And yet it moves
An innovative IT system generates a new dynamism in the field of multimodality

Chip ahoy!
How digitalization will bring about a revolution in traffic engineering

"Holistic approach needed"
Interview with Fritz Kuhn, Mayor of Stuttgart and leading member of the Green Party

Rethinking mobility
How modern cities manage to keep sustainably on the move
The task for municipal authorities is to steer those pre-programmed changes in such a way as to ensure that everyone will benefit
When the wind of change blows, some build walls and others build windmills,” says a Chinese proverb. Which of these alternatives is preferable seems obvious, at least when it comes to meeting the challenges faced by the mobility systems of the future. Because no matter whether we are talking about the increasing demand for transport, the ambitions of the new players in the market for mobility services, or current megatrends such as electromobility or automated driving: Ultimately none of these can be stopped. The task for municipal and regional authorities is rather to effectively steer those changes, which have long since been pre-programmed, so to speak, in such a way as to ensure that everyone will benefit from them.

The chances are looking good, even though today’s strategies for designing the mobility of tomorrow are of course encountering their limits. Our current interviewee, Stuttgart’s Lord Mayor Fritz Kuhn, detects a high degree of willingness to rethink mobility in all stakeholders, transport users as well as transport authorities.

Fortunately, modern information and communication technology is paving the way to developing the right tools that will give our mobility systems the flexibility that is so needed in these turbulent times of far-reaching transformation. Of course, this applies not least to the holistic networking of private and public transport – one of the prerequisites for the success of multimodality, without which maintaining an efficient urban mobility will hardly be possible in the future.

So to build the proverbial windmills when the wind of change blows, mobile society needs two things: innovative thinking and innovative technology. That is why the following pages are focusing on both those facets. As always, I wish you an enjoyable read.

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“A great willingness to rethink mobility”

Interview Fritz Kuhn, Lord Mayor of Stuttgart, on the shortcomings of today’s responses to questions about tomorrow’s mobility, the most important landmarks on the collective path towards sustainable change, and his very personal vision of urban transport in the year 2030.
Focus

Mr. Kuhn, as the first mayor of a German state capital to belong to the Green Party, you have already made history with your inauguration in January 2013. Achieving this success in Stuttgart, the home of Daimler and Porsche, makes it doubly remarkable. Do you remember the wording of the congratulations from Untertürkheim and Zuffenhausen, the boroughs where these two famous car companies have their headquarters?

Regarding the text, I cannot remember the precise details, but I recall there was a certain curiosity about the priorities of a Green Party mayor. That was why I started early on to open up a dialogue with these companies. Today we maintain good and regular communication with all employers in Stuttgart. Car manufacturers and their suppliers are not the only businesses. The issue of mobility is of concern to everyone.

The environmental impact of transport can only be sustainably improved by working with the car industry rather than against it. That was more or less the politico-philosophical basis on which you entered into dialogue three years ago. To what degree do you see this approach as having been confirmed?

We are on the road from being a car-friendly city to being a mobility-friendly, sustainable city. This is really only achievable by working together with the automotive industry. After all, the industry is vital to the livelihood of Stuttgart and the region. My concern is that people are able to travel to Stuttgart easily and move around the city without any problems. These days, commuters are part of a metropolis like Stuttgart. The city relies on manpower, the retail sector on customers – including those from the surrounding area. We are determined to expand public transport, which is already an attractive option, and to promote cycling and walking. We are working on the smarter control of traffic and also reducing its impact on quality of life and the environment. Some people may or may not want to give up their cars. Here electric vehicles are an environment-friendly alternative, one which the city itself is using intensively.

Stuttgart was and is the driving force behind the “Cities for Mobility” initiative, an international network of local decision makers, transport and urban planning experts, scientists and companies from over 80 countries. How can...
“Cities for Mobility” improve the world of mobility?

There are innovative approaches to improving mobility throughout the world. Because of its practicality and versatility, “Cities for Mobility” is an ideal platform where we can learn about solutions and ideas developed by other players or cities and share our own approaches to the issue. The network brings together people who would not otherwise meet. It is an active exchange forum, especially at the CfM congress in Stuttgart every two years, but also at other times in-between these events. Incidentally, Siemens is one of the partners of the network. I am very grateful for their support.

Which issues concerning the mobility of tomorrow are basically reaching the limits of the strategic responses of today?

We can predict with reasonable accuracy how mobility will change technologically. Automated driving is just starting out, and autonomous driving will be reality in the future. However it is difficult for us to predict what this will mean for people’s mobility behavior. In the coming years it will be all about redefining the public space. Cyclists and pedestrians need more space. This leads to a conflict of interests on the streets. Our shared responsibility is to change the culture of mobility so that it can sustain the transformation.

As part of your Traffic Development Concept 2030 you have worked out an action plan entitled “Sustainable Mobility in Stuttgart”. Which of the objectives and measures defined in this document are particularly close to your heart?

I have complemented the existing long-term transport development concept with “Sustainable Mobility in Stuttgart”, a rolling action plan that will be updated regularly. Of particular importance to me are the measures that bring about a change in the culture of mobility and encourage more people to switch over to other means of transport. As a city we have set the example and started subsidizing a job ticket, which is now encouraging more and more municipal employees to use public transport. Numerous companies, and also the Federal State authorities, have already followed our lead. With the so-called polygo-card we are introducing a kind of citizen card that is not only simple to use for transport or car sharing, but also for charging stations and parking. The card can also be used for city facilities such as the library and much more. Another important issue is corporate mobility management, i.e. supporting companies in solving their mobility issues. These are all examples of measures that may lead to a different culture of mobility and a better quality of life.

So before real change takes place there must be a rethinking process?

Rethinking works best if citizens change their behavior voluntarily. To achieve this, we must define policies that provide the right incentives. This can be seen in the example of electric vehicles. Whether or not I buy an electric car does not only depend on the price, no matter how helpful the new purchase bonus may be. As a citizen, I want to choose from a wide range of models and I expect a dense network of charging stations. And I need information. That is why we regularly organize events where people can find information about electro-mobility and can try out various vehicles. We want to accelerate the shift in thinking by putting in some preparatory work.

