to the first section of the light rail system (with agreement from the federal government)⁵. The key phrases for the concept being followed in Portland since then are:

- “Transit Oriented Development”
- “Value Capture”

TRANSIT ORIENTED DEVELOPMENT

This is the intentional integration of urban/regional development and public transit. The key point is the concentration of housing and business areas within the urban districts and along regional development axes around the stations of the primary public transit system. Remarkably the concepts in this regard are increasingly based on the modern light rail system, not on heavy rail systems; this holds true in particular for metropolises in North America and Australia.

The specific costs of building a light rail system are on average only

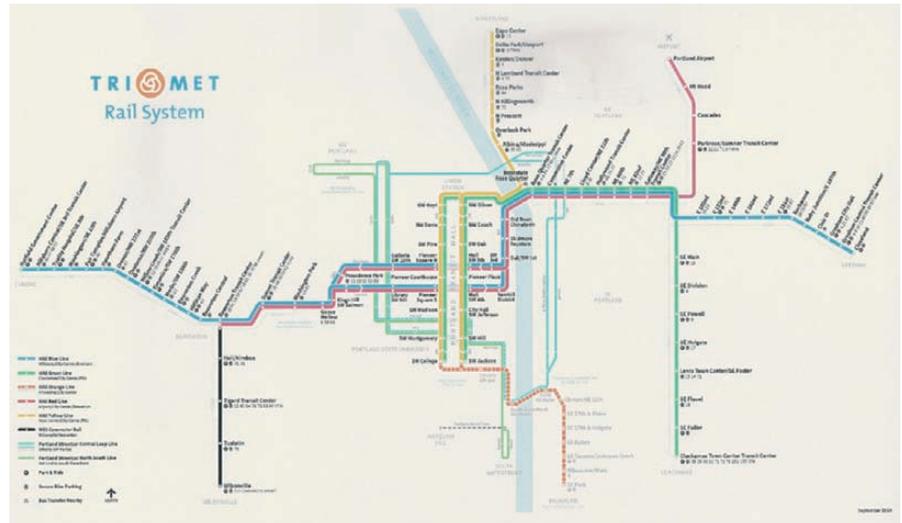


Figure.3: Urban rail network Portland, Oregon, 2015

10 per cent compared with the building of heavy rail systems (operating mainly underground). Today there are 400 light rail networks operating worldwide, another 200 in the planning status and 60 under construction. They are proving to be an efficient instrument for avoiding urban sprawl, congestion and rising fuel costs as well as improving environmental conditions. Commuters increasingly take advantage of a comfortable and reliable ride in an attractive light rail vehicle instead of being stuck in their cars on congested roads. Of the top 10 cities on the 2012 Economic intelligence Unit’s global livability index, eight have light rail systems⁸.

VALUE CAPTURE

Value capture, in this context, is the participation of the incremental value of land, of the initiated economic development and of the various other benefits of the implementation of a new light rail service – aimed at co-financing the construction and the operation expenses to a reasonable amount. Today results from numerous investigations in recent years on the positive effects of light rail systems in the respective regard are available and the catalytic effect on

the urban and regional development⁹ as well as publications from administrations and public transit operators addressing the respective factors.

SELECTED EXAMPLES

Portland, Oregon, USA (population metro area: 2.3m)

The operator of the light rail system, TriMet, estimates that about US\$10 billion (€8 billion) have been invested in projects in walking distance to the light rail stations since the announcement of establishing the light rail system in the early 1980s¹⁰.

The operation of the public transit system in the Portland area is co-financed/co-funded to a reasonable amount by the “profiteers”. That is based on a special Payroll and Self-Employment Tax to be paid by enterprises being located within the direct supply area of TriMet. The tax is collected and administrated by the finance department of the State of Oregon. In FY2015 the revenue from this tax covered 54 per cent of the total operating budget of TriMet. The share of the ticket-revenue has been only 23 per cent^{6, 11}.

Financing the single sections of the light rail system has been somewhat different. In general the share of the federal funds is remarkably

high. A very special exception was the connection of the airport (the red line in Figure 3). In this case the federal funds had been null, 25 per cent have been paid by a real estate enterprise for getting the right to develop a certain terrain close to the airport for free, 25 per cent was paid by the airport authority and, 50 per cent came from various regional and local sources, including:

- bond measures
- additional property taxes and
- private land donations.

In 1995 the city of Portland established the Portland Streetcar Inc as a non-profit organization for planning, financing and realizing streetcar-projects in the inner city as a supplement of the MAX (Metro Area Express) light rail system. The Portland Streetcar is not a traditional, historic streetcar but more a secondary, complementary light rail system. The construction started in 1999, the operation on the first segment in 2001. Two components of financing the infrastructure are particularly remarkable⁶:

- About 20 per cent of the construction costs are paid by the owners of the real estate adjacent the streetcar lines: they form Local Improvement Districts (LID) for this purpose. These are special tax assessment districts. Its formation is based on the fact that the land-owners take reasonable economic

profit from the project.

- Additional 20 per cent are contributed by the Portland Development Center based on revenues from special taxes being implemented for supporting development projects.

Dallas, Texas, USA (population metro area: 6.5m)

“According to research carried out by the ‘Center for Economic Development and Research’ at the University of North Texas, about a decade after it opened, the Dallas Area Rapid Transit (DART) light rail had generated developments worth US\$4.26 billion”⁸. “Property values near the DART lines are 25 per cent higher than in similar real estate elsewhere in the area”⁹.

“Investment in DART Rail capital projects between 2003 and 2013 has generated a return of US\$7.4 billion in regional economic activity, creating more than 54,000 jobs that paid more than US\$3.3 billion in wages, salaries and benefits. In addition, more than US\$5.3 billion in private capital transit oriented development projects have been built, are under construction, or are currently planned near light rail stations since the debut of DART Rail in 1996”¹². “From the beginning, part of DART’s mission has been to build a transportation system large enough to stimulate economic development. The voter-approved 1 per cent sales

tax that funds DART makes that possible”¹³.

Minneapolis-St Paul, Minnesota, USA (population metro area: 3.1million)

“Developers have announced at least US\$2.5 billion worth of new construction and redevelopment projects within a half-mile of the Metro Green Line (Central Corridor LRT Project) since engineering work began more than five years ago...‘The development we’ve seen so far only marks the beginning of new opportunities in the central Corridor...For decades to come the Green Line will be a catalyst for employment and economic growth along this 11-mile route’”¹⁴. “A study of Hiawatha Light Rail corridor found, that the line increased residential property value by US\$47 million”¹². After the light-rail line was completed in 2004, prices per building-square-foot increased by about 50 per cent¹⁵.

Charlotte, North Carolina, USA (population metro: 2.3m)

To date no quantified effects of the light rail project regarding the investments,

increase of property value etc are available, but numerous statements of ‘players’ being involved in the project have been published. Some examples¹⁷:

- “The first leg of the Blue Line, which opened in 2007, is widely

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Portland Transit Mall

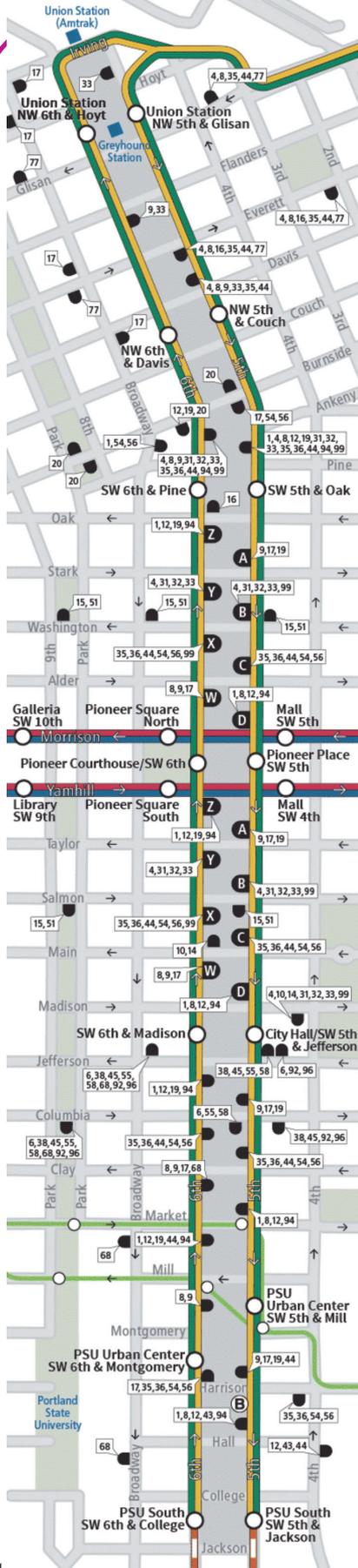


Figure 4: Portland Transit Mall

credited with kicking off the apartment boom that's spread down South Boulevard. Now, those who planned the next phase say the US\$1.2 billion is paying off."

- "Developers are willing to pay a premium because they can charge higher rents to tenants near a busy stop."
- "Transportation infrastructure has this powerful effect of repurposing real estate."
- "Development coming fast to the Blue Line extension".

Perth, Australia (population metro: 2.0 million)

"Perth's southern rail line raised land values around stations by 42 per cent over 5 years and could have raised 60-80 per cent of the capital if tax increment financing had been used." This is taken as a proof for the fact that financing of light rail projects based to a reasonable amount on value capture is not only acceptable but imperative. "As soon as the route was announced, developers from around the world bought up all the best sites and now are delivering them". "Perth's southern Rail Line was parodied as a complete waste of money as no-one would use it...The rail system has dramatically increased patronage...This was beyond the expectations of every-one...^{19, 20}

TWO EXTRAORDINARY COMPONENTS OF TRANSIT ORIENTED DEVELOPMENT

1. Portland Transit Mall^{6, 10}

The Portland Transit Mall was opened in 1978 as the first of its kind in the USA. It consists of two one-way streets intended specifically for mass transit, spanning 22 blocks (29 blocks since 1994) through the high-density office and retail core of the city centre.

