Unleashing the Potential of Intelligent Transport Systems

An IRF paper in response to the public consultation of the UNECE on the future deployment of ITS

Geneva, May 2011

1. The International Road Federation

The International Road Federation (IRF) is a non-profit, non-governmental organisation established in 1948, uniting public and private sector stakeholders as well as research in the road infrastructure sector. IRF promotes roads that are safe, environmentally friendly and economically viable. IRF's mission is quite straight forward: Better roads, Better world.
The IRF membership consists of some 400 organisations in over 90 countries, ranging from government agencies, construction companies, transport and engineering consultants, equipment manufacturers and materials suppliers, motorway operators, research institutes and national road associations. IRF has offices in Geneva and Washington and closely cooperates with the European Union Road Federation in Brussels.

1.1 IRF Policy Committee on Intelligent Transport Systems

Clients are increasingly demanding IRF members for integral solutions to their mobility problems, rather than just a stretch of tarmac. IRF wants to be at the forefront of future developments and strongly believes Intelligent Transport Systems (ITS) have a considerable role to play. Despite a growing body of evidence that ITS deployment contributes to important transport policy objectives, like improving road safety, reducing negative environmental impacts of transport and increasing network efficiency, ITS still suffers from a lack of support from politicians, high level policy makers and the general public. IRF has taken up this awareness challenge by creating a Policy Committee on ITS, which saw its kick off during the ITS World Congress in New York in 2008.

The Policy Committee is composed of IRF members, national and supranational governments, national and regional authorities, ITS Associations, intergovernmental institutions and other organisations upon invitation by IRF. The Committee has among its active members several ITS businesses (e.g. Kapsch TrafficCom, ARUP, GMV, WSP Group), research institutes and national and regional ITS Associations (e.g. ITS America, Connekt/ITS Netherlands, ITS Russia, ITS South Africa, ITS Portugal, ERTICO). The work is actively being followed by the World Bank, UNECE and the European Commission.

2. IRF's Vision on Intelligent Transport Systems

The mission of the IRF Policy Committee on ITS is: "*to foster the deployment of ITS by supporting the development of national and regional ITS strategies and by encouraging governments to integrate ITS as a major tool to achieve their transport policy objectives in safety, sustainability and efficiency.*" ITS stands at the service of *mobility*, which by many is perceived as a basic human right. Mobility opens up opportunities to learn, to work, to socialise, to develop and to unleash people's full potential.

2.1 The Need for ITS

The current European traffic forecast foresees an average increase in the traffic performance in Europe of about 2% per year for the next 20 years (see figure 1). A closer look shows that the increase at major sections of the transport network (e.g. in the high-level network) will be at an even higher average growth rate of up to 4%. Especially such sections of the transport network have in many cases already reached their capacity limits today.