In this context who exactly has to do more rethinking – the road users or the traffic planners?

Sustainable mobility is a community responsibility with everyone contributing, not only in their professional capacity, but also by their individual behavior. For example, as Lord Mayor I use an e-Smart in the city. With our support, the big companies have surveyed their employees about their mobility behavior and want to use the results to create their own mobility services. In the Real-Life Laboratory for Sustainable Mobility Culture at the University of Stuttgart, citizens have developed a rental platform for cargo-bikes. In cooperation with the Fraunhofer Institute we are currently preparing a pilot project for city logistics, in which conventionally powered delivery vehicles are replaced by other means of transport, such as cargo-bikes. If everyone joins in, we can achieve a lot.

And how do you assess a willingness to rethink mobility in the two groups?

I detect a high level of willingness. For many young people, especially in major cities, the car has lost its role as a status symbol, while bicycles are the trend. No one likes being stationary in a traffic jam, everyone wants to travel as safely, quickly and cheaply as possible, and in most comfort. That is why we are not simply devising abstract programs, but rather promoting concrete measures: extending the cycle route network, developing an integrated traffic control center, promoting electric mobility, expanding the bus and rail network and offering attractive...
monthly tickets for public transport, to name just a few examples. Rethinking mobility very much depends on the different needs of the stakeholders, and my role is, where possible, to reconcile those with each other.

In early 2016 the particulate matter alert was repeatedly triggered in Stuttgart. During these periods motorists had to switch to public transport, use electric vehicles or carpooling. How receptive were people to these recommendations? Stuttgart, like many other cities, has problems with the accumulation of particulate matter and nitrogen dioxide in the air – harmful substances that are mainly produced by car traffic. With its basin-shaped layout, Stuttgart’s topography exacerbates the problem for us. I want us to push pollution down to below the threshold values on a permanent basis. Actually, we are obliged to do this, otherwise we will have to pay penalties to the EU. One important measure is the particulate matter alert, which we have always declared when stationary temperature inversions have caused us to expect increased pollution levels. At present the particulate matter alert is a call to voluntarily leave the car at home. If this does not work out, from 2018 there may be regulatory measures such as traffic restrictions. The particulate matter alert has ensured that our air quality was talk of the town. In that regard, it was a success. There was a measurable effect, too, with the traffic on alert days falling by as much as eight percent at peak times, and the demand for local public transport tickets and car sharing increased significantly in some cases. But we still have to convince more people to change their mobility behavior when the particulate matter alert is activated.

When it comes to electric mobility, it is still a chicken-and-egg problem: The investment in a comprehensive charging infrastructure is only worthwhile if there are enough users – but then, there will only be enough users when a comprehensive charging infrastructure is in place. Is there a way out of this dilemma? Our network of charging stations has the greatest density per inhabitant of any major German city. This means the requirement for a charging infrastructure in the public space has been covered. In the medium term, the gradually expanding range of the e-vehicles will bring other factors to the forefront. These include for example the deployment of more fast-charging stations on the main axes around Stuttgart as well as convenient charging options at home. I believe that a shift in thinking has now begun in people’s minds. It is no coincidence that car sharing schemes with electric cars of the Smart model work so well in Stuttgart. Another important element of our strategy is offering free parking for electric cars on around 15,000 public parking spaces.
Many experts see a consistently more flexible organization of transport systems as a key requirement for the efficient design of mobility in the future. Do you? What might such higher flexibility look like in your city? In Stuttgart, we are working on integrating all types of transport across all steps, from information to booking to payment. Together with over 20 public and private partners, we have created the polygoCard mentioned earlier, which makes intermod and multi-modal transport really simple. It is an important building block for sustainable mobility in the wider Stuttgart region with its 2.7 million inhabitants.

What contribution do you expect from smart transport infrastructure? Smart infrastructure must support us in managing and directing the large volumes of traffic and in making them flow more steadily. But in the future it must also be able to support the transition from conventional driving to automated driving and finally to autonomous driving. That will not happen overnight, but rather step by step. So we will need to make it possible for different systems to coexist in the same road space. This will be a major challenge.

In a recent interview with ITS magazine, Professor Dr. Frank Köster of the German Aerospace Center (DLR) said that it would make no sense to develop the infrastructure exclusively in view of, say, automated driving. The growth in the intelligence of the system should benefit as many applications as possible in the areas of road safety or energy efficiency. Do you share his views? Basically I do share this view, because it makes sense to make newly established infrastructure smart enough for it to be used for other applications. Due to the limited space in most cities, this is a good strategy. Individual mobility, which in the future will be electric and autonomous, can also be an invitation not to change one’s behavior and continue to travel alone – but without the bad conscience because one is using an environment-friendly and efficient means of transport. Is this then the better traffic jam? We need to take a holistic approach. If one only looks at the technological implications and disregards the social, cultural and environmental opportunities, there will be no major progress towards creating a sustainable city.

In the development of transport infrastructure, which applications should be the first in the focus? Our Integrated Traffic Management Center already uses intelligent structures to control traffic, and we are going to extend this approach still further. We have just defined a recommendation network for trucks, and in the next few years we are going to refurbish our parking guidance system, which is over 30 years old. At Park & Ride lots in Stuttgart and the region, projects are under way for testing sensors that are able to determine the availability of parking spaces in real-time. The occupation data can then be accessed online by drivers on the way to the parking lot.

In the holistic networking of systems, there remains an availability problem with regard to traffic information because some cities or private owners do not want to share their ‘data gold’ for use in third-party applications. How can we solve this problem? The public authorities cannot permit a ‘data-mining gold rush’ without any rules, and the consumer would not go along with it either. In the city administration we have agreed on what data we can and should pass on to interested companies. Specifically, as part of the NAVIGAR project, we have passed current data from our traffic control center to providers of navigation systems, with some success. In the final analysis, this increases the quality of information and benefits road users.

