The urban population is growing at an explosive rate.

Think outside the box!

The clever way from A to B.

The direct connection between two points is not always the fastest.

How do we solve our infrastructure problems?

How do I connect nine points with four straight lines without lifting my pen from the page?

Intermodal mobility could be a solution.
Urban transport 2.0

From A to B with smart connections

People in our mobile society prefer to sit in traffic jams than in the metro. Is intermodal travel perhaps too complicated, too inconvenient, too unreliable? The Integrated Mobility Platform from Siemens aims to change this. It will make it easier for operators to integrate various mobility services, and it will act as a catalyst for networked mobility across different operators.
This trend also has economic implications. “The congestion leads to enormous costs, as we lose relatively large sums of money through waiting times and additional fuel consumption.” Schmidt estimates that in Germany alone these costs amount to over €100 billion per year. Meanwhile, the time factor is particularly relevant to companies in terms of keeping to schedules and making punctual deliveries. Residents are increasingly experiencing health problems due to the harmful emissions, and their quality of life suffers greatly. This reduces the appeal of the cities affected, and it weakens their economies and development prospects. So much for the problem – what about the solutions?

Expanding is one possibility. Wider roads, better connections and new modes of transport such as metros and fast bus lines could absorb and channel the rising transport volume. But only few urban regions have sufficient space available for expansion. “Almost all large and very large cities are growing so quickly that infrastructure expansion is always a
“The concept of integrated mobility is based on the idea of networking publicly accessible modes of transport together, without giving preference to one carrier over another.”

game of catch-up, even when sufficient funds are available,” says Schmidt. “This also applies to plans to build new public transport infrastructure. Even in countries like China, which don’t have to contend with decade-long planning and approval processes like in Germany and elsewhere, we can already observe the same problem.” What’s more, transport experts recognize that extra traffic space almost inevitably induces additional traffic – car drivers very rarely switch to buses or trains on their own initiative. This raises the question as to whether public space for the purpose of expanding roads and parking is actually “an outdated kind of luxury.”

Optimizing the existing infrastructure certainly helps. Intelligent traffic and parking space routing systems, the introduction of a congestion charge or the decommissioning of multi-lane approach roads in favor of new park & ride spaces on the outskirts can help to reduce inner-city traffic and route the remaining vehicles more effectively. Existing rail systems like subways and metros also need to absorb higher passenger numbers – and with the help of intelligent automation systems such as Trainguard MT it is possible to increase rail capacities considerably.

Automatic train control systems maintain constant contact with the vehicles via WLAN – this kind of system is called Communication-Based Train Control (CBTC). CBTC allows for shorter headways between trains using the moving block process (see como 06, April 2011, page 12). It optimizes train operation based on the characteristics of the line and controls the trains largely independently, even enabling driverless operation. As a result, the average headways can be reduced from around three minutes to 80 seconds with no risk to safety. This means the line can handle 50 percent more traffic and cut its energy consumption by up to 30 percent. However, each of these measures taken in isolation only has a limited effect. For one thing, the available infrastructure imposes limits, and for another, people used to the comfort of their own car have to actively make the decision to switch to an unfamiliar mode of transport. This rarely comes easily.

Integrating new and existing modes of transport to create a new, networked mobility concept – this is what farsighted transport experts are increasingly recommending as a way out of the congestion problem. “Today there is a broad consensus that, along with modernizing and optimizing the existing infrastructure, networking various modes and systems...”
of transport can lead to a significant improvement in the transport situation,” says Schmidt. “By giving people the opportunity to simply and conveniently switch between private cars, buses, trains, carsharing and rental bikes, we are facilitating intermodal mobility. As such, the benefits of private and public transport are combined.”

Everyone involved benefits from this kind of concept: passengers can flexibly choose their optimal method of travel, gaining genuine, individual added value in the form of time saved and a combined billing service. For the municipalities, “the networking of car parks, public transport and carsharing reduces the number of private cars on the roads, which prevents congestion and its economic implications, and minimizes harmful emissions.” But how is it actually possible to consistently network such varied transport services?

Integrated Mobility Platform: complete transport networking

The Integrated Mobility Platform (IMP), currently being developed by Siemens, is the toolbox that makes it possible. This business-to-business platform makes it easier for service providers, for example, to extend their mobility services by adding compatible offers from various other providers and presenting passengers with a central, standardized interface for planning, booking and paying for their multimodal travel. Schmidt: “Users don’t have to book each mode of transport from A to B individually; they can take the journey as a whole and then personally optimize it according to environmental and economic criteria.” IMP gives cities and munici-

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Getting the best price: users can take advantage of special prices or discounts, and book the entire journey right away.
People in our mobile society often prefer to sit in traffic jams than in the metro – intermodal travel is still not convenient enough. In the future the Integrated Mobility Platform will act as a catalyst for cross-provider, networked mobility.”

Mobility as an association

The idea itself is nothing new, but it has never before been implemented so thoroughly. “Out of well over 700 transport companies in Germany, many have come together in regional or national associations, offering transport services with standardized tickets at standardized prices,” says Schmidt. By way of example, the world’s first transport association was founded in Hamburg in 1965. Today it has extended beyond the city itself and comprises around 30 transport companies. Aside from sensible coordination of timetables, at the heart of such transport associations is end-to-end pricing: passengers buy a single ticket for their entire journey and are still free to use several modes of transport.