"The Mall immediately received international attention as a model for transit and downtown redevelopment. It was recognized for its exceptional design quality and its strategic and operational innovation...the Mall was celebrated as a prototype for redeveloping an urban center using transit as a major catalyst."

In the centre of the mall all light rail lines are meeting around just one block at the Pioneer Courthouse – see figures 4 and 5. On Pioneer Square in front of the Courthouse there was an eight-storey car park that was demolished to make way for the Mall and replaced by an attractively designed meeting place. The Portland Transit Mall has set a new standard for urban design and was honoured with the highest architecture awards.

2. Orenco Station, Hillsboro, Oregon²¹

"Orenco Station is a new transit-oriented community of 1,800 homes, a



Figure 5: MAX Light Rail (left) and Portland Streetcar on the Portland Transit Mall

town center, office, retail and nearby employment on 209 acres in the town of Hillsboro, west of Portland, Oregon. Extending out from the light rail and town center is a grid of walkable, tree-lined streets and parks, featuring cottages, condominiums and row-homes in a broad range of sizes and prices. The site of Orenco Station was designated a 'Town Center' under Portland's 2040 regional plan, one of a number of Town Centers along a new light rail line. As the most ambitious and most successful such community to date, it has become a closely studied laboratory of new ideas in the battle against sprawl." (Figure 6)

CRITICISM

Some critics put forward that light rail is too expensive compared to Bus Rapid Transit (BRT) while the latter fulfills the same function even better^{22, 23, 24}. In fact there are examples to be found where the notably higher positive efficiency of light rail systems in terms of attracting passengers, increasing property values and stimulating urban development has not been proven to date or does not actually exist.

However, the critics mostly use tired, misleading arguments and have been known to intentionally misinterpret figures and facts, or are, at best, comparing apples and oranges. Their arguments are retorted¹⁹ as follows: "It's not just a question of trams versus busses – it's really an issue of rail-based versus road-based urban development. The former can attract private financing, while the latter does not."

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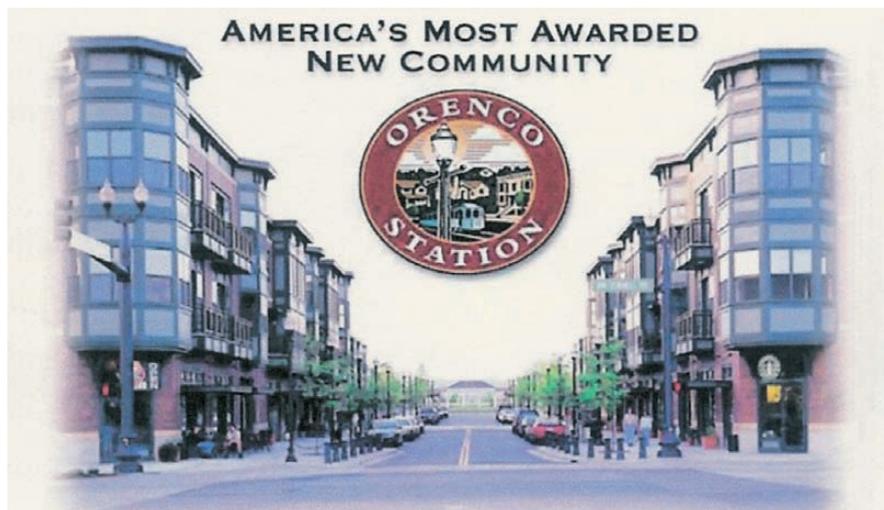


Figure 6: Logo of the "Orenco Station" project⁹

Nevertheless it is highly recommendable to check thoroughly in every concrete project if the intended effects are to be expected to come true under the specific conditions of the actual project. That will generally be the more the case the more the rail project is systematically and functionally integrated in a convincing urban/regional development and transport concept (based on a clear preference for public transit).

CONCLUSION

Targeted and distinct Transit Oriented Development has, over the last few decades, proved to be an efficient instrument for developing and renewing cities and metropolitan areas in compliance with the changing mobility attitudes of the citizen and the requirements of an attractive urban environment. The main focus in this regard is increasingly on modern light rail systems as the backbone of the transit system, not

least because the tracks are mostly on the surface they are highly attractive for the passengers and can be a decisive image factor for the whole supply area.

Taking into account the manifold available proven examples of reasonable positive economic effects of modern light rail systems (investments, property values, etc) it is not only acceptable, but logical to capture a reasonable part of the induced value in order to be able to co-finance the construction and operation of the light rail systems as well as being in the position of keeping the ticket prices low in order to attract additional demand for public transit. ☺

FYI

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Smart policy:

The thinking behind Utrecht's SUMP

Tineke Mateboer and **Mark Degenkamp** explain how to use expert opinions on new technologies to complete a Sustainable Urban Mobility Plan

Utrecht is a city with ambition: more quality of life with a growing population within existing city limits. It's a city of 340,000 inhabitants in the middle of the Netherlands. It is a fast growing, young, dense urban area. By 2030 it's predicted that 400,000 people will live here. Particularly in the inner city, 'active modes' are used a lot: people get around Utrecht by foot and bike. The bicycle is especially a very popular mode of transportation, with the city currently building the largest bicycle storage in the world with 12,500 places.

Thus: more space for pedestrians and cyclists, thus a shift in focus for planning, thus: the SUMP.

But still the inner city is crowded. More road traffic will have negative effects on air quality, congestion,

road safety, etc. But also the amount of cyclists and buses are a challenge in several streets. This demands a radical shift in policies: towards a smart policy with more space for pedestrians and bike (which occupy less space per person), attractive public space, smart routing and smart planning. This is addressed in Utrecht's Sustainable Urban Mobility Plan (SUMP).

The plan is now in the final phase: approval by the city council. It contains the ideas of the Government in Utrecht, elaborated in over 60 projects from now until 2025. For each mode of transportation a network is developed: it is now easy to see which routes are important for bikes, cars, public transport and so on. This is a base for projects for each mode of transportation.

Smart mobility has roughly three components: hardware, software and orgware. In the centre is the quality of life: the wheel is spinning around this ultimate goal

SUMP WITHOUT NEW TECHNOLOGIES?

Next to the SUMP – with mostly projects concerning spatial planning, infrastructure and traffic management, initiated by the city council, we examined an extra field of play: technology. This was on request of the city council as they felt technology could play a role in reaching the goals of the SUMP. In Utrecht the government is experimenting with new technologies in mobility: for example, in 2015 a light companion for the bike has been tested.

Therefore we organized an expert meeting to further explore the theme. The workshop had several goals:

- Collect knowledge from different experts about smart mobility. We made a difference between short-term developments (5-10 years) and long-term developments (>10 years).
- Identify the relevance of the expected developments for Utrecht. Therefore we had a focus on societal rather than technical effects.

The workshop

SMART MOBILITY WHEEL

The first thing we did was to define ‘smart mobility’. Smart mobility is becoming a term like sustainability: it means so much that in fact it means less and it is therefore difficult to define. We used the smart mobility wheel to clarify the different topics.

Smart mobility has roughly three components: hardware, software and orgware. In the centre is the

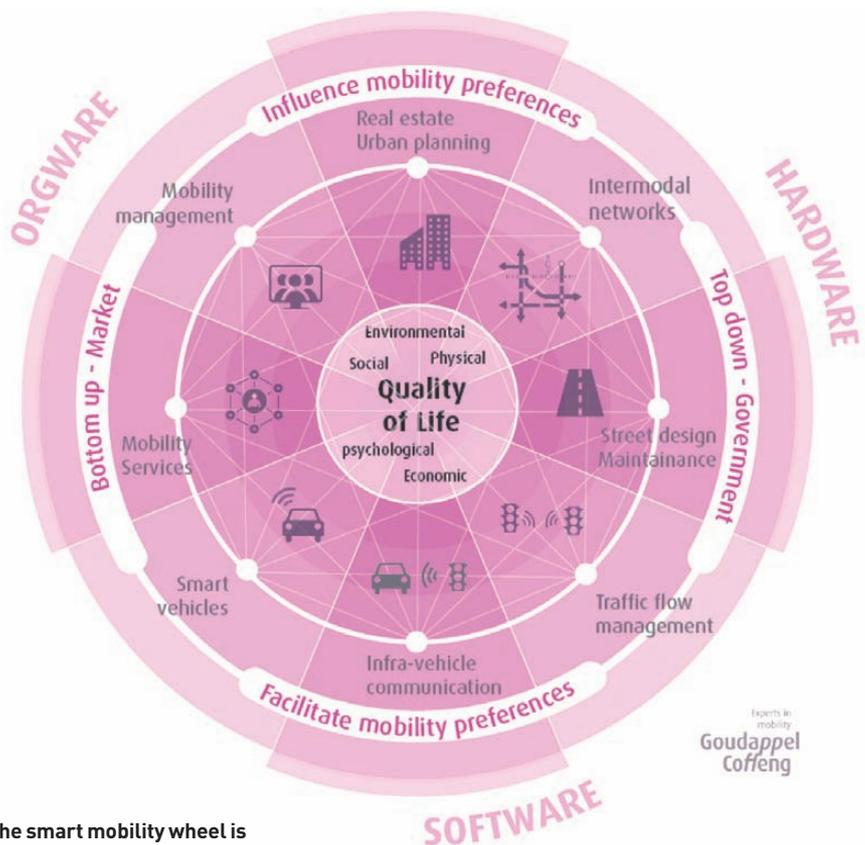
quality of life: the wheel is spinning around this ultimate goal. Hardware – the street design, the allocation of functions – is organised mostly top-down. The government can quite easily influence the hardware. In terms of smart mobility, this gives options such as dynamic markings, 3D printing of asphalt to maintain streets. Also the government can facilitate smart vehicles and e-bikes through the hardware.

