Horn concert
Calmer ways ahead for road traffic in India?

The 800-billion-dollar question
The enormous economic benefits of investing in urban transport infrastructure
“What could be the best roadmap for the development of Indian transport?”
Dear Reader,

Almost exactly two years ago, at the end of July 2012, India was affected by a power outage of enormous proportions: The lights went out in literally half of the country and the assembly lines in the factories stood still, as did the subway trains in major cities. More than 600 million people were without electricity, some of them for several days. What Outlook magazine called the ‘single largest blackout in world history’ is still seen today as an image for the inefficiencies of Indian infrastructure as a whole, which are estimated to detract about two percent from the country’s economic growth potential every year.

Besides the power grids, it is of course the mobility system that gets a lot of the blame. “Here too we need to do a lot of expanding and improving,” says Raghuram Rajan, the Governor of the Reserve Bank of India. He counts poor traffic infrastructure and the resulting high transport costs among the main reasons for the fact that India has much less industry than other emerging nations.

But what could be the best roadmap for the development of Indian transport? Which kinds of systems could ensure sufficient capacity to meet the mobility demands of a population of over 1.2 billion? We have talked to experts who should know some of the answers. For instance the renowned transport scientist Professor Dr. Geetam Tiwari of the Indian Institute of Technology in Delhi, whose interview underlines the importance of building a holistic mobility system that will be able to integrate the extremely heterogeneous traffic mix on India’s roads and streets. Or Dr. Ashish Verma, President of the Transportation Research Group of India, who in his essay summarizes the opportunities offered by the implementation of intelligent transport technologies in his country.

In addition to a range of strategies and concepts for future development, this issue of ITS magazine with its focus on India also offers a glimpse of the current reality on the country’s roads. So be sure to read on and find out what traveling in urban traffic was like for my colleague Kai Fischer on his first visit to Mumbai.

As always, I hope you enjoy the read.

Sincerely,

Markus Schlitt
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Most of the vehicles that bustle around on Indian roads do not really inspire much confidence. A few years ago, a new law was introduced to implement plans for improved roadworthiness testing for the first time – a perfect through ball for the German TÜV SÜD, who has since set up its first testing facility in New Delhi.

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“We need a holistic mobility system”
Interview ■ Professor Dr. Geetam Tiwari, occupant of the Chair of Transport Planning sponsored by the Indian Ministry of Urban Development at the Indian Institute of Technology in Delhi, speaks about weak transport infrastructure as a bottleneck to economic development, the problems caused by a heterogeneous traffic mix, and the different takes that the authorities and the academic experts have on the issue of road safety in her country.
Professor Tiwari, on the basis of historical data, scientists at the Dutch university of Groningen have calculated that around the year Zero of the Christian calendar, India was the world’s leading economy with a share of 32 percent of global economic output. Is this just playing around with numbers – or could it provide some valuable insights for the present or the future?

I am not sure about this. While this may be true, there is no hard evidence for it. We have very little information about how different sectors of economy and society were organized at that time. Even if the Dutch colleagues’ calculations are correct, I don’t think that this information will provide us with useful insights for solving current and future problems of economic growth and for mastering the challenges of urbanization in 21st-century India.

The World Bank predicts India’s share of the global economic output to double from today’s three percent to six percent in 2030. Does this correspond to the expectations of your own experts?

India’s urban population is expected to double by 2030, with an estimated 600 million people living in urban areas by then. As regards economic output, Indian experts have similar expectations as the World Bank’s experts, but the actual development will depend on the level of investment in basic infrastructure, i.e. energy and transport. At present, the poor state of India’s energy and transport infrastructure is considered one of the major bottlenecks retarding the rate of economic output. And in view of our large population, the challenges of providing basic health care, education and employment remain a daunting task.

The Governor of the Reserve Bank of India, Raghuram Rajan, sees India’s transport infrastructure as one of the areas in particular need for optimization. Where would you start, for example?

In interurban transport, especially goods transport, very little effort has gone into connecting the different transport modes, i.e. road and rail, to form an integrated transport network for optimum goods movement. Moreover, little attention has been paid to last-mile connectivity in both systems. Improvement plans for highways and railways have been made independently of each other. Then again, the foundation of an integrated Ministry of Road and Rail Transport has been suggested by the report submitted by the National Transport Development Planning Committee that the Indian government constituted in 2010. The final report was submitted in January 2014.

While the Chinese government has been banking mainly on strengthening the industrial sector, India is focusing its efforts more on the service sector. Will this place less challenging requirements on the efficiency of your country’s mobility systems?

With its large population, India cannot afford to neglect the manufacturing sector. Hence the growth of the service sector must not be pushed at the cost of the manufacturing sector. In India, the slow growth of the manufacturing sector is a major concern. This is why continued efforts to ensure safe and efficient mobility for a wide variety of transport needs, road users and goods remain important.

Which area do you think suffers from more significant weak points today: urban or interurban transport?

Both. Recent upgrade projects for the national highways have resulted in better quality roads for motorized traffic, but the number of traffic crashes has increased at the same time. The share of goods transported by rail has declined due to frequent delays and general inefficiencies at the transfer terminals. As regards urban transport, investing in upgrading the basic infrastructure for pedestrians, bicycles and public transport has not been a priority in any city. In an attempt to improve public transit, some cities have included the introduction of new buses in their plans for suitable infrastructure improvements. Five cities have established a metro rail system, but neglected to sufficiently integrate it with existing systems. For these reasons, many people are turning to personal motorized modes to meet their mobility and accessibility needs.

Recently, many emerging economies have developed detailed master plans for optimizing their mobility strategy. How about India?

There have been weak attempts in a few cities to prepare comprehensive mobility plans, mainly at the insistence of the central government of India, which stipulated the existence
of such a plan as a precondition for cities to become eligible for government funding of their transport infrastructure projects. Due to poor monitoring however, the actual investments made in improving the transport infrastructure do not really comply with the mobility plans.

Which are the transport infrastructure projects that have been successfully completed over the past few years?

