

*telematics,
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CONDITIONS OF THE TRANSPORT TELEMATICS DEVELOPMENT IN POLAND

The need to modernise all the transport by its ordered informatization becomes more and more urgent. Unfortunately not satisfactory country and local administrations engagement in this process and lack of financial support caused by needs to finance goals acknowledged as more important, makes strong obstacles. Nevertheless there are entertained numerous developing and organisational activities in transport telematics solutions implementation. Those can be seen as a first paces on the way to form consist and complementary actions leading to construction of the intelligent transport systems in Poland.

WARUNKI ROZWOJU TELEMATYKI TRANSPORTOWEJ W POLSCE

Potrzeba modernizacji transportu staje się coraz bardziej pilną. Niestety niesatysfakcjonujące zaangażowanie krajowej i lokalnej administracji w tym procesie i brak finansowego wsparcia są silną przeszkodą. Pomimo to następuje wdrożenie rozwiązań z zakresu telematyki w transporcie. Może to być postrzegane jako pierwsze kroki na drodze do ukształtowania wspierających i uzupełniających działań, prowadzące do skonstruowania inteligentnych systemów transportowych w Polsce.

1. INTRODUCTION

Since over 10 years in UE countries as well as in numerous other, not only ranged as developed, are continued intensive research, implementation and planning works on applications of telematics systems in transport [1, 2, 3, 4, 5]. In Poland, unfortunately, those problems did not found as till now quite satisfactory level of acknowledgement, what created obvious delay in transport modernisation.. It should be reduced as soon as possible, as it is important for the reason of necessary modernisation of the transport area, but even in the context of accession to UE. Even the potential economical advantages from the deployment of intelligent transport solutions are of great importance.

2. TELEMATICS IN TRANSPORT

In the area of transport telematics solutions are to be applied commonly: in all the categories of land transport, in water transport and obviously in aerial. Those solutions allows

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also to integrate all of types of transport and build inter-modal and multi-modal transport structures.

A basic feature and advantage of telematics applications is a possibility to provide and process a rich set of data adequate for given application, adjusted to users needs, belonging to proper place and proper time. Operations on data can be realised automatically or in an interactive mode. An important feature of telematics applications is ability to effectively associate operations of various subsystems and co-ordinate their actions.

Exchange of data have to be made between following elements of transport hiper-structure:

- Travellers (including pedestrians),
- Vehicles,
- Roads and their surrounding environment,
- Institutions and organisations.

The quality of functions of the systems completed from such elements depends –beside their own features like dimensions or quality – installed information technology equipment such as detectors, counters, data processing systems, transmission systems, information presentation systems and so on, but also capability to exploit this equipment. Therefore by now, to above mentioned elements of hiper-structure must be added one more, namely:

- Telematics structures.

An important area of idea creates telematics services. The number of services resulting from traditional needs of broadly understood transport is considerable and accordingly to circumstances and development of transport systems equipped with telematics solutions, new ones arises on the basis of actual needs of transport or on the inspirations by information technology possibilities.

Especially, very intensive telematics applications development is observed in land road transport. Main applications are observed in:

- Traffic management,
- Security management,
- Freight management,
- Fleet management,
- Information for travellers,
- Collection of traffic and vehicles data,
- Fee collection systems,
- Public transport systems management.

A good illustration of telematics services variety reflecting real users needs and possibilities if intelligent transport systems is made on a basis of broad questionnaires [6] list of real services divided on some areas and grouped accordingly to user service, shown in Tab.1.

Table I

Transport telematics services

User Service Bundle	User Service
Travel And Traffic Management	Pre-trip Travel Information En-route Driver Information Route Guidance Ride Matching and Reservation Traveler Services Information Traffic Control Incident Management Travel Demand Management Emissions Testing And Mitigation Highway-Rail Intersection
Public Transportation Management	Public Transportation Management En-route Transit Information Personalized Public Transit Public Travel Security
Electronic Payment	Electronic Payment Services
Commercial Vehicle Operations	Commercial Vehicle Electronic Clearance Automated Roadside Safety Inspection On-board Safety Monitoring Commercial Vehicle Administrative Processes Hazardous Material Incident Response Commercial Fleet Management
Emergency Management	Emergency Notification and Personal Security Emergency Vehicle Management
Advanced Vehicle Safety Systems	Longitudinal Collision Avoidance Lateral Collision Avoidance Intersection Collision Avoidance Vision Enhancement for Crash Avoidance Safety Readiness Pre-crash Restraint Deployment Automated Vehicle Operation
Information Management	Archived Data Function
Maintenance and Construction Management	Maintenance and Construction Operations