The software is more about the vehicles (self-driving cars, e-bike

and communication between infrastructure and vehicles. The market has a big role here, but in dialogue with the government.

How to organize mobility is also very important in smart mobility: we call this orgware. This is mostly privately organized. Examples of this are neighbourhood car-sharing platforms such as Snappcar or MyWheels.

We invited 15 experts in the field of smart mobility and about 10 civil servants to meet each other



The smart mobility wheel is used to clarify the different topics within the smart mobility definition

The government should be in dialogue with the market to decide what is best for the city. In Utrecht this way of thinking has already started thanks to the attention for new technologies in the SUMP

in February and discuss different topics around smart mobility. The experts represented, among others, TNO, University of Amsterdam, University of Utrecht, MyWheels and the Ministry of Infrastructure and Environment.

Conclusions from the workshop and how this will change or complete the SUMP

The collected knowledge helped to explore what smart mobility means, it helped in checking the relevance of the smart mobility wheel (is it true? What is the most important?). For example we learned that the different sections (orgware, hardware, software) are much more intertwined than we thought.

Smart mobility will change our way of living. In fact, it already does. Our smartphones give us real time information on congestion and delays. Thanks to that, traffic jams are solved much more quickly. The self-driving car is already being produced, although not for the public just yet. Traffic lights are much smarter than before and we are still making improvements. Lots of companies are experimenting with 3D printing. Platforms to share vehicles are booming, even more so is the use of drones.

The main uncertainty concerning

all the developments as elaborated in the smart mobility wheel is when they are going to happen. Developments are happening fast, but when, what and how, is difficult to predict. Yet we had several recommendations for Utrecht.

RECOMMENDATIONS

We identified a few developments which will be important for the government in the next few years.

Smart organization of mobility

- Sharing is part of the smart mobility future. Bike sharing might be the next thing: 'the Airbnb for bikes'. The government should act as a provider of data and as a mediator to bring the private 'leasers' together.
- Delivery of goods will change. The government should think about the legal issues around the use of drones and think of a way to bring efficiency to all the different mini-vans which currently deliver online ordered goods.
- For the long term: public transport is not always organized efficiently. The government has to rethink the system: now a lot of buses have too little or too many passengers. New technologies can help in making a more efficient system: on demand, or maybe with little self-driving vehicles. People can make a request for a specific trip. Based on all the requests an ideal route is made and small vehicles make the most efficient trips. This can be more efficient as well as will save costs.

Smart infrastructure

- Flexible, dynamic markings on the road: roads or parking spaces can have more 'options': not always meant for cars, but at some times of the day for bikes only for example.
- 3d printing of asphalt to repair roads: this is very efficient in terms of costs.

Smart vehicles:

- The government should think of the integration of self-driving cars with other modes of transportation. Also about legal issues.
- In the long term the difference between the traditional modes of transportation will become less clear. This is important for street design, a governmental task.

In all these topics, the government could start with experiments in different neighborhoods – preferably neighborhoods with a lot of early adopters. In this way, Utrecht can discover what works and what doesn't work. For example the dynamic markings: try it at one place so you can see what happens. This is important, because the role of the government changes: the government should adapt to different circumstances.

THE ROLE OF THE GOVERNMENT CHANGES

On a more abstract level, the role of the government will also change. Traditionally, the government organized mobility in a top-down way. Also public transport is still organized in

People at the heart of transport policy

The city of Utrecht has been shortlisted to the 4th European SUMP Award. This year's edition focuses on multimodality and intermodality in sustainable urban mobility planning, which refers to the combination of various transport modes within one trip or separate trips. Vienna has also been identified as finalist, while Malmö (Sweden) has received the award at the ceremony on 20 April in Brussels.

The jury states: "The city of Utrecht is committed to providing a high quality of life and puts people at the heart of its transport policy. Utrecht considers mobility planning to be "more than transport", with an impact that goes beyond the pure movement of people and goods from A to B. ... Utrecht is aiming to provide seamless transport options without dependence on private vehicles. This also applies to the movement of goods, reflected in an outstanding strategy to test innovative urban freight measures and further improve urban freight delivery by water and land."



a very top-down fashion. Nowadays, the government should facilitate the private sector. That can be done by having a clear vision on what kind of developments are desirable, and within what limitations. For example, there is the trend that more and more goods are ordered online. This should not lead to far too many delivery vans driving through our neighbourhoods.

Or, developments for an increase in the sharing of vehicles should be encouraged, because it will reduce the need for parking spaces.

In this way, the government should

be in dialogue with the market to decide what is best for the city. In Utrecht this way of thinking has already started thanks to the attention for new technologies in the SUMP.

The workshop helped to improve the SUMP. We think new technologies should always be part of a SUMP, but in such a way that the SUMP is flexible and able to adapt on the uncertain technological future. This workshop very much helped us in defining what new technologies are important and to define the relevance for the city. 

FYI

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The best-laid plans...



Is your transport plan a sustainable urban mobility plan, asks **Siegfried Rupprecht**

“What are your city’s development goals? Which measures have you designed to deliver your policies? How can you be sure these will be effective?”

As a mobility planner in an ambitious European city, you are likely to refer a person demanding such information to the Sustainable Urban Mobility Plan (SUMP) that your city may have recently developed. After all, developing a SUMP, is strongly suggested for European cities by the European Commission – and many forward-looking cities have such a plan. But, who determines whether

a plan qualifies as a “Sustainable Urban Mobility Plan”? Who can say if one SUMP is of better quality than another? What would be the criteria for such a claim?

The SUMP team¹ of Rupprecht Consult has developed a new tool to help answer these questions. An easy-to-use self-assessment tool, which is publicly available and free to use for all cities, assists to determine the quality of urban mobility plans, but what is “SUMP” and why has it become such a popular idea?

The concept of SUMPs has been actively promoted by the European Commission for several years. In

2010, they initiated a thorough and Europe-wide expert consultation process which resulted in the development of the essential concept characteristics, required procedural steps and eventually the release of the SUMP Guidelines in 2013 (http://www.eltis.org/sites/eltis/files/sump_guidelines_en.pdf). In addition to an English document, translations into Bulgarian, Estonian, Greek, Hungarian, Italian, Polish, Romanian, and Ukrainian are available at <http://www.eltis.org/content/sump-process>. An online version (in English) is at <http://www.eltis.org/guidelines/sump-guidelines>.

NOTE

¹ The team consists of Dr. Susanne Böhler-Baedeker, Ana-Maria Baston, Tim Durant, Miriam Lindenau, Siegfried Rupprecht, and Frank Wefering, who is now CEO of Changing Track, Research & Consulting LLC, New York.

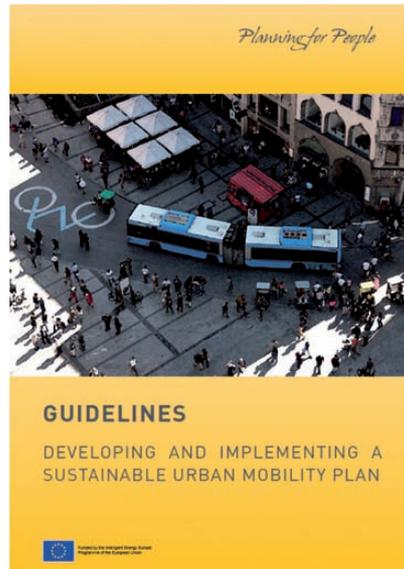
Our team was worried that the promotion of the concept of SUMP might also lead to simply relabelling traditional transport plans, so we felt that a clear and transparent set of criteria would be required to help cities understand the difference

SUMP stands for a paradigm shift in urban mobility planning: SUMP means

- planning for people rather than planning for more cars;
- promoting a balanced development of all relevant transport modes;
- advocating a shift towards cleaner and more sustainable transport modes;
- integrating closely related policy areas such as land use and spatial planning, social services, energy and environmental protection, health and others;
- placing fundamental value at a long-term vision and strategy;
- working in Interdisciplinary planning teams;
- involving stakeholders and engaging citizens through a transparent and participatory approach;
- monitoring and evaluating impacts and communicating progress towards citizens.

The concept is based on the motivation of a growing number of urban planners to adapt planning processes to deliver more effective and long-term solutions, plans that are responding more effectively than traditional plans to today's increasingly complex and interconnected urban challenges. Creating more liveable, more sustainable, more inclusive and also more competitive cities are not seen as contradictions, but as citizens' demands that policy makers should aim to fulfil.

In 2013, the European Commission generated a further push for cities



to adopt the SUMP concept when it published the *Urban Mobility Package* (European Commission, *Urban Mobility Package*, COM (2013) 913, Annex 1). On this basis, various Operational Programmes within the EU's Structural and Investment Funds now require planning authorities to develop SUMPs as a precondition to receive funds. As a consequence, transport authorities are preparing SUMPs in order to get access to Europe's major funding instruments.

WHY IS A SUMP ASSESSMENT TOOL REQUIRED?

