IT & T Solutions in Logistics and Maritime Applications

edited by
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Scientific Proceedings of the Project eLOGMAR-M
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eLOGMAR-M

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EDITORS' PREFACE

These proceedings were prepared as part of the eLOGMAR-M project "Web-based and Mobile Solutions for Collaborative Work Environment with Logistics and Maritime Applications". The project eLOGMAR-M ran from 2004 to 2006 and was funded by the European Commission's IST Sixth Framework Programme.

eLOGMAR-M is a coordination action project involving researchers and experts from nine countries. The project consortium consists of the Port of Hamburg Marketing Association and Transportation Freight Broker Company RTSB (Germany); Port of Kokkola (Finland); Maritime & Supply Chain Solutions (Europe) Ltd. (U.K.); Thessaloniki Port Authority and Transeuropean Consultants for Transport, Development and Information Technology (Greece); Logitrans Consult and Interbalt Maritime Agency (Estonia); IDC Information Technologies, Riga Technical University and Latvian Intelligent Systems (Latvia); Klaipeda State Seaport Authority and Sonex Computers (Lithuania); Warsaw University of Technology (Poland); China Harvest Development Ltd. and Beijing HOPE Software (China) and is coordinated by the Fraunhofer Institute for Factory Operation and Automation (Germany).

eLOGMAR-M consortium workshops and meetings were not only used for the internal exchange of knowledge but also as a means to establish contacts between experts from the ports of Tallinn, Riga, Klaipeda, Kokkola, Hamburg, Thessaloniki and Shenzhen.

During these events and at conferences where results from eLOGMAR-M were presented, numerous discussions with other experts and scientists generated fruitful inputs for the project work.

We would like to thank the representatives of Klaipeda State Seaport, the Port of Hamburg, the Port of Kokkola, the Thessaloniki Port Authority and the companies Beijing HOPE and CHD for their active support of several workshops.

We would also like to thank Jacques Babot (European Commission) for his support of the eLOGMAR-M project.

These proceedings are structured into four major parts. Part I summarizes core results of the eLOGMAR-M project. Part II provides information about topics and IT systems closely related to the focus of the eLOGMAR-M project. Part III reprints three contributions selected from the China-Europe Forum on e-Logistics organized by eLOGMAR-M in Shenzhen, China. Part IV presents interesting research papers written by PhD students involved in the project.

We hope that you find the results of the eLOGMAR-M project presented here as interesting as we have found our work on the project itself.

Eberard Blümel

Leonid Novitskis

Steffen Strassburger

eLOGMAR-M project, Magdeburg, Riga, September 2006

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Part I

eLOGMAR-M Results

eLOGMAR-M PROJECT: IT SOLUTIONS FOR COLLABORATIVE WORK ENVIRONMENT WITH LOGISTICS AND MARITIME APPLICATIONS

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Keywords

Transport Logistics, Web-based Solutions, Mobile Solutions, Maritime Applications, Modelling

Abstract

Maritime transport is a rather fragmented sector with a quite significant number of different players involved. During recent years, substantial efforts have been made to overcome this fragmented structure and to build an integrated maritime research community. Large and mid-sized logistics and transport organisations often consist of many decentralised business units. The challenge is to balance the benefits of decentralisation with group optimisation and volume advantages. The Web, WML/WAP and GPRS solutions are becoming a corporate communication infrastructure for setting up integrated information services and mobile collaborative processes in logistics and transport with maritime applications. The EU-funded project eLOGMAR-M devoted to developing of corporative portal for transportation services' consumers ran from 2004 to 2006.

Introduction

The major goal of the eLOGMAR-M project is to create a Web-portal, which incorporates different partners operating along the selected maritime freight route.

Although some of the companies operating along the selected freight route are competitors, the advantage that co-operation could bring real benefits for different target groups, should be realized. The Cargo group – owners of goods (manufacturers or buyers) - can calculate a start-to-finish transportation rate and "optimise" the logistics supply chain. Actors from the Transportation group can benefit by attracting new customers and increasing cargo flows: shipping lines (deep sea and feeder lines) – bringing additional cargos flows, promotion of their services and increasing quality of services (the delivery of goods at the correct time); terminal operators – planning of cargo transportation and decreasing of storage and

processing time; freight brokers – increasing the profit of their business by involving a wider range of users dealing with freight transportation.

