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Development and Standardization of Intelligent Transport Systems

G. Nowacki
Motor Transport Institute, Warsaw, Poland

ABSTRACT: The paper refers to theoretical basis and history of Intelligent Transport Systems. The first term telematics was created in 1978, then transport telematics in 1990 and term - Intelligent Transportation Systems (ITS) were approved in USA and Japan in 1991 and in Europe in 1994 on the world ITS Congress in France. The development and standardization of Intelligent Transportation Systems has been presented. ITS standardization in Europe is dealt with by the following institutions: CEN, ETSI and CENELEC. Furthermore standards of the applications of maritime intelligent transport systems have been presented including maritime Management and Information Systems, sea environment and interactive data on-line networks, ship integrated decision support systems, Advanced maritime navigation services, automatic identification, tracking and monitoring of vessels, as well as safety purposes.

1 DEVELOPMENT OF ITS

1.1 *Terminology of ITS*

The term telematics comes from the French - télématique and first appeared in the literature at the end of the seventies. In 1978 two French experts: S. Nora and A. Minc, introduced this term- télématique, which was created by linking telecommunication (télécommunications) and informatics (informatique), and using the following segments of those words: télé and matique. In 1980 this term began to function also in the English terminology (Mikulski 2007). The term telematics describes the combination of the transmission of information over a telecommunication network and the computerized processing of this information (Goel 2007).

Some authors define the term telematics, as telecommunication, information and informatics technology solutions, as well as automatic control solutions, adapted to the needs of the physical systems catered for – and their tasks, infrastructure, organization maintenance processes, management and integrated with these systems (Tokuyama 1996, Piecha 2003, Wawrzyński 2003, Mikulski 2007, Nowacki 2008).

Telematics systems use various software, devices and applications:

- for electronic communication, linking individual elements of the telematics system, WAN (wide area network), LAN (local area network), mobile telecommunication network, satellite systems);
- for information collection (measurement sensors, video cameras, radars);
- of information presentation for the telematics system administrators (GIS – Geographical Information System, access control systems);
- Of information presentation for the system users (light signalling, radio broadcasting, internet technologies).

Telematics term has begun to be introduced into various branches of the economy, hence the appearance of such terms as: financial, building, health, environmental protection, operational, postal, library telematics.

A particular example illustrating the application of the telematics is modern transport. Transport telematics encompasses systems, which allow – thanks to a data transmission and its analysis – to influence the road traffic participants' behaviour or operation of the vehicles' technical elements, or out on the road, during the actual haulage (Internationales Verkehrswesen 2003).

Transport telematics term has been used in Europe since 1990.

The applications of transport telematics are Intelligent Transportation Systems (ITS).

ITS mean the systems, in which people, roads and vehicles are linked through the network utilizing, advanced information technology (Berghout & 1999).

Intelligent Transport Systems (ITS) mean systems in which information and communication technologies are applied in the field of road transport, including infrastructure, vehicles and users, and in traffic management and mobility management, as well as for interfaces with other modes of transport (Directive 2010/40/EC).

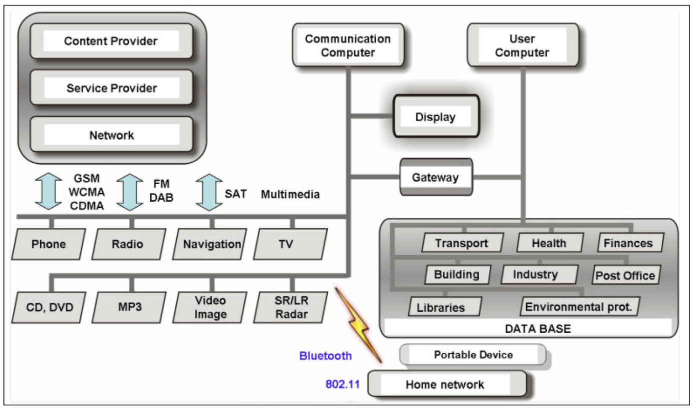

Figure.1. General structure of telematics system

Legend:

– WCDMA (Wideband Code Division Multiple Access) an ITU standard is officially known as IMT-2000 direct spread. ITU (International Telecommunication Union – former CCIT (Comité Consultatif Internationale de Télégraphie et Téléphonie) was created in the first of March 1993.
– CDMA (Code Division Multiple Access) is a spread spectrum multiple access technique. A spread spectrum technique spreads the bandwidth of the data uniformly for the same transmitted power. Spreading code is a pseudo-random code that has a narrow Ambiguity function, unlike other narrow pulse codes. In CDMA a locally generated code runs at a much higher rate than the data to be transmitted.

