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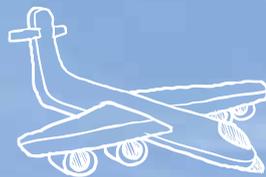




19th **ITS World Congress**  
**Vienna, Austria**  
22 to 26 October **2012**

# Congress Report

Report on 19th ITS World Congress  
Vienna, Austria, 2012





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# RAPPORTEURS' REPORT ON THE 2012 ITS WORLD CONGRESS IN VIENNA



The Vienna Congress was organised around six key themes:

1. Optimising provision and use of Infrastructure, traffic and travel data and information
2. Intelligent infrastructure
3. Continuity and interoperability of seamless multimodal services for mobility
4. Integrated safety and security for all users
5. Connected vehicles, Infrastructure and users for cooperative mobility services
6. Sustainable, clean and energy efficient mobility

The International Programme Committee (IPC) chaired by Vincent Blervaque (ERTICO – ITS Europe) and co-chaired by Reinhard Pfliegl (Austriatech) appointed a rapporteur for each theme from each of the participating regions (Europe-Middle East Africa, Asia-Pacific, Americas) tasked with capturing the key messages and outcomes from the Congress. The themes were addressed by a wide range of different types of sessions, around 250 in total – Executive, Special Interest, Technical, Scientific, Interactive, IBEC, and Host. Over 800 papers were presented in Vienna divided among the Themes roughly as follows – 1:225; 2: 190; 3:65; 4:120; 5:110; 6:90.



Vienna also saw many live demonstrations of ITS systems together with a number of stakeholder workshops and four Plenary Sessions where high-level industry executives, public officials and international experts shared their perspectives and rich experience on ITS topics encompassing policy, strategic, economic, technical, organisational and societal aspects.

This Report by the Chief Rapporteur, Professor Eric Sampson (ERTICO / Newcastle University), summarises the Congress proceedings focusing mostly on the Technical and Scientific papers and the Special Interest sessions.

# Theme 1 Optimising provision and use of infrastructure, traffic and travel data and information

Rapporteurs – Risto Kulmala, Takashi Oguchi, Richard Easley



## Summary

Overall, cooperative traffic and connected vehicles & infrastructure were dominant areas of the theme. There was much interest in monitoring, urban traffic management and network operation with emphasis on mobile sensor techniques. Compared to earlier Congresses the number of presentations describing a planned deployment and study decreased in relation to those describing experiences and results from actual deployments and experiments giving participants more added value. Both the exhibition and demonstrations showed clearly that a major part of ITS has now moved from ideas and proof-of-concept trials to products, contracts and deployments. We saw a strong presence of the relatively new subjects of Cloud Computing and XaaS (X = S/I/P ie Software/Infrastructure/Platform as a Service) applications.

Many papers addressed data issues other than collection eg: public open data, data fusion, data quality, use of real time data to improve system planning and management, mitigation of effects from road works and other major events. Data quality was often cited, but too often results did not address quality parameters and only related to the use of the service in terms of the number of users and sometimes user acceptance. Very few results were presented on the actual impacts on safety, efficiency, environment and economy.

We are getting closer to traffic management that includes both responsive management (dealing with existing traffic and known trends) and active management strategies (providing information and incentives for changing modes, actively creating capacity, creating dynamic corridors/routes for different times of day and finding targeted solutions to congestion and greenhouse gas related problems). This includes prioritisation of multiple modes (transit, bicycles, walking, freight etc) for both people and goods and the use of social networks, innovative in-vehicle devices, public service announcements, congestion pricing, dynamic parking fees etc in a holistic and integrated fashion.

## Overall balance

A wide range of technologies was reported eg floating vehicle or floating cellphone, automatic vehicle location, road user charging, Bluetooth, webcams, automotive radar, roadside microwave, active traffic management, mobility management and rush hour avoidance, environment related network operation, variable speed limits, dynamic lane allocation.

Monitoring covered road weather, congestion, incidents, events and traveller/goods mobility with the help of floating vehicle data FVD, automatic vehicle location AVL, Bluetooth, video, webcams, automotive radar, roadside microwave, and cellular data. The concept of mobile sensors was by far the most popular single aspect. Urban traffic management covered advanced signals, priorities, area-wide optimisation, active traffic management, mobility management and rush hour avoidance. Traffic simulation was shown to be a useful tool to support traffic management centre operators and to assess the performance and impacts of different traffic management strategies.

Network operation covered the topics of optimisation, breakdown minimisation, mitigation of effects from road works and events, service interoperability across organisational and geographic borders, environment related traffic management, short term predictions, variable speed limits, and dynamic lane allocation.

The content of any ITS service relies on data/information, and many of the congress sessions, papers, presentations and demonstrations highlighted this very clearly. Users always look for the information they themselves need ie the specific

information needs depending on their particular journeys and their purpose, destinations, traffic and weather conditions, environment etc. A common need for all tends to be that this information needs to be accurate, reliable, timely and easy to access.

