UNECE's role in the promotion of Intelligent Transport Systems

Strategic note

1. Introduction

The main objective of the United Nations Economic Commission for Europe (UNECE) is to promote economic integration. It brings together 56 countries, members of the European Union (EU), as well as non-EU Western and Eastern European countries, and member countries in South-East Europe, Central and Western Asia and North America. The Inland Transport Committee was created in 1946 to facilitate the international movement of persons and goods by inland transport modes and improve safety, environmental protection, energy efficiency and security in the transport sector to levels that contribute effectively to sustainable development. Furthermore, UNECE administers the United Nations inland transport and vehicle agreements that have a global outreach.

Intelligent Transport Systems (ITS) have been on the agenda of the Inland Transport Committee and its subsidiary bodies for many years. Already in 2003, the UNECE Inland Transport Committee recognized ITS as both a major challenge for future transport development and an opportunity to ensure mobility in a safe, efficient and environmentally friendly way. The first UNECE Round Table on ITS in 2004 focused on technological issues and called for more technical harmonization. Within their mandates, UNECE Working Parties have been working on a number of ITS-related matters: for example, the Working Party on Road Safety (WP.1) is engaged in debates on liability concerns and is charged with maintaining, as well as modernizing the UN Convention on Road Signs and Signals and the UN Convention on Road Traffic (Vienna Conventions)[1]. Furthermore, it pursues the harmonization of variable message signs. The Working Party on the Transport of Dangerous Goods (WP.15) is examining how Telematics can be used to enhance safety and security. Meanwhile, the Working Party on Inland Water Transport (SC.3) works on River Information Systems and the Working Party on Road Transport (SC.1) deals with the Digital tachograph and e-CMR[2]. In addition, the World Forum for Harmonization of Vehicle Regulations (UNECE WP.29) hosts a group of experts that provides general guidance on how to incorporate provisions on intelligent vehicle systems into the UN Vehicle Regulations.

The second UNECE Round Table on ITS held in 2010 was organised on the occasion of the International Transport Forum in Leipzig. This Round Table shifted the focus from technology to policy issues and discussed the legal, institutional and policy obstacles blocking faster deployment of ITS solutions. In 2010, the Inland Transport Committee emphasized the need to take actions in support of ITS applications in a harmonized way and supported the launch of **a strategic review on how Intelligent Transport Systems can contribute to sustainable transport and what role UNECE should play in promoting the use of ITS solutions**. The review benefited from the support of many, but in particular of the government of Italy and the government of the Federal Republic of Germany. The result is the ITS review package that consists of:

- A **background paper** with primary objective to share information (including best practices) and raise awareness about the values ITS solutions can deliver.
- This **strategic note** that attempts to identify the main gaps in and impediments to the broader use and faster dissemination of ITS applications irrespective of which organizations, institutions or bodies can or will fill the gap.
- A **Road Map** that outlines the areas and lists the activities UNECE can embark upon either as a continuation of on-going tasks or as new initiatives.

The draft strategic note was subject to a broad-based consultation during which we received valuable comments from Governments, businesses, international organizations, non-governmental organizations, the academia as well as from individuals (the web-based public consultation was combined with bilateral discussions). These comments are now incorporated both in the strategic note and in the Road Map.

(1) The Vienna Conventions are designed to facilitate international road traffic and to increase road safety

(2) e-CMR Protocol: a Protocol which will ease international road freight and further improve good governance in road transport by allowing the use of electronic consignment notes. This Protocol relates to the United Nations CMR Convention (Convention on the Contract for the International Carriage of Goods by Road) signed in Geneva on 19 May 1956. It refers to various legal issues concerning transportation of cargo by road

2. The UNECE Transport Division's vision, commitment and Road Map for ITS

How UNECE can meet its commitments on ITS is discussed in the Road Map, which marks the critical change from research to implementation. It lays down concrete actions to be performed in the future. It will represent the UNECE Master Plan for global deployment of ITS and it will give UNECE the opportunity to become the international platform for bringing together and harmonizing innovations, technological developments and regulatory framework.

The UNECE vision on ITS, its commitment to promote the use of information technologies in transport and overall its strategy have been shaped by considerations that are elaborated on in this strategic note. The note briefly assesses the challenges to the development of transport, the benefits of ITS, as well as the obstacles and impediments to its use. For easy reference it also reviews the related UNECE activities.

Our vision

The convergence of the transport and communications sectors is driven by innovations in information and communication technologies, and particularly by Intelligent Transport Systems. However, future inland transport systems should be shaped not just by technologies, but also and primarily by the policy makers.

UNECE as the centre of inland transport legal instruments, the secretariat to the World Forum for Harmonization of Vehicle Regulations (WP.29), to the UNECE Road Safety Forum (WP.1), to the global and regional intergovernmental bodies on dangerous goods transport, further more as the centre to promote pan-European and Euro-Asian transport linkages, will

- bring ITS to the policy makers agenda; and
- contribute to filling the gaps and the elimination of obstacles to a broader use of ITS solutions.

Our commitment to promote ITS

- UNECE is a partner for addressing inland transport issues from various fields in a harmonized way.
- UNECE is the forum that unites transport partners from all over the world.
- UNECE's ITS activities will have an added value in communicating best practices and will serve as a platform for finding innovative solutions.
- UNECE encourages an open and transparent dialogue between Government regulators, technical experts and the general public, in order to ensure that best safety and environmental practices are adopted and economic implications are taken into account in the development of regulations.

20 Global Actions for UNECE to promote the use of ITS

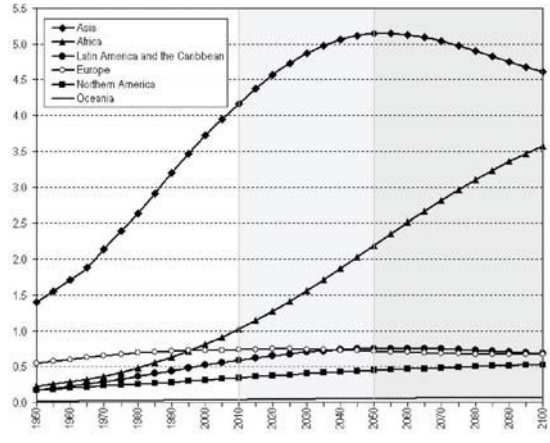
1. Reaching a common definition on ITS.
2. Harmonizing policies.
3. Forging International cooperation.
4. Facilitating inter-operability and the ITS architecture.
5. Ensuring data security.
6. Scaling up the work on ITS in all Working Parties of the UNECE Inland Transport Committee (ITC).
7. Promoting vehicle-to-infrastructure communication.
8. Promoting vehicle-to-vehicle communication.
9. Fighting the road safety crisis.
10. Addressing the liability concerns.
11. Harmonizing Variable Message Signs.
12. Making Transport of Dangerous Goods less dangerous.
13. Integrating with Rail Transport.
14. Integrating with Inland Water Transport.
15. Enhancing the modal integrator's role of ITS.
16. Developing Cost-benefit assessment methodologies.
17. Contributing to climate change mitigation.
18. Launching analytical work.
19. Contributing to capacity building, education and awareness raising, with special attention to emerging economies.
20. Organizing the United Nations Annual Round Table on Intelligent Transport Systems.

3. Transport growth reaches its limits...

Transport cannot grow without limits, and definitely not in the old traditional way. Adding a new lane in densely populated areas is already a problem. Furthermore, the political pressure on the sector to become "green" questions the justification of extensive growth and calls for more public transport instead of individual motor vehicles on the road. If we take a longer term perspective, the limits to transport growth become even more obvious. Nonetheless, in many parts of the world transport infrastructure is under-developed and large and small-scale investments are warranted to ensure that the entire population is connected to public services and to the rest of the world.