Until now, traffic control decisions have been based mainly on information provided by detectors that...
are connected to the traffic computer in each city. The integration of external data such as weather or air quality data provides additional options to increase road safety or to implement environment-oriented traffic management systems. What role do these possibilities play in your considerations?

For us, this is already happening in two areas: The particulate matter alert is triggered when weather conditions involving limited air exchange are predicted, and this is immediately communicated to motorists on the dynamic display panels on the main arteries. On an urban section of Federal Highway 14 with a length of nearly three kilometers, we are testing a dynamic speed control scheme in certain weather conditions or with congested traffic, in the scope of EU Project 2MOVE2. This is our first big step towards combining weather and traffic information.

Finally, let’s take a look into the distant future – say: the year 2030. Which vision of urban transport in Stuttgart appears in your mind’s eye?

My vision is of an urban transport set-up that increases the inhabitants’ quality of life through a changed mobility culture that protects the public space, is well balanced ecologically and economically, and in which the diversity of the mobility needs of the citizens is respected, as are those of the economy. In this vision, the happy citizens of the future can live, work and shop in their neighborhood, and cover all urban routes by public transport, on foot or by bike.

Mr. Kuhn, thank you for the interview.

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**Flights of the mind**

The secret of successful people is physical and mental fitness. If necessary, the odd little shortfall can be patched up by using modern technology.

With all the challenges that everyday life brings, it’s more important than ever to stay fit not only in our bodies but in our minds. Luckily there are clever solutions these days – take an example: Doctor Tamagotchi’s Brain Expander Smartphone app. Drives any jaded cerebral cortex to new peaks of performance. According to the ads.

This kind of app is fully compatible with a relentless quest for efficiency: Modern man or woman, always on duty, can now even use unproductive idle time to train the grey cells – sitting in a traffic jam, riding the train or standing in the elevator. Really clever.

Let’s go then: “What inspired the physicist Isaac Newton to formulate his insights into gravity?” murmurs Doctor Tamagotchi in your earpiece, part way between the third and the fourth floor. – Uh, no idea, it was 350 years ago anyway. Next question.

The insistent doctor intones: “What is the official alias of the city of New York?” – Simple, Gotham City! – “This is not the correct answer,” snaps the virtual coach. – Gaargh, next!

“What did Paris, the son of Trojan king Priam, present to the goddess Aphrodite?” – Something or other made of gold, didn’t he? – “Please elaborate,” drones the voice. – Ring, choker, whatever ... The electric tutor assumes a peevish tone: “And what was the source of Snow White’s health problems?” – Er, the seven dwarves?

Some apps can pose the daftest questions ... you’re better off looking after your own health. The Roman poet Juvenal knew that a healthy mind resides in a healthy body – mens sana in corpore sano! OK, that will teach me.

How great that there are even digital assistants for physical optimization. Snap on a fitness wristband and check out your current physical condition. One shake of the wrist and there’s the answer: “Keep an eye on your weight, take the stairs instead of the lift. And eat an apple a day!” – Honestly?
SiMobility ■ For years now, multimodality has been seen as the key to efficient mobility. The modal split, however, has not substantially changed yet. But now things are starting to move, thanks to an intelligent IT-based system that offers benefits to travelers, mobility operators and municipalities alike.
The strains are rather high, on everybody involved: Many road users have long since stopped to count the hours lost to traffic congestion—and for the industrialized countries, all this unproductive time and the resulting delays add up to an economic disaster. Cities must fear that their chronically congested road network will make them less attractive in the global competition for investors and professionals. At the same time they are under pressure from ever stricter pollutant emission thresholds. And the providers of public transport services don’t have much reason to rejoice either: They have difficulties to reach a satisfactory capacity utilization level because most of their potential passengers still prefer to take the car.

The only way for mobile society to keep moving

The way out of this dilemma has long since been staked out by policy makers and experts from public administration, academia and industry. The only way forward is the implementation of holistic mobility strategies, or in other words: The future is multimodal. Only if the transport load can be distributed much more evenly across the different transport modes our mobile society will have a chance to keep moving. "For quite some time now, this topic has been high up on the municipalities’ priority list," says Markus Schlitt, Head of Siemens Intelligent Traffic Systems. "But even so, the modal split in most major cities, apart from a few exceptions, is still too much in favor of the private car."

For Schlitt, the reasons are obvious: "Firstly, humans tend to be very much set in their ways and reluctant to change long-established habits even if proven inefficient." One tool that may help to turn car drivers into ‘multimodal travelers’, says Schlitt, could be an external incentive, for instance the introduction of a..."
This is probably not least due to the fact that in many cities, metro, tram and bus networks are operated by different companies. “At least in the field of public transit, there is no organizational framework in place to effectively foster the concept of multimodality,” explains Rainer Czerwinski, Senior Strategy Consultant at Siemens Mobility. And then there is the tight financial situation of many rail transport systems: “Most of those systems do not make a profit and need to be subsidized out of tax coffers,” says Czerwinski. “This means that even in those cases where the responsible public bodies are willing to implement schemes for fostering multimodal transport, the end result is often just a compromise due to a lack of funds.”

**The current market dynamism is a threat to the established providers**

In contrast, the new players who are currently pushing into the mobility market usually benefit from a much better financial situation. “After an extended phase of experimentation in the scope of small-scale projects, the topic has been picking up speed for about three years now,” explains Dr. Steven Ahlig, whose role as Innovation Manager for Siemens involves keeping a permanent eye on ongoing market developments in the area of mobility management. “Eight-digit investment sums in trend-setting start-ups such as moovit or Citymapper are not uncommon these days.”

This dynamism is also what Dr. Ahlig sees as a serious threat to established providers of mobility services. And he is not the only expert to think so: “Rüdiger Grube, Chairman of the Board of Deutsche Bahn AG, recently said that his worst nightmare was to see new players such as Uber, moovit or moovel insert themselves as a kind of ‘sales hinge’ between the travelers and his company. This is also why many public transport providers have started to look actively for ways to strengthen their own position in the sales process, for instance by integrating additional service offers.”

