



## 1 International Project Forum

Croatian - Montenegrin bilateral cooperation program in the field of science and technology

# ICT and e-Learning in Intermodal Transport

**E<sup>HR-CG</sup> LEARNING**

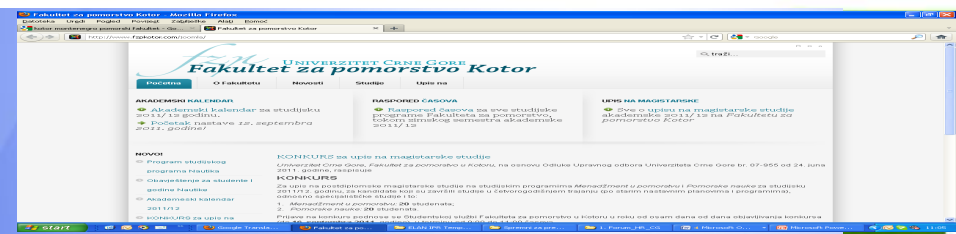
12th October 2011, Zagreb

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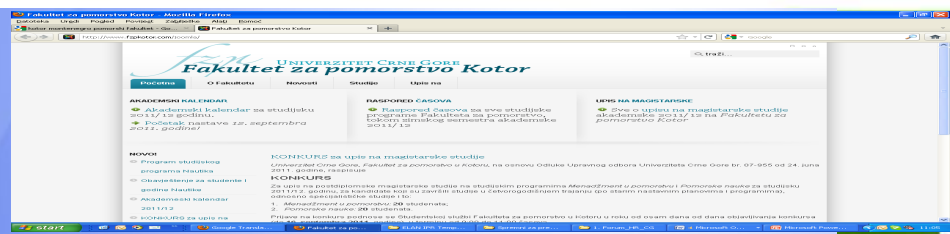
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# ICT APPLICATIONS IN THE FUNCTION OF DEVELOPMENT AND INTEGRATION OF INTERMODAL TRANSPORT SYSTEM

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# OVERVIEW OF THE PRESENTATION:



# INTRODUCTION

- World trends in intermodal transport are directed towards the need to use innovative systems and solutions in order to improve the industry of intermodal transport
- the intensity of the development of intermodal transport requires increased implementation of the adapted ICT applications
- the usage of ICT applications allows more efficient and optimal usage of the existing capacities (ships, trucks, rail, barges, ports, intermodal centres, etc.)
- ICT represent one of the factors of success in the operation of intermodal transport system
- in spite of the recognised possibilities, the ICT applications have not yet been sufficiently developed for the needs of intermodal transport
- the development possibilities are numerous, and they are reflected in different phases of its process
- the paper analyses the possibilities of implementing ICT applications on intermodal transport system

# CHARACTERISTICS

## OF THE APPLICATION OF ICT/1

- the analysis of introducing the IOT (equipment and services) in intermodal processes of the developed countries has shown a series of positive effects, but limitations as well
- the development and integration of ICT applications in a unique system of different subsystems is expected:
  - departure and arrival management (entry and exit control processes) of individual traffic entities and goods to certain locations (sea or river ports, intermodal terminals and centres, etc.), as well as location within the very transshipment points;
  - controls of loading and unloading;
  - tacking during transport;
  - resource management;
  - stock management;
  - geographic information system (GIS);
  - support and exchange of electronic documents, etc.

# CHARACTERISTICS OF THE APPLICATION

- construction and implementation of the integrated information and telecommunication system inside intermodal company contributes to:
  - faster and more efficient information exchange, briefing and remote access;
  - company's centralized database, security, archiving, surveillance and management system;
  - efficiency of entire business system by using: *Business Intelligence* (BI), *Enterprise Resource Planning* (ERP) and *Customer Relationship Management* (CRM) systems;
  - integration, coordination and supervision of larger number of users, processes, flows and activities;
  - Web access, video and IP telephony services.