Population and trade growth create huge demands for personal and cargo mobility. With around 7 billion people today and predictions of up to 9 billion people by 2050, the enormous growth in population has created an unprecedented demand for personal mobility. Similarly, the 540 fold increase in the value of merchandise trade since the start of the steamship (representing about $13,000 billion USD today, three times more than in the early 1990's) created a formidable demand for cargo mobility and freight transportation. Consequently, transport infrastructure and services have grown extensively. However, even this growth is not adequate to meet the demand. In addition, it is not environmentally, economically or socially sustainable.

Urbanisation. The geographical distribution of the population, trade and transport growth will go under major changes, as well. Looking at the UN-DESA graph, consider the fact that 95 per cent of the world's population will be living on only 10 per cent of the land (World Bank) and predominantly in cities. From a transportation perspective, moving billions of people in mega-cities and meeting their needs in terms of supplies and public services will call for exceptional efficiency improvements in transport and logistics. This will not be possible without fundamental transport policy changes and ultra-modern traffic management. Traffic congestion is not only a formidable problem in mega-cities, but also elsewhere. Congestion has become a daily concern resulting in loss of time, and numerous other negative externalities (pollution, deterioration of safety etc.). Congestion pricing has proved to be an effective means for demand management - especially when combined with other measures and investments in favor of public transport - and this transport policy and management tool is the result of modern information and communication technologies.



1

Source: United Nations, Department of Economic and Social Affairs (UNDESA), Population Division (2011): World Population Prospects: The 2010 Revision. New York

1. World Population Prospects, the 2010 Revision: estimated and projected population by major area, medium variant, 1950-2100 (billions)

Affordability. A country's and its businesses' capacity to participate in the global supply chains is partly determined by the available transport infrastructure and the border crossing conditions. Landlocked least developed countries are particularly vulnerable and can be destined to remain marginalized as they usually suffer not only of low-quality infrastructure at home, but also in their transit neighbors. Investments in transport infrastructure have been a high priority not only for them, but also in all other countries. However, only a fraction of the required investments have been accomplished worldwide due to a lack of of available funds. The extended global financial and economic crisis coupled with *"weak sovereign and banking sector balance sheets"* (International Monetary Fund, IMF) further reduces the investment capacity

of countries and regions. In regions with high densities, land availability is a further limit to the expansion of transport infrastructure. Better traffic management assisted with Variable Message Signs and other ITS solutions can improve the throughput capacity of the existing infrastructure. In such cases, ITS can be an alternative to capital expenditure. In addition, the effective implementation of *"the user pays principle"* through electronic toll collection can be both a demand management tool and a way to recover part of the investment and maintenance costs.

The ***vulnerability of global supply chains*** is a concern all over the world. Natural disasters, terrorist attacks or other disruptions could severely affect the global supply chain at any time. After the Japanese earthquake and tsunami, the number of cars manufactured worldwide is estimated to have dropped by up to 30 per cent. This resulted in the further decline of the GDP of many countries with an automotive industry, suppliers and vehicle manufacturers alike (IMF, World Economic Outlook: Slowing Growth, Rising Risks). The vulnerability of the transport portions of the global supply chains can be reduced by improving not just the traffic flow, but also the real-time information flow and the infrastructure and services resilience across the borders. Still, ITS solutions face even more hurdles in cross-border operations than in local applications. Notwithstanding the relevance and availability of ITS solutions, this issue is not yet a top priority on policy maker's agendas. Therefore, it is high time to bring ITS to the agenda of the international transport policy fora, as well as to the broader agenda of the economic debate.

4. ...but ITS can expand the transport sector's limits

ITS can bring solutions to many of the above mentioned transport issues. ITS can make transport safer, cleaner, more secure, and more reliable. ITS can improve traffic fluidity, traffic management, as well as demand management. It can be a tool to commercialize road management and bring a very different institutional structure to the transport sector. It can help countries to leap-frog in development and reduce the vulnerability of transport infrastructure and services. ITS can offer new solutions, new opportunities and expand capabilities.

Leapfrogging. ITS is quite often seen as a privilege of the wealthy and a feasible investment only in high or middle income countries. Developing countries are often considered to be at a disadvantage compared to more developed countries in regards to building basic infrastructure that provides the foundation for economies and societies. This is largely due to the limited financial, technical and engineering resources that developing countries have access to. On the other hand, developing countries do have certain advantages, including that of being the "newcomer". Nowadays, when new infrastructure is constructed it can be combined with highly advanced IT capabilities based on the needs of tomorrow. In other words, less developed countries are not "stuck" with yesterday's solutions. This represents a huge opportunity for installing electronic infrastructure at the same time physical infrastructure is being constructed. This is far less expensive than retrofitting existing infrastructure. In addition, developing countries usually do not have appropriate IT infrastructure. Consequently they are not trapped in outdated technology. They can also benefit from continuing and rapid cost decrease in IT technologies. Building a new IT infrastructure from scratch is often less expensive than updating an existing system. Developing countries can make immediate use of other systems like cellular telephones and the Internet, which are spreading rapidly in parallel. Finally, developing countries can take advantage of IT and ITS products and applications which have already been tested and deployed in developed countries, and which are now mature, stable, well understood, and starting to become less expensive to acquire and operate.
As a result, developing countries have the opportunity to leapfrog directly to an ITS-enabled transportation infrastructure far more rapidly and far less costly than developed countries[3].

(3) World Bank, *ITS Technical Note For Developing Countries*

Reaching equity. Do we all have access to mobility in the same way? Definitely, not. In many countries, transport systems are still under-developed. Once they start to be built, the primary goal is usually to serve motorists, while little or no space is left for pedestrians. At the same time, public transport services are limited due to severe under-investment. In addition, in most places of the world, access-free public transport and infrastructure remains a dream. We know transport or personal mobility offers access to work, education, health, culture, in sum, it offers access to opportunities. However, little attention goes to the 3 per cent of the world's population that is severely disabled in their mobility. This means that unless the special mobility needs are addressed, their access to work, and to a better life is limited. ITS could offer solutions leading to more equity among individuals. Furthermore, in most cases, the introduction of these technological changes could be viable even without subsidies.

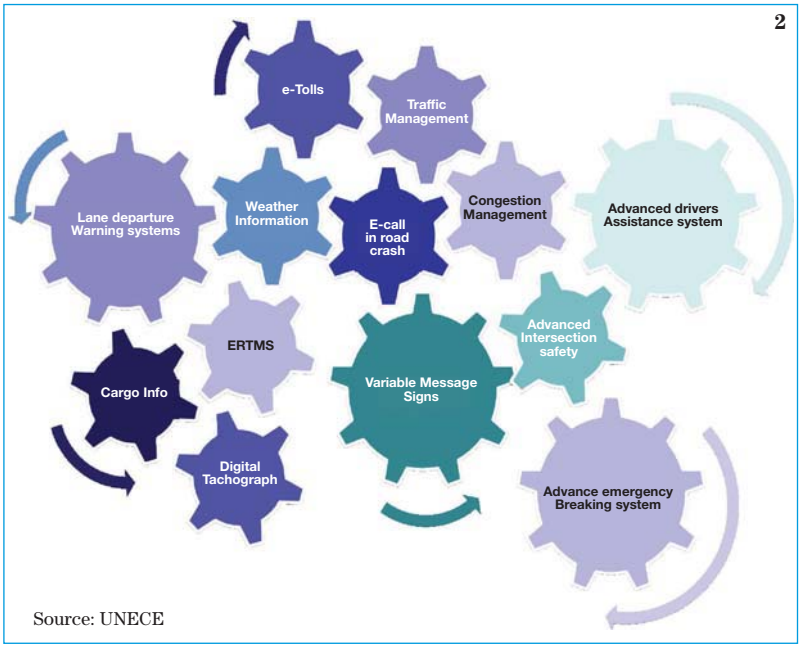
5. What is ITS?