The general structure of Intelligent Transportation Systems applications may include: vehicle, airplane & ship operations, crash prevention and safety, electronic payment and pricing, emergency management, freeway management, incident management, information management, intermodal freight, road weather management, roadway operations and maintenance, transit management, traveller information.

Interoperability of ITS is the capacity of systems and the underlying business processes to exchange data and to share information and knowledge. ITS application means an operational instrument for the application of ITS. ITS service - the provision of an ITS application through a well-defined organisational and operational framework with the aim of contributing to user safety, efficiency, comfort and/or to facilitate or support transport and travel operations. ITS service provider means any provider of and ITS service, whether public or private. ITS user is any user of ITS applications or services including travellers, vulnerable road users, road transport infrastructure users and operators, fleet managers and operators of emergency services.

ITS integrate telecommunications, electronics and information technologies with transport engineering in order to plan, design, operate, maintain and manage transport systems. The application of information and communication technologies to the road transport sector and its interfaces with other modes of transport will make a significant contribution to improving environmental performance, efficiency, including energy efficiency, safety and security of road transport, including the transport of dangerous goods, public security and passenger and freight mobility, whilst at the same time ensuring the functioning of the internal market as well as increased levels of competitiveness and employment.

The conclusion from many years of research conducted in the USA and Canada is that, the use of ITS results in the reduction of the funds allocated for the transport infrastructure even by 30 – 35 %, with the same functionality of the system (FHWA-OP-03-XXX 2005).

1.2 *Development phases of ITS*

Based on the analysis of the literature, it is possible to select three phases in the history Intelligent Transport Systems development to date – fig. 2.

First phase is the beginning of ITS research in the 1970 and 1980s. Since the 1970's, several European companies have developed more complex systems that broadcasted a code at the start of the message so that only cars affected by that information would receive it. In Germany, ARI, a highway radio system using FM (Frequency Modulation), was introduced in 1974 to alleviate traffic congestion on northbound autobahns during summer holidays.

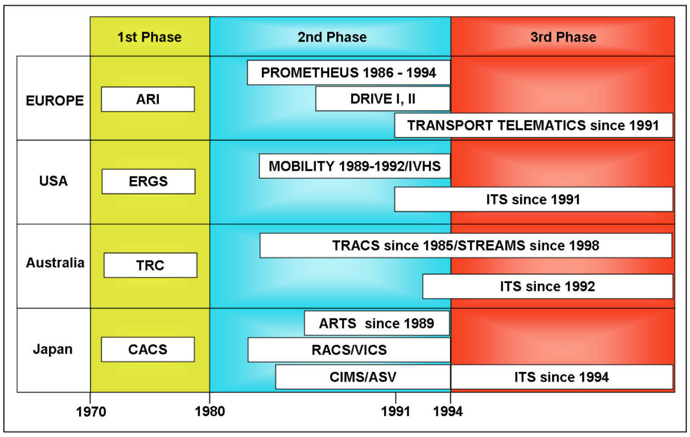

Figure 2. History of ITS development

Legend:

- ARI (Auto-fahrer Rundfunk Information),
- ERGS (Electronic Route Guidance System),
- TRC (Traffic responsive Capabilities),
- CACS (Comprehensive Automobile Control System,
- ARTS (Adaptive Responsive Traffic System),
- TRACS (Traffic Responsive Adaptive Control System),
- RACS (Road/Automobile Communication System,
- VICS (Vehicle Intelligent Control System),
- CIMS (Control Intelligent Management System),
- ASV (Advanced System of Vehicle).

Since 1970, the Department of Main Roads in Australia installed the first system that included 30 signalized intersections featuring centralized control and TRC.

In the United States, government sponsored in-vehicle navigation and route guidance system - ERGS was the initial stage of a larger research and development effort called the ITS (Dingus & 1996). In 1973 the Ministry of International Trade and Industry (MITI) in Japan funded the Comprehensive Automobile Control System (CACS) (Dingus 1996 & Tokuyama 1996). All of these systems shared a common emphasis on route guidance and were based on central processing systems with huge central computers and communications systems. Due to limitations, these systems never resulted in practical application.