1 Consortium and Approach

17 partners from 9 countries are presented in the project's consortium: co-ordinator - Fraunhofer Institute for Factory Operation and Automation (FhG/IFF), Port of Hamburg Marketing and Transportation Freight Broker Company RTSB (Germany); Port of Kokkola (Finland); Maritime & Supply Chain Solutions Ltd. (U.K.); Thessaloniki Port Authority and Transeuropean Consultants for Transport, Development and Information Technology (Greece); Logitrans Consult and Interbalt Maritime Agency (Estonia); IDC Information Technologies, Riga Technical University and Latvian Intelligent Systems (Latvia); Klaipeda State Seaport Authority and Sonex Computers (Lithuania); Warsaw University of Technology (Poland); China Harvest Development Ltd. and Beijing HOPE Software (China).

The combination of expertise of IT companies and transport and logistics enterprises enables solving problems related to the proposed area.

The following scheme was used to reach the major objectives of the eLOGMAR-M project (Figure 1):

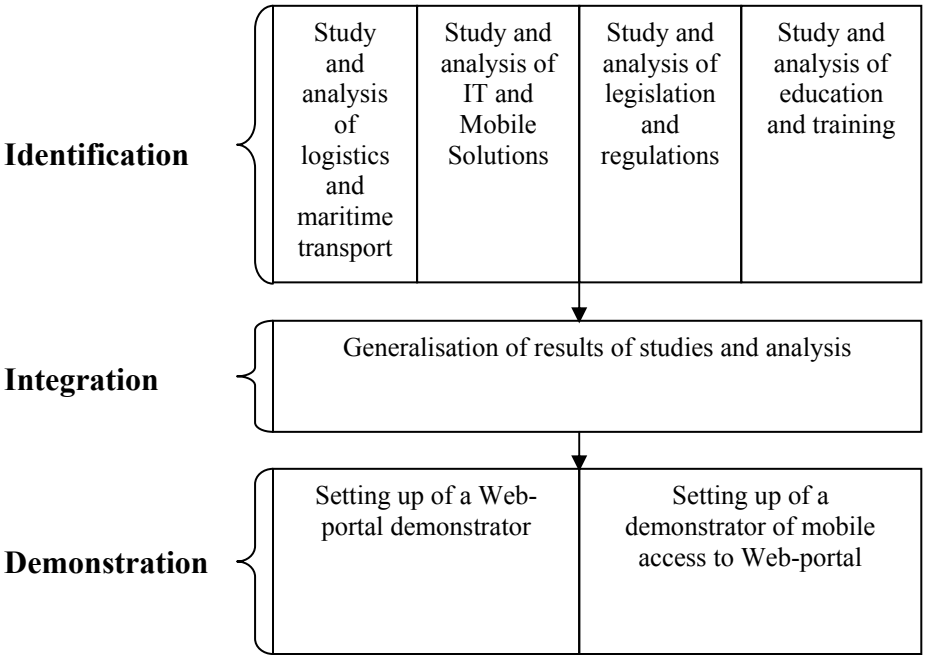

Figure 1: General Scheme

Identification and integration phases serve as a technical and organisational platform to create a dynamic, collaborative, virtual pool (Web-portal) of the partners, operating along the selected maritime freight route. However, the phase of

demonstration illustrates the applications of this platform in the sections of the selected maritime freight route "Europe – China".

The overall methodologies and technologies used to achieve the objectives consist of:

- Web-based technologies.
- Mobile Internet Solutions.
- Formal models to specify and re-engineer logistics business processes (LIS Technology).
- Multi-level methodology to analyse and simulate logistics and maritime processes.
- Computer-Based Training.

Essential logistics principles for setting up a Web-portal, technological platform and demonstration scenarios are presented in (Vinichenko et. al. 2006).

2 Exploitation and Dissemination of Results

The exploitation of results is very important for projects funded by the European Commission. For this reason, the consortium core partner group created the Baltic Sub-Regional Competence Centre (BSRCC) in Riga within the frameworks of the BALTPORTS-IT project (Bluemel et. al. 2003).

BSRCC is the instrument to create and support a networked, collaborative virtual, organisation aimed at bringing together industrial users, universities and research institutions around the common topic of, e.g. "Logistics, IT-solutions and Simulation with Maritime and eLogistics Applications".

