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**A COLLECTION OF ESSAYS FROM
INTERNATIONAL LEADERS IN THE
INTELLIGENT TRANSPORTATION SYSTEMS
COMMUNITY**



The 18th World Congress on Intelligent Transport Systems returns to Orlando, Florida for the first time since its inaugural hosting of an Americas World Congress in 1996. Much has happened in the world of ITS since then, both in Florida and internationally. This World Congress will highlight many of the innovations that have emerged. It does so in the context of larger economic forces as the world struggles to regain its footing after one severe recession and avoid another.

The challenge for ITS is to keep the economy moving. By sweating the details that help us better manage the transport capacity we have, rather than attempting to build our way out of problems like congestion, we do in fact contribute to productivity and economic prosperity. When we protect the precious human capital of our nations by reducing fatalities and injuries, when we help everyone better use their precious time by reducing delays and simplifying our travel experience, and when we forego the need to develop remedial measures to protect our environment with the application of sustainable transportation, we contribute to the economic prosperity of our nations.

To its credit, the field of intelligent transport systems has seen both evolution and revolution since its early days. No longer is this a promising field hopeful that its research and emerging applications will find traction in the transportation sector. Two decades and more into the development and maturation of ITS finds national, regional, and local public authorities, the research community and private sector regularly working together to design and deploy smart solutions to improve safety and mobility and support sustainable transportation.

But more must be done if we are to see widespread deployment of transportation technology resulting in dramatic change in the safety, mobility, and sustainability equation. With fewer resources at hand, governments needing to do more with less are well positioned to benefit from the economical solutions that ITS provide. The emergence of performance management systems and the proven application of cost-effective ITS solutions around the world validate this.

Our essayists reflect on the way forward for ITS over the next decade and the challenges we will face along the way. We take their reflections and advice to heart and call on the ITS community to stand together to ensure the smart transportation solutions we promote do indeed help keep the economy moving.

Essayists

Americas

- T. Russell Shields, Chair, Ygomi LLC
- C. Michael Walton, Ernest H. Cockrell Centennial Chair in Engineering, The University of Texas at Austin
- Kirk T. Steudle, P.E., Director, Michigan Department of Transportation

Europe

- Ms Doris Bures, Federal Minister for Transport, Innovation and Technologie, Austria
- Risto Kulmala (Research Professor, VTT Technical Research Centre of Finland)
- Josef Czako (Kapsch TrafficCom AG), Richard Harris (ACS, A Xerox Company), Hans-Joachim Schade (TSE Consulting)

Asia Pacific

- Hajime Amano, President ITS Japan
- Wang, Xiaojing, National Intelligent Transportation System Center, China

From the Americas

ITS: No Lack of (Bad) Ideas

T. Russell Shields, Chair, Ygomi LLC

From the standpoint of business, the greatest challenge to ITS in the next 10 years is the same as it has been in the last 10 years: many business and technology approaches that are not commercially viable.

This is not to say there is a lack of ideas in ITS. In fact, ITS has succeeded wildly in generating ideas for new technology, a few of which have been commercialized successfully. But as ITS technology becomes mainstream, some concepts have become entrenched as ends in themselves, without ever becoming self-sustaining. Many people in ITS, especially researchers, have held onto concepts, technologies, and research programs that cannot be commercially viable. It's as if they are pushing a horse that has already run the race – and lost.

We all know the stereotype of the engineer who creates a “Rube Goldberg” contraption (see <http://www.rubegoldberg.com/>) – a complex device to do a simple task – more because he loves to play with technology than because anyone needs the solution. A review of many research organizations' agendas will reveal at least a few concepts for ITS services that can, in fact, be accomplished more quickly and cheaply with less sophisticated technology. Especially as financially strapped governments consider the need for solutions to be sustainable, the ITS sector does no favors to anyone by pushing technologically complex solutions where simpler, cheaper, more robust ones are needed.