Fusion of data remains very important. It was stated on several occasions that fusing and integrating data from different sources (own and others) enables wider and better coverage of data in a very cost-efficient way. There was a tendency to an incremental approach, where the stakeholder first set up an ITS service based on data collected by or for him specifically, and then widened the scope of the service with the help of data from other stakeholders and sources, often also collected for the services of these other stakeholders.

Several examples were presented of the use of real time data collected for ITS services to improve the planning and management of transport system for example, to explore travel patterns and to build up origin-destination matrices. Privacy concerns have often set clear boundaries for these kinds of uses but solutions are beginning to be found.

Cloud concepts and services have already found many uses in ITS, and it is likely that this trend will continue supported by the overall shift



towards open data, where most data collected by and for public sector stakeholders is being made available to service providers via national data warehouses or marketplaces. The concept of data commons was brought up at the congress, describing well the overall idea and benefits of open data.

The importance of positioning, location referencing and maps to ITS services was stressed at many occasions. These are also the prerequisites for the presented examples of multimodal dynamic navigation and routing, also including indoor

navigation and routing for pedestrians.

Numerous smartphone applications were also presented. A very important statement was made early on in the congress: "the smartphone is the trigger for consumer adoption of ITS". It is evident that today a smartphone is the device widely and ever increasingly used by people all over the world at home, work, leisure and during travel, and that hundreds of different traffic and travel related applications are already available at the app stores. The low prices of both the device and the apps combined with the ease of use has already brought ITS to consumers especially in the form of information, navigation, and payment related services. This trend is becoming stronger widening the scope of applications to other types of ITS services including freight and fleet services, connected vehicle and cooperative services.

Some topics featured less than expected eg: impact and economic feasibility of traffic management and information services, organisational and business model issues. Disappointingly, rail, maritime and air transport ITS related topics were not really covered.

Trends compared to earlier Congresses Vienna presentations showed a reasonable balance between bringing forward new ideas

and reporting on how older ideas are performing. The numbers of papers describing a planned deployment and study decreased in relation to those describing experiences and results from actual deployments and experiments giving Congress participants more added value. Some of the most interesting new ideas in this area were:

- approaches and methods to consider extreme conditions such as typhoons, earthquakes, and snow storms in traffic management
- predicting traffic accident occurrence to enable traffic and incident management to mitigate the impacts of incidents but also to prevent incidents occurring
- use of wireless sensor networks, web camera images and high definition radar satellites in monitoring

- providing situation awareness to traffic managers and operators via "situation radar"
- providing novel yet inexpensive ITS solutions via smartphone applications
- the use of social intelligent incentives targeted to the preferences of users to affect traveller and driver behaviour and trigger people to make good mobility choices

XaaS (X = S/I/P ie Software/Infrastructure/ Platform as a Service) applications were also present in many presentations suggesting that we are entering an era where stakeholders focus on their core business and purchase any other elements required by their operation as services from the outside. This emphasises the importance of standardisation, interoperability and quality management concerning such services and their interfaces.

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## Theme 2 Intelligent infrastructure

Rapporteurs – Malika Seddi, Jason Chang,  
Nu Rosenbohm

### Summary

The key messages from this Theme were heard at the opening Plenary sessions when speakers identified the use of intelligent infrastructures as being at the heart of developments to improve mobility, safety and environmental issues. Many presentations described advanced applications supporting innovative mobility services, improved traffic management, new sensors and detection devices, and schemes based on different technologies to optimise the use of infrastructure. The emphasis was frequently on “connected mobility” through mobile technologies merging with intelligent infrastructures and cooperative systems.

### Overall balance

Theme presentations and demonstrations covered a range of advanced applications for better use of infrastructure, based around innovative services for traffic management, sensors and detection networks, and road charging. There was a marked shift in paper contents towards the use of non-traditional infrastructure-based technologies such as smartphones and smart imaging based on camera as well as satellite technologies.

We saw an impressive numbers of papers about sensors and detection, the most popular subject under this topic along with traffic control with different perspectives: policy, urban and inter urban. Presentation and Special sessions gave updates of some new systems, proven technologies and systems (virtual loops, laser, radars, infra-red, video, weigh in motion, probe data with mobile devices). Interesting pilot test sites have been set up worldwide and were presented in contributions from USA, Asia-Pacific and Europe. One emerging topic was the use of sensor systems based on anonymous position data from ETC tags, mobile phones etc as probes

to give travel time analysis.

The deployment of intelligent infrastructure techniques has had a major impact on traffic control and incident & congestion management. Papers and Special sessions reported on interesting case studies in managed motorways and ramp metering control aimed at addressing congestion and improving journey time reliability. Active lane management, such as temporary hard shoulder running, variable speed limits and enforcement systems, has clearly been one of the successes of intelligent infrastructure.