ITS is not only an innovative transport technology. It is a new way of living, a new business approach, and overall, a new culture for all players. Every portion of the transport sector of the future will be a receiver and a sender of information. Information can save lives, reduce congestion, emissions, and save energy. Information exchange will make life easier, safer and more predictable for everybody. Information sharing will reduce the need for more investments in infrastructure, because infrastructure will become an "interactive object" that will transmit and receive information. Therefore, the debate in a growing number of places, starting in mega-cities, will no longer be about how much to expand infrastructure to serve the continuous increase in population, but rather how to make the most use of the existing infrastructure to better serve more people.

Vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) applications will help prevent crashes, enabling vehicles to act like nodes on a network and to communicate with the surrounding environment. V2V and V2I will be the tool for enhanced connectivity, information, entertainment and safety for all inland transport modes.

The Figure 2 illustrates the myriad of ITS applications in our daily life. Obviously, there are far more ITS applications than a figure on paper can capture. Here we have included only some of the most emblematic appearances to show that (i) they are numerous, (ii) they are various, and (iii) they are not aligned along only one specific theme.

2. What ITS can do for you?



Source: UNECE

Intelligent Transport Systems can be a solution for limits to transport growth - it expands these limits, optimizes efficiency and increases the effectiveness of existing transport infrastructure. ITS, therefore, can make the following possible:

- Create a secure system that relies on gathering and sharing real-time information to improve detection and response to emergencies of any kind.
- Reduce the number and severity of accidents, saving thousands of lives.
- Contribute to safer vehicles and roads, with fewer and less severe crashes.
- Reduce congestion, which will save energy resources each year, and realize proportionate gains in reducing emissions.
- Achieve "managed" transport networks and more sustainable mobility.
- Facilitate remote access to reservation systems and electronic payments.
- Facilitate the mobility of people and goods

that are crossing borders or can improve door to door services.
- Enhance personal and cargo security on roads or railway lines and at ports, and identify the exact location of freight as it moves from ship to rail or to truck on its way from manufacturer to retailer.
- "Make" vehicles alert their drivers about possible dangerous driving situations using in-vehicle technologies.
- Create access to mobility for those who find it hard today to move around.
- Accelerate economic development and can even help leapfrogging, etc.

6. ITS can contribute to the solution of global issues

6.1 ITS and Environment protection

Local pollution. Despite success in arresting the negative trends of air pollution, the challenge remains huge, especially with regard to noise pollution. In Europe, for example, a quarter of the population lives less than 500 meters from a road carrying more than 3 million vehicles per year. Consequently, nearly 4 million life-years are lost each year due to pollution[4].

Climate change mitigation. Although transport is not the primary global polluter, it is a considerable source of Green House Gases (GHG) and within this of CO_2 emissions. With the current rates of emissions, CO_2 concentrations will likely double their pre-industrial level by the end of the 21st century. Clearly, any transport policy considerations should address climate change. Furthermore, transport decision makers need to be able to measure traffic-induced Green House Gases. ITS solutions can be instrumental in this regard, as well. For this to happen, a lead agency or cooperation among the key stakeholders is warranted.

The Ministerial Conference on Global Environment and Energy in Transport (MEET), held in Tokyo (Japan) in January 2009, as well as MEET 2010, held in Rome (Italy) in November 2010, shared the long-term vision of the World Harmonization Forum of Vehicle Regulations (UNECE WP.29) in achieving low-carbon and low-pollution transport systems, which also ensure sustainable development. The ministerial declaration encouraged countries to broaden the diffusion and transfer of existing technologies and encourage research, development and the deployment of innovative technologies and measures such as ITS.

More broadly, the draft decision of the Copenhagen Accord 2009, as well as the Cancun Agreement 2010 within the framework of the United Nations Climate Change Conference (UNFCCC), recommend various approaches to climate change, including opportunities to use markets, enhance the cost-effectiveness, and promote mitigation actions. Imagine that the transportation sector succeeds in renewing its technological base and managing its growth in a climate-neutral way, while meeting the mobility demand.

6.2 ITS and public transport

Making public transport available, affordable and attractive is among the key transport policy goals. ITS, with its capacity to bring real-time information to travelers, can be an important player in achieving this goal.

(4) UNECE publication: *Transport for sustainable development in the UNECE region*

6.3 ITS and the Global road safety crisis

Following the declaration of the First Global Ministerial Conference on Road Safety held in Moscow in November 2009, the United Nations General Assembly declared 2011-2020 as the *"Decade of Action for Road Safety"*, with the goal to stabilize and then reduce the forecast level of global road deaths by 2020.

Since the first motor vehicle was put into operation, around 30 million lives have been lost in road traffic accidents. Globally, 1.3 million people are killed on roads and 50 million more injured every year. Traffic accidents are often seen as personal and family tragedies, but in fact they are also tragic for society as a whole. Taking into account the direct economic costs of road crashes alone, the costs are estimated to be around US$ 518 billion globally every year. At the same time, we should be realistic: with every day there are more people on the planet and they travel more.

To address the global road traffic safety crisis, many more Governments are committed to take actions than ever before in history. They will - hopefully - take a system approach and implement the most appropriate policies and measures. To successfully combat the road safety crisis, it is imperative to put all resources to their maximum use, including the mainstreaming of ITS solutions.

7. Why is ITS not adequately addressed on the policy agenda?

3. Gaps and stumbling blocks in ITS deployment

Fuelled by the rapid advancement of computer and information technology and consumers' demand for innovation and efficiency, ITS technologies will continue to improve and evolve at a phenomenal rate, providing more services to the transport industry. This new information and knowledge-driven economy is a reality and not just a fad. The benefits of deploying ITS technologies could be significant, if a focused, systematic and incremental approach is taken.

Governments have started turning to emerging and evolving technologies for solutions to help them meet the many challenges and demands placed on transportation systems.

There are several (although still not a sufficient number of) examples where Governments started large scale investments in ITS systems. In addition, even in this information age, these examples are often isolated. A good example, although relatively unknown internationally, is the project of the local Welsh Government (UK), which has awarded a four year contract for the management of 'intelligent transport systems', including telecommunications and tunnel systems for the entire motorway and trunk road network in Wales. (30 June 2011, *The Guardian*).

It is clear that innovative solutions are warranted to solve many of the biggest problems of the transport sector and that ITS can be a solution or a catalyst for solutions. However, we also see that ITS has not attracted the interest of policy makers. The question is why. In general, the main reasons why ITS is still not on the policy makers' agenda can be summarized by the following:

- ITS is still considered an innovative technology, rather than an economic development tool.
- Few studies and analysis are available that demonstrate the return on ITS investment. Such studies and analysis are difficult to produce, since the benefits of ITS differ from case to case.
- The most well-known ITS applications tend to be ones that are expensive and produce largely qualitative results e.g. real time information that benefits a group of travellers. Given the fact that the results are predominantly qualitative in nature often makes it difficult to justify investments. Indirect benefits, such as savings from non-expansion of infrastructure, decreased demand for hospital services and energy savings with fewer emissions, should also be taken into account when calculating

the overall benefits of ITS applications.

- Lack of funding, especially in low-income countries where ITS applications are considered a luxurious investment creates formidable barriers.
- The lack of qualified staff with relevant skills and knowledge creates constraints because more funds are needed to hire specialized staff.
- The lack of national and regional strategies means no detailed path forward can be referenced.

Further on, we will explore the institutional divide, particularly the slow reaction and adaptation capacity of the public sector compared to the private sector or businesses. For all the above mentioned reasons, **ITS**, **despite all its values**, **is still under-utilized**.