# CHARACTERISTICS

# OF THE APPLICATION

# OF ICT/3

- ICT application enable achieving results, which have positive efficiency of working processes, improvement of service quality, better harmonisation with positive legal regulations and new marketing strategies

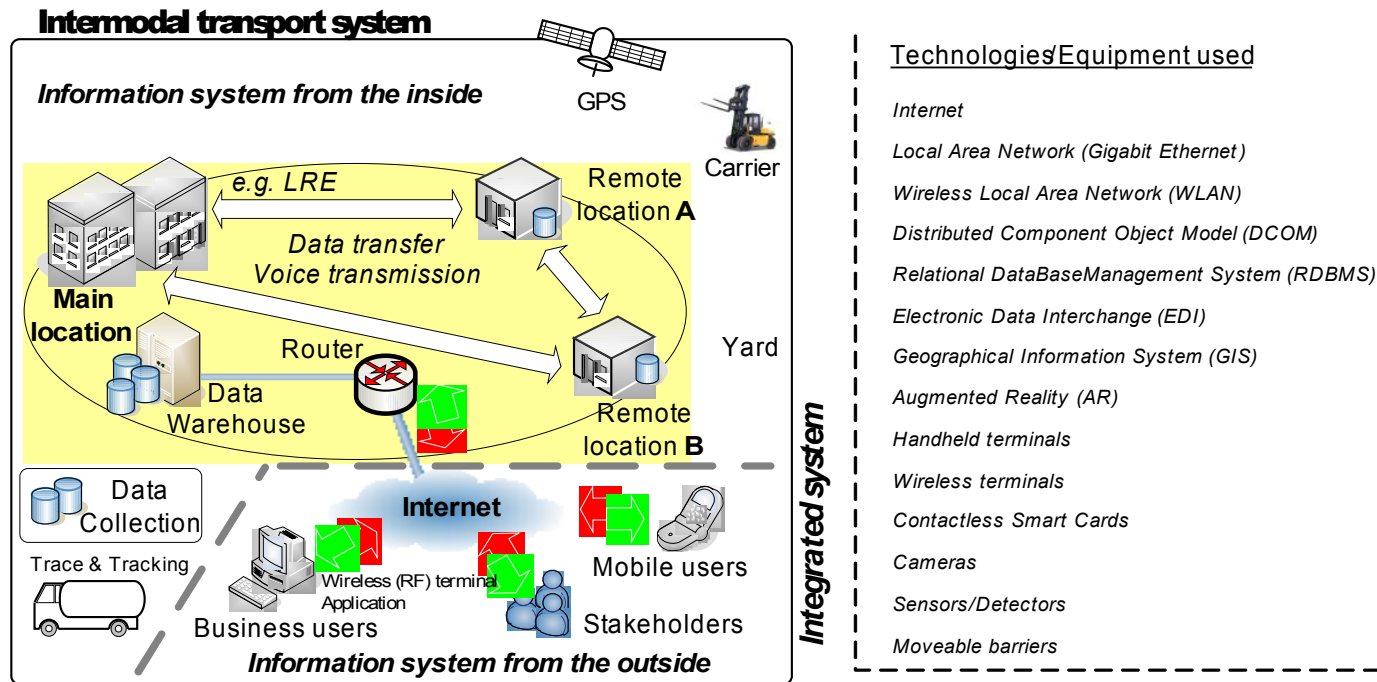


Figure 1 - Intermodal company's information system and equipment used

# CHARACTERISTICS

## OF THE APPLICATION

- ICT applications in intermodal transport represent a significant development:
  - they can be used to facilitate the exchange of crucial business information on international scale (and with the help of international projects);
  - to realise the proactivity of the users and integral improvement of capacities;
  - availability of real-time information, decision-makers do not have to wait long for the research results and changes in the transportation method of certain goods;
  - simpler collection of data using unique databases;
  - simpler establishment and maintenance of contacts with the target groups;
  - tracking and communication with the performers of certain transport processes;
  - connecting of intermodal centres with the environment (business partners/operators, other intermodal centres, regional scientific and research&development institutions, etc.) in the form known as “virtual organisation”;
  - possibility of planning certain intermodal delivery (from – to), based on the valid data of different operators;
  - in education of target groups and implementation of lifelong learning.

## OF ICT/4

# CHARACTERISTICS

# OF THE APPLICATION

- as a result the *Transport white paper on EU Transport policy* provides a number of priority actions, that can be summarised as follows:
  - support the development of international transport infrastructure by focusing on networks, and terminals,
  - develop fast data communications networks,
  - support transport applications of ICT,
  - adoption of common competition rules and guidelines,
  - development of integrated Logistics services ,
  - consider the requirements of the end-user.

# CHARACTERISTICS

## OF THE APPLICATION

- the incentives to start unique ICT applications can be:

### OF ICT/6

- exchange of crucial business information and transparency of operation;
- absence of adequate ICT applications and solutions in the field of intermodal transport;
- problem of interoperability of various “previous” (telematic) systems ;
- need to optimise the transport processes;
- need for harmonisation with the projects from the transport area (other transport branches);
- adoption of a common standard at least in the form of high level architecture;
- traffic accidents with major consequences and material losses;
- vision of political decision-makers who want to make significant improvement of the quality of intermodal transport through ICT sector.