The idea is as simple as it is logical: If the user-friendly smartphone app of a subway network operator provides in addition easy access to car- or bike-sharing schemes and allows ordering a taxi or reserving a parking space for one’s private car, the operator switches from his role as a simple public transport provider to that of a holistic mobility partner. As a result, the wide range of integrated services will counteract the travelers’ deep-rooted reluctance to choose multimodal travel options over remaining a part of the daily traffic gridlock.

**SiMobility opens up a new dimension of multimodal travel**

The key piece of the puzzle needed to open the door to a new dimension of multimodality has now been created: SiMobility, a perfectly coordinated range of intelligent IT-based solutions that covers all transport services offered by conventional and innovative providers, integrating them into a large, inclusive mobility system. The different portfolio elements make the required information available to the users in real time, and enable all kinds of transactions before, during and after the trip. Transport operators and mobility service providers profit from reduced complexity when it comes to managing inter- and multimodal transport services – and from the dedicated analysis tools that support the optimization of their offers and the adaptation of supply to actual demand.

All SiMobility solutions are based on Siemens’ long-term industry experience and state-of-the-art technologies. As-a-service business models as well as OPEX-based pricing increase ease of implementation and help the customers keep their financial flexibility. The combination of standard hard- and software and open-source applications ensures reliability and optimal support of the widest range of use cases. The possibility to select individual modules or opt for complete end-to-end-solutions reflects the diversity of the customers’ situations and enables a step-by-step approach to system implementation. Today, the system consists of three main components:

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**“Seamless mobile telephony around the globe is a matter of course today – while seamless travel is often not even possible within one and the same city”**

Markus Schlitt, Head of Siemens Intelligent Traffic Systems
“Many public transport providers have started to look actively for ways to strengthen their own position in the sales process.”

Dr. Steven Ahlig, Innovation Manager for Mobility Management, Siemens

- SiMobility Connect allows the provision of information and enables transactions
- SiMobility Flow triggers the provision of proximity-based information, whether relating to transport or other individual needs, during the trip
- SiMobility JustGo makes traveling more convenient thanks to hands-free “Be-in/be-out” ticketing

Depending on the application, virtually all transport modes can be integrated

The core of SiMobility Connect is a B2B platform that includes system interfaces to both multiple service providers and mobility retailers. One of its main strengths is that it integrates processes across several transport modes, offering the users real-time information about PT schedules and route options as well as functions for booking, ticket purchases and billing. Which transport modes can be included depends on the specific use case. The list includes public and private transport such as car- and bike-sharing and -sourcing schemes, taxis, demand-responsive transport services, ferries, gondolas as well as parking-related services. Traffic information may also be included as a value-add service for real-time optimization of routes in the case of changes or incidents during the trip.

The B2B platform is the basis for efficient integration of services, secure data transmission and scalable use of functions. It enables a broad offering of multiple services via uniform interfaces. What is more, as a cloud-based solution it is able to reliably cover also periods of peak demand for passenger information and transaction services. The system supports the management of multiple stakeholders. The cross-provider platform reduces complexity – and as a result, the costs for the individual players involved.

The focus of SiMobility Flow is the provision of context-sensitive information for users while traveling, for example in bus and rail stations or in vehicles. Proximity-based triggers push relevant information to the users’ smartphones at exactly the place and time when they need it. Subject to individual preferences, information on transport options, tourist attractions or even marketing content may be provided. For operators, targeted data analysis tools enable efficient fleet management and the optimization of infrastructure and services based on actual passenger behavior.

With SiMobility JustGo, the user’s smartphone is the ticket – thanks to hands-frees “Be-in/Be-out” (BiBo) ticketing. The system operates on the basis of low-energy radio beacons and an innovative smartphone application. The smartphone is detected when in a moving vehicle. For the user, this means the end of individual ticket purchases: no hassle with vending machines, no waiting at gates, no bothersome check-in. Charging is done according to the route traveled. Service operators benefit from highly efficient ticketing management using the SiMobility backend. SiMobility JustGo can be operated independently, as well as side by side with existing systems. The solution supports all types of public transportation, from buses and trams right up to train services. It may also be used to include other modes such as bike- or car-sharing services.

In sum, the SiMobility portfolio is clearly the result of an in-depth analysis of the key stakeholders’ needs of in a modern transport network. The outcome of these efforts is a multi-talented personal travel companion, which has already started to prove its ability to transform regional mobility. All three system components have already been deployed or are awaiting implementation in various practical applications. In other words: The world of mobility is prepared for the future.
Even in the past, those responsible for road traffic in local and regional authorities could hardly complain of a lack of challenges in their work. For many years they have had to force a continuously growing number of vehicles into a confined space that remained mostly unchanged, trying to make the traffic flows pass through the road network as smoothly as possible. In addition to their expertise and experience, they are now benefitting from modern transport engineering.

It is clear that the complexity of the systems has increased in step with their increasing efficiency, and that there is no end to this development. In fact, quite the opposite, because a whole bunch of additional requirements will be affecting our traffic infrastructure in future. For example, the ongoing trend towards multimodal concepts requires more intensive networking of private and public transport (see page 14). It is also important to incorporate new mobility options into traffic information systems, such as car- or bike-sharing schemes. The same applies to the charging infrastructure for electric vehicles, which according to current plans will be silently travelling our cities’ streets in the future in far greater numbers than we see today.

A number of Herculean tasks await mobility systems

Another source for the significant rise in the volume of data to be processed is the use of cooperative systems based on Car2X communication. Big Data should therefore be playing an increasingly important role in the world of mobility. “In a certain sense, every vehicle will be its own detector at some point in time,” says Stefan Rouvel, Product Lifecycle Manager at Siemens Mobility. “Of course it is vital to make this huge data base available for all kinds of useful applications – both strategically for planning decisions, and tactically in the field of traffic management and traffic control.”

If we take a look a little further into the future, yet another Herculean task awaits our mobility systems – the integration of automated vehicles into the technical transport infrastructure. “Although self-driving cars are expected to need no external intelligent support to get from A to B,” says Rouvel, “networking brings clear benefits in terms of road safety. In addition, I assume that the municipalities will wish to have direct access to autonomous vehicles for guidance purposes.”