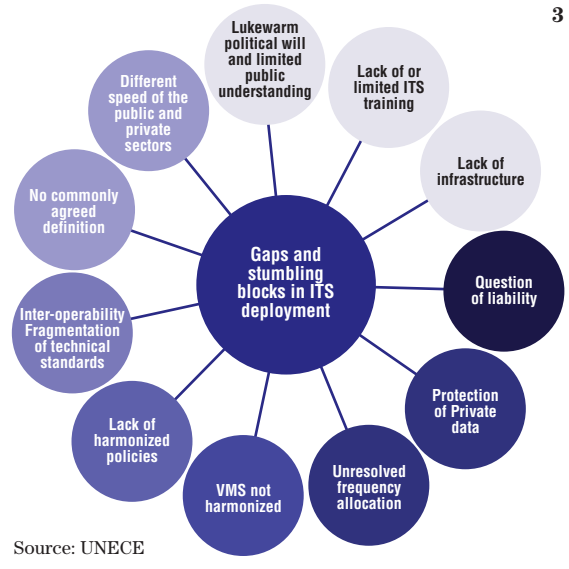
Convincing studies and analyses will make it possible to show evidence of the worthiness of ITS and will help include ITS on the policy maker's agenda.

Facilitation work is needed to harmonize the systems, analyse the benefits and the return on investment and help Governments create their own national or even regional strategies for ITS application and transport development.

8. Gaps and stumbling blocks in ITS deployment

All ITS applications have one thing in common - they change our way of work. They have an impact on organisational and institutional responsibilities and operations. Achieving appropriate governance of ITS is therefore a major factor for its wide-scale deployment and is vital for securing the full benefits of ITS and maximising returns on investment. While good governance is essential and its shortcomings create an overarching web of impediments, there are also several distinctive and very specific obstacles. ITS does not only fail to attract the attention of politicians and transport policy makers in general, but it faces a number of obstacles to penetrate the transportation system. As a whole, we have attempted to collect and briefly analyze the different gaps and stumbling blocks in ITS deployment, summarized in the Fig 3.

3



Source: UNECE

8.1 Lukewarm political will and limited public understanding of ITS benefits

To meet the mobility demands of citizens and of businesses in a sustainable way is no longer possible through traditional means, particularly in the context of a one dimensional transport approach. All economic, social and environmental aspects must be considered and demands met in a balanced way, even as they continuously evolve over time and distance. This also requires a comprehensive view of transport policies, as well as political will and leadership. By focusing exclusively

on one aspect of sustainability, other dimensions may be worsened. Taking all effects into account and realizing the importance of transport for all dimensions of sustainable development can induce properly designed policies[5]. It is critical to understand the benefits ITS can produce. Countries with high scores in the Global Innovation Index[6] are usually the high-income countries where ITS application is wide-spread. On the other hand, low income countries struggling with basic infrastructure delivery are delayed and further handicapped by lack of innovations, as well as the limited or sporadic use of ITS. Therefore, it is important that ITS is no longer treated as a topic for "technical experts" only. Both politicians and senior policy makers committed to the sustainable development of their transport sector and determined to assist their country to leapfrog in development, need to become familiar with strategic values of ITS solutions.

In regards to transport, infrastructure development gets the most political attention. The reality, however, is that transport funds are scarce and prioritization is needed, as well as quick win solutions that cost the least and ideally produce the largest returns. Effective prioritization requires sound knowledge about the impact of projects.

The benefits and challenges of Intelligent Transport Systems must also be understood by the broader public in order to achieve a balanced culture of innovation. This must be accompanied by an enabling legal environment, combined with far-reaching strategies that could support solutions on a political level.

Cost-benefit assessment methodologies. Referring to cost-benefit analyses, much information is available through the International Benefits, Evaluation and Costs (IBEC) Working Group[7] of the UK and the National Highway Traffic Safety Administration (NHTSA) of North America. It is evident that more knowledge in this area is needed and that cost-benefit analyses will have a major impact on the future of sustainable transport planning. Appraisal methodologies for projects with ITS components, however, are relatively limited, despite being essential tools both for prioritization and for convincing policy options. Such methodologies would be of special interest for Governments and policy-makers.

8.2 Protection of private data

In many countries, privacy and security concerns are real or latent barriers to ITS deployment. All participants must have confidence that data about their travel is kept safe from corruption, access to that data is suitably controlled, and in case of abuse - e.g. in the form of "over-charging" for the use of infrastructure - there is a reliable system to remedy the situation. Data security can be achieved through new, targeted legislation. New institutions may even be warranted. But above all, it is confidence that is required. The public's confidence in both society and the country's general political system are pre-conditions for overall confidence in data security of ITS applications. The transport community has the responsibility to share information about best practices in data security within the sector. However, political support and the role of the politicians are far from negligible.

The protection of private data and securing the highest security and reliability of ITS applications is of major importance. It could be a potential show stopper because of potential high profile losses of supposedly secure data. The risk of identity theft from personal data loss has the potential for restricting the implementation of ITS. This is an area already under consideration by the European Commission as part of the ITS Directive and ITS Action Plan. However, not much has happened at a pan-European level and even less at a global level.

Regulations are required to also improve the human interaction with many in-vehicle information systems. The rise in the use of smart phones as the delivery and communications platform of choice promotes even more unsafe driving practices, since nomadic navigation devices are widely used without regulation or restriction. Given the fact that smart phones are also outside the attention of automotive ergonomic experts, we can see new safety challenges, e.g. through driver distraction, which could lead to road traffic crashes.

(5) UNECE Study: *Transport for sustainable development in the UNECE region*, 2011
(6) See the Global Innovation Index INSEAD, as well as the Global Innovation Index by the Boston Consulting Group
(7) See: **http://www.ibec-its.co.uk**

8.3 Different speeds of the public and private sectors

One of the biggest challenges is the difference between the speed of innovation and changes in the public and private sectors. While it is natural that the private sector leads the way in technological innovations, particularly in ITS, the growing divide between the public and private sectors is becoming a serious stumbling block for future ITS deployment.

The first issue is that roads and highways are usually managed as part of the public sector. Virtually all countries suffer from under-investment to various degrees and in most middle-income countries and in almost all low-income countries there is a huge maintenance backlog. Given these burdens, it is understandable that ITS is not the top issue on their priority list. Further handicaps, such as non-competitive salaries and remuneration for staff can add to de-motivation, bureaucratic delays and aversion to risk, which further impedes innovation.

Luckily, even against this institutional backdrop, we have seen a growing number of best practices, especially in urban areas where public administrations have demonstrated support for ITS applications. We also see that one such best practice dovetails many more new experiments in introducing ITS solutions. Nonetheless, the infrastructure sector at large continues to lag behind what is actually feasible through ITS, due to its very nature. At the same time, many ITS solutions require communication not only between the vehicles, but also between the infrastructure and the vehicles. Therefore, it is time to revisit the institutional development scenarios for road and highway management and consider ways to improve their adaptive and innovation capacity.

Secondly, there are several concrete examples demonstrating that, at times, the automotive technology offers more than what consumers can use due to the lack of supporting services from the public sector. For example, consider the case of ECall. ECall has been heralded as an innovative way to dramatically improve road traffic safety. While the overall aim is to prevent road traffic crashes, it is also important to mitigate their impact, once they happen. How quickly an ambulance can be deployed and the effectiveness of the emergency medical service's response is critical following a serious accident. The in-vehicle system can already be installed. However, it is not enough to have vehicles with this automatic calling device. The calls must be received, processed and the emergency services must be mobilized. In other words, a whole set of institutional and legislative steps have to be taken. In this regard, we could commend the bell-raising initiative of the European Commission with its recommendation for ECall in September 2011. In this recommendation, it urges its member States to ensure that the in-vehicle system is in place and designed to dial Europe's single emergency number 112 in case of a serious road traffic crash and communicate the vehicle's location to the emergency services.