Presentations described the management tools now available for transport network managers to use for increasing efficiency for incident detection and resolution. Congestion management is an important topic but compared to the USA Europe and Asia-Pacific still lack successful concrete examples like HOV lanes or reversible flow lanes.

Funding has always been an issue. With the financial crisis experienced by agencies around the world plus the difficulties in many countries of raising motoring taxes combined with declining fuel usage following electrification of the vehicle fleet, many contributions described potential solutions pointing towards road user charging. As expected there were no completely new technology proposals for road charging; all presentations were based on existing technology but delegates heard some interesting presentations including overviews and especially the accounts of experience from actual situations and not the expectations at pre-implementation level. The key issues remaining are institutional and organisational ones including interoperability business models plus the perennial question of



user acceptance.

One of the big European issues remains the implementation of the European Electronic Tolling Service EETS. Both the scheduled presentations and workshops referred to specific projects, particularly truck tolling schemes, and interoperability programmes but there was an



absence of papers looking at the overall situation and achievable low-cost real-world solutions for EETS.

Intelligent truck

parking management answers a strong need from both professional drivers having to fulfill regulations on working time and policymakers who set rules for better safety. This subject is an emerging one, with great expectations. Some trials were presented: parking lot availability test sites, experiences with video-based parking space surveillance, display of the information available on road signs, electronic displays via communication networks to mobile devices such as smart phones, desktops and on board units. Parking management is becoming more important as an integral part of an overall ITS system, particularly within cities because it can contribute to demand management not to mention the funding needs of agencies. However the parking papers were still at an early stage of development, describing mostly single mode/ single solution projects instead of parking as a part of an overall metropolitan ITS system.

Telecommunications is a backbone for ITS solutions and several papers described new approaches, mostly wireless, to address communications needs. However there was a feeling that the security implications of using telecommunications technologies for safety-critical applications is not adequately addressed, which is becoming a major issue.

### **Trends compared to earlier Congresses**

The previously unfashionable area of (secure) parking management is now an issue of high importance for policy makers and this trend

prompted some promising papers. In some cases the results of trials were presented – availability of parking lots, experiences with video-based parking space surveillance. This subject is not yet a mature one and a lot of developments are occurring. It will be interesting to see progress in future congresses.

Comparing with Orlando 2011 there was less focus on public transport beyond traffic signal priority schemes. Very few papers described coordinated and integrated approaches across modes (highways, metro systems, buses, and trains, as well as other means) such as the Integrated Corridor Management project in the US.

There has been a strong emphasis on technology to support applications for mobility, security, and manageability but very little on cost benefit analysis. Compared to Orlando 2011 we heard about more case studies on managed motorways and ramp metering to address congestion and improve journey time reliability, lane management, hard shoulder running, variable speed limits and enforcement systems. However there was reduced interest in network management tools for increasing efficiency as opposed to incident management.

We might have expected more presentations on GNSS applications – in previous ones congresses we had papers on new capabilities made possible through GPS and satellite based technologies for intelligent infrastructure. Nevertheless, there was a huge variety of presentation with merging technologies bases on connectivity and mobile devices.

Perhaps one of the lasting messages will be the many clear statements from policymakers worldwide of the need to deploy more intelligent infrastructure to meet the challenges of improved mobility. Political statements stressed the need to find good business models to develop the services made possible by intelligent infrastructures; the answers perhaps rest with increased interactivity of infrastructure on the one hand and the vehicle fleet and mobile devices such as smartphones, androids, and devices yet to emerge.

# Theme 3 Continuity and interoperability of seamless multimodal services for mobility

Rapporteurs – Martin Boehm, Young Jun Moon, Carol Schweiger

## Summary

The most popular Congress topics included: multimodal journey planners, mobility applications, real-time traveller information, services for elderly and disabled travellers, effect of traveller information on behaviour and mobility, border crossing technologies, security and logistics solutions, e-payment and e-ticket systems.

There was a marked emphasis on deployment not development with numerous papers describing commercially-available services for users. The most popular topics included: multimodal journey planners; mobility applications; real-time traveller information including its effects on behaviour and mobility; services for elderly and disabled travellers; border crossing technologies; security and logistics solutions and electronic payment systems.

There was a lot of interest in new approaches to mobility and the 'green' agenda. Topical policy issues reviewed included: making car-sharing a business; dynamic ride sharing; the use of car pool databases; availability of privately owned vehicles as rental cars; a tool to determine mobility when determining location for residence or business; mobility behaviour based on provision of multi-modal traveller information; management and analysis of urban mobility; open data policy v open service/information policy; access to data; and how to ensure mobility of elderly and disabled people and make services acceptable.

## Overall balance

As with earlier Congresses we saw and heard a lot of isolated solutions – some proprietary, others working for a single operator or for a single region/state. But aside from freight and logistics



there was not much about interoperability or services continuity within the papers. Where there had been discussion of service improvements the focus tended to be on raising services' quality and accuracy, but not on making them interoperable with other modes or regions. However, there were papers discussing system improvements which were very much more than only "more of the same".