A branch office of the BSRCC in Tallinn was established under the eLOGMAR-M project.

The main tasks of BSRCC are:

- To create a network of excellence and a training network aimed at bringing together industrial users, universities and research institutions around a common theme "IT-solutions and e-logistics for maritime applications". Such a network would be used in future as a kernel for the next RTD projects, including EC activities.
- To improve the systematic exchange of information between different organisations that are interested in virtual collaboration.
- To provide the possibilities of regional specialists training by using Web-based open-distance courses.
- To support the organisation of Internet conferences.
- To introduce partners, operating in Freeport areas of the Baltic States, to the Western and Chinese experience and to the methodologies of privatisation and ports re-engineering processes based on modeling.

- To provide distant access to simulation models, training materials and knowledge located in specialised servers

In accordance with the project exploitation plan a network of competence centres with the central office in Riga will be established. It will involve Fraunhofer FhG/IFF (Germany), Beijing HOPE company (China), CHD company (Shenzhen, China). The considerable experience of the co-ordinating organisation Fraunhofer FhG/IFF in creating different regional centres and branch offices will be used.

Special sessions were organised by the consortium partners within the frameworks of:

- European Simulation Multi-Conference (Riga, 2005).
- International Conference "Logistics and IT-Solutions in International Trade" (Tallinn, 2005).
- International Workshop HMS "Harbour, Maritime & Multimodal Logistics Modelling and Simulation" (Genoa, 2005).
- IST4Balt International Workshop (Riga, 2006).

International workshop CEFE'2006 (China-Europe Forum on eLogistics) was organised by consortium partners in Shenzhen, China in March 30-31, 2006 for promoting project's results.

3 Conclusions

eLOGMAR-M project is Coordination Action aimed at supporting logistics and maritime operations by Web-based and Mobile Solutions. Project objectives, consortium structure and general scheme of workplan are presented in the article.

Acknowledgement

The presented activity is supported by the eLOGMAR-M project funded under the IST Sixth Framework Programme of the European Commission.

References

Bluemel, E. et al. 2003. "Applications of Simulation and IT-solutions in the Baltic Port Areas of the Associated Candidate Countries". JUMI, Riga.

Vinichenko, S. et.al. 2006. "Essential Logistics Principles for Creating a Web – portal of Transport Services` Consumers". In the same proceedings.

Homepage of the eLOGMAR –M Project Awailable online at www.elogmar-m.org

NEW CHALLENGES FOR COLLABORATIVE WORK IN E-LOGISTICS

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Keywords

Collaborative Work Environments

Abstract

The predicted development of flows of goods between the main regions of the world makes clear how important the control of transports is becoming for the successful development of the global economy in the next twenty years. The growing share of intermodal transports requires new rules and laws to harmonize transit between modes of transport beyond national borders. The security, transparency and cost efficiency of transport processes are becoming more important at the same time. The development of new technologies and methods to design, control and monitor secure chains of goods are as important as their integration in state-of-the-art ICT tools that enable users to reliably plan and cost effectively manage their transport jobs while remaining mobile throughout the world. Against this background, tasks and objectives of the project eLOGMAR-M supported by the EU are discussed briefly and results are presented.

Introduction

The ongoing globalization of the world's economy has made logistics one of the key industries in Europe. With approximately 2.7 billion jobs in Germany alone, this sector has become an enormous growth market with international dimensions. This trend is proceeding on a global scale. Forecasts indicate that the value of goods exchanged throughout the world will have more than tripled in 2025 compared with 2005. Causes for this are rooted in the global division of labor, which has become essential for manufacturing complex products with a great diversity of variants and shortened life cycles. Rapidly reacting to short-term market changes demands companies flexibly use dependable supplier networks – taking cost, time and quality into account.

In their strategies for flexible operation in rapidly changing markets, companies are banking on working together with Asian countries such as India or China. Thus industrial value added is increasingly created in complex global networks, likewise making new logistics concepts and strategies necessary for their control and monitoring. This consequently means that logistics services themselves are also increasingly subject to an outsourcing process.

The complexity of the challenges arising from global value added processes require innovative technologies to deal with them, which satisfy the different requirements of all the different stakeholders involved. New integrative concepts are needed to do this.