The SUMP Guidelines have now become the key reference document for (sustainable) urban mobility planning in Europe and, increasingly on other continents. However, until now, it was not possible to assess

the quality of a plan in a systematic way: the Guidelines suggest a clear course of action, but a more concise approach is required to determine systematically if a plan is, according to transparent criteria, a "SUMP". And in fact, the European Commission's Urban Mobility Package (2013, Annex 1) demands: "*Local Planning Authorities should have mechanisms to ensure the quality and validate compliance of the Sustainable Urban Mobility Plan with the requirements of the Sustainable Urban Mobility Plan concept.*"

Therefore, it was clear that some kind of assessment mechanism would be required to fulfil the needs of transport authorities, and regional and national government – as well as European funding institutions.

Sustainable Urban Mobility Plan – Definition

A Sustainable Urban Mobility Plan is a strategic plan designed to satisfy the mobility needs of people and businesses in cities and their surroundings for a better quality of life. It builds on existing planning practices and takes due consideration of integration, participation, and evaluation principles.

(Rupprecht Consult (2014): *Guidelines – Developing and implementing a Sustainable Urban Mobility Plan*)

The SUMP self-assessment tool, developed by Rupprecht Consult and endorsed by the European Commission offers this much-needed possibility.

The primary purpose of the SUMP Self-Assessment tool is to assess the compliance of a SUMP with the EU requirements, based on the EC's SUMP concept and Guidelines, as presented in the Urban Mobility Package.

HOW WAS THE "SUMP" ASSESSMENT TOOL DEVELOPED?

Before the tool was officially launched at the 2015 Polis Annual Conference in November 2015 and made available online, it was put to the test for the City of Vienna. The Austrian capital was the first to receive a certificate of "SUMP Excellence" for its new urban mobility plan 'Together on the Move.' Over the summer of 2015, 19 other cities and independent experts carried out self-assessments and offered valuable fine-tuning suggestions. Now, the SUMP Self-Assessment tool is available online at <http://www.mobility-academy.eu/course/index.php?categoryid=15>. Any city and its planning authorities can assess their urban mobility plan against the criteria of the European

Commission's SUMP Guidelines. The SUMP Self-Assessment tool is made available free of charge for non-commercial use and is subject to a Creative Commons licence ("attribution, non-commercial, no derivatives"). The promotion of the concept is co-funded by the European Commission's CH4ALLENGE project.

HOW DOES THE SELF-ASSESSMENT TOOL WORK?

The SUMP Self-Assessment is easy to understand and the scoring is simple: The planning authority answers 100 yes/no questions in the order of the well-known SUMP circle (below).

The focus of the Self-Assessment is on *how* the SUMP was prepared: have the key features that distinguish an SUMP from a traditional transport plan been applied during the plan development process? On the content side, the Self-Assessment tool is checking only whether essential policy areas are covered, not which measures are proposed by the plan. This may be seen as a somewhat formalistic approach. However, the SUMP Guidelines as well as the European Commission Urban Mobility Package assume that a properly organised process is bound

to produce also a quality plan that meets the challenges of the city for which it was prepared and the needs of its citizens – while the definition of concrete measures must remain the responsibility of the local stakeholders and the decision making processes in place.

Each of the 100 answers awards one point ("yes") or no points ("no"). However, 13 of the 100 questions are considered "foundation questions". Failure to score a point in any foundation question means that the plan cannot be considered a SUMP. Foundation questions represent the basic SUMP requirements like minimum levels of analytical work, stakeholder engagement, policy integration, cooperation across boundaries and other essentials. The tool also includes 15 "excellence questions" that reward plans and processes of exceptionally high quality.

In addition, each of the 100 Self-Assessment questions is associated with one of the key SUMP characteristics, as defined by the European Commission's Urban Mobility Package (above right).

A full list of all questions can be downloaded from the tool page. Once all questions are answered,

How the self-assessment tool works

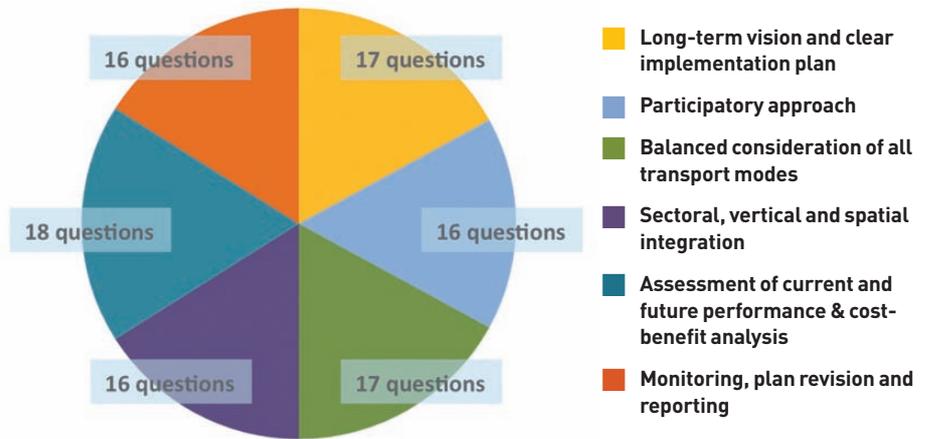


the Self-Assessment tool calculates the score and assigns a plan to one of four SUMP quality categories (below).

In addition, the tool generates a detailed analysis of the plan's quality features according to the SUMP cycle steps and the SUMP characteristics. This analysis allows cities to identify strengths and weaknesses and to improve their planning process, and the plan content. If a city opts to make data available, it can compare its plan's performance with other cities at their own discretion: a document including all answers and a summary analysis can be downloaded for further use.

WHAT CAN THE TOOL BE USED FOR?

Cities are strongly encouraged to use the free SUMP Self-Assessment tool to assess the compliance of their transport plan with the EU requirements. Increasingly, access to European funding requires the development of a SUMP on the basis of the SUMP Guidelines. Such an assessment is usually undertaken after the SUMP process has been finalised and the plan is approved. But It also has its value during the plan preparation



to check the likely compliance or to guide the development process. Using the tool can also be useful to check strengths and weaknesses of an earlier mobility plan.

On a more strategic level, national and European stakeholders may want to track the implementation status of the SUMP concept in their area. As the tool feeds a database, analyses can be made to track the progress of SUMP take-up in Europe. Rupprecht Consult is planning to publish regular SUMP Implementation Reports on the basis of this database.

An important question remains, how will certification of SUMP compliance develop? A self-assessment can not be considered as an

independent statement of quality for example towards a public funding institution. Although Rupprecht Consult offers an independent certification of quality, based on a detailed analysis of the plan and its development process, other certification mechanisms may develop over time.

WHAT ABOUT PRIVACY OF MY DATA?

This obviously raises the question of data privacy: a city may not be interested to let the world know about its weaknesses in mobility planning! While, there is a clear commitment from Rupprecht Consult to keep any provided data strictly confidential – and to publish only non-identifiable

Plan not a SUMP 0-24 points	The planning process does not sufficiently comply with the SUMP concept and the resulting plan should not be considered a Sustainable Urban Mobility Plan.
Foundation SUMP 25-49 points	A planning process based on the SUMP principles has been followed and the resulting plan meets the criteria of a Sustainable Urban Mobility Plan.
High Quality SUMP 50-74 points	A planning process in strong compliance with the SUMP principles has been followed and the resulting plan is a Sustainable Urban Mobility Plan of high quality.
Excellent SUMP 75-100 points	A planning process with a very good compliance with the SUMP principles has been followed and the resulting plan is a Sustainable Urban Mobility Plan of excellent quality.


European Platform on Sustainable Urban Mobility Plans
 22 Sep 2015
SUMP Self-Assessment Scheme
 City ABC
 Overall score: 78 out of 100.

Congratulations, based on the answer is a Excellent Sustainable Urban Mobility Plan. A planning process in full compliance with the SUMP concept has been undertaken and the resulting of excellent quality.

Foundation and Excellence Questionnaire
 You have answered Yes to 13 out of 13 Foundational questions. These questions test the basic requirements a city must meet with the SUMP concept.
 You have answered Yes to 10 out of 15 Excellence questions. These questions highlight planning activities that motivate and award processes and plans of excellence.

SUMP Cycle Steps
The table below provides a breakdown of your score in relation to the main characteristics of a SUMP.

Step	Score	Max. Score
1 - Determine your potential for a successful SUMP	6	6
2 - Define the development process and scope of the plan	0	11
3 - Analyse the mobility situation and develop scenarios	2	7
4 - Develop a common vision and engage citizens		
5 - Set priorities and measurable targets		
6 - Develop effective packages of measures		
7 - Agree on clear responsibilities and allocate funding	0	6
8 - Build monitoring and assessment into the plan	0	11
9 - Adopt Sustainable Urban Mobility Plan	2	7
Total	78	100

SUMP Characteristics
The table below provides a breakdown of your score in relation to the main characteristics of a SUMP.

SUMP Characteristic	Your Score	Max. Score
Long-term vision and clear implementation plan	11	17
Participatory approach	14	16
Balanced consideration of all transport modes	17	17
Sectoral, vertical and spatial integration	14	16
Assessment of current and future performance & cost-benefit analysis	17	18
Monitoring, plan revision and reporting	5	16
Total	78	100

Sample output from the SUMP Self-Assessment Tool

summary information, there is also an even safer solution: the Self-Assessment tool can be used anonymously.

CAN I USE THE TOOL IF I AM NOT AN SUMP EXPERT?