The annals of technology are filled with great ideas whose time has not yet come. Less attractive, there are the technology boondoggles, Rube Goldberg contraptions, and self-justifying ivory towers. Great ideas solve problems in ways people will pay for, create value for society, and enable people to create even more ideas. Not-so-great ones simply drain resources that could be used elsewhere. Let's not kid ourselves about which is which.

By far the biggest profit in ITS has been Navteq and its customers, which was in fact based on a simple concept: provide as much map and point of interest data as possible for as wide an area as possible, and sell it in volume. GIS technology has enabled many other products and services that we could not envision in the early days of ITS. Navteq and its imitators have found new uses for the technology by following the money – that is, looking first for problems that people will pay to have solved, then developing the technology to solve them. Ideas – even fun and interesting ones – that weren't profitable have fallen by the wayside.

In contrast, there is no guiding business model for many current ITS efforts, including vehicle-to-infrastructure (V2I) communications using the 5.9 GHz band. Yet these efforts, which apparently cannot be economically viable, have become major centers of ITS activity. This mismatch of activity and viability is confusing the industry and keeping us from moving forward.

To move forward, ITS needs some creative destruction. Bright minds need to be freed to work on more viable projects that can help create more economic activity, in the way Navteq has spawned an entire electronic GIS industry, rather than hanging onto dead ideas in hopes that government finances will recover in time to save them. As difficult as the recession of the last three years has been for so many people, the sobering realities of public and corporate finances might cut away some of the dead wood and help ITS flower again.

Many aspects of the future are often projected, some with a higher degree of confidence than others, such as population. Other elements are less predictable, as the extent of their current impact is not fully known and can best be determined through deployment and actual experience. As Albert Einstein stated, “imagination is more important than knowledge.”

Forecasting the future is challenging at best. An example is shown in Table 1, which displays forecasts that were made for selected items from a base year of 1994 to the year 2010 and compared with actual figures for the same period (more or less). As noted, for some items the forecasts compare favorably with actual values; for others the forecast varied significantly. An illustration would be the telephone category, where wireless communication has become instrumental in promoting a revolution in communication as well as transportation. Similarly, the number of PCs worldwide and internet users has experienced a comparative explosion. For example, internet expansion has resulted in greater numbers of connected devices than people worldwide. Actually, the ratio of connected devices per person is over 2 per person today and is expected to grow to 6.58 by the year 2020 (Figure 1). Clearly the world is connected and greater connectivity is expected!

Given the ITS vision for tomorrow’s transportation system, science is the “trump card.” Advancing technology, wireless communication, integrated systems, data clouds, and cloud computing are just a few examples of areas of enormous opportunity that could greatly alter the way transportation systems and mobility are viewed. Premier Wen Jaibao of the People’s Republic of China has stated, “I firmly believe that science is the ultimate revolution.” There are a tremendous number of paths to follow and enormous opportunities. The future is limited only by imagination and the innovations afforded by the explosion of science and advanced technologies. The following offers a strategy for going forward:

“The future is not a result of choices among alternative paths offered by the present, but a place that is created—created first in mind and will, created next in activity. The future is not some place we are going to, but one we are creating. The paths to it are not found but made, and this activity of making them changes both the maker and the destination” (John Schaar).

And, finally, “Gentlemen, we have run out of money. It is time to start thinking” (Sir Ernest Rutherford, Nobel Laureate, Chemistry).