Some transport associations are also already cooperating with carsharing or bicycle rental companies, parking lot operators and other service providers. “The thinking is perfectly logical and consistent. But if you want to integrate a wide range of offers into a common service environment, allowing end customers to book and pay for them from one

Intermodal ticket: a mobile ticketing application registers the various transport services, routes traveled and changes of class. Various ticketing systems can be integrated, from purely electronic tickets to smartcards.
source, you need more than just a powerful computer and a database." The Integrated Mobility Platform being developed by Siemens therefore supports the integration of cross-operator mobility services at various levels.

**Technical integration:** The IMP merges real-time data from various mobility providers and the transport management headquarters, forwards information and customer enquiries to them, and refines data from various sources. On this basis, the system generates travel data for the users, disruption reports and timetable changes, tickets for smartphones and computers, and billing information. Schmidt: "Of course there will be a few tricky questions to work out with regard to interfaces, but overall the technical challenges are manageable."

**Commercial integration:** The IMP stores the conditions for roaming between the mobility providers – that is, the rules by which the services of a third-party operator are integrated into an application – and provides central support for the billing processes between providers and recipients of services.

"People are basically familiar with these processes from mobile network roaming," says Schmidt. "More important are the actual business models. Who will introduce such a service, with whom is the end customer registered, who is earning money at what stage, what prices and price models are appropriate for the market?" Perhaps in some cases a strong association will assume the role of a service provider; in other models the individual providers might stand side by side on equal terms. "This is quite a typical situation for a market in its infancy. But I am convinced that the participating companies will come to an agreement very soon and quickly establish attractive business models to offer to their customers."

**Legal framework:** Standardized framework agreements and support with mediating and designing these agreements between the mobility providers should also come under the scope of the IMP services.

An integrated distribution module allows all sales to be managed centrally and supports the standardization of business processes – for example, the sale of tickets and the management of subscriptions, customers and electronic fares. It also automates the flow of data from sales to billing and accounting. "Linking together all these available modules intelligently brings about added value for the providers of mobility services in cities," assures Schmidt.

Always up to speed: during the journey the system provides updates in real time, for instance in case of construction work or delays, and gives current recommendations for alternative travel routes.
The entire journey from your smartphone

Equally, users will soon come to appreciate the new convenience of such a system. Universal information and payment systems based on the IMP can offer travel planning, a convenient choice between different modes of transport, fare optimization and the option of alternative transport services in case of delays.

Using a smartphone or a computer, users first select their destination and are shown their individual recommended travel route. Smartphone apps or networked car assistance systems also give a clear picture of the traffic situation, display sensible alternatives in case of accidents or delays, and recommend the best mode of transport based on personal preferences. A user’s travel plans can, for example, be optimized according to environmental criteria. Then an end-to-end, cross-provider ticket can be booked right away, with seat reservations if required. A corresponding app then shows what flight or Intercity-Express seats are reserved or still available – while the operator is informed of the remaining train or flight capacity in real time.

During the entire journey, customers are actively informed about any disruptions, changes or alternative services according to their location, preferences and chosen destination. Changes can be made to bookings with just a few clicks. The Integrated Mobility Platform’s central billing process allows all the mobility services used to be calculated together. Mobile ticketing or card-based solutions such as Siemens eTicketing with Check-In/Check-Out or Be-In/Be-Out functions register the various transport services used, routes

Convenient billing: a centralized billing process working on the Integrated Mobility Platform collects the data related to all mobility services used. The passenger receives a single bill for all these services.
traveled and changes of class. Customers are only charged the cheapest fare option for the services they have actually used. Finally, they receive a single invoice – like the itemized bills usually issued by telecom providers.

“Data security is a very important issue throughout this process,” stresses Schmidt. “Using Germany’s very high security standards, we have brought to market a solution with real-time data processing of travel routes and route-based billing. The route data is kept separate from the personal data for a very long time, and only brought together when calculating the service provider’s invoice. Certain security risks, which could lead to a passenger’s movements becoming transparent, do not come into play here at all.”

IMP – a tool for modern mobility

The Integrated Mobility Platform can therefore form the basis of intermodal transport services, bringing clear benefits at every level. Customers get convenient, multimodal travel, transparent travel information in real time, and a larger range of mobility services with attractive pricing thanks to the cooperation of several operators, all of which makes this method of travel a real alternative to the private car. Meanwhile, mobility providers can make their overall transport service more attractive, remove access hurdles and gain new passengers – even those accustomed to the convenience of their own car. For the individual operators, the automatic recording of routes and times brings about greater transparency with regard to passenger numbers, preferred travel times and capacity utilization of individual routes.

Ultimately the cities benefit too. Universal, environment-conscious transport management combined with an intermodal mobility service gives municipalities an effective tool for guiding traffic, offers residents an attractive way of planning their journeys, improves the capacity utilization of the infrastructure, and helps to take control of emission levels. The more cars that are left at home in the future, the more the city will regain its appeal as an attractive place to live and work.
The solution

Many attempts at the nine-point problem fail because the lines do not extend beyond the square formed by the points. Only when this self-imposed restriction is abandoned does a solution emerge. It is a matter of thinking outside the box.
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