In the *second pha*se from 1981 and 1994 the conditions for ITS development were determined. Technological reforms, such as the advent of mass memory, made information processing cheaper. New research and development efforts directed at practical use got under way. Two projects were being run in Europe at the same time: the Program for a European Traffic System with Higher Efficiency and Unprecedented Safety (PROMETHEUS), which was mainly set up by auto manufacturers, and the Dedicated Road Infrastructure for Vehicle Safety in Europe (DRIVE), set up by the European Community. PROMETHEUS was started in 1986 and was initiated as part of the EUREKA program, a pan-European initiative aimed at improving the competitive strength of Europe by stimulating development in such areas as information technology, telecommunications, robotics, and transport technology. The project is led by 18 European automobile companies, state authorities, and over 40 research institutions.

In 1991 ERTICO (European Road Transport Telematics Implementation Coordination Organization) was created with support of EC as a private-public partnership, and is open to all European organizations or international organizations operating substantially in Europe with an interest in ITS. It facilitates the safe, secure, clean, efficient and comfortable mobility of people and goods in Europe through the widespread deployment of ITS. Specifically, ERTICO:

- provides a platform for its Partners to define ITS development & deployment needs,
- acquires and manages publicly funded ITS development and deployment projects on behalf of its Partners,
- formulates and communicates the necessary European framework conditions for the deployment of ITS,
- Enhances the awareness of ITS benefits amongst decision makers and opinion leaders.

Applied effectively, ITS can save lives, time and money as well as reduce the impact of mobility on the environment. ERTICO's vision is of a European transport system that is safer, more efficient, and more sustainable and more secure than today. ITS technology, combined with the appropriate investment in infrastructure, will have reduced congestion and accidents while making transport networks more secure and reducing their impact on the environment.

In Japan, work on the RACS project, which formed the basis for current car navigation system, began in 1984. In 1985, a second generation traffic management system was installed in Australia. This was known as the TRACS.

In 1989 in the USA the Mobility 2000 group was formed and led to the formation of IVHS (Intelligent Vehicle Highway Systems) America in 1990, whose function was to act as a Federal Advisory Committee for the US Department of Transportation. IVHS program was defined as an integral part, became law in order to develop "a national intermodal transport system that is economically sound, to provide the foundation for the nation to compete in the global economy, and to move people and goods in an energy-efficient manner".

In 1991 ITS America was established as a not-for-profit organization to foster the use of advanced technologies in surface transportation systems. Members include private corporations, public agencies, academic institutions and research centres. The common goal is to improve the safety, security and efficiency of the U.S. transportation system via ITS. Traffic accidents and congestion take a heavy toll in lives, lost productivity, and wasted energy. ITS enables people and goods to move more safely and efficiently through a state-of-the-art, multi-modal transportation system. ITS America has sister organizations in Europe and Japan, as well as affiliates in Canada, Brazil, and elsewhere.

The *third phase* began in 1994, when the practical applications of earlier programs were seen, understood, and intelligent transportation systems were being thought of in intermodal terms rather than simply in terms of automobile traffic. ITS have started to gain recognition as critical elements in the national and international overall information technology hierarchy.

In 1994 the IVHS program (USA) was renamed the ITS (Intelligent Transportation Systems) indicating that besides car traffic also other modes of transportation receive attention and during the first world congress in Paris, the term - Intelligent Transport Systems (ITS) was accepted.

Development of the transport telematics and ITS applications was envisaged in the IV EU Framework Program (1994-1998). The 4th Framework Program adopted by the Council and Parliament in April 1994 includes telematics as a major topic of research. It invites the Commission to draw up Telematics Applications for Transport in Europe Program (4 November 1994) for the measures required at Community level for the implementation of Telematics in the Transport Sector (action plan); and to support the work of standardization in traffic management by means of all suitable measures including research and development.

