Intelligent, networked, green

Solutions for future mobility
Take a moment to imagine a business trip in the near future: You make your booking from the comfort of your home computer, the optimized rail and air itinerary is displayed on-screen. You select with a click of the mouse, and seconds later your cell phone shows your ticket confirmation – you’re ready to go.

The traffic-guidance system reliably calculates the fastest route to the nearest mass-transit station. The departure time of the metro is shown on the cell phone’s display. The automated metro system provides for extremely short cycle times of the metro lines to the airport or central train station. Since a dense high-speed rail network has been established for medium-distance routes of up to 800 kilometers, an increasing number of passengers travel by train instead of plane. This is despite the fact that air travel times have been reduced, as long lines no longer form at the check-in and passport control points. Since the introduction of scanners, passengers are automatically identified at the entrance to the gate area and this data is checked against their cell-phone ticket. The rental car at the destination can be unlocked and started by fingerprint, and the route to the hotel is already programmed in the navigation system. If the traffic gets too heavy, the GPS comes up with a suggested alternative route on its own. From door to door, your journey time is half what it used to be.

Is this an illusion, or someone’s bold vision for the future? Not at all! All these systems already exist today. Route planners, online booking, traffic guidance and passenger information systems were invented long ago. Metros run automatically, and trains such as the Velaro in Spain run at speeds of more than 400 kilometers an hour. Electronic tickets and 3-D face and fingerprint scanners are currently being tested or are already in use. Navigation systems are available even for small cars. Furthermore, the development of electronic clearing systems has made substantial progress in recent years. Splitting the prices of combined tickets among multiple transport companies is no longer a problem. Everything is in place – what is still missing is the integration into an overall system.

Megatrends, including rapid urbanization, the increasing number of large cities with more than ten million inhabitants, imminent climate change and increasingly aging populations, are posing new problems. Social, economic and ecological issues are too closely intertwined to be tackled using traditional means. Quick and intelligent solutions are required – as well as high-performance trans-
port systems that are also environmentally sound.

Technical innovations, such as those developed by Siemens over the past 160 years, can show ways of achieving this. No other company in the world offers such a wide spectrum of mobility solutions for so many different fields, or such highly developed expertise in combining different transport systems into a new, user-oriented complete solution. And mobility is not limited to allowing people to travel individually in comfort: future-oriented transport and logistics concepts for goods and baggage are integral parts too, as is postal automation.

It is time to coordinate the many individual solutions intelligently, so that every transportation system can play to its own strengths. The rejection of individual modes of transport, whether for ideological or political reasons, will not move us forward. Each means of transport, including trains, automobiles, planes and ships, has its specific strengths, and they must be combined seamlessly so as to complement each other perfectly. I am firmly convinced that this is the only way to meet the challenges of the future. When it comes down to it, the integrated whole is more effective than the sum of the individual systems. This is why, here at Siemens, we are working on complete, integrated and intermodal mobility solutions – this is what we call “Complete mobility.”

Our new corporate structure opens up the channels we need: the Mobility Division has now brought together highly developed expertise in rail transportation, intelligent traffic management and specialized logistics solutions, all under one roof. The way that concepts, ideas and products can actually be transformed into “Complete mobility” will be the subject of the new como magazine, the first issue of which you are holding right now. Have a quick read – I’m sure that we will capture your interest.

Yours sincerely,

Dr. Hans-Jörg Grundmann
CEO Mobility Division

One of the greatest challenges in the coming decades will be to ensure the mobility of people and goods without putting undue strain on the environment.
horizon

6 The bigger picture
Megacities and holistic solutions:
an interview with Prof. George Hazel

10 Character study
There are many paths out of the chaos:
how metropolises will survive

12 Making waves
The future of logistics is flat and has
four letters: RFID

focus

14 The wiser combination
A city gets tough: London as a model
for “Complete mobility”

18 Total overview
“Complete mobility” on a single photo:
on the way to the perfect shot

27 The Rolling Stocks
Chart-toppers five years running:
Desiro UK multiple units

move

28 Pulling power
From the Arctic Sea to the Bosporus without
changing locomotive: that’s the Eurosprinter

30 Green’s the answer
Where the frog croaks: environmentally
sound mobility technology

connect

34 Hand in hand
Both giving their all: the efficiency
of public-private partnerships

38 VIB service
Free movement in the Free State:
the Bavarian Traffic Data Agency
keeps things flowing
Megacity challenges: Comprehensive solutions

The future belongs to cities – the city regions to be precise. In the future, people and business will need a new approach to transport systems in city regions to allow them to fulfill their needs. These systems will have to be user focussed, seamless and valued – in other words providing “Complete mobility.” In an interview, we talk about this topic with Professor George Hazel, Managing Director of the Scottish consultancy MRC McLean Hazel.

A new era has begun, almost unnoticed: for the first time in the history of mankind, more people are living in cities than in the rural areas. In the meantime, there are between five and thirty million residents in the world’s largest megacities and their economic power is often greater than that of many countries represented at the United Nations Security Council.

At the outset of this new era of urbanization, it becomes clear that megacities will be the core of an increasingly interlinked, global economy. This development provides major business opportunities, but also new challenges: megacities are like dynamic organisms with increasing complexity, the mechanisms of which are little understood.

What are the challenges that lie ahead? What infrastructure is required to cope with them? In his “Megacity Challenges” report promoted by Siemens, Professor George Hazel, Managing Director of the Scottish consultancy MRC McLean Hazel, outlines the major points.

como: Professor Hazel, as an engineer and expert in transportation, you have undertaken several groundbreaking studies on different means of transportation. What is the core message of your megacity report?

Hazel: The report mainly focuses on the infrastructure of megacities. For this study, we surveyed 525 city leaders, i.e. politicians and decision makers in the cities, and developed a theory of governance based on the triangle of success outlined in the report. The three sides of the triangle stand for quality of life, economic prosperity and environmental protection, with governance at the center of the triangle. Governance needs to balance these three aspects in order to ensure that they interact smoothly and maximize the benefits to the city.

como: Why are megacities the focus of interest?

Hazel: Megacities are considered to be the gateways to globalization and hubs for persons, goods, knowledge and money. The world’s ten most economically powerful megacities are already generating one-fifth of the global gross domestic product (GDP). Also at the national level, megacities account for a disproportionately high share of the economic growth. According to a study by the Munich Re Group, Tokyo accounts for 28 percent of the Japanese population, but produces 40 percent of the national GDP. Almost the same is true for Paris, where 16 percent of the French population generates 30 percent of the country’s GDP. Nigeria’s
former capital, Lagos, provides living space for only eight percent of the country’s population, but produces 30 percent of its income. In the OECD countries, many population centers achieve growth rates far above the average of their country.

como: Does this mean that megacities are the life-lines of their regions and nations?
Hazel: Considering their major contribution to the country’s national economy, the global competitiveness of these metropolitan areas is particularly significant. To attract investors, these cities require modern and efficient infrastructures. The transport system is paramount and megacity mayors show great interest in the modernization of congested road and railway networks, shipping ports and airports. Transportation was voted the No.1 issue in the survey.

como: In your study, you emphasize the importance of the transportation infrastructure. What are the reasons for this?
Hazel: Optimized logistics have always been a core prerequisite for the development of civilizations. The power of the Roman Empire, for example, relied mainly on an excellent road network. Transportation already played a vital role in those days. In our modern world, transportation from A to B is even more important, especially in our global economy. The decision makers interviewed for the survey have also pointed out that transport networks are an essential economic factor: 27 percent of these decision makers considered transportation to be the most important infrastructure criteria for investors, ranking well ahead of security, which takes second place with nine percent.