There was increased emphasis on enhanced functionality (comfort functions) integrated into Multi-Modal services eg parking guidance; shopping information including bicycle route information or walking; are there free seats in the tram or train? and using the semantic web to enable new functionalities (like neighborhood research – what events take place close to your location?). Deployment papers focused on multi-modal traveller information services including on-trip and results from early tests showed that interoperability across all of Europe can indeed become real (eg the European projects In-Time or Wisetrip). Papers also commented on the need for quality management procedures to ensure reliable services and traveller acceptance.

This Theme was not exclusively passenger travel: many papers looked at Freight and Logistics services especially interoperability and multimodality (a combination of administrative and logistics processes as a common information

framework) in order to improve efficiency while ensuring secure and contraband-free logistics services eg: ITS solutions which drastically reduce on-site border waiting times and weigh in motion enforcement that reduces road damage.



Can we see how to make multimodality a way of life ? A number of key issues were cited:

- We have to change our and the traveller's behaviour so that multiple modes are not thought of in a fragmented way. Technology (driven by data) can facilitate that change in behaviour, and the behaviour must be evaluated
- "Multimodal" is different from customers' perspectives and agencies' perspectives
- Agencies need incentives to be partners and it is essential they are involved in a common ITS architecture to facilitate multimodal travel in a region. Partners must also work together to provide funding for the technology
- Reduction in car ownership and extensive use of technology among young people also has an influence on multimodal travel
- There is a need for business models and cost-benefit analyses to determine the most effective technologies to influence multimodal travel
- Social media and crowdsourcing must be considered along with traditional technology to support and influence multimodal travel. Customer feedback must be analysed, not just reported
- The "mobility cloud" is a new way of thinking about multimodal travel technology

## Trends compared to earlier Congresses

Many presentations illustrated enhanced functionality (comfort functions) integrated into multi-modal services such as guidance to parking; indoor navigation for large-scale transit users; shopping information (enabling longer stays and enhanced town incomes); provision of bicycle or walking route information; multimodal planning during special events; and the general deployment of multi-modal traveller information services. While multimodality is easy to describe and seems to give options, it is not simple to deliver. Political measures are needed (eg road pricing, parking policies, and making public transport cheaper) as well as services such as traveller awareness to ensure multimodality to give public transport a chance against personal road transport. A lot of presentations stressed that multimodality is not only about people but also about goods and is the only option for mega-cities such those in Asia-Pacific. Business models are still necessary and there are far too few cost-benefit analyses.

The ITS community is increasingly focusing on real-time information for all modes of transport. Modes like cycling, car sharing and walking are an integral part of the multimodal picture and ITS solutions such as journey planners are starting to incorporate these modes. Ancillary information (eg lighting and elevation for walking or cycling) is starting to be considered. Quality management procedures are emerging to ensure reliable services and traveller acceptance. Qualitative services are seen as a key to success – and even more important than interoperability, at least for the moment. This might reflect the fact that data- and service-quality based on improved data generation and collection methodologies is a quick win, as it rests within an operators' own responsibility while interoperability is based on cooperation with others resulting in legal contracts as well as in restructuring at least parts of existing systems.

Vienna saw some interesting approaches to how to make car-sharing concepts, especially dynamic ride sharing, a viable business. Key questions remain – how to use carpool databases; how to make privately owned vehicles rental

cars available through 3rd party management companies; how to provide a cloud transport system with electronic vehicles as a car-sharing service.

There was a pleasing quantity of strong papers on freight and logistics. Key topics included the need for new stakeholder processes based on interoperability and multimodality platforms and a common information framework. These are particularly needed for dangerous goods transport to ensure hand-over of information and quick emergency services response in case of an accident. Such an approach would help to improve efficiency and security for example at border crossings where waiting times would be considerably reduced, secure and contraband-free logistics services would benefit very quickly, and technologies such as enforcement-linked weigh-in-motion would have only a minor impact on road damage.

Two policy issues were very visible at Vienna. First, the need to deal with an increasing and aging world population (especially in mega-cities) and to ensure mobility of elderly and disabled people. The second main policy goal was reduction of greenhouse gas emissions. This goes hand in hand with possible improvements of the transport infrastructure for intermodal or multimodal connections to enhance the efficient utilisation of public transport systems instead of private cars. This topic is especially challenging

under current economic restrictions. We also saw vigorous debate regarding open data policy versus open service/information policy. Policy improvements and clarity are urgently needed as currently there are no harmonised policies on how to deal with public data.

Technology has inevitably moved on compared to previous congresses. Key issues that were presented included: building open platforms using standardised interfaces enable multimodal data integration are seen as highly important to overcome proprietary solutions. Several challenges were discussed such as how to merge data from multiple sources (some may be proprietary), determining data quality, maintaining data and identifying certain characteristics of the traveller (eg is the customer walking or on a tram ?). Cloud Computing, crowdsourcing and V-to-X are fast-emerging subjects particularly as they are seen as having high potential to tackle the problems in urban mobility – once all vehicles are connected completely new levels of traffic control and safety can be achieved.