Table 1. Forecasting: The Art and Reality

Category	1994	2010 (projected)	2010 (actual)
Category	1994	2010 (projected)	2010 (actual)
World Population	5.6B	7.3B	6.9B
World Telephones:			
Wired	607M	1.4B	1.3B ⁽³⁾
Wireless	34M	1.3B	5.3B
PC's Worldwide	150M	278M	1B ⁽³⁾
Number of Internet Users	16M ⁽¹⁾	1B ⁽²⁾	2.1B
Cars Produced Annually	28 M	60 M	52M ⁽⁴⁾
McDonald's	14000.00	30000.00	32000.00

(1) 1995, (2) 2005, (3) 2008, (4) 2009 // Source: Business Week, CIA World Factbook, aboutmcdonalds.com, starbucks melody.com, inc.com/news/articles/200707/computers.html, worldometers.info/cars/

The Huge Potential of Intelligent Transportation

Kirk T. Steudle, P.E., Director, Michigan Department of Transportation

The most promising of the opportunities offered to transportation through ITS is the potential to improve highway safety. While benefits like reduced emissions and congestion are valuable, the potential payback from vehicles that refuse to crash is beyond estimation.

The national safety effort “Toward Zero Deaths” has continued to improve crash rates, but still more than 30,000 people lose their lives on America’s highways each year. That’s 30,000 fathers, mothers, sons or daughters. Their passing is a national tragedy; their lost potential a cost to society that cannot be calculated.

The financial cost can be calculated, however. In Michigan alone, the economic loss due to traffic crashes is estimated at over \$10 billion annually. Think of the economic activity to be generated by spending that \$10 billion in other ways. Imagine the impact on people’s lives – and government budgets – if the number of lives lost and the economic loss due to of crashes were zero.

There are some ITS safety research efforts to mention in this regard. One project, sponsored by the Safety Highway Research Program II, is a naturalistic driving study still seeking volunteers. The project is intended to identify driver behavior – such as distracted driving or exhaustion – that contribute to “near misses.” Identifying the behaviors that almost result in a crash can help engineers, educators and enforcement personnel further reduce the potential for actual crashes.

Another exciting effort is a \$14.9 million award by the USDOT RITA for a safety pilot model deployment to the University of Michigan Transportation Research Institute. The project will equip over 2,800 fleet vehicles – buses, trucks, staff cars, and others – to interact with each other and the roadway. This test, centered out of the University of Michigan Hospital in Ann Arbor, will demonstrate in real time the effectiveness of multiple vehicles communicating their location to each other and to roadside radios for data collection from the vehicles. The results will help the National Highway Transportation Safety Administration make decisions and direct future research about the use of communication equipment to improve safety, mobility, and reduce emissions, and whether the benefits warrant having automakers install this technology on newly-manufactured vehicles.

The biggest challenge to achieving these benefits is to convince a skeptical public that the data gathered by smart vehicles and roadways is anonymous and temporary. I know my agency’s interest is in safety, not consumer data, but how can I persuade the public? I am confident this skepticism will decrease in time, thanks to the ubiquity of cell phones, facebook, and twitter. Most of the youngsters of Gen Y (should we call them Gen Wired? Or Gen Yrd, in text-speak.) have grown up with technology and accept – even revel in – the notion of having their movements on constant display. But we can’t wait until Gen Y is in charge before we integrate vehicles and roadways. The cost of waiting, and the potential benefits of ITS, are just too great.

From Europe

Smarter on the way – the future of intelligent mobility

Ms Doris Bures, Federal Minister for Transport, Innovation and Technologie, Austria

Today mobility is a basic need: Mobility is central to our individual wellbeing and to our common economic development. Mobility governs business location and makes it possible for us to share ideas and products with people from around the world. But these benefits have created exploding demand and led to problems ranging from traffic congestion to climate change. As policy makers our challenge is: How can we create a sustainable, environmentally friendly and socially responsible transport system given this rapidly increasing demand?

One step in the right direction is expanding sustainable transport. We are doing this in Austria by strongly supporting public transport, bicycling and sustainable development. But our future must also be intelligent. We need to create truly intelligent transport systems. From my perspective there are three requirements:

- First, ITS must be user-focused: they must be easy to use, helpful and increase safety.
- Second, ITS must be borderless. It shouldn't matter what language you speak or where you bought your navi. We need standards to ensure compatibility, but without constraining innovation.
- Third, ITS must increase sustainability. Protecting the environment is our generation's greatest challenge, and ITS must play a role.