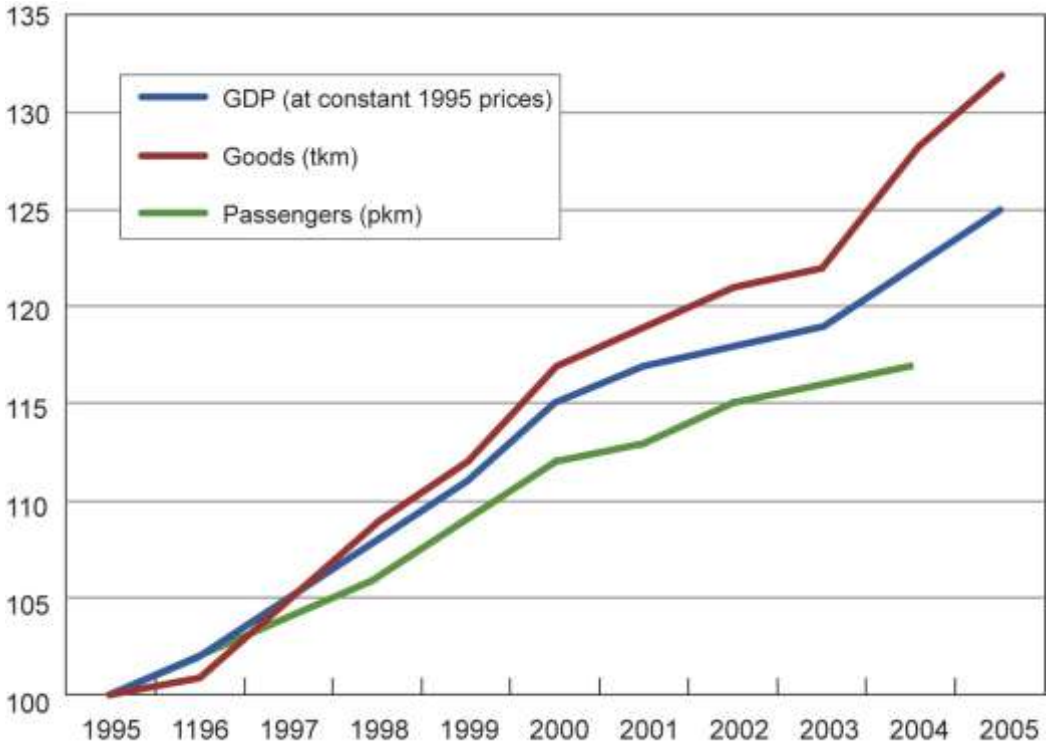

Figure 1 - Transport growth in EU 25, evolution 1995-2005 (data source: European Commission)

Furthermore, in a global context of rapid urbanisation and growing vehicle ownership, it is clear that pressures on transport infrastructure networks, especially those in urbanised areas, will increase. In general, urban road capacity problems have a direct impact on the overall economic performance of the given area. The costs of urban congestion, notably in terms of travel time delays and fuel consumption, have risen sharply over the past three decades – as, for example, illustrated by data of the United States of America from the 2009 Urban Mobility Report of the Texas Transport Institute[1], depicted in Figure 2.

[1] Texas Transportation Institute, University Transportation Center for Mobility, *Urban Mobility Report 2009*, July 2009.

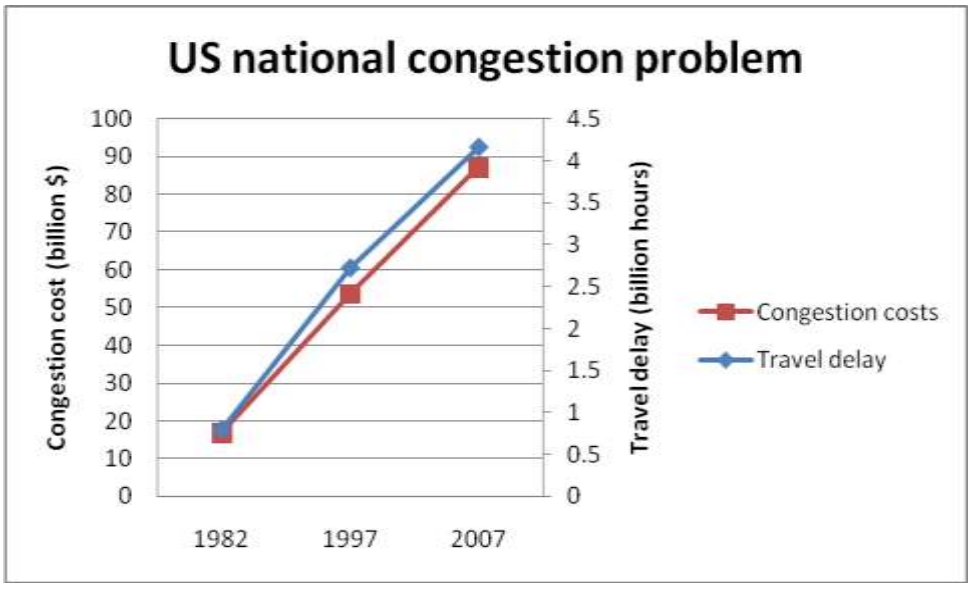

Figure 2 – Congestion costs and travel delay due to urban congestion in the United States (data source: Urban Mobility Report 2009, Texas Transportation Institute)

The options to extend infrastructure networks are often limited, due to insufficient funding, lack of space, environmental issues or lack of support from the general public. New approaches and concepts for the optimization of the transport system will have to be found. ITS can indeed play an important role in fighting congestion, improving road safety records, managing traffic growth and improving the environmental performance of road transport. IRF firmly believes ITS is a cost effective tool in the hands of road infrastructure managers to optimise the use of existing infrastructure, assuming the underlying infrastructure is in sufficient shape to gain the best rewards through intelligent use of it.