The Commission's aim is for a fully functional ECall service to be in place all over the European Union (as well as Croatia, Iceland, Norway and Switzerland) by 2015. Once achieved, it will definitely mark a huge step forward in mitigating the impact of road crashes. At the same time, it will not be an easy task to launch the ECall system and ensure its smooth functioning. For this, many nitty-gritty technical, institutional and financial details will have to be worked out. To address privacy concerns, the ECall system does not allow the tracking of vehicles, so it 'sleeps' and does not send any signals until it is activated by a crash. Currently, only 0.7 per cent of all passenger vehicles in the EU are equipped with automatic emergency call systems, with numbers barely rising. These proprietary systems do not offer EU-wide interoperability or continuity.

8.4 Lack of a commonly agreed definition for ITS

Intelligent Transport Systems integrate information and communication technology between vehicles, transport infrastructure and the user. But ITS is more than just technology. ITS is the "heartbeat" of future enhanced mobility, bringing in a new culture for doing business and new tools that will enable Governments to accomplish objectives to build more sustainable, efficient and higher quality transport services.

Today, a clear, globally-shared definition of ITS is missing. One of the latest opinions that emerged among experts is that devices such as electronic stability control systems, anti-braking-systems, airbags and even lane departure warning systems cannot be considered ITS technologies but rather Intelligent Vehicle Systems (IVS), because they are confined to vehicles. ITS should be seen at the top of the technological hierarchy in an integrated architecture, able to channel the performances of IVS and achieve the best results in terms of safety and pollution reduction. See more definitions in the following Box.

Information and Communication Technologies (ICT), which are often internationally referred to as ITS with regard to road transport, represent a wide range of organizational and technology-based systems that are designed to facilitate the process of evolution toward more efficient and seamless transport systems with fewer bottlenecks, random queuing and optimized pathways. Some examples of efficient ITS applications are road pricing, eco-driving or variable message signs. However, what does ITS actually mean?

Although it is widely shared among transport policy thinkers that the future is inter-modal transport and that ICT application is a general integrator of modes, what we see is that the different modes of transport develop their own ICT applications embedded in different technological and technical bases, name them differently (e.g. river information systems, rail traffic management systems, ITS etc) and leave their intermodal connections totally out of their horizon. This creates compatibility and inter-operability problems not only within, but also across the modes.

Different definitions for ITS

- Applying ICT to transport (*EU*).
- To add ITC technology to transport infrastructure and vehicles (*Wikipedia*).
- A system that integrates information and communication technology with transport infrastructure, vehicles and the user (*ERTICO*).
- A combination of Information Technology and telecommunications, allowing the provision of on-line information in all areas of public and private administration (*ITS United Kingdom*).
- Utilizes synergistic technologies and systems engineering concepts to develop and improve transportation systems (*Intelligent Transportation Systems Society*).
- Includes telematics and all types of communications in vehicles, between vehicles, and between vehicles and fixed locations / Not restricted to Road Transport (*The European Telecommunications Standards Institute - ETSI*).
- A system that capitalizes on leading-edge IT to support the comfortable and efficient transportation of people and goods. Its aim is to achieve a quantum leap (safety, efficiency, comfort) (*ITS Japan*).
- The application of advanced and emerging technologies (computers, sensors, control, communications, and electronic devices) in transportation to save lives, time, money, energy and the environment (*ITS Canada*).

8.5 Inter-operability continues to be an issue

Granted, ITS usage is very low compared to its potentials, there are already many different applications around the world like adaptive traffic management systems, traffic control centers, variable message signs, radio communication, the digital tachograph, advanced driver assist systems, toll charging and so on. However, systems in use across different parts of the world remain incompatible and fragmented. This becomes problematic since vehicles travel across regions and national borders and therefore interoperability becomes essential not only within national frontiers, but also across regional trade blocks and internationally, at large.

Road infrastructure is predominantly in the hands of public administrations, therefore, this part of the sector is largely not exposed to market conditions. As demonstrated ealier, it is not obligatory to innovate and to apply ITS solutions to offer a better service for road users. However, the trend to commercialize road management, especially with electronic pricing, is changing the game to de-monopolization. While this could lead to better information, services and seamless transport, a parallel running and disconnected road management landscape would undermine the desired benefits of ITS. In the United States of America, the ITS architecture was designed before beginning ITS deployment. The US Federal Highway Administration introduced a principle requiring any new services developed and marketed to be compatible with the architecture. A different approach was pursued by the European Union, which focused on the facilitation of the ITS business as a whole. It is only recently that an architectural framework at the EU-level is under discussion.

Looking at the UNECE region, which includes countries in North America, Europe and Central Asia, harmonization of ITS requirements is warranted across the borders, particularly in the context of the Euro-Asian transport linkages. Failing to do so would result in the promotion of ITS applications without internationally agreed-upon standards. This in fact could prove to be an obstacle to further development. It could also become a tool for neo-protectionism. Therefore, perhaps the biggest challenge today is to avoid the myriad of incompatible applications. Many of us may recall that in the early nineties the road transport industry cried out for improving the conditions at border crossings. At that time, long waiting times at the borders and the desperate attempt to raise political awareness gave birth to the slogan that the iron-curtain had been replaced by a paper-curtain. Similarly, unless there are standards and/or appropriate ITS architecture, we are soon going to enter the age of the “electronic curtain”. The threat posed by a lack of inter-operability and compatibility in ITS may be several times greater than the problems we can see today in the railways where hundreds of technical issues have yet to be harmonized.

The development of standards and agreements between neighbouring countries on common architecture are both difficult and time-consuming exercises. While waiting for them, there is still ample time for harmonizing ITS policies and for the exchange of experiences and best practices, since we know that harmonization and regulation are key to enabling interoperability in order to unleash the potentials of ITS.

8.6 Fragmentation of technical standards

In the field of railways, the fragmentation of technical standards increases the cost of doing business because potential economies of scale in the manufacturing of rail vehicles and rail operations cannot be fully captured. At this point we have not yet seen the intermodal connections.
Similarly, most nations still have their own unique automotive safety and environmental regulations. As a result of this regulatory diversity, a hot-selling car in one market simply cannot be sold in other markets; and a car certified as having met all regulations in the United States cannot obtain approval for sale in other nations without incurring substantial additional costs. Looking ahead, technical changes in the automotive industry will occur at a dizzying pace as a result of consumer preferences for new vehicles (energy efficient and safer) and stricter environmental standards, among other things (e.g. climate change mitigation). Manufacturers want to sell common platform vehicles globally, and will expect to do so efficiently (e.g. avoiding having to achieve compliance with different standards or regulations market by market). A workable, inclusive process for establishing standards must keep pace with the new technologies that the industry's emphasis on differentiating technology will most likely create.

8.7 Lack of harmonized policies

A growing number of the UNECE member States are intensively developing and implementing innovative technologies in various transport fields. Given that the design and industrial development cycle of innovative technologies is shorter than the policy cycle for such innovation, regulatory authorities should speed-up their efforts to maximise the potential offered by implementation. Some of these efforts remain in the domain of national legislations thereby missing institutional coordination among other countries. Accordingly, this implies a lack of coordinated cost benefit analysis, which hampers the deployment of those innovative solutions having the highest benefits for a broad community. Ultimately this results in additional costs for customers.
The use of ITS architecture, like in North America and Canada, is a strategic way to integrate ITS technologies and bring key stakeholders together. It serves as a critical framework or tool to address many of the complex transportation challenges, including congestion and road fatalities. The use of ITS architecture should be seen as a planning tool and its benefits must be better understood. The European Union is taking its first steps in this direction through its ITS Directive[8].