Recently completed transport projects include for instance 200 km of metro rail in Delhi, about 80 km of routes for the Bus Rapid Transit System in Ahmedabad, or the Sea Link bridge in Mumbai. Unfortunately, all three schemes qualify rather as construction projects than as well-conceived transport improvement measures. While the first two are considered successful public transport projects, they still lack the access facilities for pedestrians and bicyclists that would make them attractive modes of transport for commuters. And the objective of the Mumbai-Worli Sea Link Bridge is to ease congestion, so it benefits only car traffic.

And what are the short-, middle- and long-term expansion plans that are currently being discussed?

For interurban passenger transport between major cities, a high-speed rail system is under discussion. The expansion of the highway network has been underway since early 2000 to meet freight transport demand in the short and medium term. For the last five years, the Indian government has been discussing and planning a dedicated rail freight corridor to meet long-term freight demand. To improve urban transport conditions, most cities are expanding their road system, including grade-separated junctions. Building ring roads, elevated corridors and signal-free junctions is seen as the short-term solution of choice to mitigate urban congestion. In 2006, the central government of India developed an urban transport policy guideline, which recommends that pedestrians, bicycles and public transport should be given priority in urban transport plans. The construction of metro rail lines is seen as the most desirable
Personal background

Professor Dr. Geetam Tiwari holds the Chair of Transport Planning sponsored by the Indian Ministry of Urban Development at the Department of Civil Engineering, Indian Institute of Technology in Delhi (IITD). In addition, she is the coordinator for all traffic research activities and the accident prevention program at IITD. Her research interests include primarily transportation issues of special relevance to low-income countries, with a particular focus on, for instance, planning and designing road-based public transport systems and safe infrastructure for pedestrians and bicycles, as well as the analysis of heterogeneous traffic flows. Professor Tiwari is the author of more than 70 scientific papers and articles on traffic planning and traffic safety published in national and international trade journals as well as editor of four books on topics from the same research area.

Public transport measure by many city authorities. As a result, at the cost of ignoring the development of road-based public transport systems and the necessary improvement of pedestrian and bicycle facilities, cities have been planning metro rail lines, which in the end they were not able to implement due to a lack of funding.

Do these plans consider “only” the performance of the total mobility system – or are ecological aspects also playing a role? Ecological aspects are generally not considered. If environmental impact assessments are carried out at all, they are usually very weak and do not include environmental impact or overall resource consumption over the complete life cycle of the system.

Modern intelligent traffic systems enable faster and more cost-efficient capacity expansion of the existing infrastructure than the construction of new roads. What’s the role of such intelligent systems in India today – and what will be their contribution to overall mobility tomorrow? Modern ITS technology is an excellent tool for optimizing homogeneous car traffic. Synchronized traffic control and route optimization systems can result in better capacity utilization. But, in addition to car traffic, Indian cities have to optimize the movement of public transport vehicles and motorized two- and three-wheelers along with pedestrian and bicycle traffic. This is why these technologies have to be adapted for optimizing and ensuring the safe movement of heterogeneous traffic. By providing reliable data bases, ITS technologies can make valuable contributions to all phases, from planning to assessment, including the dynamic evaluation of the effectiveness of different strategies. In future urban mobility, ITS technologies can play an important role in improving the performance of the public transport system, especially as a tool for planning and managing a cohesive public transport system that integrates the informal means of public transport, which are so common in our country, with the formally planned bus and metro rail systems.

In Mumbai, the funds for a major part of current infrastructure projects are to be raised through Public Private Partnerships. What are the experiences with different PPP models that India has made to date? Over the past decade, PPP models have been applied in some cases in the highway sector. In the urban transport sector, however, the experience with PPP has not been very encouraging. Four metro projects have been implemented with private sector participation: the airport metro link in Delhi as well as the first phase of the metro projects in Mumbai, Hyderabad and Gurgaon. All of these projects have faced repeated delays, and the private sector partners have shown reluctance to continue. In the case of the Delhi airport link, the private sector partner has already terminated his involvement.

When reading travel guide books, you get the impression that in India, traffic rules are still more or less a theoretical precept. In practice, the “law of the stronger” or rather “of the bolder” rules the road, they say. Would you describe traffic in India in similar terms? Indian traffic is heterogeneous. Everywhere fast cars and buses share the road space with pedestrians, bicycles, rickshaws and two-wheelers. On high-speed roads, this becomes very challenging – and pedestrians, bicycles and two-wheelers are exposed to very high risks. It is true that the drivers of motorized vehicle generally do not yield to pedestrians and cyclists and consider it their right to move fast on the roads. Owing to design faults and poor enforcement, speed limits are not honored by most drivers. Traffic police and the city authorities responsible for managing urban traffic are more concerned about cars getting stuck in traffic congestion than about the hardships that motorized traffic causes for pedestrians and cyclists. Pedestrian and bicycle facilities are often encroached by motorized vehicles and the authorities are reluctant to take punitive actions against the offenders.

Numbers recently published by the World Health Organization show that with 130,000 traffic deaths per year, India’s roads are the most dangerous in the world. According to the experts, this is not only due to...
a lack of efficient traffic monitoring, but also, to a large part, to the technical deficits of the vehicles. What solutions are being discussed to tackle this problem?
For clarification’s sake: While India has the highest number of traffic crashes in the world, the number of fatalities per million inhabitants is not the world’s most elevated. But of course this does nothing to diminish the major concern that with the investment in improving the road system both for interurban travel and urban movement, the rate of traffic deaths has been increasing. In this area, we need to put serious reflection and effort into improving the design of our roads, tightening vehicle crashworthiness standards and enforcing safety-critical rules such as speed control, helmet use and alcohol control. The policies and attitude of the government have not changed over the last few decades and are still generally limited to ad-hoc measures. Stricter licensing regulations, higher penalties for traffic offenders and road user education continue to be the focus of government polices while the number of traffic deaths keeps rising. Various expert committees have repeatedly underlined the need for establishing a National Traffic Safety Board and developing short-term and long-term plans based on scientifically collected data. Their recommendation also included the continuous monitoring and evaluation of road standards, vehicle standards, safety laws and legislation as well as an effective enforcement regime. Unfortunately the Indian government has not yet listened to the advice of these experts.