The good news is ITS technologies are leaving the laboratories. In Austria we have invested over €200 million on ITS research and development. This investment has made Austria a leader in ITS technology development and helped build a strong industry and create new jobs.

Our challenge now is to apply ITS technologies to real world problems. In Austria we have started by developing high-quality, comprehensive and cross-modal Information systems. These systems provide users with the information they need, when they need it. Importantly, these systems also help us increase system safety and efficiency by providing managers with real time data on reliability, safety, demand and predictability.

But, nothing stands still in the world of transport. The future brings increasing challenges from the rapid pace of urbanization to the aging of populations. These changes increase transport complexity, making it even more difficult to create sustainable and equitable transport systems. I am certain that ITS will be a key element in solving these problems. For example, ITS has revolutionized all aspects of urban transportation from helping people plan their trips to paying for services.

However, to achieve the real promise of ITS, we need everyone to participate in its development. For example, although women make-up over 50% of the population, their expertise is not fully appreciated in many technical fields, including intelligent transport. We are proud that in Austria almost 29% of engineering graduates are female, but it's not enough. We need to encourage more young women to study technical subjects and awaken their interest in emerging fields like information technology.

Innovation only happens when we open our minds to new ideas and perspectives – minimizing the input from over 50% of the population means less creativity, fewer ideas and diminished potential. I should also note that studies have shown that companies with a good gender balance are more successful. It's clear that transportation faces many challenges, but it's also clear that ITS can help us successfully meet these challenges. In Austria we long supported ITS R&D. We are now applying these technologies to create a more sustainable and equitable transport system. I encourage you to come to Vienna for the 2012 ITS World Congress and see yourself. And remember: let's be smarter on the way!

What is the biggest challenge or opportunity facing ITS in the next ten years and how do we overcome or achieve it?

Risto Kulmala (Research Professor, VTT Technical Research Centre of Finland)

For me, the biggest challenge and also opportunity is to make ITS mainstream with the same sort of traditions and everyday practices for road operators, cities, companies, authorities and politicians, i.e. those who decide on, plan, deploy and manage our road transport system.

For some decades, we researchers have realised the vast potential of ITS and have tried to study and develop innovative applications and services which provide solutions to the problems of travellers, hauliers, transport and road operators and other stakeholders. Despite our often wonderful results, ITS deployment is slow and patchy. Different organisations are rarely interested in utilising ITS as a tool equal to other tools at their disposal. Organisations, processes and practices favour traditional transport tools and measures.

What should we do then? The cornerstone is to show that ITS provides value for money. We should assess the benefits and more generally the impacts of ITS. This should be comprehensive in a way that we learn about all of its impacts, including also effects on personal travel habits and quality of life or companies' revenues and profits or community structure and land use, etc. Here Field Operational Tests should play an important role.

Assessing the benefits is not enough. We must learn to make benefits tangible. We should express the benefits in the language that the stakeholders understand. For road operators, we need to talk about throughput, delays and safety. For environmental authorities we need to talk about air quality, emissions and noise levels, for companies about return on investment, market shares and revenues, for politicians about new jobs, public economy and global competitiveness.

We need to adopt new procurement practices. In the research domain, we have pushed for pre-commercial procurement. This paves the way for innovations, especially for products and services in the first stages of their life-cycle. I believe that we should go the same way towards the later stages of the life-cycle, and have commercial procurement practices favouring innovation. Ideally, everyday commercial procurement would deal with purchasing performance and impacts instead of "fully"-specified products, systems, infrastructures, and services. In such a case, ITS would truly provide one solution among the many, and would be utilised whenever it would provide better value for money or otherwise better performance and impacts than alternative solutions, conventional or innovative ones. Here the really big challenge is to find ways of specifying the procurement conditions and performance targets.