When designing the tool, an important requirement was to create a straightforward and easy to understand

system, also suitable for non-expert users. This meant in practice that the Self-Assessment had to be part of a larger learning environment: terms are hyperlinked to a glossary on the ELTIS website, extensive references are provided to an online version of the SUMP Guidelines, and various documents and a training course provide all necessary information to

fully understand the Self-Assessment and its background. Soon, the CH4ALLENGE Project will publish additional training courses on specific aspects of sustainable mobility planning. All these learning resources are part of "mobility-academy.eu" a free learning environment hosted by Rupprecht Consult, and covering a range of urban mobility topics. 

The SUMP Self-Assessment Tool in short

- Tool to **assess compliance** with the EU SUMP guidance.
- Primary use as **self-assessment** after plan completion. Additionally to assess previous plans or before/during **plan preparation**.
- **Transparent concept** with 100 easy to understand yes-no questions, following SUMP cycle.
- Provides **feedback on strengths and weaknesses** (for steps and SUMP characteristics), with a clear **overall score**.
- Focus on **planning process**, only completeness check of content.
- **Publicly available** tool for any type of city, usable at own pace.
- Available for **free** (for non-commercial use only).
- Part of a **learning environment** with online guidelines, glossary, training courses.
- Strategic use as a **progress monitoring** and **quality verification** tool.
- **Quality tool** developed by the authors of the SUMP Guidelines, approved by the European Commission.

FYI

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Further information on the use of the SUMP Self-Assessment Tool is available from sump@rupprecht-consult.eu.



Traffic Law Enforcement

Police & Security ANPR

Traffic Data Management

Traffic Safety Services

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Smart from the start

The Old Oak and Park Royal Development Corporation (OPDC), launched in 2015 by the-then Mayor of London, Boris Johnson, is driving forward development of the UK's largest regeneration site. **Justin Anderson** talks about how #HyperCatCity is helping the OPDC embrace smart thinking and technology right from the start to deliver benefits for citizens and businesses alike

Cities are dynamic engines of creativity and growth. Yet, in the UK, our largest urban centres have sometimes fallen short of their growth potential. They are also financially constrained – like many other cities in Europe and beyond – and need to make significant savings at the same time as delivering improved services. The pressures are only set to increase, with an aging UK population that is forecast to rise to 74 million within 25 years. Driving out incremental efficiencies in service delivery aren't enough to solve these challenges. We need a smarter approach.

New technology is making it possible to incorporate “smart” right through the design, construction and operation of major city infrastructure. The UK has started to embrace this new thinking, with a fast-accelerating approach to making its cities smarter, to deliver improved services at lower cost. The government is actively backing smart cities, including through Innovate UK funded competitions. Together with strong local leadership this has kick-started projects across multiple cities, including Glasgow, Bristol, London and Milton Keynes to name just a few examples. These initiatives are driving innovation, creating growth and local employment opportunities.

If the UK gets this right, there is also massive export potential. The Department for Business Innovation and Skills (BIS) has estimated that there is a £300 billion (€420 billion) global market for smart city services.

Moreover, the earlier into a project that smart approaches are considered, the greater the benefits. The best place to start is with a clear view of the needs, challenges and

Old Oak and Park Royal is the UK's largest regeneration site



Images: OPDC

The [UK] government is actively backing smart cities... Together with strong local leadership this has kick-started projects across multiple cities



Old Oak and Park Royal's redevelopment spans the Grand Union Canal

desired benefits for citizens, businesses and the public sector. This needs to be backed by a strategic approach to data, addressing how it can be securely shared, then turned into insights and improved services. Crucially, the data strategy needs to reflect the needs of all stakeholders, with sufficient flexibility to meet the evolving requirements of multi-decade infrastructure programmes.

Much of the data will come from connected "things" that sense their environment and can put real-time control of services in the hands of cities, their suppliers and citizens. This "Internet of Things" (IoT) is an integral part of the development of smart cities today and in the future. The IoT combines the intelligence from everyday connected objects (from streetlights to smoke alarms) to provide insight and improved services – all of which will be part of making cities smarter and better places to live.

OLD OAK AND PARK ROYAL – THE UK'S LARGEST REGENERATION

The Old Oak and Park Royal Development Corporation is leading the way by embracing smart from the

start. Old Oak and Park Royal is the UK's largest regeneration site and is set to be home to a vast High Speed 2 (HS2) and Crossrail Station by 2026. The new station will be the size of London Waterloo, handling 250,000 passengers a day and acting as a superhub between London and the rest of the UK, Europe and the world.

The outgoing Mayor of London, Boris Johnson, launched Old Oak and Park Royal Development Corporation (OPDC) on 1 April to drive forward future regeneration of the site and deliver up to 25,500 homes and 65,000 jobs.

As well as creating the standard-bearer for new sustainable neighbourhoods, it will also be an exemplar in 'smart' regeneration – embracing the latest technological advances to boost economic growth and quality of life.

#HyperCatCity (HCC) is working with the OPDC to create its smart strategy. #HyperCatCity is a consortium driving interoperable smart city innovation.

Victoria Hills, OPDC's Chief Executive Officer said: "We are delighted to join forces with #HyperCatCity. Together we will

explore and encourage technology, innovation and smarter approaches to help plan, design, build, and finance the UK's largest regeneration project. In doing so it will help OPDC deliver broader goals to create an exciting and thriving place which is fit for the future, responds to climate, demographic, and urbanisation changes; that is resilient; and is somewhere where people enjoy and wish to live, work, play and visit. Where innovation and smarter technology can be used to deliver an end goal, that is what we'll be encouraging."

The smart strategy has a broad scope, reflecting the needs and opportunities across Old Oak and Park Royal. This breadth also reflects the role of the OPDC as an exemplar in 'smart' regeneration.

Input to the strategy has come from an extensive series of workshops organised around eight themes. These themes include vertical specific areas such as "smart utilities infrastructure" and "smart and safe transport"; horizontal technology requirements such as "access to data"; as well as the need to ensure that smart translates into "people centric cities and community services". Hundreds of people have been involved in workshops across these themes – ensuring that the best ideas can be "crowdsourced" and fed into the smart strategy. This open approach has drawn in a wide set of smart thinkers from across big and small businesses as well the public sector.

The #HyperCatCity consortium will also consider approaches to financing, governance and procurement across these areas. It will provide smart thinking and solutions to address urban challenges and opportunities across the UK and internationally. #HyperCatCity's backers have already been working together on UK and international smart city bids.

THE IMPORTANCE OF INTEROPERABILITY

#HyperCatCity builds on the success of the HyperCat standard which is making Internet of Things data more discoverable and interoperable. This addresses two of the central challenges of the rapidly evolving Internet of Things: firstly, how to find relevant and trustworthy data from connected “things”; and secondly how to make it easier for those things to talk to each other.

While it may sound like a dry technical issue, solving the interoperability challenge has the potential to unlock trillions of dollars in value worldwide. Indeed, a recent McKinsey report estimated that this interoperability is essential to unlock 40 per cent of the US\$11 trillion (€10 trillion) estimated future value of the IoT.

Interoperability will also be highly important to support the development of the planned Level 3 Building Information Modelling (BIM) for the built environment. BIM Level 3 is the centre-piece of the public and private sector initiative to create a Digital Built Britain which has the potential to deliver £billions in efficiencies for the construction and facilities management industries. Moreover, as the UK government’s strategic plan for a Digital Built Britain recognises, Smart City and Internet of Things (IoT) technologies have a key role to play.

BIM Level 3 will ensure that the 3D models and intelligence created in design and construction can be fully leveraged by building and facilities management teams. For this to work in practice, it will be essential to share data and re-use it in applications well beyond its original purpose – for example 3D modelling of train station assets created at the time of design and construction could later be related to real-time information on people flows or predictive maintenance of equipment.

HyperCat should be seen as very much complementary to the



Artist's impression of the finished regeneration scheme at Old Oak and Park Royal, London

HyperCat has already achieved strong traction – it is backed by around 750 organisations including many industry-leading players. The standard is already being implemented today

evolution of BIM. For example, HyperCat can refer to existing catalogues of data – which could include the libraries and classifications that will be created under BIM Level 3.

HyperCat has already achieved strong traction – it is backed by around 750 organisations including many industry-leading players. The standard is already being implemented today, in buildings and across the wider built environment through a set of vertical “spearheads”. This includes two spearheads related to asset management and tracking in buildings, one related to highways infrastructure and a host of other smart city related applications.