2.2 What is ITS?

IRF maintains a wide and inclusive definition of Intelligent Transport Systems:
"ITS are systems applying information and communication technologies (ICT) in order to support and optimize all modes of transport and to facilitate their interlinking (co-modality)."

This wide concept of ITS consist of broad fields of application with numerous stakeholders involved. These fields of applications can be segmented as follows:

- **Infrastructure related ITS** are mainly traffic management, traffic law enforcement, traffic surveillance, electronic toll collection and urban applications like congestion charging, access limitation or parking management. The driving forces are governmental and regional authorities making transport policy that uses ITS for ensuring the availability and quality traffic infrastructure in a way that improves safety, performance, security and environmental matters.
- **Vehicle related ITS** aim at in-car telematics like remote diagnostics or advanced driver assistance systems. The purpose is the enhancement of fleet performance, driver safety or infotainment, the driving forces are mainly car manufacturers and transport companies.

- **User related ITS** put focus on convenience and efficiency for travellers. Sample applications are the forwarding of traffic related information to the traveller, be it before or on the trip as well as navigation. The driving forces are information service providers like cell phone operators or radio broadcasters, but public transport operators will also play an essential role in the future.
- **Industry related ITS** are commercial applications aiming at reducing costs or maximizing profits in the operation of vehicles. Examples are fleet management systems for improving efficiency in logistics and public transport or pay-as-you-drive car insurance which is seen by many insurance companies as a promising new way for attracting new customers by offering fair insurance tariffs and value-added mobility services using ITS as a basis.
- **Vehicle-to-infrastructure/vehicle-to-vehicle related ITS** are standing for future solutions in which the above listed fields start to merge. So called cooperative systems foresee the real-time-interaction among vehicles and of vehicles and infrastructure in their mind in order to enhance primarily traffic safety. An example is forward collision warning where a car having an accident instantaneously alerts following cars. The actual status is that research projects are used to determine technical boundaries and organisational preconditions, the driving forces are transport ministries and the automotive industry.

2.3 Required Framework for the Deployment of ITS

The potential of ITS can best be leveraged if the right policy, organisational, as well as legal framework conditions for accelerated and coordinated deployment of ITS are met.

2.3.1 Policy framework

National governments have a clear role to play in creating the right framework conditions for the deployment of ITS. The importance of policies lies in the fact that they define the "carrots" and/or "sticks" and hence influence society's response. Governments should implement a policy framework ensuring ITS solutions to be deployed according to a defined roadmap. The following elements should be taken into consideration:

- Establishing and adopting a mobility policy which has the *traveller* as the central focus and in which technology is *acknowledged* as having a large potential role in addressing concerns related to transport such as traffic safety, negative environmental impacts and inefficiencies in the use of existing infrastructure networks.
- Adopting an ITS Action Plan defining a minimum level of deployment of ITS solutions on both national as well as state and local level, to accelerate the current pace of ITS deployment in road transport while assuring the continuity of services throughout a country.
- Evolving the national fiscal scheme on transport from a fixed taxes model (e.g. vehicle taxes) towards a mixture of levying taxes and user fees for general budgets and earmarked budgets. This is not only to have a sustainable revenue source and a steering mechanism to balance income from transport, notably it follows a pay-per-use approach considering fairer internalisation of external costs.

2.3.2 Organisational framework

Besides actions in the policy domain, the following organisational measures should be taken in order to ensure a cost-effective, fast and low risk deployment of ITS:

- ITS applications to be deployed in the short-to-medium term should be mature, proven and sufficiently interoperable.
- ITS solutions should comply with specifications and standards defined by the adopted ITS Action Plan in order to ensure a homogenous and interoperable system environment throughout a country.
- One and the same ITS solution for a given field of application should be implemented across the country in order to generate scale-effects, leading to decreasing costs in system purchasing and system maintenance.
- ITS systems and components should be chosen in order to be shared or re-used as much as possible for various applications (e.g. re-use or multipurpose-use of roadside infrastructure).
- ITS systems should be integrated as much as possible in order to guarantee interoperability of systems and in order to avoid isolated solutions.