ITS is increasingly seen as an enabler to integrate applications, but one that can link to electro mobility and other alternative mobility concepts. However, proper evaluation of the benefits and practicability of ITS

technologies is still lacking.

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# Theme 4 Integrated safety and security for all users

Rapporteurs – Alan Stevens, Brian Negus, Michael Walton

## Summary

Safety is still important; possibly increasingly so. Even though casualties are generally reducing, the increase in mobility and the increasing unacceptability of road injury & death is clear. ITS-America confirmed Safety as the number one US priority. Security is increasingly important (since 9/11) and also because of dependence on technology there are increasing issues of data security, privacy and liability – for example developers were concerned over remote hacking of Head Up Displays.

As safety becomes more designed-in the remaining human factors (human error) can be increasingly recognised – eg 90% of accidents are the result of drivers becoming distracted and inattentive. There were 5 Technical/Scientific sessions on human factors – an unprecedented number in World Congresses. Speakers in Plenary, Stakeholder and Special Interest sessions mentioned particular concerns about human factors including, for example, “cellphone addiction” and driving. In many of other sessions eg on cooperative systems and highly automated vehicles, the issues of human factors and behaviour were raised, if not by the presenters then by the audience during questions. Clearly human factors is increasingly recognised as critical to deployment.

The exhibition, demonstrations and sessions all demonstrated continuing development of sensors and systems so incremental improvements in vehicle safety will continue. However, the potential “game changer” is automation.



## Overall balance

The papers reflected a great deal of ongoing scientific research on drivers (workload, drowsiness, gaze, attention and the associated technology developments); and human behaviour and human factors interventions utilising ITS. The papers reported the numerous applications/ services being trialled worldwide eg: longitudinal & lateral support, collision warning/ avoidance (and some are in commercial deployment) but there was a distinct gap regarding the evaluation of demonstrations or actual implemented projects to show the safety or mobility improvements achieved.

Overall the message was consolidation – there were few new areas or radical new ideas being reported or proposed. Papers describe the impacts of increasing automation (including platooning) & cooperative systems and many reported experiences from Field Operational Tests for driver information & ADAS and naturalistic driving. By contrast there was just one paper on driver acceptance. Specific safety-relevant

groups were identified eg: in the workplace, pedestrians, cyclists, wildlife along with specific safety-relevant situations such as: hazardous goods, tunnels, level crossings.

All Regions showed strong interest in ways to achieve a better

acceptability of safety enforcement; driving behaviour by aged drivers and safety counter measures; vulnerable and impaired mobility travellers; secure systems and infrastructure coupled with emergency evacuation and special events planning.

The application areas were very wide-ranging: emergency management advice and response; disaster relief and security response systems; vehicle technology to improve safety, including crash avoidance; pedestrian detection and driver assistance and intervention systems. As with previous congresses there was much interest in the human factors aspects of technology generally and ITS in particular.

There was multi-national cooperation on advanced integrated safety applications based on enhanced perception, active intervention and new advanced sensors

Many short-term responses to improve road safety were discussed eg placing more focus on good design and mitigation of distraction & inattention where industry solutions included workload managers, Head Up Displays and intermediate interfaces. Other examples were vehicles connected to the infrastructure (by cellular radio or V2I) providing near real time information including some less time-critical safety information; the increasing deployment of warning and assistance systems as standard on vehicles; and the award of additional EuroNCAP points for on-board safety technology.

A medium-term solution to human failings was openly discussed: "Automation". This has at least two facets: increasing automated decision making by infrastructure systems to influence and control traffic and enforce safe driving; and increasing automation of vehicles. Examples of highly automated driving were discussed and first examples are entering deployment eg Automated Emergency Braking can reduce collisions by up to 27%.

Cooperative systems were everywhere in Vienna. V2V for vehicle safety has potential benefit beyond autonomous systems, but has deployment challenges including the value proposition and the necessary penetration rate. Nevertheless, development and pilots are underway. We also saw glimpses of the future which might include road-trains (eg the SARTRE project in Europe, Path and Pelotan in the US); increased safety through V2V Connected Vehicles (eg Advanced Safety Vehicle Project in Japan and the US Connected Vehicle trial), and (maybe) fully

automated driving.



### Trends compared to earlier Congresses

The papers presented focused almost exclusively on road issues (little rail and no marine) and relatively little engagement from road operators/ authorities – does this mean safety is seen as a vehicle/driver issue aside from enforcement? Compared to previous World Congresses, areas presenting either a new accent or changes on ITS in integrated safety included the following: ITS to help older people improve their safety and mobility; safer cycling or motorcycling through ITS; advances in collision avoidance; and heavy vehicle safety systems. Vienna offered more emphasis on Field Operational Trials; V-to-X cooperative systems; and cross-border eCall while there appeared to be less concern about distraction from mobile phones/nomadic devices.