8.8 Frequency allocation

In spite of the significant work that has been done so far to accommodate ITS related applications in a common frequency band in several regions around the world. Further discussions are needed to reach global agreement under the aegis of the International Telecommunications Union. In order for ITS applications to have the widest possible coverage, experts suggest a special frequency band should used as a global platform, including especially a dedicated channel for safety-related applications once these become available. Countries/regions that have not yet agreed on which frequency band should be used for ITS applications are encouraged to harmonize towards 5.9 GHz. This seems to be the most feasible solution for most of the stakeholders.

(8) Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport (OJ L 207, 6.8.2010)

8.9 Question of Liability

While driver assistance systems contribute to intelligent and efficient transport, as well as cleaner and safer mobility, they also introduce new questions. For example, if an assistance system fails and a crash occurs, who is legally liable? In many countries, the law clearly states that the liability of driving remains exclusively with the driver. Does the existence of such laws indicate we are already operating on thin ice with driver assistance systems that handle parts of the driver's responsibilities? Further research and clarification also needs to be made with respect to international law.
It appears there is the need to reflect technological changes in legal instruments, such as the 1968 Vienna Convention[9]. For the time being it may be premature to change the Vienna Convention, because at this stage technology is not replacing the driver, but rather assisting the driver. However, as future driver assistance systems advance, more implications for liability will emerge with the more widespread implementation of intelligent systems. This aspect strongly demonstrates the connection between technology and society. With innovative transport technologies we can achieve major breakthroughs in road safety which will have a direct effect on society. Therefore, the policy level - combining all relevant sectors and disciplines in a government - must find answers to many emerging issues, like for example the liability questions. Just imagine future driver assistance systems that automatically stop the vehicle when approaching a stop sign and their amazing impact on road safety. But also imagine the many implications that are conveyed with this intelligent system.
Technology can increase safety, but who is liable if it fails.

8.10 Lack of infrastructure

Investment in infrastructure can introduce unusually high returns because it increases people's choices: of where to live and work, what to consume, what sort of economic activities to carry out, and which other people to communicate with. Some parts of a country's infrastructure may be a natural monopoly, such as water pipes. Others, such as traffic lights, may be public goods. Some may have a network effect, such as telephone cables. Each of these factors has encouraged Government provision of infrastructure.
As an example, despite the increasing capabilities of electric vehicles, the lack of a cohesive recharging network has continued to impede their acceptance into the mass consumer market, creating a "chicken and egg" scenario. Electric vehicles at the moment do not have a long 'range' and a major overhaul of power supply infrastructure will be required to make electric cars convenient for consumers. The effective implementation of unified recharging networks and global harmonized initiatives, coupled with the latest developments in charging technology, will make the transition to low-carbon vehicles a reality. Likewise allocation of funding for fueling hydrogen powered-vehicles and fuel cell technology should be provided.
High-speed rail networks could provide a carbon-friendly substitute to more traditional rail traffic and provided the added incentive of relieving road traffic. Yet railways are still highly concentrated on only a few networks and many of them need to be electrified. Most railway traffic (freight and passenger) can be found on only six networks: North America (freight oriented), China, India, Russia, Japan (passengers) and the European Union.
Road operators have many decades of experience in road management, so they definitely represent a body that is to be on the front line when safety is the issue at stake. Moreover, in the last 10-15 years of ITS expansion, road operators have implemented a wide variety of technological elements, contributing to the creation of "intelligent infrastructures". This allows road operators to have constant real-time data on traffic and road conditions. This data, processed and analysed in various manners, proves to be fundamental for determining specific improvements for road safety from the infrastructural point of view. In addition, roads are constantly monitored through ITS tools that enhance the data and provide timely support in case of an incident.
To improve the existing intelligent infrastructures, road operators are also looking at cooperative systems to create communication capabilities that

(9) The *Vienna Convention on Road Traffic* is an international treaty designed to facilitate international road traffic and to increase road safety by standardising the uniform traffic rules among the contracting parties. The *Vienna Convention on Road Signs and Signals* is an international treaty designed to increase road safety and aid international road traffic by standardising the signing system for road traffic (road signs, traffic lights and road markings) in use internationally

would not only be from the infrastructure to the drivers (e.g. VMS), but also from the drivers within the vehicle (vehicle/driver to infrastructure). Further communication capabilities will be needed concerning refuelling/recharging facilities, secure parking places, inter-modal connections, as well as real-time information about potential delays etc. This would further enhance the way ITS contributes to safety, allowing seamless communication between vehicles and the road operators.

8.11 Lack of or limited ITS training

There is a lack of skills and training of labour in the transport sector. Limited cooperation and communication between science, universities, Governments and industry leads to unnecessary blockages and stagnation. These gaps need to be overcome through holistic approaches and more engaged cooperation.
Education is the key to innovation. Today's world has demonstrated an extremely fast innovation speed, and universities, science and Governments need to provide the basis for education in innovation. At the same time, the public should be better involved, for example, through campaigns such as the eco-driving initiative.
There is a need to inform the public on what the future of transport will look like in order to foster this new culture - to keep the public abreast, to plant understanding and to gain acceptance.

8.12 Non-harmonised Variable Message Signs decrease safety on the roads

Road signs and signals are important elements of traffic management, regulation, information and warning. Their harmonised use is based on the 1968 UN Convention on Road Signs and Signals and the UN Convention on Traffic Signs and Signals. With new technologies, and particularly with the development of ITS, advanced traffic management systems increasingly use variable message signs (VMS), both to provide information and to adapt traffic management to actual demand.
Similarly to conventional road signs and signals, VMS need to be understood by all road users who may be locals and foreigners. In addition, there needs to be continuity and consistency in road operations from one country to another. Mobility implies timely and reliable communication of unexpected hindrances, information about adverse weather conditions and potential alternative routes. Therefore, the delivered message must be clear, universal and easily understood in an international context.
Drivers receive information via variable message signs in cities and on motorways. Since technology advances much faster than public services and regulations, it often happens today that the same message is communicated in different forms; or even worse, conflicting messages could be communicated (such as one message instructing drivers to proceed ahead, while another message urges the driver to exercise caution). These inconsistencies could create distractions, raising the level of risk associated with driving, resulting in more traffic accidents. What can prevent these occurrences is an increased effort on international harmonization.

(10) UN Regulation No. 83, *Emission of pollutants according to engine fuel requirements*, for passenger cars (vehicle category M1) and light duty vehicles (vehicle category N1)
UN Regulation No. 49, *Emission of pollutants*, for all other vehicle categories
UN GTR No. 2, *Measurement procedure for two-wheeled motorcycles equipped with a positive or compression ignition engine with regard to the emission of gaseous pollutants, CO_2 emissions and fuel consumption*
UN GTR No. 4, *Test procedure for compression-ignition (C.I.) engines and positive-ignition (P.I.) engines fuelled with natural gas (NG) or*

9. UNECE's support for ITS

The main objective of the UNECE Transport Division is to facilitate the international movement of persons and goods by inland transport modes. It aims to improve competitiveness, safety, energy efficiency and security in the transport sector. At the same time, it focuses on measures to reduce the adverse effects of transport activities on the environment and contributes effectively to sustainable development. For more than six decades, the UNECE Inland Transport Committee (ITC) has provided a major intergovernmental platform for cooperation to facilitate and develop international transport and improve its safety and environmental performance. The main result of this critical work is reflected in more than 50 international agreements and conventions, which provide a legal framework for the development of road, rail, inland water and intermodal transport, as well as dangerous goods transport and vehicle construction.

UNECE collaborates closely with other stakeholders, such as the European Commission, the International Transport Forum, ITS Europe (ERTICO) and others with whom it shares a common goal to improve transport efficiency and road safety.