ITS Japan established in 1994 promotes research, development and implementation of ITS in cooperation with five related national ministries in Japan and serves as the primary contact for ITS-related activities throughout the Asia Pacific region. ITS Japan is Part of a Global Advanced Information and Telecommunications Society. The policies of ITS include development of system architecture, research and development (R&D), standardization and international cooperation, and so on. The Interministerial Council works in cooperation with the national and international organizations - such as the Vehicle, Road, and Traffic Intelligence Society (VERTIS) - and supports a variety of activities. VICS (Vehicle Information and Communication System) and ATIS (Advanced Traffic Information System) have been recently in operation in Japan. VICS started from April 1996 in Tokyo and Osaka by VICS Centre supported by Ministry of Construction, Ministry of Telecommunications and National Police Agency and expanding the service area. VICS Centre receives real time traffic information from Highway Traffic Information Centre which gathers the information from each of the highway authorities. And VICS Centre provides the information through roadside beacons as well as FM broadcasting.

In Australia in 1998, the TRAC and South East Freeway's systems merged to create STREAMS Version 1. Since 2007 STREAMS Version 3 was implemented. It is Integrated Intelligent Transport System that provides traffic signal management, incident management, motorway management, vehicle priority, traveller information and parking guidance.

ITSS (Intelligent Transportation Systems Society) is governed in accordance with the Constitution and Bylaws of the Institute of Electrical and Electronics Engineers (IEEE), the basis of ITSS (Press Release announcing the new ITS Council) were implemented in 1999. The purposes of the Society are to bring together the community of scientists and engineers who are involved in the field of interest stated herein, and to advance the professional standing of the Members and Affiliates.

New development of the Intelligent Transport Systems is opened by the program of an EU common transport policy for the years 2001–2010. Additionally, the European Commission has begun the negotiations, in order to achieve consensus on the introduction in 2010 of an e-Call emergency system in all new cars (the new deadline is 2014).

The matter of transport telematics appeared in Polish publications in the middle of the nineties. In 1997 the attempt was made to define conceptual scope and the area of transport telematics applications (Wawrzyński 2003), which were finally described as a branch of knowledge and technical activities integrating information technology with telecommunication in the applications for the needs of the transport systems.

On the 19 of March 2007 in the district court of Katowice, the registration took place of the Polish Association of Transport Telematics (PATT). It is a newly called gathering, which members dwelling from various environments such like colleges, research institutes, national and private companies of transport business, put themselves for target, through activity in Association, propagating transport telematics and its applications into possible diverse circles of recipients.

31 May 2007 was signed the agreement between PATT and Intelligent Transportation Systems Slovakia, concerning the realization of bilateral contacts

and the mutual partnership for the development intelligent transport systems in signatory’s' countries.

In 2008 PATT became the Member of the ERTI-CO – ITS Europe-hosted Network of National ITS Associations.

On the 26 of April 2007 the founder’s meeting took place of an Intelligent Transport Systems Association - ITS Poland. The association’s objective is to form a partnership of knowledge for the promotion of the ITS solutions, as a means to improving transport efficiency and safety, with the natural environment protection in mind. ITS Poland cooperates with similar organizations in Europe and world wide.

2 STANDARDIZATION OF ITS AREA

2.1 *Standardization of ITS*

European Intelligent Transport Systems have been fully exploited to maximize the potential of the transport network. European standards will become a key element of the preferred solutions in emerging economies.

Public transport users will have access to up-to-the-minute information, as well as the benefit of smart and seamless ticketing. Freight operators will have real-time information about the entire logistics chain, enabling them to choose the most secure and efficient route for their consignments.

Standardization in transport telematics in Europe is dealt with by the following institutions (Wawrzyński 2003 & Wydro 2001): CEN, ETSI and CENELEC.

CEN (European Standardization Committee) - is a private technical association of a „non-profit” type, operating within a Belgian legislation, with a seat in Brussels. Officially it was formed in 1974, but the beginnings of its activities date back to – Paris, 1961. The primary task of CEN is drafting, acceptance and dissemination of the European standards and other standardizing documents in all the spheres of the economy, except electro-technology, electronics and telecommunication. Currently CEN has 30 state members. Polish Standardization Committee (PKN) gained the status of a full CEN member on the 1 January 2004.

ETSI – European Institute for the Telecommunication Standards – was formed on the 29 of March 1988, and is the European equivalent of IEEE. The prime objective of ETSI is drafting standards necessary for creation of the European telecommunication market. In 1995 the work of the organization was made international by admitting also the institutions from outside Europe, to participate in it.