There can be no doubt that the ’digital policeman’ promises many advantages when it comes to flexibility. Firstly, because it can address and monitor specific vehicle groups in a targeted manner. Secondly, because parameters that are dependent on the time of day can be easily implemented with its support. For example, the first of these makes it easier to set up environmental zones, restricting access to particular areas according to pollutant class, while the second allows the introduction of more stringent speed limits at certain times of day, for instance in the vicinity of schools and kindergartens.

In view of the many new challenges, over the coming years the focus will be mainly on the flexibility of mobility systems. Of course this means that it is inevitable that the solutions will have a higher level of complexity. “But this does not of itself represent a problem,” says Stefan Rouvel. “As long as it does not result in everything becoming more complicated at the same time – something which thankfully can be prevented with the right technology strategy.”
Clear structures, even in the most complex systems

The Sitraffic Concert, Sitraffic Scala and Sitraffic Guide traffic center platform forms the basis of this strategy. It brings together the hitherto separate worlds of traffic management, traffic control and parking guidance. Even in the most complex systems, this ensures clear structures, and also maximum efficiency because the platform uses a common data pool, thus dispensing with multiple entries and analyses. An additional benefit is the uniform operating interface for the various applications. The application-oriented interface takes into account all processes and activities at the control center and makes handling easier and more transparently structured, despite the wide variety of functions.

All functional modules in the areas of traffic management, traffic control, parking guidance and transport planning as well as connection to external system are based on the shared platform. The modules can be combined in any way – with a multiple focus and completely independent of the area of activity that they cover. For the users, this means that they can put together their own individual bespoke solutions at any time, not only in terms of their current needs but also those of the future.

“Open standards and interfaces are among the essential criteria for many of our customers,” explains Stefan Rouvel. “They ensure a smooth exchange of data between various heterogeneous systems and allow the connection of field devices of different origins and different generations.” In other words, regardless of the actual components used in a city’s transport system and of the kind of systems that may be added tomorrow, the communication across the entire system will work in any situation. “Of course, we fine-tune our own modules so that they work together seamlessly,” states Rouvel. “But customers opting for our platform are not forced in any way to choose our products for all functions and all eternity.”

The right module for each and every traffic challenge

The basic modules of the integrated traffic center platform itself cover, among other functions, the operational monitoring of all connected actuators, sensors and subsystems, the management of data from different sources, highly secure web-based system operation and a digital vector map for displaying all objects with their static and dynamic information in layers that can be shown or hidden as overlays of the city map.

The portfolio of modules for traffic control in Sitraffic Scala range from Sitraffic Office applications for signal plan creation and data supply to traffic signals, to situation-dependent signal program selection with Sitraffic TASS and the model-based, traffic-dependent traffic light control with Sitraffic Motion. There are also modules for detailed quality analysis and visualization of the current and historic signaling states of individual traffic lights, including coordinated green phases. Comprehensive statistical evaluations are also available.

A core element of the integrated traffic management in Sitraffic Concert on the central platform is traffic situation detection. For this purpose, data from different sources is collected, checked, interpreted, and then translated into intelligible instructions for the operator and the connected control and information systems. Since not all the traffic-related data can be collected automatically, a traffic news gathering system that is part of the module event management completes the data pool with additional information about major events or current police reports.

The acquisition of section-related data, in particular travel times, is also part of transport management. This allows traffic jams and disturbances to be assessed much more accurately than if only local detection is used. The strategy management module accesses all measured values, status information and reports available within the system, compares them with predetermined threshold values, matches them with time conditions and then derives effective interventions in the traffic situation.
In addition, the center platform integrates the modules for parking guidance. Parking data acquisition creates the basis for the parking sign control system to display parking data – along with other traffic-related information – on freely programmable displays. As a result, the parking guidance system can be operated as a component of an overall traffic management system. For further optimization the operator can use the parking route management function, recommending road users the best route to the nearest free parking space.

**This alliance of different worlds opens up considerable synergies**

Even in the past, the alliance of different traffic engineering worlds, operating on a common platform, opened up considerable potential synergies. “When we developed the model a few years ago, there was not much that could be integrated, at least compared to today,” recalls Stefan Rouvel. “Back then we were certainly a bit ahead of our time. But these days the number and complexity of the different systems have grown significantly – and that will now continue at a much faster pace. In our view it makes no sense at all to continue deploying one system alongside the other and then to run them separately from each other.”

In order to make the platform fit for the future, developers are in the process of integrating applications from Car2X communication, for example. Preparations for coping with ever-increasing volumes of data – and with new kinds of data – are in full swing. Many important milestones have already been reached. For instance, importing third-party data about weather conditions or pollutant emissions to implement environment-oriented traffic management system is no longer a problem. Currently, the integration of innovative hosting and cloud technologies is high on the agenda. Of course there is a special focus on maximizing the availability, reliability and security of these systems. In the case of the cloud-based traffic computer system, Sitraffic smartGuard (see page 22), this has all been certified by TÜV Süd. The high safety standards that have already been achieved are evidenced by the fact that today some users prefer access to their transport systems via smartGuard rather than via their own PCs.
Invent

**Everything’s new** is the straightforward headline for an inclusive themed special on digitalization in Siemens’ online customer magazine. In his introduction to the topic, Siemens President and CEO Joe Kaeser writes: “Digitalization is a game changer for all sectors of industry.” It goes without saying that he meant his statement to apply also to the world of mobility, where bits and bytes are going to make many things easier and enable many new applications.

Several impressive examples for this (r)evolution have already been implemented in the real world, for instance in the South-German town of Böblingen with the successful operation of Sitraffic Stream, a completely new system for giving priority to urban buses and emergency vehicles. Located by GPS, the vehicles report their position no longer to the traffic lights at the intersection, but via GPRS directly to the central traffic computer. This eliminates the need for a retrofit of the traffic signals as well as for the installation of roadside components and the associated cabling or antenna systems. The resulting savings make a huge difference in the cost calculation for the system. The investment for the realization of the Sitraffic Stream application in Böblingen was not even a fourth of the sum that a conventional radio beacon solution would have cost.