Megacities are the motors of the world economy – today and will be even more so in the future. It is the transport infrastructure that keeps these motors running. Since passengers and freight have to be transported to the places where they are needed, infrastructure is essential for the competitiveness of megacity regions. Furthermore, crowded trains and pollution caused by traffic represent particular burdens for cosmopolitan and densely populated megacities.

como: In your study, you describe the end of the paradigms of individual means of transportation. What does this mean, in particular for the different systems – and of course for the population?
Hazel: In summary, this means that not one mode of transportation is dominant anymore, but all
forms coexist and must therefore be perfectly interlinked in the future. People’s lifestyles and needs are growing more complex and require systems that are joined up and act as one. This is what we refer to as “Complete mobility” transport infrastructure, and this will be the challenge of the future. In megacities, many different transportation lines cross at the same major intersection. Therefore, the comprehensive “Complete mobility” approach conceived by Siemens points in the right direction. This is the strategy for the future.

como: What do you think is the greatest challenge on the way to the future?

Hazel: The high number of interfaces between the systems is, of course, a problem. Solutions from an all-in-one provider are still too rare. There is a lack of integrated long-term planning, especially in cities. Many confusing structures are the result of having different authorities with different responsibilities, such as construction and operation, rail and road, as well as traffic and environment. Not only are these structures difficult to coordinate, but each of them has its own plan for improved mobility. The challenge now is to get rid of these transport and governance silos and combine all these factors based on “Complete mobility.”

como: In your study you describe a wide range of different megacities, each of which presents its own specific requirements. In view of this situation, are comprehensive solutions from a single provider really possible?

Hazel: Yes, of course. The spectrum of megacities can be represented as a curve showing their different stages of development, including developed cities such as London, cities like Shanghai and also emerging cities like Jakarta. All of these are developing according to similar principles, but are in different stages of development. Since these cities are pursuing a common goal, i.e. economic competitiveness, their mobility requirements will increase, and they will have to focus on the refurbishment and extension of their existing infrastructures. New elements must complement existing ones intelligently.

To get back to my original point: all products should be defined based on the idea of comprehensive mobility and complement each other. Based on this approach, cities will continue to buy individual, customized products, but these products will be components from a comprehensive system. This will be held together by the glue of ICT. A flexible financial concept for megacities, in view of their different stages of development, will also be important. Of course, the cities themselves have to undertake long-term planning and provide integrated governance.

como: Professor Hazel, you have also managed public infrastructure projects yourself. So you have experience in both theory and practice. What are you referring to when mentioning the braking effect of the so-called silo mentality in your study?

Hazel: Cities too often try to cure symptoms and this only gets in the way of the real solutions. The development of technical solutions as a first step often fails to bring the expected success. Therefore, it is much better to focus on the objectives and link them to desired outcomes: Which solution tackles the causal issue most efficiently? What problems does it solve? What problems actually have to be solved? For example, congestion is the symptom, not the problem. A partner or city that approaches traffic problems based on this strategy would be the first choice for me – and is also well prepared for the future.

como: Comprehensive planning and the smooth integration of systems – is this the core message of your study?

Hazel: This prerequisite has to be met by transport systems in each city, but especially in megacities, because this is where the mobility requirements with regard to passenger and freight transport are concentrated, and megacities are an indicator of future development. But only truly sustainable, integratable solutions based on long-term planning will be able to meet these requirements. The answer to the challenges of the future will in fact be: “Complete mobility.”

como: Professor Hazel, thank you very much for the interview.

Megacity challenges in short

- Metropolitan regions are the lifelines of a country’s national economy. Furthermore, their global competitiveness is a core factor that will continue to gain in importance.
- The decision makers of city governments consider the transport system to be by far the most important infrastructural challenge and thus a key factor for a city’s competitive strength.
- Governance lacking in efficiency and short-term planning is singled out as a major problem.
- Since air pollution and congested roads are the two major ecological challenges, urban decision makers expect the increased utilization of public mass-transit solutions in the future.
- Cities mainly focus on the improvement of their existing infrastructure and – for reasons of costs – are less prepared to introduce new transportation systems. New systems must be integrated smoothly in the existing structure.
- Comprehensive “Complete mobility” based on a user-focused, seamless and valued transport system is the core prerequisite for meeting future challenges.
The mobility survival strategy

What links the Pakistani capital Karachi, Lagos in Nigeria, Los Angeles and the Rhine-Ruhr megalopolis? They are all in global competition – and they are faced with huge challenges in terms of mobility. The consequences of increasing traffic congestion and greater pollution are directly noticeable to the people living there; the economic damage can be expressed in figures. But what can be done? The latest study by Professor George Hazel shows some ways of tackling the problems.

Mobility is becoming a vital question for cities across the globe – it heavily influences the appeal of major cities and their ability to compete in global markets. The economic damage due to traffic congestion in the EU alone is calculated at €100 billion per year, and it reaches a similar scale in the United States. Moreover, this trend is far from reaching the end of its development. Globalization and growing prosperity, particularly in the emerging Asian nations, are leading to increasing car ownership among a broad social strata; massive urbanization is creating regions with extremely high traffic density. Major cities across the world are struggling to cope with roughly the same consequences of increasing mobility – but the concrete challenges are extremely varied.

In his latest study entitled “The Inescapable Urban Challenge,” the British transport analyst and mobility consultant George Hazel has gone through 46 global urban centers with a fine-tooth comb, examining them in terms of specific mobility criteria. In his observations of these cities, Hazel has considered the way they have expanded their road networks as well as the public transport they provide, the state of their information and payment systems, their links to the surrounding area and, furthermore, the number of accidents, their use of energy, their environmental pollution and their transport costs. On the basis of this data, the analyst worked out the mobility index for each city, which spans from category 1 (insufficient) to category 6 (exemplary).

The Dutch metropolis Amsterdam comes out on top with an average score of 5.2 and top marks in energy consumption, emissions and public transport. Only in its frequency of accidents, where it scores four points, does Amsterdam fall some way short of its target. At the other extreme is the Nigerian city of Lagos: it receives the poorest evaluation from Hazel and his research team, scoring lowest in eight out of eleven categories. Only in transport costs, energy consumption and emissions does Lagos come out somewhat better – this is due to the low rate of car ownership among the population.

With his catalogue of criteria, Hazel has come up with an instrument that transparently renders the strengths and weaknesses of every urban region worldwide. However, before he makes concrete recommendations on how to move forward, the analyst explores the question of how the mobility of these regions has kept up with scientific progress. This makes it clear that the economic growth of the cities is directly related to the quality of mobility they offer. For Hazel, three categories can be distinguished:

1. Struggling to cope: Hazel puts megacities such as Lagos or Karachi in this category, which are characterized by chaotic road-traffic conditions with permanent congestion, many accidents, overstrained mass-transit systems and poor links to the surrounding area. No journey is calculable; every trip turns into an adventure.

2. At risk regions: Major cities such as Los Angeles and Sydney, as well as Prague and Rome, are to be found here – highly developed urban centers that have grown up as “car cities” and where the mobility network beyond road transport shows serious gaps. These locations are charac-
**The car cases: even well-developed major cities such as New York and Rome can lose out in global competition.**

3. Best of class: These major cities with considerable economic power and an above-average score in the mobility criteria offer customer-friendly public mass-transit systems. Here, great efforts are made to reconcile supply and demand in the mobility sector, as well as to reduce accidents, air pollution and energy consumption. Typical representative cities in this category are London, Amsterdam, Zurich, Berlin, Tokyo and Singapore.