For over ten years, the eLOGMAR-M consortium has been working on developing IT and simulation-aided solutions for planning, evaluating and implementing logistics processes in ports and networked logistics companies. Figure 1 provides an overview of the continuity of the sequence of projects, which started in 1995 with the project AMCAI with a core consortium consisting of seven organizations from four European countries and in the meantime cooperates with a global network of experts.

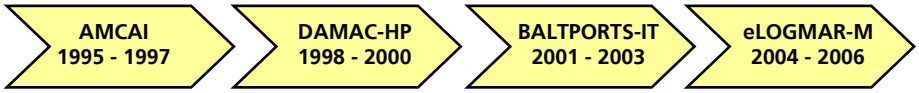

Figure 1: *Sequence of EU supported projects focusing on logistics, ICT and maritime transport and port operations*

In preparation for the European Unions's 7th Framework Programme, a multitude of initiatives were started to develop European technology platforms (ETP). Selected results from these initiatives' documents and workshops are presented below with reference to the new requirements for collaborative work in eLogistics. Selected results from the projects DAMAC-HP, BALTPORTS-IT and eLOGMAR-M are reflected in strategic objectives of the ETP.

1 Future Development of Maritime Transport

The predicted increase of the global exchange of goods is chiefly concentrated in the trade regions forming: Asia-Pacific, Western and Central East Europe, the Middle East, Africa and North and South America.

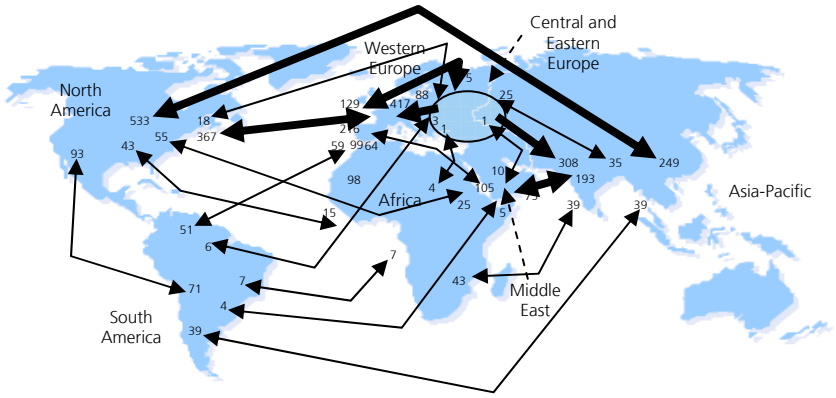

Figure 2: *The trade flows between world regions in 2004 (in billion $)*

Figure 2 presents an overview of the distribution of the flows of goods over the resultant trade flows.

The development of changes in transport flows between the large trade blocks of Europe, the USA and East Asia and Southeast Asia in years reveals that East Asia and Southeast Asia has been able to consolidate its leadership as the most important logistics hub (Table 1).

Source	Destination	1997 MTEU	2003 MTEU	Change
Europe	USA	1.5	2.2	+ 47%
USA	Europe	1.5	1.6	+ 7%
Far East	Europe	2.9	5.2	+79%
Europe	East & Southeast Asia	2.4	3.2	+ 33%
East & Southeast Asia	USA	4.8	9.4	+96%
USA	East & Southeast Asia	3.5	4.3	+23%

Table 1: *Changes in trade balances between the major trade blocks (source: IRAC-SIRA)*

On the other hand, the growth rates of container transports from East Asia and Southeast Asia to Europe (79%) and to the USA (96%) make clear what complex challenges logistics centers there are facing as they orient their infrastructures and processes toward these challenges.

The driving force behind the waterborne transport mode, maritime transport is especially affected.

Waterborne transport is an important business moving 90% of external EU trade and 40% of internal EU trade. The total annual turnover for the EU (15) in 1997 was € 137 billion and reached 2.4% of the EU GDP in 2003. (cf. Waterborne ETP)

Container transport, which has sextupled worldwide in the last twenty years, has resulted in consequences for services being provided and thus generated related changes in the load capacity of container ships:

- Shipping companies' one port concepts involve:
  - Expanding short sea shipping and
  - Upgrading the hinterland infrastructure.
- Inland shipping is profiting from the growing container traffic.
- Container ships will have grown to capacities of up to 12,000 TEU by 2025 (and thus grow by +50 %).

This trend toward larger and larger container ships is not only making new demands on the infrastructure of deep sea ports but also on the reorganization of feeder and

inland ports. The projects Damac-HP and Baltports-IT supported by the EU developed solutions for this (Table 2).