**Sitraffic smartGuard: Virtual control – real savings**

Especially for municipalities whose coffers are not well filled, the digital revolution in traffic engineering is a blessing. The cloud-based Sitraffic smartGuard traffic computer, for instance, allows small and medium-sized towns to implement virtual traffic guidance management systems without investing in hardware of their own. The latter is hosted at the Siemens premises in Munich, and the company also takes over continuous maintenance and regular updates. The municipality pays only for the services actually used.

Via a Private Cloud, the users in the town’s traffic department can access the system from their PC, notebook, tablet or smartphone – as conveniently as if the traffic computer was located right next to them. Maximum efficiency is also one of the system’s benefits when it comes to maintaining roadside traffic equipment: In case of a malfunction, the maintenance alert function sends a message to the local service technician, who can then use a tablet computer to check the root causes.
“Innovative software solutions are enabling functions already today that we wouldn’t have dared to dream of only yesterday.”
The introduction of 1-Watt technology would allow a large city such as Berlin to save about € 500,000 and 2,000 metric tons of CO₂ per year.

In practice this means that the introduction of this 1-Watt technology instead of the currently widely used 12-Watt LEDs would allow a large city such as Berlin to save about € 500,000 and 2,000 metric tons of CO₂ per year. In other terms: A city of this size would have to plant around 2,000 deciduous trees every year to offset the CO₂ emissions needlessly caused by the present technology. Based on the typical 10-year service life of traffic lights, the newly planted forest would have to consist of more than 20,000 deciduous trees to compensate for the higher energy consumption of the traffic light systems. In cities that are still using a high number of incandescent light sources instead of LEDs, the savings effect in terms of energy costs and pollutant emissions would even be much higher, of course.

What is more, the new 1-Watt technology also helps reduce future maintenance work. An optical monitoring function based on a motto for the range of individual innovations: “Smart systems. Smart traffic. Thinking mobility further through adaptable and modular solutions.”

Sitraffic One: The world’s first and only 1-Watt traffic equipment

Digital LED driver modules are one of the key advantages of the new 1-Watt technology that is setting entirely new standards for energy efficiency in traffic lights. They make it possible to do without the load resistors and switching elements that used to account for a major part of the overall energy demand of signal heads. Consequently, an LED traffic signal now needs a mere 1 to 2 Watts, as compared to a power consumption of up to 60 Watts in case of signal head with incandescent light source. Moreover, high-performance LEDs of the latest generation are used.
photo-sensor continually checks the state of the LEDs. In the future, this information could be used to predict the probable time of failure of an LED and then replace it preventively. In addition, Siemens is the first manufacturer worldwide to fit the devices with monitoring functions not only for voltage and current levels, but also for LED luminance. Thanks to this multilayer monitoring concept, the 1-Watt traffic light achieves the highest safety level (SIL3) for road traffic equipment – also a world-first.

Another big advantage of Sitraffic One: The innovative technology is something like a ‘pillar of stability’ in case of mains power fluctuations, which are expected to become more frequent with the growing feed-in of electric power from renewable sources into the grid. Until now, such fluctuations cut through right to the signal heads, in the worst case causing signal failures. With the new 1-Watt technology, the power supply to the signal heads is decoupled from the mains grid and takes something like a detour via a special circuit in the traffic light controller installed in a grey housing at the roadside. Acting as a kind of buffer between the grid and the traffic light, this circuit can filter out even extreme fluctuations. In combination with the optimized heat management in the LED signal heads, this solution designed for 1-Watt technology delivers a further significant increase in the robustness and availability of the traffic lights.

SiBike smartphone app: ‘Green wave’ for cyclists

Exactly 90 years ago, Berlin implemented the first ‘green wave’ for motorized private transport. Today, according to expert calculations, about 75 percent of all urban traffic lights in Germany, for example, are equipped with coordinated switching routines to allow car drivers to proceed smoothly and at a constant speed across several signaled intersections without having to stop. For cyclists, in contrast, it usually was a game of pure chance whether they would be able to arrive at the next intersection during the green phase or have to stop on red.

Today, however, cyclists are a target group of growing importance to municipal traffic departments, and not only in Europe. This is why it was a perfectly obvious decision for the traffic engineering experts at Siemens to use the possibilities opened up by digital networking also for the development of an innovative tool designed specifically for cyclists. The outcome of their efforts: SiBike, a smartphone app that allows cyclists to create their own ‘green waves’ so to speak.

When a cyclist using the SiBike app approaches an intersection, the traffic light will turn to green within a few seconds – or the ongoing green phase will be extended. For this, SiBike leverages the advantages of satellite navigation technology. The cyclist’s smartphone uses GPS to determine its exact location and checks if the bicycle is passing a virtual trigger point at a pre-defined speed. If this is the case, the app notifies the traffic center that the trigger point has been activated. Then the center sends the corresponding command to the traffic light controller to initiate or extend the green phase for the cyclist.

Cities who want to enable the use of SiBike on their streets only need to modify the software of their traffic light systems. No construction work is required. On the plus side, the limited costs in terms of time and effort are more than counterbalanced by enormous chances for improved traffic conditions: The existence of a ‘green wave’ for cyclists may convince a large number of road users to switch to what is by far the most eco-friendly mode of locomotion, using the power of their own muscles.

Besides new market-ready products, the Siemens presentation at Intertraffic Amsterdam showcased also the most important digital visions, for instance the integration of the already available Car2X technologies in a holistic concept that will cover also trains, ships and airplanes. Because, as has become patently clear, the future of mobility is multi-modal.
History of traffic engineering, part 1

When long-term employees of Siemens’ Intelligent Traffic Systems unit stroll down memory lane, a tour of the ITS equipment archive turns into an exciting journey through time. The first part of their chronicles is all about signal heads.