It was very noticeable that there were five Technical/Scientific sessions in the Congress covering Human Factors; this is unprecedented and perhaps as a result of vehicle technology deployment promoting work in the area. The papers came from all regions. In many of the other sessions eg on cooperative systems and highly automated vehicles the issues of Human Factors and behaviour were raised, if not by the presenters then in the audience's questions. Human Factors does seem to be increasingly recognised as important and clearly has a significant safety dimension.

The Executive session on global vehicle safety was very well attended and confirmed previous messages from US speakers about the US DOT's activities and expectations for cooperative systems. It discussed warning and assistance

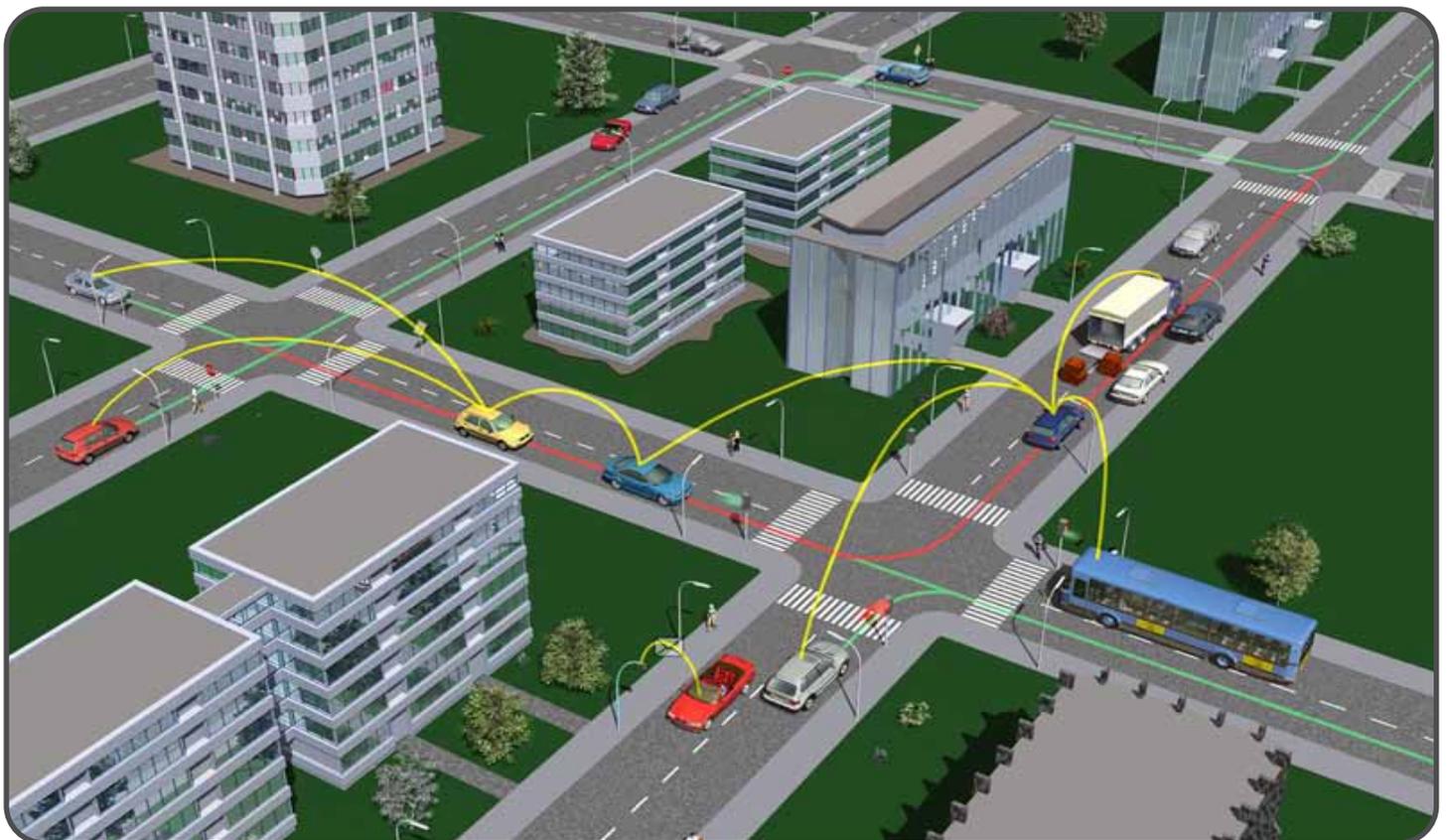
systems, V2V safety systems and Advanced Crash Notification over cellular radio. It was argued that the autonomous Google Car has spurred the US-DOT to do research in the area. The work of the UN/ECE WP29 Informal ITS Group on safety engineering was described together with presentations on warning guidelines and possible new work on guidelines for semi-autonomous vehicles. This session also heard from the University of Michigan with some details on the 3000 connected vehicle trial. Much of the collected data will be made available for research purposes. Throughout the session issues of human factors, driver-in-the-loop, trust, acceptance etc were raised.