Professor Tiwari, thank you very much for talking to us.

“Authorities are more concerned about congestion than about the hardships for non-motorized traffic”
Quantum of fear

Traveling in Mumbai • Traffic signals are often regarded as nothing more than colorful lights, road markings as being basically inconsequential street paintings. However, traffic in Indian cities still operates according to the rules – even if few of them can be found in the statute book. It took a few hairy moments before Siemens project manager Kai Fischer came to appreciate this reassuring insight.

My Mumbai adventure started the moment the doors of the aircraft opened. It was like walking straight into a wall – not a stone wall, but one that at first seemed just as impenetrable. Despite the midnight hour, the air was still extremely warm and humid, combined with the ubiquitous dust and that typical smell which I discovered was to accompany me at every turn for the next three weeks: a mixture of exhaust fumes, mostly from two-stroke engines, the odors of the garbage baking outside in the heat, and the vapors given off by countless cookshops across the city.

My colleagues from the local Siemens office had sent me a driver who, in the absence of a sufficient knowledge of English, directed me with many gestures to an old car that resembled a typical London taxi. But as soon as he engaged first gear, such associations with familiar fixtures of European traffic came to an abrupt end. There’s no other way to say it: The young man drove like he wanted to kill us both. Certainly faster than the police would have allowed, had they been anywhere to be seen. It was put to use as a matter of course – traffic cones or not. The fact that the drivers realized that we were installing the loops on only one lane with traffic cones. But the loops were not really clear either, even though it was quite important to know exactly how long the daytime rules applied, and when the night regulations came into force. “The borderline is about ten,” was a rule of thumb that was mentioned to me, “but it can sometimes be a bit sooner or sometimes a bit later.” Overall, the individual’s discretion in Indian city traffic seems to be significantly greater than in the cities in other parts of the world.

Later we experienced this at close quarters in the scope of our professional mission in Mumbai. In order to install traffic-dependent controls at a crossing in the district of Bharamatra, we had to move the induction loops and cut off any two of the four lanes with traffic cones. But the moment the drivers realized that we were installing the loops on only one of the two blocked lanes, the other was put to use as a matter of course – traffic cones or not. The fact that the cars’ exterior mirrors, where still
in existence, missed us only by a hair’s breadth didn’t act as a deterrent either.

I must confess: It takes a few days to get used to the traffic environment on Mumbai roads, which is highly unusual by European standards. But there comes a moment when you realize that even here, not everyone is driving on the limit as you initially thought, but rather that road users generally know what they are doing. From then on, your own adrenaline level drops, and as a passenger you do not just look out of the front window spellbound, but sometimes to the right and left as well – and there certainly is a lot to see.

Eventually, I was even able to enjoy the atmosphere, especially in the side streets. They are indeed a lot dirtier than the main roads, and sometimes you have to bump along on gravel tracks, but at least things are pretty relaxed here. The fact that various market stalls, queues in front of food stands or sometimes one or more cows are blocking the road seems to bother no one. You simply give them a “wide” berth. More difficult to classify are the impressions of a level of poverty that is hardly known in the old industrial countries. At almost every corner you will find people who live in cardboard huts or simply under tarps. And yet most of them exude a greater joy of life than the often grumpy people in the pedestrian zones of any European city. The bottom line is that it was this discovery that impressed me far more than the strange experiences and encounters I sometimes had in Indian city traffic.
On the move?

Essay: The World Bank predicts India’s share of the global economic output to double from today’s three percent to six percent in 2030. Among the key factors in this race to catch up will certainly be the transport systems. Dr. Ashish Verma, President of the Transportation Research Group of India, has summarized for us his thoughts on efficiency and ‘intelligence’ in transport networks based on the findings of a broad-based mobility study and a recent ITS workshop.
move?
The world is increasingly focusing its attention on the developing nations, especially the so-called BRIC countries, i.e. Brazil, Russia, India and China. Every step forward or backward of these potential markets is permanently under close scrutiny, including the factors that are vital for the economic development of any country. One such factor is the available transport infrastructure, especially in the cities, because the latter usually contribute the largest share of a nation’s GDP.

Over the past decade, India’s transport infrastructure has made enormous strides forward. The present essay is based on the findings of the “Global Mobility Monitor Network (GMMN)” project and the results of a workshop on “Intelligent Transportation System (ITS) for Sustainable Transportation Systems and Choices” hosted by the Indian Institute of Science (IISc) in Bangalore. It provides a summary of various indicators and describes the current mobility conditions in Indian cities as well as the present status and the need for future development of ITS in India.

One thing is certain: The largest democracy on Earth is urbanizing at a fast pace. In 2011, according to the Census of India, there were a total of 53 cities with a population of more than a million. By 2030 this number will have risen to 68, as predicted in 2008 by the management consultants of McKinsey & Company. To keep pace with this rapid growth, the Indian government has launched massive urban infrastructure development schemes such as “Jawaharlal Nehru National Urban Renewable Mission (JNNURM)”, “National Urban Transport Policy” and many more.

According to the numbers published by the Planning Commission in 2013, more than 12,000 billion Indian rupees, the equivalent of about US$220 billion, have been allocated to investments in the transport sector for the years up to 2018. These schemes are aimed at improving the overall urban development in India, with a special focus on transportation.

India has traditionally been a country with a strong share of public transit and non-motorized transport. But now it is seeing a sharp growth in private vehicle ownership, especially in urban areas. The public transportation systems in most of the cities are insufficient, which encourages the use of private vehicles. The cities have a peak hour travel speed of 15 to 20 kmph, and the heterogeneous traffic mix only makes the situation worse. With inadequate provisions for cycle and foot paths, and the usual high levels of congestion, Indian roads have become practically unusable for cyclists and pedestrians.

This state of things leaves people no choice but to use private modes of travel. Along with all this, the number of fatalities due to road accidents is increasing year after year.

In September 2013, the IISc Bangalore completed a study under my direction called the “Global Mobility Monitor Network (GMMN)”, which aimed to analyze the recent history, the status quo and the future prospects of mobility patterns in the BRIC nations.