Finally, in order to mainstream ITS we have to adopt good business models. I believe there is no one ITS business model. ITS is a wide concept, with more than 50 listed service types already today, most of them differing from the others with regard to stakeholders involved, potential customers and the regulatory environment. Therefore, we need to have a number of suitable business models.

An important instrument to solve this challenge is cooperation, on the global level. And the ITS World Congress is the perfect venue for that.

Mobility opportunities and challenges: The private sector view

Josef Czako (Kapsch TrafficCom AG), Richard Harris (ACS, A Xerox Company), Hans-Joachim Schade (TSE Consulting)

Smarter transportation is necessary. Not only to improve accessibility, efficiency and economic performance but also to minimize accidents and reduce waste and environmental damage. Being smarter means using the available ITS tools to provide the essential information and communications needed and to better balance supply and demand of our networks.

The need for smarter transport was recognized in 2010 by the European Council, European Parliament and European Commission, as they agreed on an ITS Directive to establish consistent pan-European services.

The success of this Directive will mean that travellers will benefit from seamless services across Europe. Authorities and administrations will reduce waste as network reliability and equilibrium will be improved through the use of more integrated systems, and industry will have a stable market to service. Transaction systems, like integrated ticketing, road user charging, electronic fee collection and improved traffic management and information systems will be the key to this step change in transport. To support better and more efficient transport decisions, more and better quality data is essential. Success will be measured in terms of mobility rather traditional transport statistics.

Of course with 27 Member States, numerous regional and city authorities and administrations, reliable, long-term and strong political support for the realization of the Directive's ambitions will be critical. Clearly, new communications and information technology provide the opportunity for wider coverage or shared services than the traditional adherence to administrative boundaries so even more political leadership will be needed.

Support from the private sector is also essential both as independent providers and through public/private partnerships. Effective cooperation of all ITS stakeholders in the context of development and deployment of ITS applications and services is necessary to achieve interoperable technologies and seamless services. This stakeholder cooperation is especially important in the development of future standards and establishing European specifications.

To realize smarter transportation the ITS Directive must deliver the success story that the European Union needs. The current situation in Europe is characterized by isolated solutions, severe recurring congestion, poor modal balance, too many accidents and injuries, poor air quality, inefficient freight services and haphazard levels of service. Failure of the Directive will make the situation even worse. Regional differences will increase, the market will be fragmented and European industry will find it harder to address the challenges in a coherent and consistent way. Europe would not only miss out on saving many lives, protecting the environment and strengthening mobility, but would also miss the opportunity to lead in this high technology sector.

Let's be clear – the technology already exists in Europe and further progress can be made towards a breakthrough in deployment. This should be based on robust business cases which provide clear returns in terms of achieving objectives and justifying investment. This means evidence based implementation, stable standards, political stability, and commitment to system and service maintenance.

European industry strongly supports the initiative from the European Commission and we believe that the ITS Directive can help achieve the necessary momentum needed. However we also recognize the significant challenges faced. Stakeholder involvement, education and engagement are essential but challenging as everyone is a stakeholder when it comes to transport. We support our politicians, authorities and administrations as we strive for improved European mobility through wide scale and intelligent deployment of ITS services - and secure, community-wide benefits of ITS. Together we can create a better future.

From Asia Pacific

Application Oriented, Effectiveness Created

Wang, Xiaojing, National Intelligent Transportation System Center, China

Intelligent Transportation Systems (ITS) were introduced into China over 15 years ago, from learning, small-scale applications to specific large-scale applications. Now, it has come to a turning point to further enhance the level of development.

ITS in China is facing rapid technological change and product updates. China's people and local governments are concerned about the ability to solve practical problems. To solve urban traffic congestion, for example, the benefit of ITS applications is not obvious. Instead, the effects caused by road infrastructure construction, subway construction and the construction of public surface transportation are more prominent. Questions are asked: can ITS solve the traffic congestion? Are developed technologies and products suitable for use?