The Executive session on International ITS Cooperation gave the background and main activities of the EU-US cooperation in this area governed by a high-level agreement. The Driver Distraction and HMI Working Group had a session addressing safety issues. All of the speakers were up-beat about cooperative systems and vehicle automation and the safety benefits they would bring but spoke about the need for business models such that, finally, the consumer will pay for the technology. Important issues for the future were presented:

- Identification and use of appropriate technologies
- Legal frameworks
- Viable business models
- A focus on user needs
- Support for quality of services

A session on Cooperative safety applications on rural roads heard about Japan's ITS Green Safety national project which includes:

- Provision of Radio Frequency Identification (RFID) devices for pedestrians, cyclists and motorcyclists which send position information to approaching vehicles and warn drivers if necessary
- Intersection collision avoidance using DSRC technology
- Intelligent speed advice to avoid collision with pedestrians in school zones
- A ghost driver (wrong way) application
- Skid incident information service
- Pedestrian existence information service using mobile phones to send pedestrian and vehicle position data – the question of who pays for communications is currently unresolved



# Theme 5 Connected vehicles, Infrastructure and users for cooperative mobility services

Rapporteurs – Stéphane Petti, Koji Ukena, John Funny

## Summary

A very strong emphasis of papers and Special Sessions was on trialling applications and technical advances with little new on deployment mechanisms or business models. There are now quite a few practical trials of connected systems worldwide and most are reported in papers or Special Sessions. This is also an area where there is a well-established platform for international discussion and collaboration.

There was an emerging interest in how to make maximum use of existing cellular communications as opposed to planning for early adoption of future technologies. Vehicle platooning continued to attract interest with increasing attention to the implications for commercial vehicles, and the possible deployment of highly autonomous vehicles. This latter issue was possibly the 'hottest topic' for the congress. A number of papers made references but the platform for news about plans, trials or policies was the Special Interest Sessions that directly or indirectly dealt with it.

## Overall balance

Many papers in this topic centered on the Connected Car ie V-to-I and V-to-V technology with a strong focus on specific safety-linked standards and the use of existing cellular wireless technologies. The favoured deployment areas were traffic efficiency and safety with a few papers looking a long way ahead to extensive deployment in inner cities. A strong set of papers and Special Sessions looked at the telecoms aspects. There is still a great deal of territoriality in the connected vehicles space – the papers' authors were nearly always drawn from one single area such as automotive OEM, infrastructure management, telecoms companies, R&D

organisations or third party service providers. It was possible to see some central policy coordination in Japan, Korea, and the USA but a "team effort" is still apparently lacking in Europe.

V2V safety services require dedicated short range communications (DSRC), not just because of the channel's low latency but for reasons of geographic coverage. A possible alternative, 3G/4G cellular radio, is not expected to cover all roads and may provide less coverage than 2G. However, V2V has a "penetration" problem – safety systems using V2V become effective only when a significant number of vehicles are equipped. It is planned to introduce V2V on vehicles in Japan in 2015; this may work as one manufacturer has ~ 45% of the market giving a good user base and inducing collaboration from other car makers. By contrast the European industry is looking for "use cases" to help first steps. Examples could be installing transmitters on mobile roadworks to provide warnings, or in emergency vehicles for transmitting to surrounding cars.

A number of papers and sessions referred to the US DOT connected vehicle safety trial in Ann Arbor, Michigan and the goal of deciding whether to mandate fitment of V2V, presumably to address the penetration problem. This will depend on benefit-cost and also practicality. There are around 3000 vehicles (cars, trucks, buses) in the one year pilot. The trial is looking at both OEM V2V and aftermarket autonomous warning systems. Some presenters argued that autonomous systems using on-board sensors can provide a lot of safety functionality (eg Automatic Emergency Braking) and questioned whether the incremental safety improvement of V2V cooperative systems over autonomous safety systems has sufficient value/business case.

## Trends compared to earlier Congresses

Vienna saw a continuation of a trend visible in Busan and Orlando – a movement from theory and proof-of-concept reports to the design of trials and the emergence of trials results. This was especially true in the general area of the Connected Car where as noted earlier the emphasis was on benefits such as safety, throughput, economy. The US DoT described itself as “laser focused” on V2V for safety in its connected vehicles programme arguing that cooperative vehicles have the potential to address ~80% of light vehicle crashes involving unimpaired drivers.

While there was no obvious innovative trend with respect to V2V we saw a renewed interest in the design of and potential benefits from platooning – especially for the freight and logistics sectors – and autonomous cars. The US activities and associated publicity from the DARPA challenge and the Google autonomous car have prompted new initiatives in all three Regions. Europe’s SARTRE project was also presented.