# ICT APPLICATIONS IN INTERMODAL TRANSPORT SYSTEM/1

- usage of ICT applications can be very favorable for all the actors on the intermodal market
- for instance, obtaining a transparent overview of the carriers who offer their services, etc.
- intermodal transportation system is just waiting for the further development of norms and standards, with the aim of greater interoperability between the system users
- there are many standards and systems available that handle or are related to freight management among the transportation industry (*Traffic Management System (TMS)*, *Waste Management System (WMS)*, *Enterprise Resource Planning (ERP)*, *Business Intelligence (BI)*, fleet management systems, and port community systems)
- in order to make various ICT applications attractive to their users, it is important to understand and analyze the complex and sensitive business relations and working models in the various parts of the supply chain

# ICT APPLICATIONS IN INTERMODAL TRANSPORT SYSTEM/2

- within the frame of the EU numerous international projects are being opened and their aim is to implement certain segments of ICT (e.g. SMART-CM, Freightwise, Euridice, e-FREIGHT, NELI, etc.)
- table 1 shows some of the applications that may improve the operation in intermodal transport system.



# ICT APPLICATIONS IN INTERMODAL TRANSPORT SYSTEM/3

Application	Technologies	Function/service	Verification
Web based client	Software module	The interface for controlling user account, addition, editing, deleting and general communication between users of the system. Solutions for companies of all sizes. Insuring that information of "public interest" is available to all (e.g. Estimated Time of Arrival).	Functional testing, unit testing and compatibility testing (browser). Regression testing per iteration.
Trip matching module	Software module	On the fly trip matching, filtering, scheduling, optimising intermodal transport system. Supply chain management.	Load testing (performance + stress). Integration testing.
	Optimisation algorithms		
Database module	Database manager (DBMS)	Storing, retrieving data used for the trip matching modules and the intermodal users profile system.	Load testing (performance + stress). Integration testing.
	Database servers		
User communication module	Email servers	Communication between different users, system to cellphone.	Conformance testing (SMS). Integration testing.
	SMS servers		
Mobile software client	Software module	Identical, plus added wireless connection and localisation by GPS. Plotting map GIS data of intermodal users and trips.	Functional testing unit testing and compatibility testing (cross platform, Windows Mobile, Symbian and Apple Iphone), Regression testing per iteration.
	Wireless connection		
	Localisation (GPS)		
Payment	E-payment service provider	Transactions carried out activities, keeping user balances, transactions to bank accounts.	Conformance testing (E-payment). Integration testing.
	Financial management		

Figure 2 - Application description

# ICT APPLICATIONS IN INTERMODAL TRANSPORT SYSTEM/4

- revitalization of intermodal and logistic company's information system must deal with certain conditions such as:
  - utilization of currently installed ICT infrastructure;
  - data transmission on larger distances;
  - data security during transmission;
  - network congestion control and avoidance algorithms;
  - network scalability and robustness;
  - acceptable costs of implementation.

# CONCLUSION

- based on the presented facts and the need for the development and integration of intermodal transport system:

## Advantages

- Advanced and centralized distribution, delivery and inventory management;
- Current or time interval consumption by many different criteria (location, user, driver, vehicle, ship, transport corridor, sector, company etc.)
- Resource management (customers, suppliers, tankers, transportation and working means, warehouses, locations, etc.);
- Overview of current and historical inventory of goods, reporting options and long-term data-storage;
- Statistical analysis and presentation of collected data;
- Automatic forecasting of demand at the warehouses or remote destinations to automatically generate orders/necessary deliveries;
- Data-mining from a filtered history of data on demand and other factors that influence the demand;

# CONCLUSION

- Supporting multiple users, each with self defined workplace and set functionality restrictions;
- Minimizes human factor and environmental risks;
- Fleet and driver management;
- Integration with third party products and easy data sharing and presentation.

## Disadvantages

- Initial costs and prerequisites;
- Requirements for suitable, reliable and robust ICT infrastructure;
- Implementation of specially designed equipment (e.g. tank probes and onboard units);
- Dependency and coordination with “outside” systems and services (mobile GSM/UMTS network and GPS service providers);
- Necessity for trained and skilled personnel;
- Maintenance and support costs.



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# Thank you for your attention!



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