CENELEC – European Committee for Electro technical Standardization - was formed in 1973. In Poland the role of the State Committee is performed by Polish Standardization Committee – PKN (it is a CENELEC member since 1 of January 2004).

CENELEC, together with CEN and ETSI form European technical standardizing system, whilst international standards come under the jurisdiction of the International Organization for Standardization (ISO) and International Electro technical Commission (IEC).

In 1991, the Technical Committee for Transport Telematics and Road Traffic - CEN/TC 278 (Road Transport and Traffic Telematics) was established.

Also, a world organization – Telecommunication Industry Association has been established, within which, the Technical Committee ISO/TC 204 is responsible for standardization in Transport Telematics (Intelligent Transport Systems).

In the Committee TC 278, as well as in TC 204, there are working groups, which are responsible for various areas of activities – table 1.

Table 1. Areas of activities for TC 278 and TC 204 working groups

The activity area	**TC 278**	**TC 204**
EFC –Electronic fee collection and access control	WG 1	WG 5
FFMS – Freight and Fleet Management systems	WG 2	WG 7
PT – Public Transport	WG 3	WG 8
TTI – Traffic & Traveller Information	WG 4	WG 10
TC – Traffic Control	WG 5	WG 9
GRD – Geographic road data	WG 7	
RTD – Road Traffic Data	WG 8	
DSRC – Dedicated Short Range Communication	WG 9	WG 15
HMI – Human-machine Interfaces	WG 10	
Automatic Vehicle Identification and Automatic Equipment Identification	WG 12	WG 4
Architecture and terminology	WG 13	WG 1
After theft systems for the recovery of stolen vehicles	WG 14	
Safety	WG 15	
Data base technology		WG3
Navigation systems		WG 11

Vehicle/road way warning and control systems		WG 14
Wide area communications/protocols and interfaces		WG 16
Intermodal aspects using mobile devices for ITS		WG 17

TC 278 Technical Committee formulated following standards for the transport telematics: EN 12253, EN 12795, and EN 12834 (ISO 15628) and EN 13372 – table 2.

Table 2. Standards for the transport telematics formulated by TC 278

Standard	Characterization
EN 12253 (2003)	RTTT. DSRC. Physical layer using microwave at 5.8 GHz. Traffic control, Physical layer (OSI), Open systems interconnection, Microwave links, Radio links, Information exchange, Data transmission, Communication networks, Mobile communication systems, Telecommunication systems, Data processing.
EN 12795 (2003)	RTTT. DSRC data link layer. Medium access and logical link control.
EN 12834 (2003)	RTTT. DSRC application layer.
EN 13372 (2003	RTTT. DSRC. Profiles for RTTT applications.

ETSI - European Institute for the Telecommunication standards developed standards EN 300674 and EN 301091, concerning transport telematics – table 3.

Table 3. Standards for the transport telematics developed by ETSI

Standard	Characterisation
ETSI EN 300 674-1 V1.2.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); RTTT; DSRC transmission equipment (500 Kbit/s / 250 Kbit/s) operating in the 5, 8 GHz Industrial, Scientific and Medical (ISM) band; Part 1: General characteristics and test methods for Road Side Units (RSU) and On-Board Units (OBU).
ETSI EN 300 674-2-1 V1.1.1	Part 2.1: Harmonized EN under article 3.2 of the R&TTE Directive; Sub-part 1: Requirements for the Road Side Unit (RSU).
ETSI EN 300 674-2-2 V1.1.1	Part 2.2: Harmonized EN under article 3.2 of the R&TTE Directive; Sub-part 2: Requirements for the On-Board Unit (OBU).

2.2 *Standardization of Maritime Intelligent Systems*

Maritime telematics applications support routine maritime operations, including navigation, as well as safety purposes.

Maritime intelligent systems involve the use of GPS technologies, wireless mobile communication systems, internet access, which provide vessel tracking, emergency aid and electronic mapping to monitor and provide important boat data from port, land or sea. Systems normally consist of a user interface, satellite antenna, and a communication link with the vessel's electronic systems. This technology can be vital to the user since it provides a satellite link to the outside world when other communications may unavailable. The standards of maritime telematics were presented in table 4.