Comparing the biggest cities with second-tier urban centers bring interesting results

Bus Rapid Transit system in New Delhi: National transport policy promotes mixed land use as a very effective tool
A heterogeneous mix of various transport modes and means, non-lane based traffic, exponential growth of vehicle numbers, bad roads, poor geometrics, conflicting movements of pedestrians and vehicles on the road, problems with the driver licensing system, poor traffic law enforcement are some of the factors that add to this complexity. While certain factors could be improved by policy interventions and other measures from government and local bodies, the traffic conditions in India today are as such beyond the level of control that can be exercised by simple traffic management measures or human interventions. This makes the use of technology all the more important to manage traffic in India today.

Let us first take a detailed look at the most important mobility-relevant trends in Indian urban development, based on a summary of the key findings of the Indian part of the GMMN study. An immediately noticeable trend is the steep growth in population, especially in the cities of Bangalore, Delhi and Indore, where numbers have almost doubled in two decades. This rapid population growth is due to urbanization and has led to a sudden rise in travel demand.

India has a workforce participation rate of 39%, which is much lower than in most developed countries like the USA, Japan and Germany, or even in developing countries like China and Brazil, where the participation rate exceeds 50%. Among the cities analyzed in the study, Bangalore leads with a rate of 38.5%, followed by Guwahati and Delhi. In terms of per-capita GDP, too, India scores rather low (US$ 1,509) compared to Germany (US$ 44,021), the USA (US$ 48,112) or even developing nations like China (US$ 5,445).

The bigger cities of Delhi and Bangalore have a higher share of transit usage, while the smaller cities show a higher two-wheeler penetration. A comparison of Delhi and Bangalore shows that, although the surface area of both cities is comparable, the number of public-transport passenger kilometers per person per day for Delhi is more than twice as high as that of Bangalore. One reason for this is the heavy usage of the metro services, the most important means of public transit in Delhi.

The price of transit is much lower in Indian cities than in cities around the world. But due to the high economic disparity found in India, even these low prices are not affordable to a high proportion of the urban population.

In Bangalore, Delhi and Indore, the population has nearly doubled over the past 20 years.

In respect to road density, too, Indian cities have a considerable amount of catching-up to do in comparison to international benchmarks: The length of the routes reserved for public transit is 0.82 meters per thousand inhabitants for Bangalore and 10.07 for Delhi. That is quite far from the values for cities like Berlin (140.16) and Tokyo (92.39).

Two-wheelers are another mode of traffic used for a major share of urban
trips, in particular in the smaller cities of Indore and Lucknow with their insufficient public transit supply. Among the five cities studied, the number of two-wheelers is highest for Indore, where there is almost one two-wheeler for every two persons. The growth rate, however, has been the highest for Bangalore.

Even though car ownership in Indian cities is much lower than in other countries, it is growing at a fast pace. In India, the number of registered passenger cars per thousand inhabitants is still extremely low (16) compared to developed countries like the USA (423), Germany (517) and Japan (453). But the numbers are skyrocketing: In the sample cities, car ownership increased by 23 to 75% between 2007 and 2011. The highest number of cars per thousand inhabitants is found in Delhi, but the growth rate has been the highest for Bangalore. At present, India has a motorization rate of 121 vehicles (i.e. cars + two-wheelers) per thousand inhabitants. This is projected to increase to 230 vehicles by the year 2020.

As of now, government policies do little to control car ownership. The only dis-incentives for buying cars are the high cost of ownership and the high fuel prices, which are above those paid in cities in developed countries. Vehicle registration costs are very high for Bangalore. Delhi, in contrast, has a very low registration costs for both cars and two-wheelers, which is one of the factors responsible for the higher number of personal vehicles in this city.

Along with ownership rates, the numbers for passenger and vehicle kilometers traveled have also risen significantly. This increase has been higher for cities with less developed transit systems. In this respect, too, a comparison between different Indian cities provides very interesting insights: Even though Delhi and Bangalore cover areas of similar size, the number of car kilometers per population unit per day for Delhi is more than twice as high as in Bangalore. Lucknow and Indore show very low car usage compared to Delhi and Bangalore.

The road length per population unit is much lower in India than in the cities of developed countries. It ranges from 0.79 m per person in Indore to 2.06 m per person in Guwahati. This chimes with the finding that, independent of their size, all cities covered by the GMMN study are facing similar issues of congestion: During peak times, travel speeds range between 15 and 20 kmph.

In contrast, city size clearly correlates with road accident statistics: The number of road deaths per million inhabitants is much higher in second-tier metropolitan cities like Indore, Guwahati and Lucknow than in the bigger cities of Delhi and Bangalore. One presumed reason for this is that bigger cities have a higher share of public transit, which is less prone to accidents. It is interesting to note that, despite much lower private vehicle ownership, the number of road fatalities in India reaches 118 per million inhabitants, far higher than the rates for Germany (45), Japan (45) or Australia (61). However, most of the cities covered by the GMMN study even exceed this already very high national average.

Last but not least, I would like to cite two more findings from the final report of the scientific project: Firstly, the number of passenger cars produced per thousand inhabitants has been growing steadily in India, but it is still very low (2.63) compared to countries like Japan, which manufactures 76 passenger cars per thousand inhabitants. And secondly, India still imports the biggest part of the oil consumed in the country, but the consumption-to-production ratio has seen a decline over the last few years.

On the bottom line, the scientists who participated in the expert group meeting organized in the scope of the GMMN study agreed on numerous points: For instance, they expect travel demand in India to keep increasing rapidly despite its sensitivity to fluctuations in fuel prices. Secondly they have also recognized that it will not be possible to adopt the same solutions as in other countries because the trends highlighted by the study show very clearly how much the urban mobility scenario in India differs from that of large cities in other parts of the world.