(Top) The traffic light tower that was put into operation on Berlin’s Potsdamer Platz in 1924 symbolizes the beginnings of modern road traffic engineering

(Right) After the German reunification, the ‘Ampelmännchen’ design developed in 1961 in the former GDR became a cult design object

(Topmost) Since 2003, Siemens has been receiving more orders for traffic lights with energy-saving LED technology (left system) than with conventional incandescent lamps

(Far right) In 2013, on the occasion of the big Christopher Street Day parade, 50 traffic light systems in Munich were equipped with the first ‘manikin pairs’
If any one picture can be taken as a symbol for the start of modern traffic control, it is the famous black-and-white photograph of the five-sided traffic light tower on Berlin’s Potsdamer Platz. Installed in 1924, it was the first electrical traffic light system in Germany. If you look closely, you can see that, at the time, the signal heads were mounted side by side.

With later versions, however, this layout was soon abandoned because of the relatively high number of people with congenital red-green color vision deficiency. In the end, based on the assumption that people were less often confused about up and down than about left and right, the vertical arrangement of the signal heads prevailed as the most appropriate solution. Still, the signal aspects remained red and green, with one decisive modification:

In the 1970s, on the initiative of Siemens, the hue of the green light was shifted considerably towards the blue range so as to be easier to identify for people with color vision deficiency. This color shift even called for the development of special blue-green light-emitting diodes when, towards the end of the 20th century, traffic lights entered the energy-saving era of LED technology.

Apart from that, the basic design has not changed much over the decades, at least for the traffic lights that govern vehicle traffic. Pedestrian traffic lights, in contrast, have gone through a number of stages: The early versions used words instead of today’s pictograms to indicate when it was time for pedestrians to walk or to stop – in the U.S., this design is still in use. In most other regions of the world, the postwar period saw the rapid introduction of pictograms in the form of little walking or stationary manikins – mostly men, but today also occasionally women.

In Germany, the East-German version of the ‘Ampelmännchen’ has long since turned into a design cult object. Other parts of the world, too, have proven quite creative in this field: In Denmark, the ‘Ampelmännchen’ sometimes comes in the shape of Hans Christian Andersen, the famous Danish author of literary fairy tales, and in Mongolia, there are pedestrian lights with manikins on horseback instead of on foot – a far echo from Genghis Khan’s times.

The evolution of vehicle traffic lights is more a question of inner qualities, but the changes have been much more important in fact. The signal heads of the first traffic light systems used ordinary 230V/75W incandescent lamps. The first big evolutionary step came in the 1970s when Siemens introduced energy-saving 10-V technology. The new low-voltage lamps had a power consumption of only 20W, almost three quarters less than their predecessors.

In the late 1990s, it was time for a true technological revolution: Practically overnight, innovative LED signal heads set completely new standards in terms of energy efficiency. And even their record performance has been broken since: At Intertraffic 2016, Siemens launched Sitraffic One (see page 22): The so-called 1-Watt technology uses LEDs of the latest generation and special digital LED drivers that operate without load resistors and switching elements. This leads to a further substantial reduction of the signal heads’ energy consumption to a mere 1 to 2 Watt.

The transition to LED light sources does not only benefit the environment and the municipal budget, but also helps boost road safety. The reason: While signal heads using incandescent lamps need diffusing lenses to create the colors, with LED technology the LEDs themselves emit light in the desired signal color. This means that the dangerous phantom light effect caused by direct sunlight is now definitely a thing of the past.
“Extraordinary in character and scope”

Interview ■ Dr. Reinhard Giehler, Managing Director of VMZ Berlin Betreibergesellschaft mbH, talks about the great value of traffic information in Germany’s capital, the key challenges for urban mobility in the future, and a research project that raises the concept of multimodality to new dimensions.

Dr. Giehler, with the organizational separation between traffic control as a public task on the one hand, and traffic information and traffic management as non-public tasks on the other hand, Berlin is striking out on its own. Where exactly is the dividing line between the two fields?

The Berlin traffic steering group, in particular the traffic regulation center, is concerned with the control of traffic signaling systems and the traffic flows on the freeways, using dynamic information panels and also corridor section control systems. The Senate administration’s department for urban development and the environment has mandated us as an external private service provider to operate the traffic information center of the city of Berlin, which is surely unique in Germany in character and scope. We have a dense network of our own detectors, including 380 on the major road network and 800 on the freeways. These are complemented by Floating Car Data from TomTom and real-time information on public transport. We collect, aggregate and process the data and then feed them back for use in traffic control and various administrative departments. At the same time, our traffic editorial team makes the data available to road users, via a range of channels, including 33 dynamic roadside information panels, traffic broadcasts (Radio 88.8) and the Internet. In this regard, mobile Internet access is increasingly playing a part, which explains why there is now our convenient BerlinMobil app with an innovative intermodal route planning function. We also issue a daily traffic forecast for radio and TV stations and the press. Berlin was quick to recognize how much can be achieved with high-quality traffic information.

And how much can be achieved?

One impressive example of this was the required temporary closure of the Spandauer Damm bridge on freeway A100, which carries about 180,000 vehicles on an average workday. On that occasion, thanks to optimal information for the road users, there were no problems even on any of the diversion routes. On a smaller scale, something similar can be observed at any given moment. Year after year we have more than 60,000 relevant incidents in the city: accidents, closures, emergency service callouts. And in many cases we manage quite well at keeping traffic disruption within limits.

Could the Berlin model be a pattern for other major world cities?

I can definitely recommend other municipal bodies to follow our philosophy of treating high-quality traffic information as an integral part of traffic management.
The transport challenges that major cities have to master these days are becoming greater and more numerous. With which ones are you concerned most actively at the moment?

One question that is fully in the spotlight is: How will the introduction of autonomous driving affect our area of responsibility? This field is crammed with so much dynamism and activity at the moment that its future development is very difficult for municipal traffic departments to assess. Of course it goes without saying that even in the future, traffic will have to obey certain rules. Hence traffic signs will certainly continue to exist. And in the final analysis, it is irrelevant whether these are placed at the roadside or are displayed digitally inside the vehicle.