Application	Results	Cooperation
Evaluation of port processes Design of port infrastructure and processes	Non-monetary methodology for port process reengineering Simulation-based optimization of logistics processes in ports	Baltic Container Terminal Riga Port of Gdansk Port of Klaipeda
Control of container terminal processes under external influences	Simulation tools for controlling container terminal processes under different weather conditions	Baltic Container Terminal Riga
Structuring of business information	Static and dynamic infological models of business processes	Riga Freeport Authority Ventspils Freeport Authority BALVA
Reorganization of business information of data flows	Guide for reorganizing business processes by using LISTechnology	Riga Freeport Authority Ventspils Freeport Authority BALVA
Scheduling of incoming train processing	Decision support software for scheduling incoming trains	Latvian Railways

Table 2: *Results of the projects DAMAC-HP and BALTPORT-IT*

Conceiving sustainable logistics solutions necessitates holistically integrating the requirements of all elements of the process chain and hence cannot be confined to pure port operations. Logistics processes in ports frequently constitute the link between the modes of transport involved, e.g. waterborne, road, rail and air. They thus provide excellent conditions for developing, testing and implementing logistics strategies for designing intermodal transports.

2 Challenges of Intermodal Transport Chains

Fifty members from industry and stakeholders in the intermodal sector formed the European Intermodal Research Advisory Council (EIRAC) to define the Strategic Research Agenda for Intermodal Transport in 2020.

"In 2020, intermodal transport is seen to be the natural choice for the movement of goods in Europe. By 2020, the European intermodal transport system, featuring also Multimodal and Combined Transport, is envisaged as accounting for 40% of the movement of goods, as the transport of freight, even bulk, will become increasingly unitised. Intermodal transport will be an industry with its own identity, its own strategy, and its own voice." (EIRAC SIRA 2020)

The EIRAC vision is to promote consistent use of intermodal transport to enable Europe to cope with the growth of the economy, transport and related services.

In order to meet this challenge, a visionary intermodal transport system needs to be seamless, reliable, available, accessible, secure, sustainable, accountable, affordable and transparent.

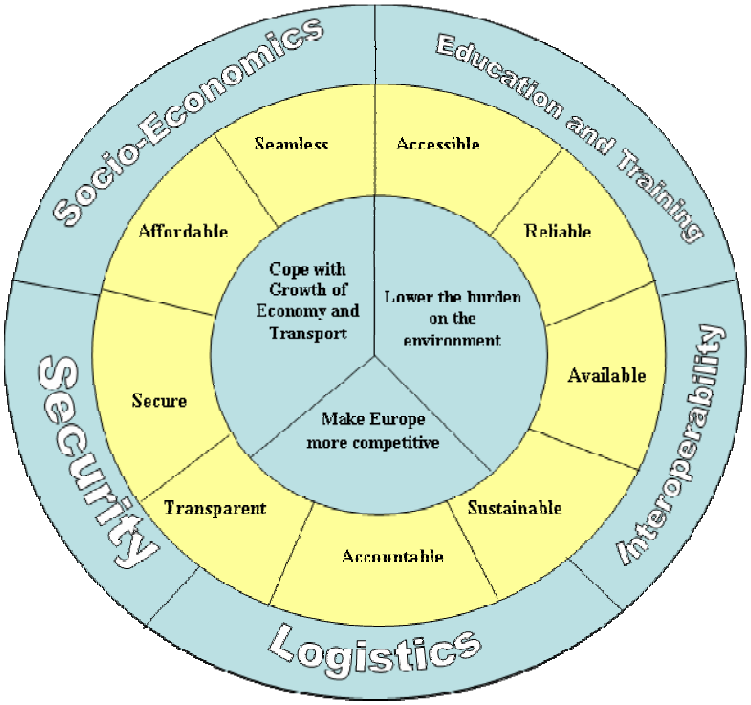

Figure 3: *The EIRAC mission and Strategic Research Agenda*

The EIRAC Strategic Research Agenda identifies research areas and defines implementation plans for its five pillars of research: logistics, security, interoperability, socio-economics and education and training.

Information and communication technology (ICT) plays an important role in all fields of research. Utmost priority is given not to the technical aspects of information but rather to the creation of applied collaborative work environments (CWE), geared toward supporting the aforementioned requirements of intermodal transport systems.