In previous congresses virtually all presentations on V2V placed the emphasis on technical achievement with business cases and



quantification of benefits put to one side. Vienna revealed a small but definite move to explore the practicalities of marketing systems and exploring the organisational and legal issues involved in autonomous or semi-autonomous systems such as the 1968 Vienna Convention. There was a general feeling in discussions that the major safety developments for passenger transport will come through increasingly intelligent and automated vehicles that both support the driver and, when necessary, intervene to prevent or mitigate collisions.

It will be interesting to see whether in future congresses the main driver for vehicle–infrastructure connectivity is accident avoidance in outer-urban areas or enhanced traffic flow in inner-urban areas.



## Dates for your Diary!

Dublin, Ireland, 4-7 June 2013, 9th European ITS Congress, [www.itsineurope.com](http://www.itsineurope.com)

Tokyo, Japan, 14-18 October 2013, 20th ITS World Congress, [www.itsworldcongress.jp](http://www.itsworldcongress.jp)

Helsinki, Finland, 16-19 June 2014, 10th European ITS Congress

Detroit, USA, 7-11, September 2014, 21st ITS World Congress

Bordeaux, France, 5-9 October 2015, 22nd ITS World Congress



## Theme 6 Sustainable, clean and energy efficient mobility

Rapporteurs – Phil Blythe, Taro Ishi, Robert Bertini

### Summary

There was a good deal of overlap between Theme 6 topics and those in other Themes for the simple reason that in transport generally, and within ITS in particular, whenever we improve safety or mobility (efficiency) there invariably additional benefits of reduced energy and fuel consumption and reduced emissions as well. However it seemed clear from the presentations that as transport researchers, practitioners, educators, or policy makers we still lack the tools to clearly articulate the trade-offs of ITS strategies in terms of the different benefit categories.

As with past Congresses, traffic management (from the top down perspective) and driving and routing (from the bottom up perspective) continued to be popular subjects within this Theme perhaps reflecting that whenever we improve safety or mobility (efficiency), there are often additional benefits of reduced energy and fuel consumption and reduced emissions as well. Other papers looked at environmental impact reduction as a priority and tested new transport strategies that might deliver worthwhile gains. In general while the individual paper quality was high there were few “overview papers” that set the scene and the problems and put all the various issues into the context of the societal, technical and financial challenges that they are reporting on.



### Overall balance

Both Plenary Sessions addressed sustainability issues, the first with emphasis on energy saving and policies for energy use improvement; the second looked more directly at the potential environmental benefits from wider deployment of converging technologies meaning that different kinds of technologies do more than move in the same direction (“integration”) they merge to deliver different or improved solutions.

A number of Special sessions were related to this Theme. One on using human machine interface design to encourage environmentally friendly driving behaviour addressed electric vehicle technologies and eco-driving although the main emphasis was delivering the ‘eco-pedal’ message to the driver. Another Special session reviewed the use of-ITS for fully electric vehicles, especially the political framework and deployment aspects. The clear message emerging was that models for the deployment of EVs are still developing. Many technical development barriers have been solved; the key issues are routes to mass production and ways to encourage social acceptance.

The Executive session on enabling future sustainable mobility was very wide-ranging, looking at V2V information provision, ways to improve travel efficiency and air quality, public and private energy grid systems, and ways to develop human, driver and social acceptance issues will keeping pace with technology evolution. A key issue was the need to start from clear political statements as an ITS service can be ‘tuned’ to put the benefits focus on safety, or efficiency, or environmental impact, but not all three simultaneously.

Presentation sessions covered a very wide range of emerging subjects:

- Environmental and energy efficiency

implications of alternative traffic management and routing strategies

- Using ITS to modify driving to reduce energy & fuel consumption and emissions
- ITS strategies to deliver environmental impact reduction policies
- Vehicle and infrastructure aspects of Electromobility
- Creation of a common CO<sub>2</sub> assessment framework for ITS
- A trial of managed hybrid buses
- Sustainability and emissions in cities and the links to well-being and health

There were no fewer than 5 sessions on Electromobility, from both the vehicle and infrastructure sides, reflecting a strong new trend and focus for the Congress. There will be much interest in how participants address the potential use of smart grids and what efforts are underway to bridge the gap between the transport and energy communities.

Other emerging subjects were covered by several exciting papers drawing connections between vehicles and the “grid”; proposing a common CO<sub>2</sub> assessment framework for ITS; addressing sustainability in Latin American and Asian megacities; looking at range extension and performance in mountainous regions; reporting on a trial of managed hybrid buses; and discussing EV carsharing, cybercars, and Citytrains. A few papers addressed emission modelling where there is still a very large knowledge gap for understanding the impacts of ITS solutions on individual vehicles.

A pleasingly large number of papers dealt with specific project results. We were short of papers on the wider context of sustainability and emissions and what this means for cities and the well-being and health of the population, and what role ITS can play to help although two of the Special sessions tackled these wider issues. In a number of cases speakers struggled to address the potential of the smart grid concept and set out what efforts are underway to bridge the gap between the transport and energy communities.



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