THE FUTURE OPPORTUNITY

The smart strategy for Old Oak and Park Royal has a broad applicability to

other major developments and smart city initiatives. Old Oak and Park Royal touches on a wide range of challenges and opportunities that are seen elsewhere in the UK and internationally in the smart cities arena. There is an aspiration that it is seen as an exemplar in ‘smart’ regeneration – embracing the latest technological advances and smart thinking to boost economic growth and quality of life. As such, the OPDC smart strategy will provide a series of insights that will be highly relevant to the cities in the UK and internationally. 🌐

FYI

Justin Anderson is Chief Executive Officer at Flexeye

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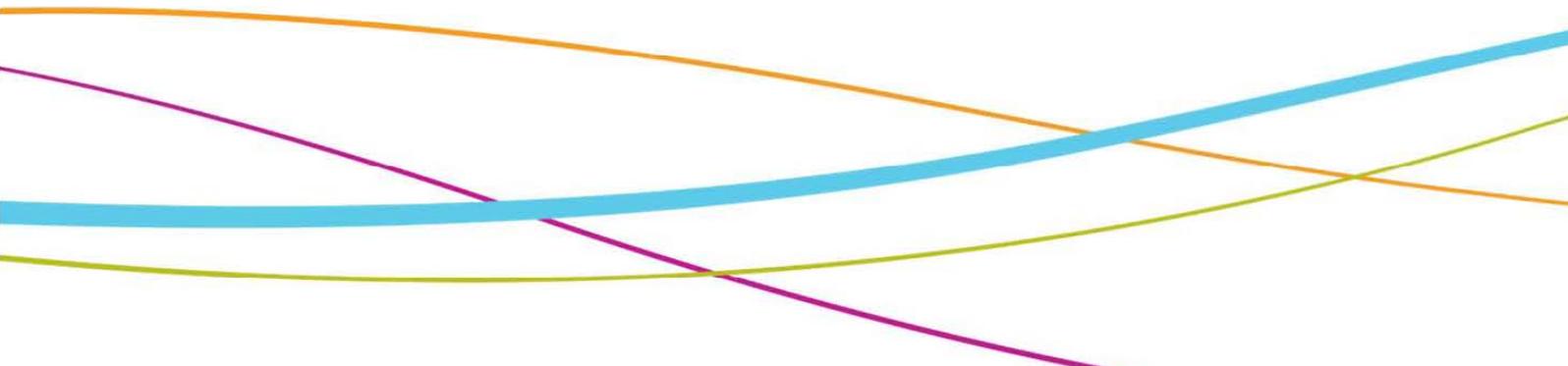


The 2016 Polis Conference takes place on 1 and 2 December in Rotterdam.

The Annual Polis Conference provides an opportunity for cities, metropolitan areas and regions to showcase their transport achievements to a large audience, and for the wider transport community to engage with representatives of local and regional authorities on innovative transport solutions.

The conference offers a mix of high-level plenary sessions, with prominent figures debating topical issues and trends, and technical sessions showing innovation in policy and practice across the transport spectrum.

<http://www.polisnetwork.eu/2016conference>



School of thought

Langley Hall Primary Academy, an independent school in the South East of England, has gone from logistical nightmare to peace of mind thanks to some particularly smart mass transit thinking. **Vibeke Ulmann** takes up the story

When Sally and Chris Eaton took up the challenge under the UK Government's new scheme for the establishment of free schools in 2011, they had never imagined the rapid growth they would achieve in just three years. By 2014 Langley Hall Primary School Academy (LHPA), near Slough in Berkshire, had grown from 182 pupils in one location at its inception, to 728 aged 4 to 11 in two locations.

The logistics for pupils having to be ferried around for various activities was simply staggering. The school also operates a pickup service in morning and drops children home after school. LHPA further serves lunch for all pupils, and must adhere to the Food Standards Agency rules and regulations on allergies, hence staff need to know each individual child's allergies, intolerances and religious beliefs/strong dislikes, as well as appropriate medical action in case of an emergency. Add to this pre- and after school clubs and LHPA was simply faced with a logistical nightmare. This is why Sally Eaton had to endure several months' worth of sleepless nights before she could begin to consider that a technology solution might be able to ease the administrative burden and give the staff peace of mind. Discussing the idea with her friend and former colleague Chris 'Ziggi' Paul, an expert Dyalog APL programmer, the idea for the Laser Learning with Near Field Communication (NFC) Solution quickly gained momentum. (Chris Paul's nickname takes on a certain



degree of importance to the story, as you will discover.)

ZIGGI'S STARDUST

In 2010 the UK Government opened the possibility for the establishment of free, privately run schools. Sally and Chris Eaton had previously run a group of schools and nurseries that they sold, before establishing the Childcare Company for the purpose of delivering an online training facility for nursery staff. They knew Ziggi from their previous business and, being an experienced software developer, he developed the Childcare online training solution using Dyalog APL with an ASP.NET web front-end. The solution was developed over a mere three months and won the Nursery Supplier/Innovator 2008 Award at the Nursery Management Today Awards. The Childcare Company's Laser (Learner's Assessment, Support and Evidence Resource) Solution is currently in use by organisations in 12 countries, including the MoD, who

run nurseries on all their bases around the globe, and the solution has helped hundreds of thousands of users completing their nursery training online.

Sally, who is now head of LHPA said: "The more I worked with the Childcare Company, the more I missed being hands-on with the children. So when I saw the opportunity to run an Academy, I decided to apply. The application went in, in June 2010, and in July we were confirmed as one of the first 24 schools to move forward. We spent some time looking for appropriate properties and I knew Langley Hall as I live in the area. The building, then hidden by large trees, is lovely and belonged to Berkshire College. We knew that the College was starting a two-year refurbishment programme which meant that the building would become obsolete, so we managed to persuade them to bring forward their plan and sell the building to fit our timescale. Although we did share some of the

By establishing LHPA we are able to offer children from non-affluent, multicultural backgrounds, the kind of education that previously has only been available to those who can afford to pay for private schools

building with the College at first, we managed to open the school in September 2011 with 182 children.”

GETTING THE IDEA FOR A TECHNOLOGY SOLUTION

By September 2012 LHPA had doubled in size to 364 children, with 500 on the waiting list, as Sally explains.

“There is a real shortage of schools in the area. By establishing LHPA, for the first time, we are able to offer children from non-affluent, multicultural backgrounds, the kind of education that previously has only been available to those who can afford to pay for private schools. The growth was phenomenal! Normally when you start a school, you have a reception year, and it takes four to five years to build it up the level we achieved in 12 months. Originally the plan was to only run the school at this site, but we were approached by a private school about a mile away who were closing down. They had a 10-year lease on their buildings and suggested that we took it over. As we had 500 children on the waiting list, we applied to the Department for Education for the expansion, and were given permission

to do this. So, by September 2013 we suddenly had 676 pupils over two sites – Upper School and Lower School – with all the administration and logistics that involves. On top of that, we have a School Dining Hall across the road from LHPA, and the swimming pool at Lower School. We started to run a shuttle bus service between the two sites, before- and after-school clubs, as well as a collection and drop home minibus service. Quite frankly, I was worried sick that we could not keep track of all the children, at all times. So I suggested to the Governors that we use a technology solution to help us.”

Ziggi picks up the story, “After the success of The Childcare Company we split the software development into a separate company called Laser Learning in 2009. Laser Learning was hired to run the IT solution at LHPA, which effectively meant that I was their IT manager, as well as looking after the software development in Laser Learning. So when the Governors approached me in November 2013 with the idea of using a Laser system, I started thinking.

I could see the admin staff working with huge paper spread sheets trying to line up which children were doing what, which after school clubs they were supposed to attend, if they had to go swimming, get picked up before school and so on. Having previously developed a Nursery Staff training solution for another company in Dyalog APL with an ASP web frontend, I thought the same method could be used for LHPA.

“I started the software development in January 2014, and the first thing we did was to create a solution for booking after-school clubs. It worked brilliantly. And then we started adding more functionality. When the idea of adding the shuttle buses and the minibus services also entered the equation, I thought that Near Field Communications (NFC) would be the easiest solution. NFC works by tagging. Each child is issued with a wristband (called a ‘Ziggiband’ as the children wanted a name for the bands and some thought that the N printed on them, meaning NFC, was a Z when worn around the wrist and presumed that was after their ‘inventor’) as well as a backup tag on their school tie and bag. By the Easter I had a prototype ready for testing, and used the Easter Club children as ‘rabbits’ – the children preferring to be called rabbits rather than ‘guinea pigs’. We then thought about adding school lunches so parents could choose in advance what their child would have for lunch, and then we thought we would add medical information as well. After some



LHPA's Ziggi bands



dinner pre-booking came into it, and parents now pre-book school dinners for the full term (6 weeks). The children are scanned out of the Langley Hall site and we have walkers who take them across the road. They're then tagged again when they queue in the Dinner Hall so we know they're off site here, and on site in the Dinner Hall. At the same time, the catering staff serving lunch view a screen above the food, which shows a picture of the scanned child as well as name and class. It also shows if a child can have beef or not, is allergic to eggs for example, and can then make sure that they do not give children anything they should not have. It gives great peace of mind."

THE SOLUTION IN PRINCIPLE

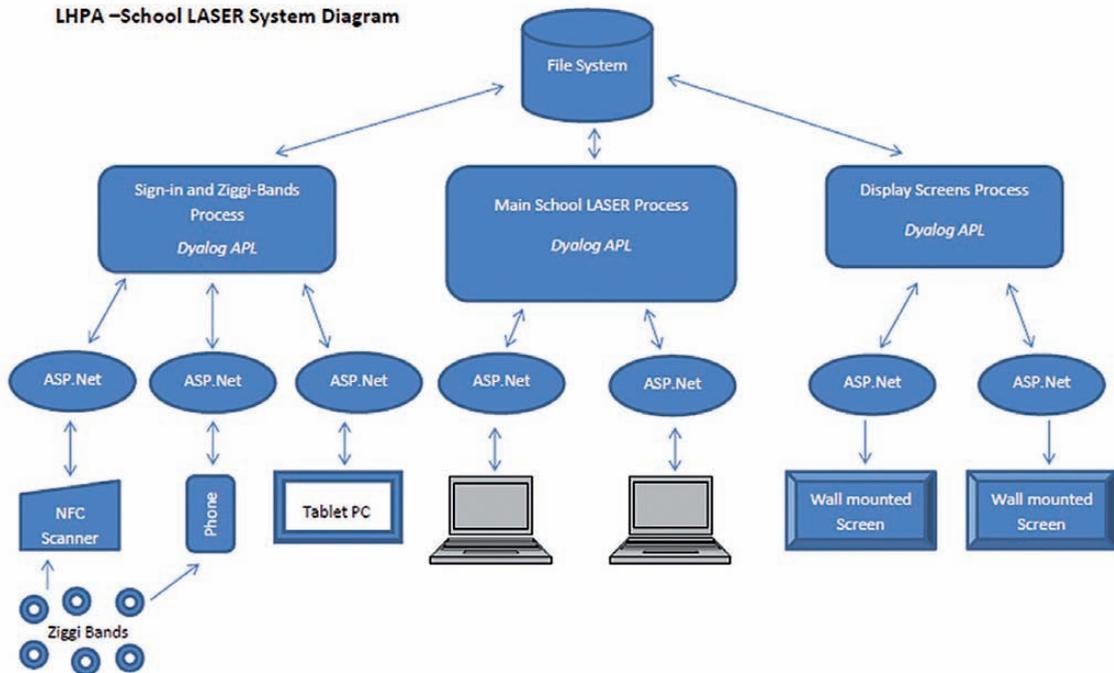
Ziggi explains, "Once I had the idea for the format, it kind of rolled on. The most important thing is that you have to think in exceptions, rather than rules. As an example; what about a child who has two different medical conditions, that needs to be covered