While most countries around the world are making deliberate efforts to move towards sustainable modes of transport, we already have a high share of transit and non-motorized trips. This is why India’s task is to maintain, if not increase this share by providing better facilities for both public transit and non-motorized travel. In view of the alarming growth in car ownership rates, it is important
to initiate interventions on policy level to curb the usage of private vehicles and encourage people to use transit and non-motorized modes. The solution does not lie in building more roads, or in increasing the capacity of existing roads, but in providing more sustainable options for the users.

Also, for the smaller cities that are growing at a fast rate, the sharply increasing two-wheeler ownership needs to be controlled through the provision of suitable alternatives. The National Urban Transport Policy promotes mixed land use, which can be very effective in decreasing travel demand. In the smaller cities like Indore, Lucknow and Guwahati, along with introducing new modes like Metro and BRTS, it is also important to improve the capacity and frequency of the existing public transport systems. There are only 110 buses in Indore to serve a population of 2.1 million, whereas Bangalore has a bus fleet size of 6,000 for a population of 8.5 million. The lack of integration of public transport is another area needing improvement when investing in the introduction of new modes in the cities.

During the 2013 ITS Workshop at the Indian Institute of Science in Bangalore, an expert group discussed the following key questions: “What do we need in India to promote ITS for a more efficient mobility system?” and “What types of ITS technology do we need in India but do not have as of now?” Let me summarize the insights from the discussion.

Decisive factors for the introduction of ITS in India include not only the marketability of the required technologies, but also the selection of those systems that cater to the needs of the different sections of Indian society. This implies the need to educate the people, independent of the level of their involvement in traffic and transport. An important measure could be the establishment of an ITS forum to support the exchange of knowledge and ideas between everybody involved and generally disseminate information about ITS.

Of course you first need to understand the travel behavior of people before you can steer it successfully to decongest the transport system. Besides user requirements studies for

ITS, the recommended areas of activity include suitable measures for educating policy makers, road users and the general public on the importance of ITS and the possibilities it opens up. Highly recommended are also training programs for traffic police as they are primarily responsible for managing urban traffic. Case studies highlighting successful ITS applications could help favorably influence political decisions.

By the way, the key goals that the expert group defined for driving the introduction of ITS in India do not differ much from the objectives established in developed countries:

- Optimization of basic traffic data (volume, density, flow, travel speed)
- Strengthening the three pillars of sustainability (economy, ecology, social issues)
- Increasing transport safety, both for transit systems and private travel
- Promoting multi-modalism

The list of preferred systems, too, comprises mostly established technologies, though they need to be adapted for their successful application in the world’s largest democracy:

- Systems for detecting and reporting hazards within the transport infrastructure
- Sensor-based systems for warning the drivers about obstacles
- Dynamic speed indicators to help enforce speed limits
- Advanced car-based safety technologies such as drowsiness detection and gap assistant
- Provision of up-to-date multimodal travel information
- Integrated ticketing and easy transfer between modes
- Multi-modal travel options for the “last mile” to the PT locations
- Trip planning tools that integrate also environmental input

Regardless of the differences between India’s mobility conditions and the situation in other parts of the world, there is one vital element that India needs to include in its efforts to successfully introduce ITS: work with international benchmarks and use the various indicators available today to show how ITS can help improve the system parameters.

Personal background

Dr. Ashish Verma is the President of the Transportation Research Group of India and Assistant Professor for transportation engineering at the Indian Institute of Science in Bangalore. His research interests focus, among other topics, on sustainable transportation planning, modelling and optimization of transport systems, public transport planning and management, as well as the effectiveness of traffic management and intelligent transport systems. He has been involved in numerous national and international research projects on sustainable transportation planning and road safety, and is member of the editorial team of several international journals published by the American Society of Civil Engineers and other institutions. Moreover, Dr. Verma is a member of the scientific committee of the World Conference on Transport Research.
For the individual commuter, having to idle away 40, 60, 80 or more hours per year while stuck in a traffic jam or waiting for the bus, tram or metro may already be quite a nuisance. But for a country’s national economy, those countless hours lost on the way to and from work can add up to a real disaster. For years, experts have tried to calculate how much economic output literally ‘falls by the wayside’ because of inadequate transport conditions.

Now this economic arithmetic can finally rely on a sound data foundation, compiled by the London-based consultancy firm Credo on behalf of Siemens. In contrast to what one might expect, the Credo researches have looked at the transport issue from a positive perspective: Instead of deploring the inescapable time losses due to inefficiencies in the mobility system, their brand-new study “The Mobility Opportunity” quantifies the possible economic benefit that cities stand to gain by investing in targeted optimization measures.

The Credo experts under team leader Chris Molloy have studied a selection of 35 major cities and analyzed in detail how well the cities’ transport systems are prepared to meet future challenges such as population growth and tougher competition between different urban centers. Their results show that through well-planned transport infrastructure investments, all 35 cities studied can boost their combined gross domestic product (GDP) by about US$ 238 billion per year as of 2030. This corresponds to about one percent of their GDP on average. Extrapolating to all comparably-sized cities around the world, this suggests an economic opportunity of roughly US$ 800 billion annually.

The only precondition: The cities have to catch up with the best-in-class member of their category. According to the Credo study, the highest performers in respect to cost efficiency are:

• Copenhagen in the “well-established cities” category
• Singapore in the “High-density compact centers” category
• Santiago de Chile in the “Emerging cities” category

In the past, budgetary constraints often prevented municipal authorities...
International press echo on “The Mobility Opportunity” study

“Delhi and Mumbai stand to gain up to $17.8 billion a year as economic benefit by upgrading their transport networks, which may otherwise be unable to cope with the anticipated massive rise in peak hour commuters by 2030.”

Financial Chronicle, India

“Singapore can create a smart city.”

Antara News, Indonesia

“Jakarta’s economic benefit can be US$ 8.9 billion per year by 2030 if the government manages to control traffic congestion by improving the inhabitants’ mobility through optimized transport network quality.”

Kompas, Indonesia

“The system of public transportation in Jakarta needs freshening up.”

National Geographic, Indonesia

from adequately developing their transport networks. Now “The Mobility Opportunity” study heralds a true paradigm shift: Instead of a cost factor, the mobility system now qualifies as a competitive driver – and that not only for metropolitan areas with several million inhabitants. Because today, the fierce competition that used to rage mainly between global megacities increasingly involves also regional and national capitals.