Under the organisation framework the institutional settings for deployment should also be addressed, including streamlining cooperation between different levels of government and between government agencies at the same level.

2.3.3 Legal framework

Existing legal frameworks might not allow for appropriate ITS deployment. A prerequisite for successful implementation of an ITS Action Plan is to align the planned actions with the national legislation or adapt the legal framework. Regulatory instruments best act as part of a total package of measures to enable ITS deployment and to produce synergy and the best overall benefits.

2.4 Benefits – ITS Best Practices for Smart, Safe and Sustainable Mobility

The following two examples of ITS Best Practices are to illustrate and demonstrate benefits in the fields of Infrastructure and User related ITS applications.

Example 1 - Effects and Potentials of Low Emission Zones

Low Emission Zones (LEZ) are the municipalities' response to the European Clean Air Directive, which obliges regional governments to take appropriate measures to not exceed certain thresholds for pollutants like particle matter (PM), NOX, etc.. Most LEZ are regulating the access for polluting cars, though the regulations are different and act differently in changing the driver's behaviour, as is illustrated by the overview in Table 1. Mostly, the pollution class is subject to the regulation. The access regulation is either a pure drive ban or a charge has to be paid; these are the technological options.

Drive bans are easy to implement as they are a variant of traffic law. In addition they work immediately as people are forced to change their habits immediately. Though, pure driving bans are disadvantageous for certain population groups, like inactive households or small trade, starting a public debate about the appropriateness of the measure that overshadows environmental opinion making. By collecting charges, people are not excluded from accessing the city and may adapt according to their individual capabilities and needs.

The experience shows that emission targets and public acceptance are well achievable with charged low emission zones.[2]

Country	Drive Ban	Charge	Scheme
Norway (Bergen, Oslo, Trondheim)		X	Introduction still uncertain; charge for HGV according to vehicle weight and pollution class.
Sweden (Gothenburgh, Heslingborg, Lund, Malmö, Mölndal, Stockholm	X		Pollution class specific, phase-in
Denmark (Aalborg, Århus, Copenhagen, Odense)	X		HGV, pollution class specific, phase-in
Germany (50 cities)	X		Pollution class specific, phase-in
Netherlands (16 cities)	X		HGV, pollution class specific, phase-in
UK (London, Norwich, Oxford)		X	HGV according to vehicle weight, pollution class specific, phase-in
Czech Republic (Prague)	X		HGV according to vehicle weight and time of the day, pollution class specific
Italy Various: cities with individual schemes:			
Rome	X		Motorcycles with pollution class 0
Alto Adige province (some 15 municipalities)	X		Vehicles worse than pollution class 2, seasonal ban (winter) for twostroke motorcycle
Aosta; Lombardia (some 15 cities); Piemonte (some 35 cities); Emilia Romagnia (~ 20 cities); Napels; Palermo; Trentino (5 municipalities); Tuscany (~ 15 cities); Umbria (2 municipalities); Veneto (2 cities)	X		Pollution class specific, some vehicle class specific
Milan		X	Pollution class specific

Table 1 - Low Emission Zone in Europe Network (data source: Low Emission Zone in Europe, http://www.lowemissionzones.eu)

Example 2 - Driving assistance and its impacts on driver behaviour, road safety and fuel consumption

Research in the United Kingdom has shown that individual driver choices can largely affect a number of aspects related to road transport:

- 90 % of crashes are caused by the driver and crashes are a leading cause of work related injuries in transport companies;
- Fuel consumption and related costs;
- Costs related to crashes and maintenance & operation of the vehicle fleet;
- Driver behaviour can impact up to 33% of vehicle emissions.

[2] Leihs, Dietrich (Kapsch TrafficCom), *Low Emission Zones: Experience and Future Options*, Published in: IRF Bulletin Special Edition on Urban Mobility, International Road Federation, Geneva, 2010.