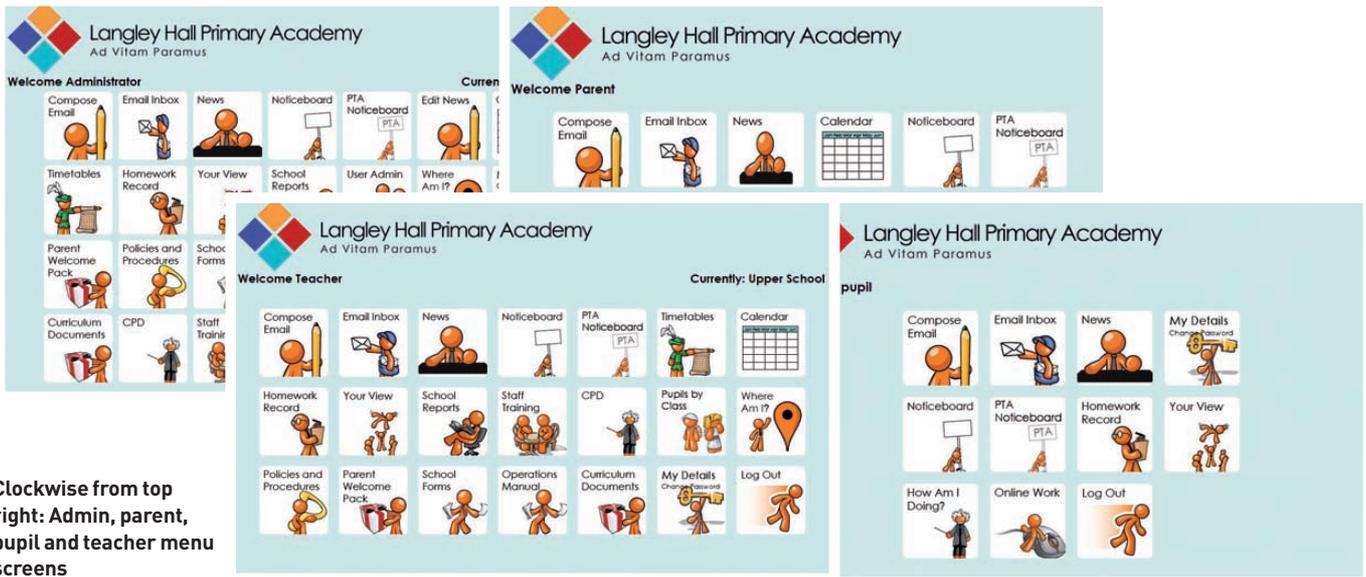
as well. You have to think about all the circumstances of all exceptions, which is why we decided to show allergies, intolerances and religious conviction/dislike in all cases. One statement doesn't cover it all. Dyalog lends itself admirably to fast prototyping so all in all I probably spent 1 month between January and Easter programming the first prototype. All of the data management is done in Dyalog and the frontend is programmed in ASP and the interface is a webpage. It is essential that the system is fast and real time. Dyalog APL in itself is fast, so it lends itself admirably to this solution. When the NFC came into play, I knew it was the obvious way to go. But I had to sit down and find out how it actually worked! The management of the NFC is also done in Dyalog. The scan kicks off a web page which kicks off an APL session, or it uses the existing APL session, to send data into the system. As people use the NFC tags, it registers and keeps the information real time, so the screens that

the staff look at, changes all the time. In terms of speed, we are obviously relying on the internet connection more than anything else. And if you're out in the field or on the minibuses, they use mobile phones, so there we are relying on mobile coverage. There are a couple of black spots, so I am in the process of developing an app which will register for example when children boards, or get off, the bus – which will automatically send the data once there is mobile coverage again. The amount of data we're managing is really quite remarkable."

Sally says, "The system really works, and outside of saving us a massive amount of paperwork and time, we recently had an instance where a child, who normally takes the minibus home from school, had forgotten that her Mum was picking her up. When the Mum arrived we looked at the system, ascertained that she was on the red minibus, phoned the driver and asked him to return to the school with the girl."

LHPA –School LASER System Diagram





Clockwise from top right: Admin, parent, pupil and teacher menu screens

ADMINISTRATIVE SAVINGS

Kate Judd works in the School Administration Office and is responsible for Clubs and Transport. “The live feed shows us every time a child is tagged somewhere; in or out of the building, she explains. “It also shows us if someone signs in on the iPad in the Reception in the entrance Hall (as the author did as a visitor upon arrival). It also tracks when staff arrives and leaves. And you can see the children being scanned over the road in the Dinner Hall. They are colour coded, and as the queue moves, they change colour.

“The reds are the ones which are literally being scanned now. It moves really quickly this time of the day. You can read the time, but as it’s red it stands out, so it’s easy to spot who is being scanned right now. So if something happened within the past 5 minutes we get the information instantly.”

“Outside of checking that the children have gone over to the Dining Hall and they’re scanned out of this building, we use the live feed for shuttle busses between the sites – on and off – they’re also colour coded, so we can see what time they get on and off. When the Mini busses take them home after school, they scan

the children on and off the bus, so we – and the parents – know their child has been dropped home. If a bus breaks down, we can see who is on-board, and who needs to be picked up on the route. I can also see when swimmers go across. We shuttle bus them to Lower School for swimming, so I can see who has gone off site here, and I know when they have checked in at the pool.”

“We use the system a huge amount – even just to check where a child is during the day. If a child has not gone across to lunch we can find them, and get them over there. It’s massively useful. Prior to Laser, everything with regards to busses and clubs were done manually. I had to sit a type up every child’s movement after school, which was a nightmare from the perspective that they could finish school at 3p.m. go off to an art club until 3.30 p.m., go to a holding club until 4p.m. – both at Lower School, then go on a shuttle bus to come over here to Upper School, go to another club at 4.15p.m. until 5p.m., and then go on a Minibus to go home. And I had to register this for every single child every day.”

“If we have a child come to us after school, and the teacher says they should be in drama club, or they

haven’t been collected where they should be, we scan the child, and the system tells us exactly where that child is supposed to be at this point in time. We used to be two full timers doing this, and now I am part time.” Kate smiles.

Having now seen the system in action, the author is particularly impressed with the speed at which 728 children are served their pre-booked lunch. There is limited time allotted for lunch, and it’s as smooth an operation as walking through the underground and touching your Oyster Card to a pad.

The savings in time and administration and manual typing, in terms of tracking children going to clubs, buses boarded/buses alighted, swimming pool, on or off site, are equally impressive. The conclusion can only be that any primary and secondary school in England ought to have a similar system. ☺

FYI

Vibeke Ulmann is Director of Catalyst Communications
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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

- o **Intelligent Video Surveillance** – How to significantly reduce bandwidth and storage requirements in IP-based video surveillance systems for smart cities, by Stefan Lundberg



it makes little sense to invest in high quality cameras when reducing the video bit rate, resolution or frame rate to a level where important details are no longer captured and footage does not provide clear evidence

Compression suits

How to significantly reduce bandwidth and storage requirements in IP-based video surveillance systems for smart cities, by **Stefan Lundberg**

Over the course of the past 10 years we have seen surveillance camera technology steadily advance offering better and better image quality and detail. Today's cameras feature Megapixel and full HDTV image resolutions with first models already taking the leap to 4K Ultra HD. Frame rates up to 60 fps are not uncommon. Wide

Dynamic Range technology enables today's cameras to capture detailed images even in complex scenes with high contrasts such as when sunlight creates both very bright zones as well as very dark shadow areas. Advanced image sensors allow for color video even in very dark and extreme low-light conditions.

With these advances in surveillance

camera technology the requirements in terms of bandwidth and storage consumption have steadily increased. This has put a lot of pressure on system operators to manage the underlying network infrastructure as well as storage resources in a smart way. After all, the best video surveillance evidence is of no value at all if the system was configured to automatically overwrite the footage before it was needed. Also it makes little sense to invest in high quality cameras when reducing the video bit rate, resolution or frame rate to a level where important details are no longer captured and footage does not provide clear evidence anymore.

THE H.264 VIDEO COMPRESSION STANDARD

Most IP-based video surveillance systems today are based on the H.264 video compression standard lowering bandwidth and storage requirements. This is achieved by reducing and removing redundant information. The video compression algorithm identifies regions in the video that have already been transferred and do not need to be sent again in the next image frame. However the H.264 standard does not specify the algorithm used to compress video but only the syntax and the method to perform playback. This allows for improved H.264 encoding solutions to be created while maintaining the same file format for interoperability with existing H.264 network infrastructure and video management software.