For ICT, this means defining fields of research to develop CWE that support intermodal transport systems in achieving the following target objectives (cf. EIRAC-SIRA):

- Seamless: Barriers to modal exchange at nodes are minimized.
- Reliable: Deliveries are punctual and commodities are undamaged.
- Available: Door to door services are provided 24/7, and Europe-wide.
- Accessible: Customers deal with one stop shops / single entry points.
- Secure: Commodities end up in the hands of those entitled to receive them and intrusions are impossible.
- Sustainable: Intermodal transport systems are built to last and strike the right balance between cost for the customer and achieving the overall societal objectives.
- Accountable: Customers have a contract with one party responsible for performance during transport.
- Affordable: Intermodal transport is in the position to offer competitive prices to customers and sufficient profits to operators and investors.
- Transparent: All stakeholders understand the relation between public costs and market prices (per infrastructure / slot / facility / commodity).

The project MOSAIC is exploring the requirements of CWE for mobile users collaborating in distributed workplaces. For CWE for transport processes, the following aspects of the results from MOSAIC especially deserve consideration:

- Availability of experimental environments,
- Good practice approaches,
- Personalization of services and content, context awareness and adaptation,
- Transparency and awareness of situational contexts,
- Open service infrastructure and
- Seamless mobility.

These requirements constitute an orientation for concepts for solutions for the services of the eLOGMAR-M platform.

3 eLOGMAR-M Collaborative Work Environment

Container transport occupies an increasingly exposed position in intermodal transport chains. Since all modes of transport use containers throughout, they furnish excellent conditions for harmonizing transport processes and form an ideal basis for developing new technologies and collaborative work platforms.

The planning and control of transport is increasingly being done by service companies that use their know-how to support customers throughout the world. However, increasing flexibility and transparency requires making information on currently valid planning data (e.g. tariffs, availabilities, legal regulations, etc.) available anytime anywhere. Particularly on global routes, this requirement is becoming a factor determining competition.

That is why the eLOGMAR-M consortium selected container transport along the maritime freight route from China (Shanghai, Shenzhen) to the Baltic Sea region (Tallinn) to design, develop and test the use of Internet-based planning environments for mobile users with mobile access.

The objectives of the eLOGMAR-M project are to:

- Provide services and new work methods for mobile actors (traders, shippers, brokers, consignees, forwarders, railways, etc.);
- Create an Internet-based collaborative work environment and mobile access to it using GPRS;
- Use best practice to demonstrate the Internet based work environment;
- Demonstrate examples of information resources along the Europe-China maritime freight route in a dynamic virtual work environment;
- Create an interactive Internet website as a tool to support the dynamic collaboration of partners along the maritime freight route.

Thus they are geared toward conforming to the EIRAC Strategic Research Agenda. The results of eLOGMAR-M will consequently provide a foundation for their transfer to appropriate applications.

The exploitation of the project results will be in the hands of the Baltic Regional Competence Centre (www.balticIT.com).

4 Conclusions

On a Web portal, the project LOGMAR-M provides demonstrators for mobile solutions along the maritime transport route from China to the Baltic Sea region and supplies accompanying information on existing ICT solutions, legislation and regulations and educational and training programs for logistics. This is considered an initial step toward creating a global work platform for planning and coordinating transports between European and Asian logistics center.

5 Bibliography

Zukunft der Mobilität – Szenarien für das Jahr 2025, Institut für Mobilitätsforschung, 2005, Verlag: BMW AG, Munich 2005

EIRAC-SIRA Strategic Intermodal Research Agenda 2020, December 2005, www.eirac.net

WATERBORNE Strategic Research Agenda (SRA), 2006, www.waterborne-tp.org

MOSAIC The Future Workspace – Perspectives on Mobile and Collaborative Working

Blümel, E.; Straßburger, S.: eLOGMAR-M – Mobile Kommunikationslösungen zur Unterstützung der Logistikprozesse in maritimen Anwendungen. In: IFFOCUS – Logistik verbindet., 2005, 1, ISBN 3-8167-6850-4, S. 23-25

Blümel, E.; Vinichenko, S.; Novickis, L.: Model-based essential logistics principles for creating a web-portal of transport services' consumers. In: 19th European Conference on Modelling and Simulation »Simulation in Wider Europe«, Riga, Lettland 01.-04. June 2005, Proceedings, Tagungsband, ISBN 1-84233-112-4, S. 193-198