Mobility is by far the most important infrastructure factor when it comes to making a city more attractive for potential investors. In an earlier, broad-based survey, 27 percent of interviewees gave the highest priority ratings to the transport network, with public security and energy supply following far behind at nine respectively six percent.

Because of these findings, the new “Mobility Opportunity” study put its initial focus on developing pointers to the key areas where cities can start with making their transport infrastructure fit for the future. To this purpose, the experts analyzed factors such as journey time, crowding of bus and rail lines as well as overall transport network density – thus all parameters that directly or indirectly impact the productivity of a city. Comparison with the values for the benchmark cities in the respective categories directly revealed the potential for optimization in each city.

“If cities manage to learn from the leading cities in their category in order to close the gap of their transport networks’ efficiency, they can reduce costs and increase productivity at the same time. Because the more efficient a city’s transport network is, the more attractive the city is to business and people,” says Chris Molloy. And Dr. Roland Busch, member of the Managing Board of Siemens AG and CEO of the Siemens Sector Infrastructure & Cities, adds: “The best transportation systems are the ones that move people quickly, easily, and comfortably to their destination. The leading cities are already achieving this with efficient transport networks that feature modern infrastructure, easy connections across various modes of transportation, and, above all, a clear strategy of how to meet future needs.”
Shining example

Silux2  The new family of LED signal heads is setting new standards, not only in terms of energy efficiency, but also in regard to brilliancy, reliability and traffic safety.

Right from the introduction of the first models, the LED signal heads of the Silux family met with true enthusiasm from municipal authorities. “Up to 90 percent reduction in power consumption in comparison to conventional signal heads” certainly qualifies as an impressive benefit. And now the new Silux2 range of signal heads, which is based on second-generation LED technology, represents another quantum leap. The 230-V low-power signal head Silux2.230VDE, for instance, has a power consumption of only 5 Watts while offering full and reliable signal monitoring functionality. That’s another reduction by up to 70% over the previous generation of 230-V LED signal heads. The dimmable models Silux2.40D and Silux2.230D make it possible to further minimize power consumption – and at the same time prevent glare effects at night.

In addition, the enhanced models offer even better luminous intensity distribution and uniformity than their predecessors. And the resulting enhanced brilliancy makes the signal heads easier to recognize even in bad visibility conditions – for more safety at the intersection. Durable and sturdy components, exceptionally reliable and robust LED technology, and optimized heat management ensure high operational availability and an extended service life.

All Silux2 signal heads can be equipped with a whole range of removable mask-type symbol inserts, which are easy and quick to fit into the detachable front lens. On request, non-standard symbols are available at short notice. Rotating and exchanging the symbols can be done right on site. A real time-saver, now also available for the 300-mm version, is the integrated housing door equipped with an easy-to-open bayonet lock. A retrofit kit with integrated door is available for all types of Siemens signal head housings. For third-party housings, we offer a universal OCIT-standard retrofit kit.

Every Silux2 LED light source comes with an electronic monitoring circuit designed for optimum interaction with Siemens controllers. This circuit permanently monitors and checks the power and voltage values of the LEDs. In case a measured value exceeds respectively falls below the applicable threshold, the input current is cut immediately to switch off the signal head safely and communicate the malfunction to the controller’s monitoring module.

Twice prize-worthy

Böblingen, Germany In addition to winning the Best Practice Award for Municipal Telematics Applications of the European TelematicsPRO association, the STREAM pilot project has now also earned the town of Böblingen and Siemens Mobility and Logistics the “Landmarks in the Land of Ideas” award. STREAM stands for “Simple Tracking Realtime Application for Managing traffic lights and passenger information” and is a new system for dynamic passenger information and for prioritization of public transport and emergency vehicles.

What makes STREAM special: While in earlier solutions the required vehicle positioning process could only be realized with relatively extensive roadside installations such as infrared beacons and induction loops, at least in small or medium-sized towns without computer-based operations control system, STREAM uses precise satellite navigation data and the existing infrastructure for the same purpose. Per mobile radio, the GPS-based positioning data of the vehicles are transmitted to the passenger information system and the traffic computer. After processing the data, the latter sends the corresponding request telegrams to the intersection controllers. Basically the implementation of the innovative solution requires only three steps: modifying the software of the traffic light installations, integrating a public transport communication module in the traffic computer, and equipping the vehicles with GPS-capable devices. All in all, this is much cheaper than the extensive hardware installations, including expensive cabling and additional antennae, required for previously used solutions.

Absolutely brilliant

Manchester At more than 1,800 sites across Greater Manchester, a total of 52,000 traditional traffic signal bulbs have been replaced with longer-lasting and energy-saving LED light sources. The upgrade program has reduced monthly energy usage from 1,000,000 kWh in March 2012 to 480,000 kWh in February 2014, resulting in energy savings of €900,000 per year and maintenance savings in excess of €400,000. The new traffic lights also benefit the environment through being a much more durable alternative to traditional bulbs, with the new LED lights only needing to be replaced every seven years on average, saving the costs for around 30,000 standard bulbs per year. The upgrade project in Manchester is the biggest program of its kind to date and an important step towards a more environment-friendly and energy-efficient transport network on the British Isles.

Fribourg/Mendrisio, Switzerland The capital of the canton Fribourg and the 12,000-inhabitant town in the canton Ticino have adopted a new path for managing growing traffic volumes. In future, they will use Sitraffic smartGuard, a web-based traffic control center that provides the key functions of a traffic computer, to control their urban traffic equipment. The required hardware operates at the Siemens premises in Munich, and the company also takes over continuous maintenance and regular updates. Via a Private Cloud, the customers can access the system just as easily and conveniently as if the computer was installed in their own offices. As they pay only for the use of the system, the customers need not invest a single euro in hard- or software, neither do they have to hire IT staff, rent special premises or install safety and security systems.
Where’s it flowing, where’s it slowing?