2.1. TELEMATICS APPLICATIONS AIMS

Telematics solution brings defined advantages to all the engaged parties: to users and constructors of the transport infrastructure and transport means, to producers of transport and telematics equipment, to administrations of different levels, operators of systems and transport enterprises, although each of parties gains profits of different kinds. Practice shows that in common sense such a solution brings:

- More intensive exploitation of the infrastructure and fleet,

- Raising the economical effectiveness and competition,
- Raising the traffic security,
- Better environment protection,
- Raising conditions of co-operations between engaged parties,
- Easing accession to globalisation and integration processes.

According to [7] hitherto applications of transport telematics products and services brings strong proof that it is effective in:

- Saving of human life,
- Improvement of the security on roads,
- Reduction of travel and travel planning times,
- Reduction of traffic negative influence on environment.

Transport telematics solutions brings particular profits thanks to raising travel securities for they reduce evidently the number of accidents and also their extends. It is contribution of anti-collision systems, automatic rescue alarms and even easy accessible, upgraded actual information, what ease safe realisation of transport tasks. Advanced traffic control (supporting navigation systems, itinerary and parking information) even makes possible – thanks more reduced and economic use of the fuel – significant reduction of the CO₂ emission. Shortening of the time necessary for transport operations means distinct reduction of the transport or travel costs. All the mentioned factors gives great savings in above mentioned areas, reaching tens of percents of the expenses in traditional transport systems [4].

3. INTELLIGENT TRANSPORT DEVELOPMENT POLICY

3.1. EUROPEAN TRANSPORT DEVELOPMENT POLICY

Development of the modern intelligent transport in UE countries is continued over ten years and brings distinct attainment in research and applications. A program of trans-European network connecting telematics and telecommunications infrastructures supported by numerous research and development works e.g. in 4,5 and 6 Framework Programmes which have been and are conducted, is realised. In 1996 a basic principles for building *Trans-European Network for Transport* (TEN-T) have been established with deep consideration of telematics solutions and broad references to Information Society building programme. The last caused strong support for transport modernisation by its inclusion and completion in programme *e-Europe – Action Plan* established in 2000 [8]. This document consists the analyse of the existing situation and activity plans, assuming reorientation of the transport policy to directions compliant with citizens expectations and needs, friendly to environment and stimulating market.

As a main areas of works creating intelligent transport solutions for nearest future (until 2010) was accepted:

- Road safety with aim to reduce road victims by 50%,
- Introduction of active safety systems by vehicle industry,

- Better vehicle speed management with use of the on-board communications systems and variable message signs resulting in reduction of accidents and CO₂ emission,
- Targeted research for more clean and safe transport,
- Bottlenecks effects reduction by applying specific traffic management systems,
- Digital tachographs implementation for better registration and driving,
- Tracking and monitoring systems for freight and road haulage supported by *Galileo* satellite positioning,
- Transport globalisation with extension of the telematics systems on CEE accession countries,
- Inter-operating road charging /tolling electronic systems,
- Building European satellite radio navigation system *Galileo*,
- User needs analysis,
- Improving and stimulating inter-modality of transport on various levels of the systems.

3.2. POLISH DEVELOPMENT ACTIVITY

Assuming that for building and development of the contemporary economy – especially knowledge-based economy – is necessary to possess a network of modern and fully developed communication routes and taking into account that Polish integration with EU also calls for building and modernization of transport systems, on acknowledged as necessary introduction of intelligent transport systems, what found a reflection in official documents (in [2] among others).

In the Polish transport sector since some years are undertaken works on applications of information and telecommunications technology. Already exists some systems of Internet services, applications based on GSM and GPS fulfilling some for transport needs. Transport enterprises use Internet, dedicated radio communications, cellular telephony very broadly for helping road construction and management as well as for transportation processes. In some administration entities operate some tens of quite big databases accessible on-line and worth of underlining web side offering visual information about traffic on some Warsaw streets [9].

Also in research institutes and universities are conducted analytic and developing works relative to intelligent transport problems. As an example can be mentioned works in National Institute of Telecommunications (Warsaw) aimed to create national ITS architecture or research works in Technical Universities in Warsaw and Katowice. Governments decisions related to deployment of intelligent transport will strengthen development tendencies.