Regular video stream at 1254 kbit/s



Axis' Zipstream technology at 601 kbit/s



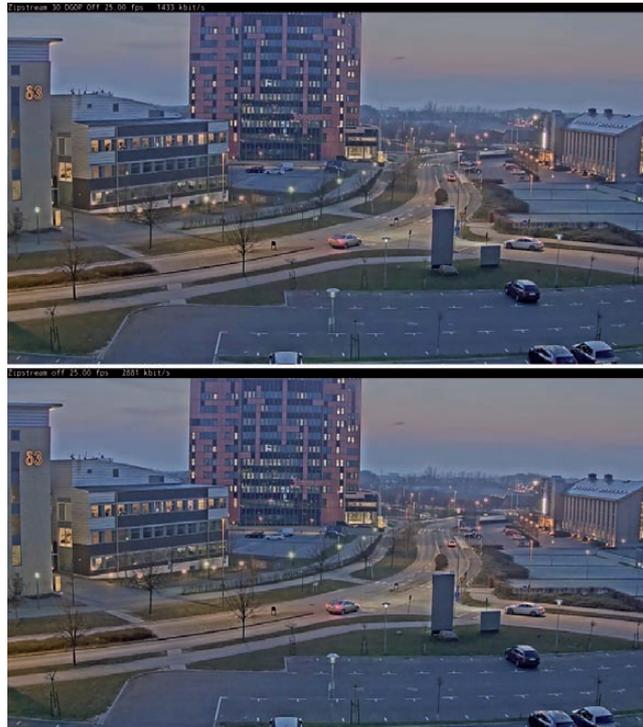
IMPROVING H.264 COMPRESSION

This is where Axis saw the opportunity to take the H.264 compression standard to the next level. Fully compatible with existing H.264 network infrastructure and video management software, the Zipstream technology is a radically more efficient H.264 implementation, lowering bandwidth and storage requirements by an average 50 per cent or more. This is achieved by adding a new module inside the video compression engine of a network camera that ensures that important details in the image get enough attention in the video stream while unnecessary data can be removed.

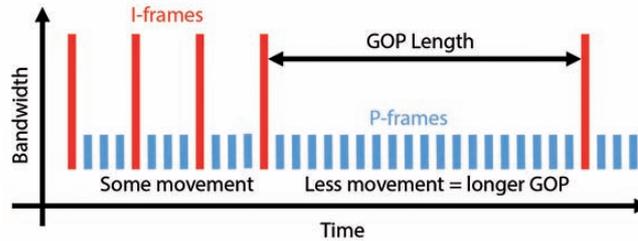
Axis' Zipstream technology analyzes and optimizes the network camera's video stream in real-time. Scenes containing interesting details are recorded in full image quality and resolution while other areas are filtered out to optimally use available bandwidth and storage. Important forensic details like faces, tattoos or license plates are isolated and preserved, while irrelevant areas such as white walls, lawns and vegetation are sacrificed by smoothing in order to achieve better storage savings. Zipstream reduces the bit rate of the video stream by applying the concepts of dynamic Region of Interest (ROI) and dynamic Group of Pictures (GOP).

DYNAMIC ROI

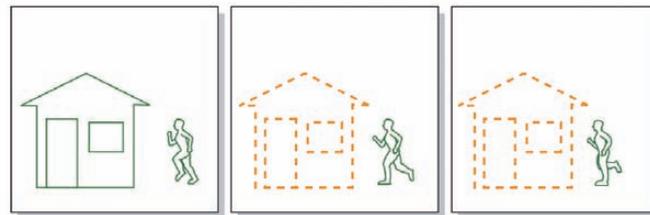
The dynamic ROI optimizes bandwidth in real-time by analyzing where available bits will offer the maximum benefit from a forensic perspective. This process is performed for all image content, resulting in a totally flexible dynamic ROI. This dynamic ROI automatically expands, shrinks, changes shape, splits, merges, disappears and reappears depending on content, to optimize bandwidth and storage consumption in real time. Since it is unknown in which parts of the image relevant information may appear, Zipstream prepares the system for



Zipstream comparison



Zipstream dynamic GOP



— Transmitted — Not transmitted

The bit rate of the video stream is reduced by applying the concepts of dynamic ROI

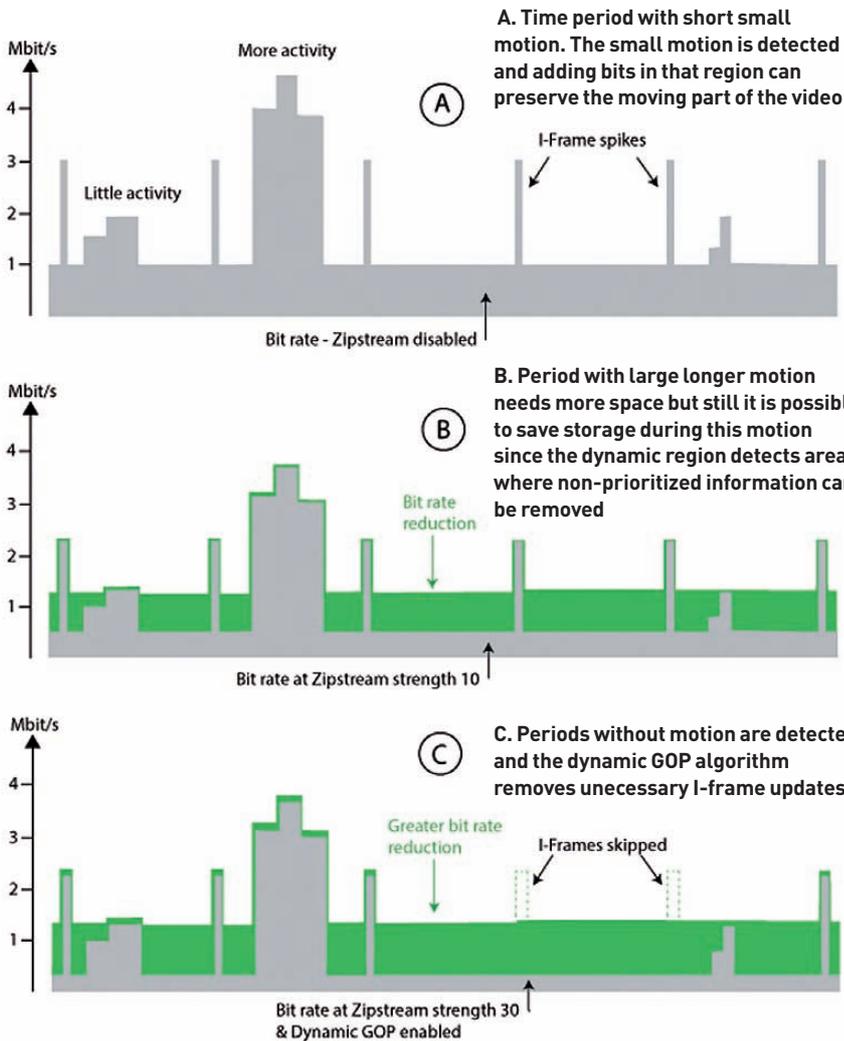
unexpected events. This dynamic automatic ROI is much more efficient than other ROI implementations where the region is set manually.

DYNAMIC GOP

The dynamic GOP reduces the bit rate by avoiding storage consuming I-frame updates. I-frames contain all details in an image while following

P-frames and B-frames build upon the preceding I-frame and contain only the changes in the image, not the entire image. Typical surveillance scenes with limited motion can be compressed to an extremely small size this way without any loss of detail. Zipstream automatically adapts GOP length in real-time depending on the amount of motion

Want more about transport issues concerning smart cities and regions?



in a scene. This allows for always the optimal setting being applied reducing bandwidth and storage requirements significantly without compromising on image detail should an incident occur.

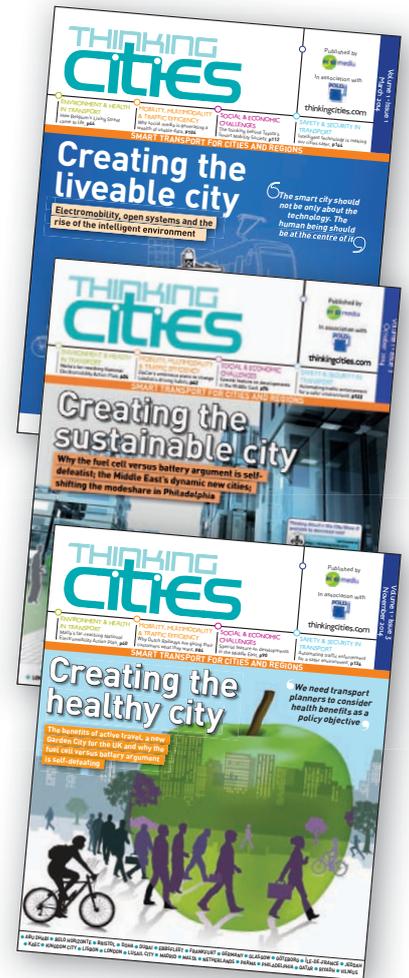
WHAT ABOUT H.265?

The H.265 standard is still very new. If we take a look back at how many years it has taken until H.264 was broadly supported by both hardware and software vendors in the video surveillance industry then it's fair to say that the market will still take some time. A big hurdle on the road to H.265 is certainly the steep migration path. Not only do the cameras have to support H.265 but also all other elements

of a video surveillance system and the underlying network infrastructure – be that video encoders, storage systems, video management software or intelligent video analytics solutions. Zipstream offers an open, non-proprietary approach to the bandwidth and storage challenges at hand without the need to invest in new hardware and software. ☺

FYI

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