According to Hazel, investments in transportation infrastructure and traffic management affect much more than the ability to transport people and goods smoothly – they create the conditions required to achieve long-term goals such as increased appeal and a greater ability to compete in global markets. This is why, he says, there can only be one target for cities that want to remain in the running in the worldwide competition between regions in 2025: to permanently separate mobility from the question of the individual transport system. All transport systems, says Hazel, must be linked to one another – both in the real world, at changeover points, and virtually through customer-friendly information and payment systems. “In 2025, integrated communication will be the elixir of life for mobility.”

The steps that lead there can vary enormously depending on a city’s stage of development: at-risk locations, for instance, should pay particular attention to the increasing phenomenon of urban sprawl in suburban regions. Here it is becoming more and more difficult to operate an integrated public mass-transit system affordably. This is why supply and demand of transport systems have to be more finely tuned to one another – through economic measures such as variable ticket pricing or parking and congestion charge systems. Hazel has a core message: smooth interaction of the systems facilitates changeovers for the customer, reduces journey times and increases the appeal and the efficiency of the system as a whole.

Even cities such as London or Amsterdam, despite their exemplary status, have some way to go when it comes to mobility. From Hazel’s point of view, it is absolutely paramount to adjust the public mass-transit systems to rising expectations and changing requirements through integrated city management. The range of transport systems or operators on offer has to appear to these demanding urban customers as if it comes from a single source. These customers want to call up bundled information and have a convenient method of paying for their entire journey. They expect a high level of comfort and have certain standards when it comes to technology and design.

Whatever level a metropolitan region currently holds, the professor is convinced that if those responsible do not act now, they will fall by the wayside in the international pursuit of success. George Hazel is therefore sending out a wake-up call: “It must be in the politician’s own interests to take action, as the outcome in terms of costs and inhabitants’ health, as well as the social consequences, will otherwise lead to a serious dip in their ability to compete.” And this is something which – quite clearly – no one could ever wish for.
Future frequencies

The technology is robust, the areas of application diverse: Radio Frequency Identification (RFID), the contact-free identification of objects of any kind using radio waves, has already transformed many fields of logistics. And that’s just for starters.

The logistics industry is forecasting growth – with increasing flows of commodities, an ever-greater tempo, and a constant stream of new customer requests. Companies are in global competition, and therefore there is a need for intelligent, innovative solutions that also conserve resources – and this is certainly the case in the highly specialized fields of cargo and logistics such as postal automation and cargo and baggage handling at airports. These are areas that have a long tradition at Siemens.

Radio Frequency Identification (RFID) is considered one of the key technologies for further optimizing logistics supply chains. This method of identifying objects using radio waves has been around for a good 60 years, but it has only recently become worthwhile to use it on a large commercial scale. Now, the strengths of RFID systems are elegantly applied in various areas of modern logistics: the transponders are attached to post crates, pieces of baggage, textiles and sea-freight containers. They support the logistical process and permit constant stock controls, and make it possible to track the route of goods and commodities through the entire value creation chain.

What’s more, as paper-thin Smart Labels, they are just as easy to attach as a regular label.

At the most basic level, the systems consist of mobile data storage units – called transponders or tags – and mobile or stationary scanning devices for activation and data transfer. Material-flow systems or stock-management systems process the information further. It is even possible to give unique labels to individual items in this way. Products with EPCglobal code can be identified worldwide throughout the entire supply chain, and localized by any RFID reader.

Compared with the conventional barcode method, the most impressive aspect is the ease of handling. It makes no difference to the scanners where the intelligent radio labels are placed on the object; they do not need to be touched or to be within a line of sight; they can be scanned reliably even when extremely dirty and they are able to store a variety of data. This extends the areas of application considerably – to the great excitement of logistics from all industries. Based on current projections, the market for RFID applications alone is to double between 2008 and 2011, taking its value to over €5 billion.

Every container knows its destination

Hardly any merchandise logistics and distribution tasks bypass RFID any more – for the sole reason that the previous unit of production and delivery has long since been superceded in global merchandise management by complex supply chains comprising of many stations, outsourcing and external service provision. The electronic accompanying document on the tag contains the essential information throughout the entire supply chain, and the data can be added to or updated if necessary.

In baggage management at airports, a high flow rate is called for, as demonstrated by the example of the baggage conveyor system at Peking International Airport. This system for the new Terminal 3, where
Radio Frequency Identification (RFID), the technology for uniquely identifying objects of any kind without any contact, allows data to be recorded by induction, i.e. using alternating magnetic fields or radio waves. The data and the energy necessary for the transfer are sent between the transponder and the scanner without any need for physical contact or a line of sight. Siemens has been supplying complete RFID systems for applications in production and logistics for over 20 years.

Over 90,000 passengers are checked in every day, sorts and transports up to 19,200 pieces of luggage per hour. When passengers check in, their bags are placed into open containers with RFID tags. The tags receive the passenger data and destination airport by radio signal before the luggage whizzes down a 2,200-meter tunnel at 36 km/h, directly to the loading carousels.

This is also possible without a container. The newly installed Simatic RFID Baggage System (Simatic RBS) at Wuhan Airport uses special BagTags, which have an integrated antenna, microprocessor and write/read memory. Because the stored data can simply be updated or overwritten, for instance when the flight information or security status of the luggage changes, the BagTags can also be reused.

Whichever method is chosen, the bottom line is that RFID systems not only speed up airport logistics, they also make it more reliable and less prone to errors. All in all, estimates the International Air Transport Association (IATA), airlines and airports save a good $760 million per year with RFID solutions.

Technology with future prospects – also at sea

In the future, it will even be possible to check the loading of containers on the open sea in real time. This is thanks to a novel technology solution that Siemens has developed in collaboration with an international consortium made up of transport companies, shipping lines, technology suppliers and security organizations. The future RFID tags will regularly transmit their current status report back home from the inside of the containers. Open doors, high gas or temperature readings, dampness or suspicious vibrations – the tag will raise the alarm right away. The system makes contact with a radio network on the mainland via satellite and sends the container data to the shipping line or the owner of the cargo.

Siemens is pulling out all the stops to move along the development of these applications, and others too. For one thing is certain: RFID will make a decisive difference in the future of logistics, transport and traffic.

**RFID overview**

Radio Frequency Identification (RFID), the technology for uniquely identifying objects of any kind without any contact, allows data to be recorded by induction, i.e. using alternating magnetic fields or radio waves. The data and the energy necessary for the transfer are sent between the transponder and the scanner without any need for physical contact or a line of sight. Siemens has been supplying complete RFID systems for applications in production and logistics for over 20 years.

Web tip: [www.siemens.com/rfid](http://www.siemens.com/rfid)
Combine, my dear Watson!

London was always infamous for causing traffic headaches. Now, the pulsating metropolis is becoming a model of “Complete mobility.”

“Combine,”
says master detective
Sherlock Holmes as he
turns to his friend Dr. John
H. Watson and draws contem-
platively on his pipe: “The case is
complex, but it can be solved.” But could
Holmes’ sharp insight have been enough to
solve London’s traffic problem? After all, even
long ago, the capital of the British Empire had to
reckon with similar problems to the present day.
The population rose sharply – from 1 million to
over 6 million in the first decade of the 19th century
alone. Slums and winding streets without drainage sys-
tems formed a stark contrast to the well-tended afflu-
ent areas. All the same, Sherlock Holmes, the
hero of the novels by Sir Arthur Conan Doyle, used
to travel around London using one of the 7,000 “han-
soms,” as the two-wheeled horse-drawn carriages were
known. In the Victorian era, the London Omnibus Com-
pany, founded in 1858, had up to 15,000
carriages and 10,000 horses on its books,
and 4,000 four-wheeled hire car-
riages rumbled over the cobbled
streets. But it wasn’t long before for-
ward-thinking engineers took
on the traffic chaos with modern
engineering: The “Tube,” as the sub-
way is known here, has been run-
ning since 1863, and the first motor-
ized bus rolled through the city in 1897.
Transport in the British capital has changed a lot since master detective Sherlock Holmes used to be driven around its cobbled streets in one-horse carriages. Congestion is heavier than in Victorian times, and the air is heavily laden with pollution, which puts a great strain both on health and on the environment. According to a recently published McKinsey environmental study carried out on behalf of Siemens, around 47 megatons of CO₂ are produced in London every year – that works out as 6.3 tons per inhabitant, more than a quarter of which is attributed to traffic. Around 90 percent of these traffic emissions, the study adds, are the result of passenger and goods transport on the roads.