At the same time it is necessary to say, that hitherto activities are not co-ordinated enough, as it is in more advanced countries (UE, USA, Japan and others). But announcements of such a co-ordination and more effective stimulation can be found in [2], where as a development aims one accepts:

- building an active security system on land roads,
- elaboration of the systems of data collection and transport data bases,
- elaboration of the system for maritime passengers information exchange,
- elaboration of the data bank concerning units for transport of dangerous materials and such materials transported by sea,

- making possible free communications during travel,
- reduction of the congestion in public transport.

Even are planned actions comprising:

- accessibility (by telecommunications operators) of the multi-lingual number (112) to rescue and information services in all the parts of country,
- introduction of the permanent control on the waters with intensive ships and boats traffic,
- elaboration of the indicative program for ITS development,
- elaboration of the transport data base frame (with access by Internet),
- elaboration of the National ITS Architecture,
- elaboration of the system for danger materials transport tracking and preparing routes for such a transport.

There are distinguished some tasks, acknowledged as a necessary and urgent, mostly related to some particular ITS applications for defined areas of transport.

4. EXISTING OBSTACLES AND NECESSARY ACTIONS

Introduction of the telematics in transport meets numerous obstacles, which have to be overcome as soon as possible. The main of those are:

- Low level of public and political awareness and support,
- Low level of the technical and organisational knowledge in this area,
- Uncertain financing from public and private sources,
- Difficulties in inter-institutional co-operation.

Nevertheless, with the time, in particular environments and societies (towns, regions) conviction about profits brought by applications of intelligent transport solutions in effectiveness, security and environment protection become more a more common. But there is also a danger to overvalue the meaning and possibilities of such a solutions. It is necessary to remember that telematics tools does not provide full solutions of e.g. city transport problems. Anyway they may create valuable packets of useful instruments allowing to reduce strongly such a problems.

One of the crucial conditions for skilled and effective introduction of telematics applications in transport, especially in not very advanced countries (e.g. UE accession countries) is to reach the proper level of knowledge at local and regional decision makers about suitability of the provision of telematics applications. Proper information about the merit of intelligent transport, brought by its advantages, and paces which have to be made for its implementations, the manner of organisation of its broad diffusion, have basic meaning for the future general development. It is suitable to present experiences of a good practices in planning and deployment a strategy of building ITS. Such a presentations should first of all concerns those applications areas for which local or regional expectations are biggest. Usually those are:

- Traffic data management and technologies of its collections,
- Urban traffic control,
- Control of public transport and time tables,
- Information provision and control by variable message signs,
- Real-time information concerning public transport.

Lack of information can be observed not only in common understanding of profits bound with telematics applications in transport, but even of choosing of the proper tools and applying the proper implementation strategy. It is not enough only to buy accessible telematics products; before local or regional authorities should prepare proper strategy of transport telematics implementation. Also a basic task is to create a specific knowledge at persons performing key administrative functions. Such a training should, beside of manners of use the particular solutions, concern manners of deployment of telematics strategy. Mentioned above persons should even possess knowledge how to overcome arising difficulties, e.g. in co-operations between several institutions.

As it was said, telematics implementation can be more effective when preceded with good presentations how some telematics solutions works. Such a presentations should be planned realistically, what means that presented solutions are accessible in the market, and should belong to the plans of ITS implementation. From its side plans should describe frames of ITS solutions deployment and consists of solution with very high probability of future application.

Another important question is arrangement of the co-operation between various co-engaged institutions having different character, usually numerous in transport problems. In such a case arises the problems of e.g. competence, leadership and so on. A common understanding and conviction should be created from very beginning of the strategy realisation.

Overcoming of arising obstacles seems to be reached, as there are quite numerous actions of organisational type, supported by growing society pressure to improve transport conditions, mainly road traffic. On the country government level more and more deeper understanding of transport modernisation problem (including implementation of information and telecommunications technologies) found understanding and expression in official documents and declarations concerning an information society building and forming knowledge-based economy. Experts and specialists environments takes initiatives of organisational (establishing Polish Telematics Society, whose activity concentrated mostly on transport telematics) as well as promotional and developing type (conferences covering transport telematics problems: Transport System Telematics, Telematics and Traffic Security, Road Technical Days, Research for Information Society). Even beginning of the international co-operation can be observed. But there is distinctive need to intensify and co-ordinate those actions, what should be stronger stimulated by Ministry of Infrastructure.

It is necessary also to mention growing conviction about need to educate new specialists, technicians, as well as managers and economists profiled on intelligent transport, but also complete ITS knowledge of persons working in road building and maintenance, transport and related administration. All those education actions are of especially great importance.

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