Blümel, E., J. Babot, L. Novitsky: Applications of Simulation and IT Solution in the Baltic Port Areas of the Associated Candidate Countries, JUMI Ltd., Riga, 2003, ISBN 9984-30-057-9

Blümel, E., L. Novitsky: Simulation and Information Systems Design: Applications in Latvian Ports, JUMI Ltd., Riga, 2000, ISBN 9984-606-73-2

Blümel, E. et al. Managing and Controlling Growing Harbour Terminals, SCS European Publishing House, San Diego, Erlangen, Ghent, Budapest 1997, ISBN1-56555-113-3

ESSENTIAL LOGISTICS PRINCIPLES FOR CREATING A WEB-PORTAL OF TRANSPORT SERVICES' CONSUMERS

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Keywords

Transport logistics, Modelling, Web-based solutions

Abstract

Logistics platform for development of Web-portal for transport services' consumers is described in this paper: the maritime freight route and target groups of actors operating along it are identified, logistics model as a set of business charts, communication diagrams and flowcharts is described.

Introduction

Functioning of the market economy depends on the effective information provision of the transport services. It is really important to reach synchronization of business processes, cargo and data flows and integrity among different activities accompanying cargo transportation along the selected freight route. One of the goals of eLOGMAR-M project is to create a Web-portal for information providing to transport services' consumers. The major idea from logistics point of view is to estimate a start-to-finish rate of cargo transportation and to select the most suitable carrier.

1 The Maritime Freight Route and Target Groups

The maritime freight route "Baltic Sea feeder ports - Western Europe hub port (Hamburg) - Mediterranean port (Thessaloniki) - Chinese ports" is selected as the subject of investigation and demonstration. The rapidly developing trade between Europe and Asia, the polarisation of producers in Asia and of consumers in Europe needs the improvement of supporting services along this transportation routes. Containerships present one half of the turnover measured in gross tonnage along the route "East Asia ↔ North-Western Europe", with China being the largest producer of container traffic originating in Asian countries. Multilevel logistics and transport business process was analysed at three levels (Figure 1): First level – containers delivery from one deep sea port (hub) to another by deep sea shipping lines, Second level – containers delivery from hub port to smaller feeder ports by feeder shipping lines, Third level – containers delivery from feeder ports to customers by trains

and/or trucks. The Baltic Sea Region is selected as the sample of feeder shipping and Port of Hamburg as container hub for this region.

Actors from two major target groups are involved in cargo transportation process:

1. *Transportation group (K1):* deep sea and feeder shipping lines, shipowners, terminal operators, block train operators, forwarding companies, multimodal transportation operators, freight brokers, truck carriers.
2. *Transportation group (K2):* cargo owners, traders.