Table 4. Standards for the maritime telematics by CEN

Standard	Characterization
EN 300065	Narrow-band direct-printing telegraph equipment for receiving meteorological or navigational information (NAVTEX). Part 1: Technical characteristics and methods of measurement. Part 2: Harmonized EN covering the essential requirements of article 3.2. Part 3: Harmonized EN covering the essential requirements of article 3.3.
EN 300066	Float-free maritime satellite Emergency Position Indicating Radio Beacons (EPIRBs) operating in the 406,0 MHz to 406,1 MHz frequency band. Technical characteristics.
EN 300162 -1	Radiotelephone transmitters and receivers for the maritime mobile service operating in VHF bands. Part 1: Technical characteristics and methods of measurement.
EN 300225	Technical characteristics and methods of measurement for survival craft portable VHF radiotelephone apparatus.
EN 300338	Technical characteristics and methods of measurement for equipment for generation, transmission and reception of Digital Selective Calling (DSC) in the maritime MF, MF/HF and/or VHF mobile service,
EN 300373 -1	Maritime mobile transmitters and receivers for use in the MF and HF bands; Part 1: Technical characteristics and methods of measurement.
EN 300698 -1	Radio telephone transmitters and receivers for the maritime mobile service operating in the VHF bands used on inland waterways; Part 1: Technical characteristics and methods.
EN 300720 -1	Ultra-High Frequency (UHF) on-board communications systems and equipment; Part 1: Technical characteristics and methods of measurement.

EN 301025 -1	VHF radiotelephone equipment for general communications and associated equipment for Class 'D' Digital Selective Calling (DSC); Part 1: Technical characteristics and meas.
EN 301033	Technical characteristics and methods of measurement for ship borne watch keeping receivers for reception of DSC in the maritime MF, MF/HF and VHF bands.
EN 301178 -1	Portable Very High Frequency (VHF) radiotelephone equipment for the maritime mobile service operating in the VHF bands (for non-GMDSS applications only); Part 1: Technical characteristics and methods of measurement.
EN 301403	Maritime Mobile Earth Stations (MMES) operating in the 1,5 GHz and 1,6 GHz bands providing voice and direct printing for the Global Maritime Distress and Safety System (GMDSS); Technical characteristics and methods of measurement.
EN 301466	Technical characteristics and methods of measurement for two-way VHF radiotelephone apparatus for fixed installation in survival draft.
EN 301688	Technical characteristics and methods of measurement for fixed and portable VHF equipment operating on 121,5 MHz and 123,1 MHz.
EN 301843 -1	Electromagnetic Compatibility (EMC) standard for marine radio equipment and services; Part 1: Common technical requirements.
EN 301925	Radiotelephone transmitters and receivers for the maritime mobile service operating in VHF bands. Technical characteristics and methods of measurement.
EN 301929 -1	VHF transmitters and receivers as Coast Stations for GMDSS and other applications in the maritime mobile service. Part 1: Technical characteristics and methods.
EN 302152 -1	Satellite Personal Locator Beacons (PLBs) operating in the 406, 0 MHz to 406, 1 MHz frequency band; Part 1: Technical characteristics and methods of measurement.
EN 302194 -1	Navigation radar used on inland waterways: Part 1: Technical characteristics and methods of measurement.
EN 302752	Active radar target enhancers; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive.

2.3 *Actual activities of ITS standardization in EU*

ITS standards define how ITS systems, products, and components can interconnect, exchange information and interact to deliver services within a transportation network. ITS standards are open-interface standards that establish communication rules for how ITS devices can perform, how they can connect, and how they can exchange data in order to interoperate. It is important to note that ITS standards are not design standards: They do not specify specific products or designs to use. Instead, the use of standards gives transportation agencies confidence that components from different manufacturers will work together, without removing the incentive for designers and manufacturers to compete to provide products that are more efficient or offer more features.

The ability of different ITS devices and components to exchange and interpret data directly through a common communications interface, and to use the exchanged data to operate together effectively, is called *interoperability*. Interoperability is key to achieving the full potential of ITS. Seamless data exchange would allow an emergency services vehicle to notify a traffic management center to trigger change in the timing of the traffic signals on the path to a hospital, in order to assist the responding ambulance.