There are many factors that have brought about this dramatic state of affairs. As Europe’s largest city, London is, to a certain extent, paying the price for its growth and success with this traffic headache. The capital attracts bankers, scientists and artists like a magnet, not to mention tourists. When Ken Livingstone – mayor up to May of this year and initiator of numerous mobility projects – was first elected in the year 2000, he took office with the promise of radically improving the traffic situation. By 2016, it stressed, the number of inhabitants could grow from the current 7.6 million to well over 8 million – and there could be more than 15 million people living in the area of Greater London, which includes the surrounding suburbs.
The majority of the infrastructure that was created in the 19th century is not so easy to adapt to the more strenuous demands. The London Underground, for instance, the oldest and longest subway network in the world which opened in 1863, serves 1 billion passengers each year on routes north of the Thames, and is often crammed to bursting on its principal lines. The road network, which has grown over centuries, does lend the British capital a particular appeal, but it is a far cry from having a smooth flow of traffic. “We are now resorting to tangible measures,” announced Mayor Ken Livingstone, “which will hurt some people, but will be of benefit to us all at the end of the day.” Livingstone therefore set out ambitious targets in a London Climate Change Action Plan. It specified a 60-percent reduction of the level of harmful emissions from 1990 by the year 2025. This is no mean feat. Nevertheless, the declared goal remains to manage London’s continued growth without traffic grinding to a standstill or causing serious environmental problems.

Intelligently coordinating and processing traffic data in a high-performance traffic guidance system is of central importance. Without a strong traffic management control center, the road network in London – as in Munich, Berlin and countless other major cities around the world – would completely collapse in no time. These control centers not only pool all the information, they also control the entire private and public transport systems, and provide passengers and drivers with comprehensive information to make their journeys simpler, safer and more comfortable. On the freeways around London, too, variable traffic signs from Siemens keep traffic flowing.

Convenient regional trains

Nevertheless, significant improvements to the traffic flow can only be achieved if more commuters switch from taking their own car to using public transport. This is why networking the city intelligently with the surrounding region, with innovative road and rail solutions, was one of the highest priorities. Thus in 2001, in order to provide an economical, comfortable and fast commuter service between the city and the surrounding region, Siemens was awarded a contract to supply 1,200 Desiro UK modular regional trains. This constituted the first step towards improving the inner-city traffic. Today, this high-comfort fleet of commuter trains forms a stable basis for networking public regional and suburban transport. The trains have long since become an indispensable means of transport. However, because this requires a high
The Heathrow Express: non-stop from the airport to the west of London into the heart of the city. The 17-mile stretch to Paddington station is covered in 15 minutes.

There’s no going back now: photographer and equipment are strapped in securely during the flight.

Loose items stay on the ground: the helicopter doors were taken off to allow a clear view of the City of London.

Hello London, say cheese!
Packing London and its seven million inhabitants into a single picture? That’s a tough cookie even for the most experienced photographer! The task, in concrete terms, is to capture a complete view of all arteries running through a typical megalopolis. But how can such complex transport networks be represented? How can we see the huge, apparently chaotic flows of people and goods that are actually always moving thanks to the intelligent networking of different modes of transport? The best way is to view it all from a distance – a very, very large picture, an aerial photograph, shot while flying “freely” above the city.

A bird’s-eye view of London – with this campaign idea from Publicis Pro fixed in their minds and plenty of creative equipment in their bags, the photo crew from hi-studios sets off for the pulsating British metropolis of London. Just getting to the shoot location, the team experiences flows of traffic first hand: a scheduled flight from Frankfurt to London Heathrow, straight into the city center approximately 17 miles away on the Heathrow Express, then through the commuter traffic on the subway and in a taxi to the helicopter – it all just flashed by, didn’t it? That’s “Complete mobility” for you.

Over the rooftops of London without a safety net, the photographer gets the traffic nodes and landmarks of the city in his viewfinder by leaning out of the open helicopter. He clicks the shutter almost 1,500 times during the three-hour flight. Did one of these make the ultimate picture? Inside you can see for yourself: a panoramic view of the “Generic Megalopolis.”
Assuming that the journey is the reward, how can we make it more efficient?
The Siemens answer: Complete mobility. Integrated solutions for urban and interurban transportation and logistics

Paving the way for people and goods around the world, bringing them to their destinations more safely, profitably and with less environmental impact – that’s what Siemens “Complete mobility” is all about: Shaping and efficiently interconnecting the diverse transportation systems for the long term with integrated mobility solutions. www.siemens.com/mobility
degree of reliability and availability, individualized service plans are an integral part of the platform concept. In Great Britain alone, Siemens employs 500 specialists who guarantee the all-round maintenance and repair of the trains at Siemens depots or those provided by the client.

The quickest way to Heathrow

The direct connection from Heathrow airport to the west of London and the city center has also been integrated into the transport system. On the Heathrow Express and Heathrow Connect lines, Siemens trains serve this highly frequented airport quickly and comfortably, thus also relieving congestion on the roads. The Heathrow Express has already provided a connection between the airport and Paddington Station in central London for ten years. Around 17,000 passengers every day are carried by 14 Desiro Class 332 electric modular trains. The passengers are met with a luxurious interior featuring air conditioning, telephones, display screens and television monitors, as well as generously sized baggage compartments.

The trains on the Heathrow Connect line, which is operated by Heathrow Express in partnership with First Great Western, reduce congestion on the Heathrow Express and serve five new stops in west London. Its Desiro Class 360/2 modular trains also travel at 160 km/h, have 280 seats and room for 130 standing passengers, and are fully air conditioned. Their passenger compartments offer much more room for baggage than usual, thus meeting the specific needs of air passengers. The most significant advantage, however, is the greatly reduced journey time: instead of taking 50 minutes on the subway or normally even longer in a cab, passengers can now reach the airport in just 15 minutes.

London’s suburban traffic is also being modernized on a grand scale. To this end, Transport for London (TfL) has set up an enormous program of investment in infrastructure, totaling €15 billion. A new bridge is being built over the Thames, the light rail network in the east of the city is being expanded, and the subway network is being modernized.

One part of the program is the iBus project, where Siemens technology is helping to improve the punctuality of the buses and the comfort of the passengers. Each year, these famous red buses carry around 1.5 billion passengers, and Transport for London is forecasting over 2 billion for 2011. Now, an information system is being installed that the 30 private-sector bus operators, TfL and the security authorities can use to track each individual bus to the nearest meter by satellite, rather than having to request the positions of the vehicles over radio. This is no mean feat for a bus network with around 700 routes and 8,000 vehicles, making it one of the biggest in the world. The operation is made possible through the intelligent interplay of GPS satellite data.

The C-charge works:

Once the city of London had set up its alternatives to car travel, it installed the Low Emission Zone.
and GPRS mobile technology: the approximate position is ascertained by GPS, while a device in the bus calculates precise data relative to the route network and sends these to the central computer of the operations control system via GPRS. The computer compiles a complete picture on the basis of these data.