We believe that rapid technological change is inevitable. However, basic service requirements of transport are stable. The timely introduction of technology and products not only depends on its maturity and effectiveness, but also depends on whether they meet the Chinese people's behavior and consumption habits. On the other hand, we must consider new technologies to create demand and technological changes in consumer habits.

Based on these observations, the Chinese government has made the following arrangements for the next 10 years. First, the focus of ITS will change from the construction of management systems to information services driven by travel service demand. Second, according to China's demand for services, as well as the institutional system and cultural background, specific ITS systems will be developed. Third, ITS will make full use of the next generation of information technology to enhance data acquisition and data management, strengthen the use of intelligent devices and mobile Internet information services, and strengthen transportation operators and communications service providers to cooperate to reduce costs and improve efficiency. Fourth, ITS development is led mainly by technology to be a combination of technology applications and capital. Policies, standards and other means will cultivate the market and intelligent transportation industries with the innovation of construction and operation.

China will increase innovation of traffic information service systems. First, the next generation of broadband wireless communications technology will support ubiquitous ITS service to become a reality. Second, traffic information collection technology and equipment based on the sensor network will be used as the base for next generation traffic management systems and information services systems. Third, Dedicated Short Range Communication (DSRC) is a key technology to improve road and vehicle safety.

In short, ITS technology development and application will provide support for supply capacity, efficiency, safety, and service levels. Meanwhile, it will also provide a huge market for high-tech industry.

Open ITS to the Next
Hajime Amano, President ITS Japan

Building transportation capacity has been one of the most important elements for economic growth and improvement of quality of our life. To move goods and people faster, safer, and more reliably, we have developed, evaluated, and implemented advanced technologies.

Confronting new challenges, such as energy conversion to alternative sources and rapidly changing business environment, ITS technologies should be integrated with vehicles with new energy sources, transportation infrastructure, urban planning, behavioral changes of individuals and enterprises, and necessary legislature under concrete policy decisions.

Multimodality, ElectroMobility, and connected mobility are all important elements of transportation for the future. However, those new technologies will be effectively deployed only when all the stakeholders agree upon goals to be achieved and framework to support deployment and operation.

ITS Japan has developed a new ITS action plan for 2011 to 2015. Our missions are; to accelerate innovation in transportation with rapid progress of mobile network and its penetration in the society, to establish sustainable and enhanced mobility in line with changes in energy sources for automobiles and supply structure, to lead international collaboration among existing regions with emerging countries who have crucial potential for the entire world to grow, and to create competent and efficient mobility to support affluent and vigorous society with diversified style of life

We identified priority areas; 1) Cooperative system for safety, sustainability, and enhanced mobility, 2) Diversified energy sources for transportation and their management, 3) Networked society for innovation in daily life, businesses, and mobility, and 4) Deployment projects under local community leadership.

We were at the very final stage of the action plan development when the earthquake hit Japan. ITS and other technologies functioned for evacuation and relief operation. However, we learned that we should have done better. We reevaluated our draft of the action plan and incorporated our experiences.

We have already initiated new projects in addition to existing ones. We are running these projects concurrently and progressively. Those are cooperative systems, networked vehicles and energy infrastructure, open platform for integrated services

We are going to host ITS World Congress in 2013 in Tokyo. Our congress theme is Open ITS to the Next.

Networked applications are built upon open platform where; interface, format, and tool kit are provided, data and applications are created by participants and shared equally by organizations and individuals, and evolution with creative ideas and new technologies is achieved at an unimaginable speed.

ITS is not an exception from the framework of the networked society for the next opportunities and challenges. Opportunities are higher flexibility in time and place to create new dimension of Quality of Life and new businesses with creative definition of product and services. Challenges are environmental sustainability and robustness against disasters, natural or human-made

While we have transportation related challenges to cope with, we will keep going forward with Intelligent Transport Systems and create new opportunities.