Already in 2003, the ITC felt that the use of ITS might become an issue that could pose a major challenge in the future, or possibly change the direction of its work. This led to the organization of the first Round Table on ITS under the aegis of the World Forum for Harmonization of Vehicle Regulations (WP.29) in 2004. This event represented the first step in the development of the UNECE strategy on legislative aspects and practical implementation of ITS. While ITS is not explicitly part of the Forum's remit, ITS technologies are increasingly considered in relevant areas. Examples include on-board diagnostics, anti-lock braking systems, adaptive lighting and electronic control systems among others. A number of other subsidiary bodies of the UNECE Inland Transport Committee (Working Parties, Expert Groups, etc.) have been working on different aspects of ITS implementation. A brief summary is given below just to highlight past achievements and on-going activities.

9.1 In-vehicle

The World Forum for Harmonization of Vehicle Regulations (WP. 29) is a key player and has a unique role in the development and updating of worldwide harmonized regulations for the construction of road vehicles and brings them to the level of technical progress. These regulations are aimed at:

(a) Protecting the environment.
(b) Promoting energy efficiency.
(c) Improving the safety of new vehicles.
(d) Providing uniform conditions for the periodical technical inspections of vehicles in use.

By developing performance requirements for innovative vehicle technologies and conditions for their mutual recognition, the World Forum contributes to a rapid introduction of innovative vehicle technologies into the global market.

The World Forum has adopted a number of Regulations to limit the emission of harmful pollutants (CO, HC, NOx and particulates). Thanks to on-board diagnostic systems (OBD) in vehicles, real time data help in the rapid identification and remedial actions for the vehicle during its whole life cycle. Timely updates of the relevant UNECE Regulations[10] have resulted in 95-97 per cent lowering of the emission limits for CO, HC and NOx for new private passenger cars, as compared to the limits established in the 1970s. This means that the latest UNECE emission limits for these pollutants are more than 20 times lower today than those established 40 years ago.

UNECE promotes other intelligent technologies, such as tyre pressure monitoring systems and cruise control, is involved in Regulations on "zero emission vehicles" and in 2010 adopted the first international regulation on safety for fully electric and hybrid cars. This landmark decision facilitates the early introduction of safe and clean electric cars on roads worldwide. UNECE has also made considerable contributions to safer vehicles. Current research shows that electronic stability control systems[11] that have been incorporated in UNECE legal instruments since 2008 are a mature technology that could have the most significant life-saving potential since the advent of the seat belt.

liquefied petroleum gas (LPG) with regard to the emission of pollutants
UN GTR No. 5, Technical requirements for on-board diagnostic systems (OBD) for road vehicles

(11) UN GTR No. 8, *Electronic stability control*
UN Regulation No. 13, *Heavy vehicle breaking*
UN Regulation No. 13 H, *Brakes of M1 and N1 vehicles*

9.2 Vehicle to vehicle

Advanced Driver Assistance Systems (ADAS) represent important improvements in vehicle safety. To optimize their potential, the World Forum established an ITS Informal Group in 2002 to consider the necessity of the regulatory framework of ADAS, which are becoming more common in vehicles. Among those improvements is an exchange of data between vehicles through wireless technology, vehicles with the "brake in case of emergency" feature, advanced cruise control systems, etc. These important new features aim to improve road safety, mobility and efficiency of traffic. The new regulation on Advanced Emergency Braking System is also expected to be adopted.

9.3 Vehicle to infrastructure

The development of provisions for ADAS, such as lane departure warning systems, are expected to be finalized in the form of new UNECE Regulation. Impact assessments made by the European Union show that the mandatory introduction of these devices could save around 5,000 lives and prevent 35,000 serious injuries per year across its 27 member States. Furthermore, many other ITS systems for vehicles, such as cruise-control, on-board diagnostics, adaptive front-lighting system and cornering lamps have already been introduced in vehicle regulations developed by the World Forum.

9.4 Road Safety and Road Transport

UNECE is also promoting the use of ITS through its Working Party on Road Traffic Safety (WP.1), which develops and harmonizes traffic regulations and rules for road signs and signals.

UNECE is determined to be a frontrunner for innovative policies to ensure road safety and sustainability in all aspects. In the context of offering best practices and solutions for a safe and seamless mobility, the UNECE Working Parties are mandated to seek multiple synergies to maximize the benefits of legal instruments. The UNECE Road Safety Forum (WP.1) has established an informal group of experts on Variable Message Signs to ensure the harmonization process is accelerated. It works with the expert group of the pan–European project Easyway, whose studies and operative deployment of VMS have paved the way for potentially updating the relevant legal instruments, the Vienna Conventions or alternatively, making amendments to the Consolidated Resolution on Road Signs and Signals (RE.2). The Expert Group works on the definition, use and operative criteria to harmonize and set common standards to keep cohesion between the posted (non-variable) and electronic (variable) signs.

The Working Party is also following and guiding the introduction of the digital tachograph[12] device that became mandatory for non-EU AETR[13] Contracting Parties, i.e. at the pan-European level, in 2010. The sole aim of the tachograph is to improve the working conditions of the driver and enhance road safety through better enforcement of driving and rest periods.

(12) The Digital Tachograph monitors the driving and rest periods of professional drivers engaged in international transport under the Contracting Parties to the European Agreement Concerning the Work of Crews of Vehicles Engaged in International Road Transport (AETR) and relevant EU Regulations

(13) AETR = European Agreement Concerning the Work of Crews of Vehicles Engaged in International Road Transport

9.5 Transport of Dangerous Goods

In the area of transport of dangerous goods, UNECE has started to consider how ITS applications such as telematics could be used to facilitate transport of dangerous goods and improve safety and security by using monitoring and tracking systems linking consignors, transport operators, emergency responders, enforcement and control authorities and regulators.
The objective is to determine which systems could be standardized for multimodal applications in the transport of dangerous goods and to propose amendments to the relevant legal instruments to regulate the use of telematics and to require necessary equipment in transport units used for the carriage of dangerous goods.
A final document indicating how telematics could be used for the purpose of the implementation of the various requirements contained in the inland transport of dangerous goods was adopted in 2010.
In further steps, experts will debate how information can be provided by telematics, decide on necessary parameters, procedures, responsibilities, control of access to data and interfaces; and carry out a cost/safety benefit analysis.

9.6 Intermodal Transport

The Working Party on Intermodal Transport and Logistics (WP.24 and its predecessors) has provided a forum for the exchange of technical, legal and policy information, best practices in combined and intermodal transport at the pan-European level since 1951. ITS is supposed to be the general integrator of modes in addition to the many other benefits it brings. Therefore, WP.24 has dedicated the year of 2012 to ITS and to identifying areas of actions in its support.

9.7 Inland Water Transport

Inland water transport often offers superior safety, good reliability, low costs, energy efficiency, a smaller carbon footprint, low noise levels, and low infrastructure costs. It also offers increasingly more efficient opportunities for supervision through tracking and tracing systems made possible by the use of River Information Services (RIS) - an intelligent transport system for inland water transport[14].
River Information Services represent a harmonized information service aimed at facilitating information exchange between parties in inland navigation (boatmasters, lock/bridge operators, waterway authorities, terminal operators, operators in emergency centres, fleet managers, cargo shippers, consignors, consignees, freight brokers and supply forwarders) using a variety of available technological solutions (VHF radio, mobile data communication services, Global navigation satellite system, internet, etc.). This facilitated exchange of traffic-related information contributes to the safety and efficiency of International Warehousing and Transport operations.
To ensure the introduction of RIS services in a harmonized way at the pan-European level, UNECE Resolution on *"Guidelines and Recommendations for River Information Services"* sets up the principles and general requirements for planning, implementing and operating RIS and related systems. The Guidelines are revised regularly to take into account the progress in developing and implementing RIS and information technologies in general. River Information Services Guidelines are used in conjunction with other, more specialized UNECE resolutions on the different components of RIS, such as Electronic Chart Display and Information System for Inland Navigation, Standard for Notices to Skippers and for Electronic Ship Reporting in Inland Navigation, Guidelines and Criteria for Vessel Traffic Services on Inland Waterways and International Standard for Tracking and Tracing on Inland Waterways using the Automatic Identification System.
The UNECE *"White Paper on efficient and sustainable inland water transport in Europe"* calls

(14) *UNECE White Paper on efficient and sustainable inland water transport in Europe* (ECE/TRANS/SC.3/189), paras. , New York and Geneva 2011, page 55-56

on Governments, river navigation commissions, international organisations and the inland navigation industry to *"promote the use of River Information Service and other information communication technologies (ICT)"*, proposes a series of UNECE actions in this area, and encourages other uses of ICT for facilitating IWT operations and inspections of inland navigation vessels.