As a result, not only do the bus drivers have a better idea of where they are in regard to their timetable, the passengers also reap the benefits: the routing headquarters can quickly adjust the timetables in case of heavy traffic, thus preventing two buses from coming at once – the first packed to the rafters and the second virtually empty. In addition, more and more bus stops are being equipped with electronic displays that inform passengers as to the precise arrival time of the next bus.

Regional and national rail services, public suburban transport and airport transfers were finely tuned to one another, and once the city of London had set up its alternatives to car travel, it began regulating passenger car traffic in the city center. Car-park and traffic-routing systems were introduced in the city along with the congestion charge. After just a few months, the flow of traffic had improved by 37 percent; commuters now reach their destinations much quicker, and considerably less strain is placed on the environment. This is therefore a path that other overstrained major cities around the world could follow – and it is probably their only chance. Only if intelligent solutions allow travelers to combine the various modes of transport effectively, and above all conveniently, can mobility be guaranteed for all the inhabitants of the world’s major cities in the future.

Former Mayor of London Ken Livingstone hardly made any friends by introducing the Low Emission Zone and a steep congestion charge. But the results speak for themselves: the city has an average of around 60,000 fewer car journeys to cope with.

City congestion charge prevents 150,000 tons of CO₂ emissions

Regional and national rail services, public suburban transport and airport transfers were finely tuned to one another, and once the city of London had set up its alternatives to car travel, it began regulating passenger car traffic in the city center. Car-park and traffic-routing systems were introduced in the city along with the congestion charge. After just a few months, the flow of traffic had improved by 37 percent; commuters now reach their destinations much quicker, and considerably less strain is placed on the environment. This is therefore a path that other overstrained major cities around the world could follow – and it is probably their only chance. Only if intelligent solutions allow travelers to combine the various modes of transport effectively, and above all conveniently, can mobility be guaranteed for all the inhabitants of the world’s major cities in the future.

"Complete mobility": London as a model

Individual and public transport, buses and the subway, rail and road networks – every transport system has its own strengths. The intelligent integration of the various systems in London shows very clearly how well “Complete mobility” can be put into practice: Regional and national rail services, public suburban transport and airport transfers were finely tuned to one another, then car-park and traffic-routing systems were introduced in the city along with the congestion charge. After just a few months, the flow of traffic had improved by 37 percent; commuters now reach their destinations much quicker, and considerably less strain is placed on the environment. This is therefore a path that other overstrained major cities around the world could follow – and it is probably their only chance. Only if intelligent solutions allow travelers to combine the various modes of transport effectively, and above all conveniently, can mobility be guaranteed for all the inhabitants of the world’s major cities in the future.
video cameras to a control center, the new Siemens solution in the extension of the Low Emission Zone processes the video data there and then. The pictures of the registration plates are encoded as digital certificates and transmitted to the headquarters via a broadband IP network. This cuts the operating costs, which means that more of the congestion charge income – which amounted to £123 million in the 2006/2007 financial year – can be put towards expanding public suburban transport services.

The effects on traffic load and the environment have been studied very closely since the program was introduced. The market researchers from Deloitte calculate, for instance, that the flow of traffic improved by 37 percent in just the first eight months after the congestion charge came into force. Malcolm Murray-Clarke, director of Congestion Charging, states that the volume of traffic has fallen by around 20 percent since the system was introduced in February 2003. The word from the mayor’s office is that 60,000 daily car journeys have been purged from the city, and that in most cases the drivers have switched to using public suburban transport. What’s more, many Londoners now walk or take their bike: the number of cyclists alone has risen by 43 percent since the introduction of the congestion charge. This works out as a saving of 66 million liters of fuel and 150,000 tons of CO₂ per year.

Red double-deckers turning green

And yet more can be done: Last year, a traditional red double-decker London bus was equipped with hybrid drive motors from Siemens – the client TfL deployed the first bus of this new and environmentally sound generation on the 141 route towards London Bridge. The bus features an intelligent combination of diesel-electric power and energy storage in a battery; the power of two drive motors is bundled by an addition gear on one drive shaft. When the bus brakes, the drive motors act as generators, with lithium-ion batteries saving the brake energy that is produced and making it available for the next acceleration. An energy-management system regulates the flow of energy between the battery and the diesel motor depending on the power required. In this way, the hybrid double-deckers of this type produce up to 40 percent less emissions than conventional diesel buses and consume around 30 percent less fuel. If all 8,000 red buses in the capital were made “green” like this, Londoners could really breathe a sigh of relief.

Still, with what has been achieved so far, the British metropolis is a strong example of how “Complete mobility” from a single source can provide a sustainable solution, even to complex traffic problems. Sherlock Holmes would be proud.
On course for success

They are popular with passengers and travelers and are at the top of the ladder when it comes to reliability: in the five years since the first trains were delivered, Desiro UK multiple units have experienced a real boom in Great Britain. The secret of their success is a flexible platform concept.

The success story began over five years ago. In August 2003, First Great Eastern, now known as National Express East Anglia, put the first Desiro UK Class 360 multiple units into service. The delivery totaled 21 four-part electric units, which have been running between the terminal stations Liverpool Street, Ipswich and Clacton at speeds of up to 160 km/h ever since.

The concept was quickly met with approval. “In the Desiro UK multiple units,” beams Christian Roth, Managing Director of Siemens Transportation Systems UK, “we have an extremely flexible vehicle platform popular with both operators and passengers in equal measure.” There are currently 279 Desiro UK modular trains running between Weymouth on the south coast and Glasgow in Scotland. At the start of 2008, they had traveled over 160 million kilometers between them. Five different series of electric trains, as well as the diesel-powered Class 185, are in service for the rail operators National Express East Anglia, South West Trains, Heathrow Express, London Midland and First TransPennine Express. Christian Roth: “Just recently, Transport Scotland and First ScotRail ordered another 38 Desiro Express 23m units. Together with the 37 Desiro Class 350 electric multiple units for the new London Midland route between London and Birmingham, there will be more than 350 Desiro trains roaming over Great Britain.”

Furthermore, the Desiro fleet is among the most reliable around, according to the British Association of Train Operating Companies (ATOC), which analyzes the reliability of the operators’ fleets using special criteria 13 times per year. The results of this National Fleet Reliability Improvement Programme (NFRI) are published regularly and used for benchmarking purposes. As of November 2007, the Desiro trains operated by First-TransPennine Express hold the top spot for reliability in these official rankings in the New Diesel Multiple Unit (DMU) category. The Class 360/2 electric modular trains of the Heathrow Connect Service, operated by Heathrow Express in cooperation with First Great Western, recently climbed to first place in the Electric Multiple Unit (EMU) category.

This was also made possible thanks to the professional maintenance by Siemens Integrated Services, implemented on behalf of the operators, which employs around 500 specialists in Great Britain alone. In order to ensure the daily availability of the three-part Desiro Class 185 DMUs, new maintenance depots were constructed in Manchester and York; for the Class 360/2 EMUs of the Heathrow Connect service, Siemens uses the Old Oak Common depot in west London.
From the Arctic Sea to the Bosporus

European rail transport is caught in the trap of different systems with procedures and regulations more varied than ever. Nevertheless, cross-border travel is possible without changing locomotives – with the Eurosprinter, which now has a new generation up and running.

Europe is united, or so we are led to believe: customs barriers have been removed, as have most border controls. When it comes to rail travel, however, our united Europe reveals itself to be as disjointed as ever before. “We are unfortunately miles away from uniform rail standards,” affirms Ulrich Fösel, Product Manager for locomotives at the Siemens Mobility Division in Erlangen. “On the European continent alone, there are four different track widths, four different voltage systems, and countless train protection systems.” This is why many trains have to stop at country borders and change locomotives before continuing. This mandatory pause is at the cost of train passengers and gives trucks a clear advantage in goods transport.