Interoperability is defined as the ability of ITS systems to:

- Provide information and services to other systems
- Use exchanged information and services to operate together effectively.

The European Commission Mandate M/453 invites the European Standardisation Organisations - ESOs (ETSI, CEN, CENELEC), to prepare a coherent set of standards, technical specifications and technical reports within the timescale required in the Mandate to support European Community wide implementation and deployment of interoperable Co-operative Intelligent Transport Systems (Co-operative ITS).

Intelligent Transport Systems (ITS) means applying Information and Communication Technologies (ICT) to the transport sector (M/453). ITS can create clear benefits in terms of transport efficiency, sustainability, safety and security, whilst contributing to the EU Internal Market and competitiveness objectives. To take full advantage of the benefits that ICT based systems and applications can bring to the transport sector it is necessary to ensure interoperability among the different systems throughout Europe at least.

This Mandate supports the development of technical standards and specifications for Intelligent Transport Systems (ITS) within the European Standards Organisations in order to ensure the deployment and interoperability of Co-operative systems, in particular those operating in the 5 GHz frequency band, within the European Community. Standardisation is a priority area for the European Commission in the ITS Action Plan in order to achieve European and global ITS co-operation and coordination.

Standardisation for Cooperative ITS systems has already been initiated both by ETSI and ISO as well as within other international standards organisations. European standardisation activities to provide standardised solutions for Cooperative ITS services are therefore closely related to the world wide standardisation activities.

Within three months of the date of acceptance of this Mandate ETSI, CEN and CENELEC must present a report to the Commission with the work program to achieve goal of completion of the standardization process for Cooperative ITS services.

Particular attention must be given to the involvement of all relevant parties, including public authorities, and to the working arrangements between relevant industry forums and consortia.

Within one year of the date of acceptance of this Mandate ETSI, CEN and CENELEC must present a progress report on the achievements in accordance with the work program. CEN, CENELEC and ETSI must present annual progress reports to the Commission services.

Twenty months after the acceptance of this mandate, a comprehensive report must be presented with the status of the on-going work and the latest available draft of the different standards.

The European Commission mandate on Cooperative Intelligent Transport Systems requires the synchronization among the European Standards Organizations on one hand; on the other hand it recommends collecting feedback from stakeholders affected by that standardization work. This session intends to verify if all the bits and bytes of standardization fit to each other, to identify shortcomings and potential show-stoppers and to find proposals for challenging standardization issues. In addition, the session offers the possibilities to present topics that should be considered by standardization additionally.

3 CONCLUSIONS

Intelligent Transport Systems are integral part of European Transport Policy. ITS Directive is the legal instrument for the deployment of ITS in Europe. Standardisation has a major role in the development of interoperable ITS. Interoperability and building ITS architecture brings about the necessity to develop standards concerning, among the others, technical, safety solutions as well as data transmission protocols between the system elements and it environment solutions. These applications in the future may provide quick and precise information and allow to safely managing transport. In the forthcoming years they will be further improved by using Galileo system, whose localizing precision will be better than that of GPS. Integration of tools by using standards would allow: reducing times and errors (preventing re-typing), facilitating engineering & trading, improving data recording, improving survey, maintenance and repair (life cycle). Telematics is a vital means of development for maritime transport in the European Union.

One of the key benefits of ITS is the exchange of information and completion of transactions directly between computers, eliminating the need for processing purchase orders, bills of lading or invoices. Clear, constructive, harmonised, and easy applicable legal rules affect differently the economic parameters of maritime transport than vague and contradictory legal rules or even more the absence of legal provisions. Community legislation now exists for all modes of transport creating new open market conditions.

The European Commission Mandate M/453 on Cooperative Intelligent Transport Systems was approved by CEN and ETSI.

Furthermore, within the frame of high level agreements between the European Union, US Department of Transportation and the Japanese communication ministries on global activities to harmonize standardization and cooperative ITS applications as well as a roadmap for deployment, this high level managers round table will provide the latest news on the global activities and discuss the way forward to achieve global interpretability for cooperative ITS when implemented and deployed in a few years.

In September 2010 the standard ETSI EN 302 665 specifying the ITS Communications Architecture has been published. Although the architecture has been designed in a modular way that allows flexible usage and implementation it is still required to harmonize the internal interfaces between the modules and the interfaces to the external world.

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