9.8 Rail Transport

Interoperability of telecommunications in railway operations is important for all countries in the pan-European region. In fact, it aims to improve rail infrastructure and the efficiency of railway operations, thus ensuring that the railway sector contributes to sustainable transport. The necessary harmonization efforts have taken place mainly in the countries of the European Union and the European Free Trade Association.

However, the intelligent transport systems adopted by the EU and EFTA countries are not interoperable in the entire UNECE region. In other words, the ITS standards for rail operations in non-EU sub-regions (mainly Eastern Europe and Central Asia) are not directly compatible with the EU Rail Traffic Management System (ERTMS). The role of the UNECE is to further assist and promote full harmonization of this system at a Pan-European level and beyond.

9.9 Trans-European Railway and Trans-European Motorway projects

The UNECE Trans-European North-South Motorway (TEM) and Trans-European Railway (TER) Projects have been addressing different aspects of information technologies in road and rail sector for many years. The TEM Project in particular targeted mostly the relevant aspects related to motorway infrastructure, namely at electronic toll collection and variable message signs.

The new Revised TEM and TER Master Plan published in 2011 summarizes the present level reached in ITS applications in rail and road transport, experience gained by the individual countries, as well as their expected future developments. Both Projects intend to address the ITS-related matters in a cross-sectoral way and link their work "on the ground" with activities of the relevant Working Parties.

9.10 The ForFITs Project

The recently launched project on climate change and transport[15] is a joint project of all five UN Regional Commissions, with the UNECE as the lead agency. The goal is to develop and implement a monitoring and assessment tool for CO_2 emissions in inland transport to facilitate climate change mitigation. The outcome of the project will provide a robust framework for analyzing different scenarios and will propose transport policy directions and strategies to achieve more sustainable transport systems. It remains to be seen how ITS will be addressed in this global project, however it is already clear that it may be featured as ITS to help measure the traffic induced CO_2, and as ITS that improves the fluidity and efficiency of transport and as such contributes to CO_2 reduction.

(15) United Nations Development Account (UNDA) project on the Development and implementation of a monitoring and assessment tool for CO_2 emissions in inland transport to facilitate climate change mitigation, see: **http://unece.org/trans/theme_forfits.html**

10. What's next?

Innovative solutions could bring us closer to achieving road safety and environmental policy objectives in the coming years. This makes ITS solutions an integral part of the range of possible measures. In the future, innovative vehicle technology will play an increasingly major role, primarily because the need for mobility will continue to increase. Aside from the possible effects and public support, the cost-benefit ratio has to be taken into account. In this context, due attention has to be paid to the fact that technical solutions sometimes have unwelcomed side effects, like distracting the driver, or encouraging inappropriate behaviour. Some techniques also have the potential to be abused.

There are major benefits from using integrated strategies in transport policies to address, for example, air pollutions, climate change, and sustainable energy consumption. Air pollution and Green House Gas emissions are often emitted from the same source. More scientific and technical efforts need to be directed to this area of work, and Government policies need to take into account the benefits of integration. Countries have to think more globally in their approaches to air pollution and climate change. There is more recognition of the global movement of air pollution and the need to improve interregional collaboration. Sharing information and knowledge between regions will be the key to future success and could achieve a great deal in cutting Green House Gas and air pollution emissions globally.

Embedded in the United Nations Millennium Development Goals and the Ministerial Declaration on global environment and energy in transport, technological innovation will be one instrument within UNECE for reaching the common objective of clean and safe roads.

Future challenges for innovation in transport should be solved on a global scale and in a harmonized way. A strong commitment from Governments, extensive collaboration between the public and private sectors, and increased financing for ITS is crucial for developing smart solutions in this area. It is important to reach a consolidated approach and avoid fragmented efforts of different parties.

In the future, the transport sector will continue to face challenges such as a high number of road crashes and continuous increases in the consumption of fossil fuels with related CO_2 emissions, which will result in increased air pollution. Congestion levels might also increase due to a continuing rise in demand for road transport. Inadequate and sub-standard infrastructure, particularly in low-income countries will continue to be additional concern.

Applied intelligently, innovative technologies can:

(a) Save lives.
(b) Save time and money.
(c) Reduce threats to our environment.
(d) Create new business opportunities.

Innovative technologies are widely accepted as the way forward for achieving the goal of sustainable mobility, while at the same time improving the quality of life.

References

[1] Arutz Sheva. Israel National News. *Israel's Green Machine gears up for 2010*. 21st January 2010.

[2] Austrian Federal Ministry for Transport, Innovation and Technology (BMVIT). *I2V - Intermodality and Interoperability of Transport Systems*, 2009.

[3] BBC News, *Bolivia holds key to electric car future*, 9th November 2008.

[4] Practice and deployment of variable message signs (VMS) in *Viking countries - potential for harmonisation*, Finnish Road Administration, Pirkko Rämä, Anna Schirokoff, Juha Luoma

[5] Conference of European Directors of Road, CEDR, Task Group O9, VMS Harmonisation in Europe, 2009

[6] DPA, *Sarkozy wants La Reunion to be "laboratory" for electric cars*, 19th January2010.

[7] D. Engwicht, *Intrigue and uncertainty*, p. 6.

[8] Die Zeit, *Intelligenz ans Steuer*, 14th June 2007.

[9] European Association of Automotive Suppliers (CLEPA), *Facts and Figures*, 2010.

[10] European Commission, *Keep Europe moving - sustainable mobility for our continent*, COM/2006/0314 final, 2006.

[11] European Commission, *A sustainable future for transport - Towards an integrated, technology-led and user-friendly system*, COM 2009/279, 2009.

[12] European Commission, *ITS Action Plan*, COM 2008/886, 2008.

[13] European Environment Agency (EEA), **www.eea.europa.eu/publications/transport-at-crossroads**, 2009.

[14] Eva Molnar, *The knowing-doing gap*, UNECE report, 2009.

[15] Eva Molnar, *Becoming wise about ITS*, in: Intelligent Transport 2008.

[16] International Monetary Fund, *World Economic Outlook: Slowing Growth, Rising Risks*, September 2011.

[17] Jack Short, *Policy-Led Technological Developments*, ERTICO-ITS Europe General Assembly, June 2009.

[18] Marc Green & John Senders PHD, *Human Error in Road Accidents*.

[19] New York Times, *In Bolivia untapped bounty meets nationalism*, article published 3rd February 2009.

[20] Transport & Environment, Bulletin No. 182, October 2009.

[21] Umweltbundesamt, Various Articles, studies and report, **www.umweltbundesamt.de/verkehr-e/index**.

[22] UNECE, ECE/TRANS/WP.29/2010/45, 2009.

[23] UNECE, *Transport of dangerous Goods*, **www.unece.org/trans/danger, 2009**.

[24] UNECE, *Transport and Energy - the Challenge of Climate Change*, International Transport Forum, 2008.

[25] UNECE, *Project: Improving Global Road Safety - Setting regional and national road traffic casualty reduction targets*, 2008.

[26] World Bank, *ITS Technical Note For Developing Countries*.

United Nations
Economic Commission for Europe

Ministero delle Infrastrutture
e dei Trasporti

SINA

GRUPPO ASTM-SIAS