TomTom traffic index • Dutch navigation specialists TomTom have taken GPS data from the system’s users to calculate the congestion figures for more than 160 major cities and agglomerations throughout the world, simultaneously banishing a few popular traffic myths.

### Most congested cities in Germany

<table>
<thead>
<tr>
<th>City</th>
<th>Level of congestion</th>
<th>Morning peak</th>
<th>Evening peak</th>
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<tbody>
<tr>
<td>Stuttgart</td>
<td>29%</td>
<td>49%</td>
<td>60%</td>
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<tr>
<td>Hamburg</td>
<td>28%</td>
<td>45%</td>
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<tr>
<td>Berlin</td>
<td>27%</td>
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<td>Munich</td>
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<tr>
<td>Cologne</td>
<td>25%</td>
<td>49%</td>
<td>50%</td>
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<tr>
<td>Frankfurt/Main</td>
<td>24%</td>
<td>48%</td>
<td>46%</td>
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<tr>
<td>Düsseldorf</td>
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<tr>
<td>Western Ruhr area</td>
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<td>32%</td>
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<tr>
<td>Bremen</td>
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<td>30%</td>
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<tr>
<td>Eastern Ruhr area</td>
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### Most congested cities in Europe

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### Most congested cities worldwide

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Since time immemorial, India has exercised a remarkable spell over the people of good old Europe. To begin with, it was the land of the pepper. In Ancient Europe, the well-fed nobility would spare no expense to add a bit of pep to their dreary diet. Phoenician and Arab traders controlled the overland route to India and a typical sack of black pepper could be worth its weight in gold. In the year 408 the city of Rome, under siege from Alarich, king of the Ostrogoths, settled its ransom in the form of 3,000 pounds of those spicy, shriveled corns.

Spanish Queen Isabella had a covetous twinkle in her eye as she dispatched the Genoese seafarer Cristoforo Colombo to find the shortest sea route to India in 1492. As a navigator, Columbus was famously weak. Misjudging his route he dubbed the natives 'Indians' even though it was America that he had discovered. The outcomes are well known. And filmed often enough for anyone's taste.

What a world it would be today if only Columbus had actually made landfall in India! The things we would have to do without! No potatoes or tomatoes means no fries with ketchup. As for cola and a giant serving of popcorn to go with a full-length Hollywood feature, no way. And here's a thing – Hollywood, make way for Bollywood. Instead of road movies featuring Route 66, the Grand Trunk Road, that asphalt inferno linking Amritsar and Kolkata. Neither would there be much by way of boundless freedom; easy-riding Dennis Hopper and Peter Fonda on their Royal Enfield Diesels would only get so far before succumbing to gridlock.

Rice puffs or popcorn

If the highway conditions are hell on wheels, do we have Christopher Columbus to thank?

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The mother of all Wild West gunfights, the famous shootout at the OK Corral in Tombstone, Arizona, would probably never have taken place. And Clint Eastwood would lumber through the jungle on his trusty elephant for 'A Fistful of Rupees'. Bruce Willis, wreathed in clouds of incense against a pastel backdrop, would dance trippingly to a sublime chorus of voices in 'Die Hard With a Vengeance'.

While the movie fans choke on their rice puffs.
Vehicle Safety in India

Most of the vehicles that bustle around on Indian roads do not really inspire much confidence. A few years ago, a new law was introduced to implement plans for improved roadworthiness testing for the first time – a perfect through ball for the German TÜV SÜD, who has since set up its first testing facility in New Delhi.

Until a few years ago, in India such tests were really just a seat-of-the-pants procedure. Before 2009, even commercial vehicles had to go through an official inspection once every twelve months, before being allowed out to make the streets even more unsafe. Unfortunately, that was often the truth. Because the number of accidents on the subcontinent reached dizzying heights some years ago. The World Bank talks about over 130,000 fatalities every year, while other sources put the figure at more than 250,000 when the vast under-reporting is included, especially in the more rural regions.

If we assume that on average there are two to four injured for every road death, in the worst case one million people per year are affected by the consequences of dangerous traffic – and that does not even include their relatives. In addition to the human aspect, the appalling numbers also have an important economic component too, especially in India. In a country where by no means everyone can afford a car, it is the top performers in particular who are lost in traffic accidents.

In the absence of reliable statistics, it can only be guessed how many of the serious crashes are caused by human error and how many are due to technical failure. It is beyond doubt that vehicle defects are among the more common items on the list of causes of accidents. That is why about five years ago a new law created the legal framework for an annual vehicle fitness test, which now also includes the use of technical testing equipment. Currently, this only applies to vehicles used for professional purposes. For private vehicles, the first check is still only required when they are 15 years old – should they ever reach that age.

At first glance this change to the legal requirements may seem rather tentative. But for those in the know when it comes to the global market for technical inspection, it was obviously clear enough for immediate action. Immediately after the law reform, Munich-based TÜV SÜD certainly got going with organizational preparations for the foundation of a test station in New Delhi. “Developments in this area do not happen overnight,” says Hans-Jürgen Schimpgen, who is responsible for TÜV SÜD’s international expansion strategy. “Countries like India cannot just flip the switch and say: Starting tomorrow, we will have the same provisions as apply in Europe.”

An immediate reason for Indian policy to move forward in small steps is the simple fact that in some regions there are not enough workshops to correct the technical shortcomings that would be found during an extensive check. But above all it was the degree of acceptance on the part of the population that dictated the pace in the implementation of such measures. Schimpgen’s observation is that in India it is not only the legal and political zeitgeist, but also the prevailing attitude of society that has to be ready for it. Still, one should not expect miracles.

Complex processes like this one can only speed up if success comes fast. Such as happened in Turkey, for example, which in 2009 adopted the same inspection requirements as the leading European countries. There, road safety improved suddenly almost overnight. “The widespread breakthrough,” recalls Hans-Jürgen Schimpgen, "could be seen about two years later, when the Transport Minister was able

“Countries like India cannot just say: Starting tomorrow, we will have the same provisions as apply in Europe”
to announce that the number of road deaths had already decreased by 50 percent at this time."