Admittedly, standardized systems have been introduced in accordance with European ERTMS regulations on certain important transport axes, the trans-Europe express lines and the goods transport corridor between Rotterdam and Genoa, for example. “For us locomotive manufacturers, however, the matter is not simplified much by these interoperability standards. In fact they often complicate things,” criticizes Fösel, “because the national regulations normally still apply in any case.” This confusion is likely to be around for the foreseeable future.

For this reason, Siemens has been working on practicable solutions since the 1990s. The result is the Eurosprinter, a product family of modular locomotives that can be adjusted to the various conditions in different countries without any problems. They can handle all four voltage supplies and several train protection systems, which allows them to travel through Europe without being restricted by national borders.

This flexibility is made possible by a consistently implemented platform concept: the basis locomotive consists of a locomotive body, a bogie and motors – all special functions can be selected as and
Many rail operators already have Eurosprinters out of the blocks (left). The new generation (right) is also running in Portugal.

when required and integrated in a modular fashion in the form of country system packages. These modules cover everything the locomotive needs to operate in a particular country – from the voltage supply and the train protection system right through to signaling technology. For instance, in order to comply with the various lighting regulations, an ingenious system has been developed using halogen bulbs and LEDs. This can be controlled flexibly and is able to provide all the light strengths and signal colors necessary for the different country packages.

Eurosprinters are already on the tracks in many countries such as Sweden, Holland, Germany, Austria, Switzerland and Italy. They are also operating further east in Slovenia, Croatia, the Czech Republic, Poland, Romania, Bulgaria and Hungary. Furthermore, the rail company Comboios de Portugal (CP) has ordered 25 goods locomotives from the new series, which are to run on the Iberian gauge tracks of 1,668 mm. “The modular multi-system technology makes it possible, in theory, to travel non-stop from the Arctic Sea to the Bosporus,” explains Ulrich Fösel. “This brings about completely new business opportunities in cross-country transport for the operators, whether national rail or private companies, as well as clear competitive advantages.” The operators are able to react flexibly to changes in the market, for instance when flows of commodities or supply agreements change. “In such a case, the locomotives can simply be modified using the plug-and-play method. The country packages which are no longer required are replaced by new ones.”

Basis locomotives and country packages are standardized, while other elements such as the paint finish can be designed individually. In addition, there are equipment packages to choose from, containing comfort furnishings or a mass-transit package, for instance. In this way, completely individual, tailor-made locomotives are created simply by combining different elements and versions. This is a strategy with a double payoff both for national rail operators and private companies: on the one hand, even a small number of locomotive units can be built at a reasonable price, and on the other hand, the production times are short because the components with longer delivery times are generally those that are included as standard. Finally, it is even possible for several operators to put together a shared, cost-saving maintenance infrastructure.

With the latest generation, Siemens has developed the platform concept of the Eurosprinter further. “The 6,000-kilowatt locomotive can either be supplied for goods transport,” says Ulrich Fösel, “or as a universal locomotive for passenger travel that can run at 200 km/h. Belgium’s national rail operator SNCB is to deploy the first 60 of these high-speed train locomotives with equipment enabling them to run in Belgium, Luxembourg and France.”

The modular locomotive family therefore not only creates new prospects for goods transport, but also increases the appeal of tourist travel – fitting the bill of “Complete mobility” perfectly.
If the frogs are croaking, nature is doing ok. This is the way things should be. Intelligent solutions protect the environment without slowing the human demand for mobility.
The future is eco friendly. People insist more than ever on mobility, but travel at all costs is no longer an option. Now it seems the only way forward is with energy-saving transport technology and integrated, intelligently networked all-in-one solutions. Measurable success in protecting the climate and natural resources has already been made – but we are a long way from the finish line.

The question of whether or not we can still save this planet has long found its way outside green political circles. The U.N. climate report published at the beginning of 2008 dramatically described the consequences of growing industrialization and the increase in environmental pollution. For once, climate researchers from all nations were in agreement when they assessed the risks of climate change. According to the experts, two-thirds of the megacities are situated in coastal regions vulnerable to flooding or in other regions that are under serious threat from climate change. The warnings didn’t really come as a surprise. Former Vice President Al Gore has been trying to warn us for a long time with his presentation tour full of stirring image sequences. And this was backed up at the end of 2006 with economic figures from former World Bank Chief Economist Sir Nicholas Stern. The material damage could add up to 20 percent of the global economy, or approximately €5.5 trillion.

Transport is also a key focus. Humanity as a whole is traveling more than ever before – and the trend is increasing. The quality of life of many regions and their ability to compete on global markets is increasingly dependant on safe and fast transport systems. Traffic volume in the EU will continue to grow and with that, generate more emissions – for just the 15 member states of the time, the 1990-2004 statistics showed an increase of 26 percent in greenhouse gases in the transport sector, more than half of which is attributed to truck transport. Transporting more goods on rail rather than road will not be sufficient. Intelligent solutions for an environmentally sound, combined transport system are required – and a paradigm shift with regard to mobility.

It is precisely these needs that are being addressed by Siemens’ comprehensive strategy for all carriers and intermodal transport. People and goods should be transported as economically, safely and smoothly as possible, while combining all environmental and climate-protection aspects of products, solutions and systems. This begins with vehicle construction and consideration of the life cycle, includes systems for saving energy and recycling, and covers everything up to optimizing schedules the coordination of all carriers. Siemens invests approximately €2 billion in the development of new environmentally sound technologies every year, and holds 30,000 “green” patents – nearly half of the entire patent portfolio.

This makes it possible to create innovative components such as the Syntegra traction bogie for the railway network. It can work significantly more economically than all its predecessors, because the synchronous motors drive the axles directly and therefore gears are no longer necessary. Compared with conventional bogies, the weight is reduced by approximately a third through this comprehensive approach and the efficiency of the engine is clearly superior to standard systems. If the integrated...
brake-energy recovery is also taken into account, then Syntegra saves a fifth of the energy previously needed. It spares the railway operator’s budget as well as the environment.

At the end of the day, the recovery of electrical energy through electric motor brakes, known as regeneration, is one of the most effective saving measures. The energy is fed directly into the electricity grid in order to promptly discharge the traction power supply. Or, as is the case with the Sitras SES energy storage system, the energy is temporarily stored in the grid and then released again later, for instance when a train accelerates. Each system can save up to 500,000 kWh of the primary energy requirement each year, which equates to 300 tons of CO₂. If the stored energy is buffered in the vehicle itself, then even journeys over longer distances are possible without overhead lines. This makes sense in the case of reduced structure gauges, at railway switches and junctions of different transport systems – or simply around old towns in order to preserve an unspoiled view of historically protected buildings.

So what does “green” technology really mean in practice? The new Class 3800 electric freight locomotives for the Queensland Rail in Australia, for example, provide a whole 4,000 kW of traction power. Therefore, the coal trains weighing up to 13,000 tons need only three locomotives, compared to the five previously required – thus saving a good 1,050 MWh of electricity per train each year. In addition, 60 old locomotives could be modernized and updated to the same performance level; the trains can now be used with energy-saving traction for another 20 years. Here also, all locomotives were equipped with regenerative brake systems. The electric motors work as generators when the train brakes, the electricity flows back into the system and saves a further 2,250 MWh of energy per train annually.

Environmentally friendly through and through: unadulterated green mobility

New standards also apply to regional and suburban transport, as the example of the Oslo Metro shows. This concept combines economic and ecological advantages in an exceptional fashion. On the one hand, the new vehicles use approximately 30 percent less energy than the previous models because of their lightweight construction and an efficient regenerative brake system. This allows the Oslo Metro to produce only 2 grams of greenhouse gases per kilometer and ton – a crucial argument against all other forms of transport. On the other hand, saving energy was not enough: the materials for the vehicles were chosen so carefully that they made the entire metro train 94.7 percent recyclable. This saves resources once the trains are out of service and makes the project in Oslo exemplary. The vehicles – when considered holistically over their entire life cycle – are environmentally friendly in their production, operation and utilization. An additional benefit to the environment that ultimately brings in some hard cash for the operator Oslo T-Banedrift AS is that, considering the current price of raw materials, when it comes time to recycle a three-carriage train the operator can make up to €60,000.