But otherwise there are still a great many areas of uncertainty. Just think of the challenge of handling the vast quantities of data that automated vehicles will be able to place at the disposal of municipal departments. In any case we see ourselves as partner of the city. For example we support the Senate administration’s planning efforts by updating and maintaining digital street maps and the huge stocks of data from our archives generated by our traffic information center. Another field that we, as a partner of the city, have been looking into intensively over those past years consists in the demands that electromobility is generating for the local authorities. Concepts for environment-driven traffic control are also gaining ever greater significance.

In Potsdam, for example, you have made a key contribution to the implementation of this kind of concept. What was your approach?

Since we are permanent collaborators on air quality plans both in Berlin and Potsdam, we are ideally acquainted with the links between transport and emissions. In certain streets in Potsdam, the measured pollutant concentrations were moderately above the limits defined by law. A closer analysis of the data showed that there was a realistic opportunity to solve the problem using traffic control measures: by ensuring a more even traffic flow and implementing temporary flow metering. This was exactly what was carried out, and thus the first environment-driven traffic control system in Germany came into being.

Operating the traffic information center is just one of three business segments for VMZ Berlin. What services do the other two provide?

Our Planning and Consulting arm advises public and private partners throughout Germany on ways to solve current and future tasks in traffic and mobility management. The spectrum of services ranges from traffic modeling and event management, to air-quality and noise-control planning, to the creation of complete concepts for local passenger and commercial transport. And our Mobility Services unit develops multimodal mobility services and software solutions and handles hosting and system operations. Our mobility monitors at the airports of Berlin and Frankfurt/Main or our BerlinMobil app are only two of many examples.

In addition to your core business you initiate and run various research projects aimed at continuous optimization of urban transport and mobility management. From your personal point of view, what is the most exciting topic for the future of transport that you currently have on your desk?

My current pet project is DORA, which is short for ‘Door-to-Door Information for Air Passengers’. Its purpose is the development of an innovative door-to-door information service that will raise the concept of multimodality to a new dimension. What makes this service so innovative is the fact that it will cover the landside means of transport as well as the air traffic aspects, plus the situation at the airport terminal. The prototype version of the service, which will be provided to passengers in the form of a smartphone app, is being developed for the Berlin – Palma de Mallorca route.

Dr. Giehler, thank you very much for talking to us.

Biography

• 1974–1978: Studied road traffic planning/road traffic engineering at ‘Friedrich List’ Hochschule für Verkehrswesen in Dresden
• 1978–1990: After starting out his career as a member of scientific staff, Giehler went on to deputy chief of the Berlin city authority’s office of traffic engineering.
• 1983–1987: Earned his doctorate in engineering from ‘Friedrich List’ Hochschule für Verkehrswesen in Dresden, Faculty of Engineering and Natural Sciences
• 1990: Head of the highways policy unit in Berlin’s municipal department for urban development, housing and transport
• 1990–2003: Head of the traffic department of IVU Traffic Technologies AG
• 2003–2008: Head of the “Business to Administration” business unit of VMZ Berlin Betreibergesellschaft mbH
• Since 2008: Technical Managing Director of VMZ Berlin Betreibergesellschaft mbH

Inspire
Talk of the towns

8th International Cities for Mobility Congress ■ “Mobility in the sustainable city: What do we need to do now?” This was the question discussed on June 21 and 22 in Stuttgart by 250 experts from 35 countries, who came up with a whole range of creative answers.

We are all part of an international movement,” said Stuttgart’s Lord Mayor Fritz Kuhn (see interview on page 06) in his opening speech. “Mobility has long since ceased to be an experts-only subject. Today it is a key topic for urban society and urban development.” This statement mapped out the generous terrain for the exchange of ideas between the municipal decision makers, scientists and transport experts from the private sector and non-governmental organizations who had followed the Cities for Mobility network’s invitation to Baden-Württemberg’s capital. The range of concepts proposed for discussion was correspondingly diverse: Maria Vassilakou, Deputy Mayor for Urban Planning in Vienna, for instance, spoke about ways and means to boost the quality of public space and promote environmentally friendly mobility. The concepts described include ideas such as the so-called ‘Grätzloasen’ – quiet oases for relaxation that help enhance the quality of life in cities. Lot von Hooijdonk, Deputy Mayor for Transport in the Dutch city of Utrecht, reported on the construction of the world’s largest bicycle parking center and showed how inner-city logistics can be managed to be compatible with urban life. And Marten Sims from Happy City Lab in the UK explained innovative concepts for involving various stakeholders in fostering urban development. In parallel to the numerous presentations and workshops in the city hall, a cargo-bike roadshow in the scope of the 2MOVE2 project of the EU took place for the wider public on the market square. As Ton Daggers from the Dutch Movilization network explained, these environment-friendly pack mules are already available in a wide range of versions, right up to extra-heavy-duty bikes with electric motor and huge cargo bays. By the way, in Stuttgart people also got to see a cargo bike converted into a coffee bar. This could be another creative forerunner of a new mobility culture.
Directory

Ample additional information on the different topics presented in this issue is available on the Internet, for instance here:

p. 08: “A great willingness to rethink mobility”

p. 14: And yet it moves

p. 18: Efficiency à la carte

p. 22: Chip ahoy!

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Highlights

Remain always abreast of developments – by regularly clicking in to our constantly updated online customer magazine.

➢ www.siemens.com/magazine/mobility/its

Soon the online version will feature new and exciting reports on the following topics:

Mobility of the mind
More in-depth information on the new flexibility needed in those times of transformation; What options are opened up by environment-driven traffic control? Why does the Italian city of Bolzano rely on traffic control via the Internet? And what does an all-inclusive no-worries maintenance package look like?

Ideally networked
Elements that belong together are now gradually growing together. Road and rail transport are progressively merging into one integrated mobility system. Hence it is a must for experts on motorized individual travel to keep abreast of developments in public transport. For instance: What measures are rail operators considering in order to hold their ground under the rising competitive pressures from automated road travel?

The shared car
What new attitude towards mobility keeps driving the enormous growth rates of modern car-sharing schemes? And what changes could the shared-car concept provoke in our current transport systems?
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Scan the QR code for direct access to the pages on intelligent traffic systems