However, in federalist India, the TÜV expansion strategist expects the transition period to be much longer. That is why TÜV SÜD, which along with the other TÜV organizations has long been synonymous with maximum technical safety in its homeland, has no problem with starting out relatively small in New Delhi. "To begin with," says Schimpgen, "the fitness checks will be run in a rather rudimentary manner. We will look at the brakes, lights, and tires. At the moment, the law does not actually require any more than that."

As for the equipment in the test station in New Delhi, which is now ready to start, the Indian subsidiary of the German inspection specialists is nevertheless already well prepared for more comprehensive tasks. For example, test equipment for play in the steering can be found here as well as suction tubes for emissions testing. And in one respect at least, the TÜV SÜD subsidiary on the subcontinent has even more to offer than the testing centers in Berlin and Hamburg. The inspection hall is simply a lot higher – so that the tuk-tuks with their piled-up loads can fit in more easily.

In one respect the inspection hall in New Delhi has even more to offer than the testing center in Berlin or Hamburg
Mr. Welz, as Head of Global Sales you are something like the ‘foreign secretary’ for Siemens Traffic Engineering. For this role do you also need a corresponding level of diplomatic skill?

The analogy does possess a certain allure, because in international sales, as in foreign policy, there’s the critical need to build a broad and solid basis for sustainable relationships. In that sense, we certainly need diplomatic skills, but the things that count much more are reliability and authenticity. One’s opposite number must be able to trust that we will honor our commitments, even when things turn difficult. Germany’s former foreign minister Hans-Dietrich Genscher once hit the mark perfectly when he said: “You recognize a good pilot by a steady hand, not by the loudest voice.”

To be able to operate independently on the international stage one always has to keep absolutely up-to-date not just ‘multi-culturally’, but also ‘multi-politically’. How do you and your team keep informed on the latest political and social developments in the various countries that you are active in?

The sales team here at headquarters includes colleagues from six nations and from different continents. This gives us a sound basis for forming an up-to-date view of the most important topics in each of the regions. And not to forget that, of course, we collabo-
rate very closely with the local units in our country organizations – from Colombia to China and from South Africa to Scandinavia.

**Despite this, have you ever stepped on one of those numerous intercultural banana skins that inevitably lie in wait?**

I am quite sure I have, but I have never been made to feel it. I believe that when collaboration rests on respect and authenticity, business partners don’t really hold such mishaps against you.

**According to the Summer Institute of Linguistics there are over 7,000 distinct languages in use today across the globe. How many of them does your team speak?**

At present there are over a dozen, but it’s my belief that a company’s international character cannot be gauged by the number of languages the staff uses. What is far more decisive is the active interplay of the largest possible range of mental approaches, work experiences and technical skills as well as individual capabilities and qualities throughout every level of the organization. We will only be successful in the long run if we are able to fully tap the intellectual potential of all our colleagues, regardless of the language in which their inspiration is expressed.

**So, do the members of your team need different skills from a colleagues who, let’s say, is responsible for automation systems?**

There are certainly general requirements that could feature in the profile of any sales professional. In this context I’m thinking for instance of a high commitment to outcome-oriented implementation, a conscientious approach and passion for one’s work. But in our field in particular, sector-specific technical expertise is absolutely indispensable, simply because our customers’ representatives mostly have many years of experience and thus possess comprehensive knowledge of the issues. To win their trust, quoting chapter and verse from datasheets is not enough. Without a genuine understanding of the problem, you will not be able to collaborate constructively on client-specific solutions.

Are there significant differences in the typical progress of a sales project from one region of the world to another?

Basically, the project and procurement processes are quite uniform. This is primarily due to the fact that we are dealing with public bodies, which are bound to the terms of specific tender regulations. For that reason the differences tend to be limited to certain local basic conditions such as project cycles, which are much longer in South America, for instance, than they are in Europe. In the Near and Middle East, on the other hand, things can sometimes move on very quickly from the initial decision to the tendering process and then on to implementation.

**As the sales chief of a global player, you belong to an exclusive circle of experts with the best possible view of the mobility-specific developments throughout the world. Which countries are currently making special efforts to expand their capacities with the help of intelligent transport technology?**

Off the top of my head, I would cite the United Arab Emirates, where the enormous economic growth dictates that the administration confront huge challenges. The thing that really impresses me in this country is the high degree of readiness to look for truly innovative solutions. Abu Dhabi, for instance, does already have a traffic control center equipped to the most advanced standards: based on Sitraffic Concert, Scala and the adaptive network control system MOTION. In the latest expansion of the system we are now implementing the British control process PC SCOOT in part of the urban area. This means that for the first time in a single city, two different control philosophies are being linked and integrated into one system. At the same time the same client is going one step further and developing a mobile app that not only displays information on private and public transport but also provides the departure and arrival data from the international airport as well as the latest taxi data.

**This issue of ITS magazine is focusing on the development of the mobility situation in India. Do you have personal experience of the subcontinent, either professionally or in a private capacity?**

To date, neither. But that will change very soon because we are making very intensive preparations to tackle the Indian market. However, before we can present our solutions to the authorities over there, we first have to understand the complex starting situation in this country. We have to learn where exactly our potential clients’ problem areas are and what their primary objectives consist of. So just now, listening is definitely the more appropriate and more important thing for us to do than talking. For sales professionals who really want to support their clients’ progress, these ‘listening’ phases are far more common than is popularly understood.

**If you could choose all your favorite components from the world’s intelligent traffic systems and combine them into an ideal system, what would it look like?**

In spirit at least, the principle of what I said earlier about India holds true: Our view is that modern traffic engineering components cannot simply be transplanted from country A to country B or from city C to city D. So unfortunately I can’t answer the question.

**Mr. Welz, thank you very much for talking to us.**

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**Biography**

- Since 2004 working for Siemens AG, Intelligent Traffic Systems
- 2004–2006: Project Manager
- 2006–2009: Commercial Business Manager, Region Americas and Near & Middle East
- 2009–2012: Sales & Business Manager, Region Central & Eastern Europe and Latin Americas
- 2012–2013: Business Subsegment Lead Sales German Technology
- Since 2013: Head of Global Sales
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