The efficiency of technology can also be increased on the roads – on practically every street corner. The application of LED technology for light signals has already reduced the energy costs of traffic-light systems by up to 90 percent. These figures speak for themselves: the light bulbs for an average intersection system with 30 light signals use almost 2.7 kilowatts at approximately 100,000 traffic-light controlled junctions in Germany alone, which adds up to a yearly energy requirement of almost 270 megawatts – an entire power station just for red-yellow-green. If all signaling systems were equipped with modern 40-volt LED technology, consumption could be slashed by around 16 megawatts. Because the little LEDs also last around ten times longer than conventional light bulbs, it is not surprising that an
increasing number of municipalities are rushing to convert their traffic signal equipment to the energy-saving, long-life LED technology. It is worth it twice over.

The solution: intelligent networking

Add an intelligent “green wave” and the motorists will also be on the better side. Dynamic priority traffic-light circuits, for example, keep the process flowing by using the new Sitraffic Motion adaptive network control, which matches the traffic-light phases to the actual traffic conditions. In conjunction with detectors and a high-performance traffic-control center equipped Sitraffic Scala, the software not only assesses the flow of traffic at the junction points, it also keeps an eye on the entire area, so to speak. The effectiveness can be seen at the green-wave project in Münster, Germany, where the system constantly adjusts the traffic-light stages according to the traffic at 24 controllers over a six-kilometer stretch. The travel speed during peak times has risen by nearly 15 percent and pollution levels are dropping.

What’s more, there is still abundant potential to be tapped in adaptive networked traffic regulation, just as the Ruhrpilot scheme shows, for example. With this project, Siemens set up the biggest European traffic management system to date. Located in a densely populated region, it incorporates 600 kilometers of freeway, 53 towns, 70 train stations, approximately 1,200 trains and 6 million motorists daily. Intelligent traffic guidance technology gather current data from various sources – from traffic detectors and car-park sensors, from district systems and the public-transport headquarters – and use these to generate concrete recommendations. The system transmits information via the Internet or cell phone regarding the optimal travel route and the relevant roads, car parks, freeways, buses and railways in the entire Ruhr region, Europe’s largest conurbation. The user can also state with which mode of transport they would like to travel and at what time they would like to reach their destination. The Ruhrpilot calculates the fastest route and the best possible mode of transport and directs the driver to a vacant parking space, where they can then board a bus or rapid-transit train.

The result is clear: a vastly improved flow of traffic as a result of the smooth interaction between the various available modes of transport reduces congestion, prevents unnecessary energy consumption and improves the CO₂ balance – green mobility in practice.

1 Red-yellow-green: LED signal technology uses 90 percent less energy. 2 No gears, less weight: Syntegra bogies are genuine energy savers. 3 Economical locomotives: Class 3800 locomotives are also strong in terms of ecological balance. 4 Economical in operation, and spares resources until the end: 94.7 percent of the metro trains in Oslo can be recycled. 5 License to change: intelligent networking of carriers facilitates “Complete mobility.” 6 Electricity-saving containers: Sitras SES storage systems buffer the energy from the brakes.
The discrepancy is made particularly clear with road and rail networks: transport volumes are rising sharply, as are customer demands for punctuality, intermodal networking of carriers and a high level of comfort at a low price. A massive boost in performance is certainly not feasible with the existing infrastructures. The German Institute of Urban Affairs already announced years ago that until 2009 German cities and municipalities alone require around €86 billion every year for investments – a good quarter of which for the transport sector. But how are they to expand and modernize if the public bodies have to act in so many areas at once? What if the financial means or certain specialist expertise are not available on the required scale?

These are the reasons why the term public-private partnership (PPP) is becoming all the more common when public projects are in the pipeline. It involves the public and private sector working together for a specific purpose. They combine their strengths on a certain project, dividing the responsibilities and the risks. The public authorities can concentrate on their core tasks, while private-sector companies bring to the project their abilities and contacts, and direct access to technology and innovations.

“That’s why a PPP model is not just a financing concept, as is often assumed,” stresses Susanne Kaidel, Head of Project and Export Finance Industry/Siemens Financial Services GmbH SFS, “but rather a purchasing model whereby the client buys a complete life-cycle service including financing, rather than just equipment.” Of course, it is rare that the entire program is delivered by one supplier. Only few companies, of which Siemens is one, have such comprehensive resources at their disposal within the organization. “Alongside the technical solution – from planning and realization through to full-service operation – we can also provide tailor-made financing in a partnership.”

The goal is to offer the citizen, whether car driver, rail customer or pedestrian, high-quality market-driven public services throughout the entire product or project life cycle. Thus, the cooperation rarely ends with the finished product; in most cases, long-term operation and maintenance con-
PPP divides opinions. Some consider public-private partnership as a universal remedy in the expansion of modern infrastructures; critics, on the other hand, fear a sellout of governmental authority. Public-private partnerships can, however, be of benefit to everyone.

With public-private partnerships, the client buys the complete life-cycle service including financing.

Susanne Kaidel, Siemens Financial Services

tracts are signed. Under the PPP model, private contractors can, for instance, assume the construction, retrofitting and operation costs of the system over a long period, usually 20 to 25 years. The public client retains ownership and pays a contract fee, agreed up front, for the duration of the contract. If well planned, this kind of mixed doubles partnership can result in considerable added value and increased efficiency. Current calculations reveal an average efficiency boost of 16 percent, or as much as 25 percent in certain cases.

Great Britain was among the pioneers: at the beginning of the 1990s, public-private structuring projects in Liverpool showed that even a run-down industrial city can be transformed into a showpiece. Today, as much as 20 percent of public investment in Britain goes through the private sector. In Germany there is still a need to catch up – but the prospects are good. A PPP task force set up by the German Federal Ministry of Transport, Construction and Housing (BMVBS) is engaged with the expansion of a federal network of expertise, and develops standards for compiling tender documents. Like almost everywhere else in the world, infrastructure measures are at the center of these activities, with a particular focus on transport and public buildings. In February 2005, the go-ahead was given for five PPP pilot projects in freeway construction – one of which was the six-lane expansion of a stretch of the A8 Autobahn between Augsburg and Munich, following the so-called A model. “In the A model,” explained the transport ministry at the time, “private companies take on the construction, operation and maintenance of a section of freeway and finance the project primarily through income from the truck tolls collected on the section in question.”

Rail transport, in particular, is currently profiting from the public-private handshake all over Europe. By the year 2020, a standardized high-speed rail network is to run through the whole of Europe. Journey times on the Trans European Network (TEN) – from Spain to Russia, from Finland to Greece – have already been slashed. One important section of this TEN network is an approximately 100-kilometer long high-speed line, HSL Zuid, in Holland.
The two-track HSL Zuid stretch, intended exclusively for passenger travel, has been designed for a train speed of 300 km/h. If the route (Amsterdam – Rotterdam – Antwerp – Brussels – Paris) is covered at this speed throughout, the journey times between Amsterdam’s Schiphol airport and Brussels or Paris are reduced enormously. The stretch from Amsterdam to Paris can be covered in three hours; Holland’s two largest cities Amsterdam and Rotterdam are just 35 minutes apart.