An exemplary ITS application, developed by GreenRoad in the UK, addresses these issues with a driver-centric programme combining real-time feedback, patented measurement, and ongoing personalized coaching for drivers through the application of several technologies in the car. Results from Fleet programmes showed that on average GreenRoad drivers crashed 50% less often and saved 10% or more in fuel and maintenance costs. [3]

3. Overcoming barriers to ITS deployment

3.1 Perceived Barriers

IRF, through its exchanges in the Policy Committee, has identified a number of barriers to ITS deployment:

- In many countries the deployment of ITS has been fragmented, with isolated implementation of applications rather than a systematic and coherent approach;
- Cooperation between agencies involved in ITS deployment is often lacking;
- The benefits of ITS are not known to decision makers, politicians and the general public;
- There is a lack of appropriate standards, hampering interoperability;
- Liability issues in case of systems failure;
- Intellectual property and data ownership issues;
- A lack of public acceptance of technology and social aspects of ITS can be an issue, for example due to perceived intrusions on privacy. Further research is needed in this specific field.

3.2 Better Understanding of the Benefits of ITS

In 2010 the Institute of Transport Studies of the University of Leeds, supported by IRF, carried out a survey among a global sample of transport professionals. The research objectives were to analyse current ITS policies, identify ITS research, training and development strategies and to identify ITS deployment enablers and barriers. Following the question of what would be the most effective measures in promoting greater uptake of ITS, the respondents placed an important weight on a better understanding of ITS benefits by decision makers and the general public. Structured evaluation of implemented ITS applications and clear communication about the outcomes could help increase this understanding. Furthermore, the positive impact on mobility and people's ability to choose should be stressed.

3.3 The Role of Sound and Solid ITS strategies

In its work the IRF Policy Committee on ITS has specifically focussed on establishing a valuable platform for the exchange of good practices in the development and implementation of ITS Strategies and Master Plans. A publicly accessible, online ITS strategy library has been set up to support authorities of all levels in drafting ITS strategies.

A well-thought-of Strategy can specifically address some of the barriers mentioned in the previous paragraph. It is not just the actual plan itself, providing a roadmap for ITS deployment, but also the *process to get to a strategy* that can be of value. Sound analysis of

[3] Gwilt, Michael (GreenRoad), *Smarter Drivers. Safer Roads*, Presentation delivered during the IRF Symposium "Providing Infrastructure that Improves Road Safety", Bucharest, May 2011, and http://www.greenroad.com/programs/for-fleets/, accessed on 28 May 2011.

the actual deployment situation in a country, state or municipality, in preparation of setting up an ITS strategy, can provide a clear image of the fragmentation and can help introducing coherency between different deployment projects. Setting up a strategy should be a joint effort between stakeholders, facilitating a common understanding of interests. It should address the institutional setting in which the plan has to be implemented, aligning the various public administrations and including an analysis of which international partners need to be informed or be involved.

3.5 The Need for Stakeholder Cooperation

One of the lessons learned in ITS strategy development is the clear need for consultation and cooperation between public, private, research and user sectors in order to facilitate successful implementation. Public-private partnership models might be looked into to bring applications from the research to the implementation phase. As stated during a recent IRF Committee meeting by one of the participants "*different parts of the industry have met around trialling and testing applications – that have now become mainstream – that nobody could have defined in solitude*." A business case might exist on a higher level rather than on the level of an individual stakeholder.

An interesting example on *national* level is provided by Sweden, where, after the successful multi-stakeholder collaboration to organise the 16th ITS World Congress in 2009, the government decided to continue this cooperation and institutionalise it in a national ITS Council with representation of the public administrations, industry and research sector.

The IRF strongly feels that cooperation on the *international* level should be fostered to tackle issues in the uptake of ITS and to educate and train officials and politicians about what ITS is and what benefits it can bring to society. Although the specific local circumstances may differ, challenges are similar everywhere. Examples of successful ITS implementation projects already travel the world, demonstrating people's eagerness to learn from each other. With its ITS Policy Committee, IRF is accommodating a truly global and neutral platform for this exchange and dialogue.

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