At the same time, the high-speed line offers an environmentally friendly alternative to air and road travel, as it runs through the Randstad (“edge city”) region in the west of Holland, one of the most densely populated metropolitan areas in Europe. More than seven million people live here, equivalent to around 40 percent of the Dutch population. This concentration entails extremely dense traffic and correspondingly high emission levels. The HSL Zuid can contribute to easing the situation and significantly reduce the CO₂ emissions – making a noticeable improvement to quality of life in the region.

The HSL Zuid was built and equipped between 2001 and 2007 by the PPP consortium Infraspeed. With an investment of around €1.3 billion, it was the largest PPP project for constructing a high-speed railway line in Europe to date. Siemens was responsible for installing the ETCS signaling technology, the overhead electricity supply, the safety technology including tunnel equipment, and all the communication equipment. In addition to supplying these elements, Siemens’ contract included servicing and maintenance for all the technology over a period of 25 years. As an experienced partner in turnkey solutions, Siemens also took on a leading role in the financing, as Susanne Kaidel explains: “In this project, SFS made a decisive contribution to structuring and securing the complete financing of the project.” And the experts were impressed: the magazine Project Finance gave this tailor-made project its award for “European PPP Deal of the Year 2001.”

Germany is catching up in the PPP business, however. In the period between 2002 and March 2008, the IFD (Initiative Finanzstandort Deutschland), an action group set up by banks and insurers, was able to register 88 German PPP projects with a total investment volume of €2.9 billion. “There are currently more than 150 new PPP projects with an investment volume of around €5 billion being planned in Germany,” estimates IFD expert Wolfgang Meyer. “Due to the federal structures in Germany,” he continues, “a large proportion of these may be smaller-scale PPP projects.” Municipal projects play an important role here.

For instance, the city of Brunswick decided to assign certain tasks in the field of public lighting and traffic routing to the private operating company Bellis – founded by Siemens Intelligent Traffic Systems and the Brunswick provider BS Energy. “A modern local authority concentrates on the real public tasks that industry cannot perform on its
behalf,” reasons Brunswick’s Lord Mayor Dr. Gert Hoffmann. “Meanwhile, it hands over all those responsibilities that can be fulfilled more efficiently by the private sector. This includes traffic management, which Brunswick assigned to Bellis in 2006, including operation, maintenance and repairs. In addition, as the central point of a region with high standards in transport, the Brunswick solution was very interesting as a model.”

Siemens brings many years of experience in the field of intelligent traffic routing to the project, as well as the ability to innovate that comes with being one of the world’s leading suppliers. BS Energy, meanwhile, has roots in Brunswick as a local, customer-oriented energy provider. This adds up to an ideal combination for carrying out the tasks at hand. Bellis now operates over 200 light-signal systems in the city, some of which can be influenced by the priority control of the light-rail services from the public-transport provider Braunschweiger Verkehrs-AG. The company also plans and creates traffic-dependent control systems, and designs and delivers control devices, signaling devices and various detectors. Perhaps its most important field of activity is providing up-to-the-minute traffic information on behalf of the city. To do so, Bellis operates and maintains the Traffic Management Headquarters, which collects and compiles extremely varied information. Data is taken into account from the traffic sensors of the light-signal systems, from construction-site management, from the car-park routing system, and from current traffic information that is collected from 250 measuring points around the municipal area of Brunswick. Soon, it will also incorporate the operational control system of the public-transport operator. One aspect worthy of note is the bi-directional processing of radio data system/traffic message channel data (RDS/TMC data) from the surrounding highways and freeways. In addition to the inner-city readings, these make it possible to compile LOS (level-of-service) values on the traffic density from which the RDS/TMC announcements for the municipal area are then generated.

Eight graphic LED boards inform drivers on the current traffic situation and recommend alternative routes if necessary. Taking a global view of transport, which encompasses all the fields of the Transport Management Headquarters, enables the traffic sensors to select the appropriate signal program by way of a strategic control system. Bellis still has lots in store for the future, however: the latest generation of car-park routing systems and traffic-calculation systems are to be united with the Brunswick Traffic Management Headquarters using a single hardware platform.

“The city of Brunswick has had very positive experiences with this model, which is groundbreaking for the entire country,” says Lord Mayor Hoffmann, summing up two years of PPP. “The firms’ performance and willingness to innovate make for rational operation of the traffic systems. The service unites cutting-edge technology and low costs. This would not be possible if it were managed by the city.” For one thing is certain: those who do not get to grips with the challenge of transport today are already failing in their challenges of tomorrow.

1 Future prospects: Siemens took on a key role in the construction, equipping and financing of the HSL Zuid project.
2 Traveling in safety at 300 km/h: the record-breaking Eurosprinter locomotive was used to commission the route.
3 Achieving more together: the city of Brunswick delegated the operation and maintenance of its traffic infrastructure to the PPP partner Bellis.
4 A more relaxed way through the city: the traffic-dependent control of signaling systems, planned and put in place by the PPP operator Bellis, can significantly reduce traffic congestion.
All-in-one routing

Superlatives should be used sparingly, but the website www.bayerninfo.de really does offer the ultimate in telematics. With this service portal, the Bavarian Traffic Data Agency (VIB) has set new standards in intermodal route planning.
The Free State of Bavaria’s Board of Building and Public Works was responsible for operating a traffic data platform called “BayernInfo” for ten years – then came the fresh start in PPP format: the Bavarian Traffic Data Agency (VIB), a consortium of five companies led by Siemens and PTV, took over the project in a public-private partnership and created a state-wide service with data incorporating several modes of transport. Uwe Strubbe, Managing Director of the new operating company: “Our goal was, and is, to bring about the first fully integrated state-wide traffic data system.”

The expectations of all those involved were high, and the debut was a success. Since the summer of 2008, the free, intermodal journey planner at www.bayerninfo.de has shown that the VIB is in a league of its own: passengers no longer have to think about the current conditions such as traffic holdups or other transport delays, then do their research and evaluate – all the information is automatically input into their journey-time calculations for the selected trip. The VIB integrates all transport-relevant data, taken into account. The Bavaria Network for Cyclists, with around 8,700 kilometers of bike paths, even calculates the height differences of the routes.

These various data are combined using the newly created geographic data platform INTREST. It allows positions to be determined much more accurately than with previous navigation techniques, and it can receive traffic data from other systems such as public-transport computers or car-park routing systems, or even information systems from Austria, the Czech Republic, Italy and Switzerland. At the end of the day, stresses Uwe Strubbe, people using transport in Europe are less and less concerned about administrative boundaries: “They simply want to get from A to B in the most efficient way possible.”

In order to finance the project, the VIB can also use the information to supply added-value services to authorities and companies at a cost – transport statistics or environmental data for the authorities, for instance, but also local information. Strubbe: “In this way, winter-sports resorts could offer their guests up-to-date information on how to get there, along with the status of the lifts. Delivery companies could let their drivers know which service areas and rest stops have parking spaces free.” The basic features that are publicly accessible, however, are to remain free of charge for the foreseeable future, assures the Managing Director. After all, the intermodal future has only just begun.

VIB service for Bavaria

takes into account information on congestion, accidents and road-construction projects as well as data on parking, the weather and large-scale events. In addition, the system processes current traffic information from around 136,000 kilometers of highways and freeways, and soon it will even include local and minor roads. Bavaria’s 6,300 kilometers of track managed by the German national rail operator Deutsche Bahn are also incorporated, as are the Bavarian subway, rapid-transit railway and streetcar networks. When changes are required between different modes of transport, the walking times are also

calculated. The Bavaria Network for Cyclists, with around 8,700 kilometers of bike paths, even calculates the height differences of the routes.

We offer the quickest connections from door to door – for all modes of private and public transport and in all sensible combinations.

Uwe Strubbe, Managing Director VIB