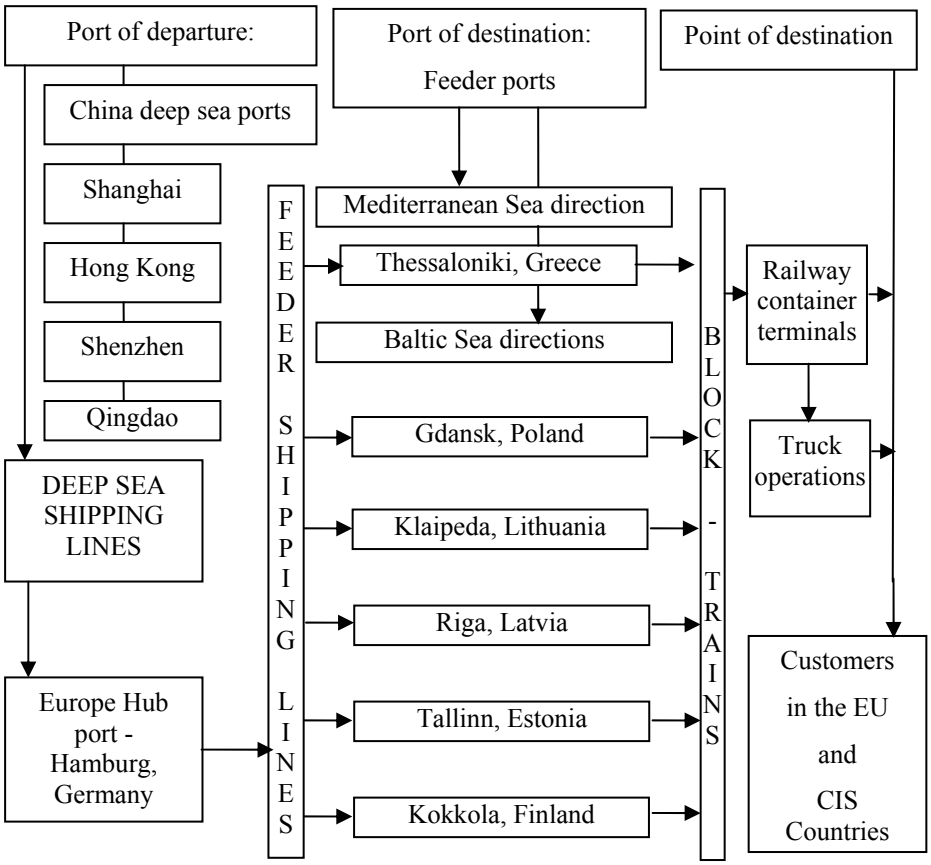

Figure 1: *Multilevel Logistics and Transport Business Process*

2 Analysis and Modelling of Business Processes

A set of business charts and communication diagrams from BSP method (Bluemel et al. 2003) and LIS Technology (Ginters et. al. 2002) is used for presentation of business processes of collaboration between partners from two major groups (transportation and cargo groups), which are involved in logistics processes of freight transportation along the selected route. The BSP method is used to produce

the set of business charts ("Processes – Actions" and "Actions – Executors"). Table 1 presents three main processes and appropriate actions of their detailed definition. Table 2 presents samples of business actions sharing among classes of executors (two major groups: cargo group and transportation group).

Table 1: *Business Chart "Processes – Actions"*

Processes	Actions
1. Preparation of Information regarding services of actors from transportation group	1.1. Preparation of information regarding sailing schedules (deep sea shipping lines) 1.2. Preparation of information regarding sailing schedules (feeder lines) 1.3. Preparation of information regarding characteristics of port terminals 1.4. Preparation of information regarding intermodal (block train) services 1.5. Preparation of information regarding characteristics of rail terminals
2. Promotion of services and information distribution among actors from cargo group	2.1. Printing and distribution of leaflets and handbooks 2.2. Presentation at conferences and exhibitions 2.3. Meetings arrangement with potential customers 2.4. Providing access to information via Internet
3. Looking for suitable actors from transportation group for cargo delivery in accordance with terms and conditions of a contract	3.1. Study and analysis of information presented by actors from transportation group in different ways (handbooks, Web-sites etc.) 3.2. Preparation and distribution of inquiries regarding conditions of cargo transportation 3.3. Study and analysis of replies to inquiries received from transportation group 3.4. Making a decision concerning the selection of partners from transportation group

Table 2: *Business Chart "Actions – Executors"*

Executors / **Actions**	**Actors from K1**	**Actors from K2**
1.1. Preparation of information regarding sailing schedules (deep sea shipping lines)		
1.2. Preparation of information regarding sailing schedules (feeder lines)		
1.3. Preparation of information regarding characteristics of port terminals		
1.4. Preparation of information regarding intermodal (block train) services		
1.5. Preparation of information regarding characteristics of rail terminals		
2.1. Printing and distribution of leaflets and handbooks		
2.2. Presentation at conferences and exhibitions		
2.3. Meetings arrangement with potential customers		
2.4. Providing access to information via Internet		
3.1. Study and analysis of information presented by actors from transportation group in different ways (handbooks, Web-sites etc.)		
3.2. Preparation and distribution of inquiries regarding conditions of cargo transportation		
3.3. Study and analysis of replies to inquiries received from transportation group		
3.4. Making a decision concerning the selection of partners from transportation group		

Note: K1 – Transportation group; K2 – Cargo group.

Communication diagrams present a model of information objects and links between them: three levels model is presented in Figures 2, 3 and 4.

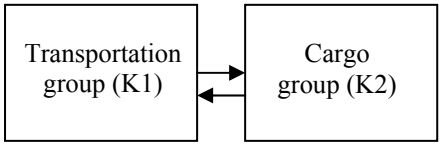

Figure 2: *First Level*

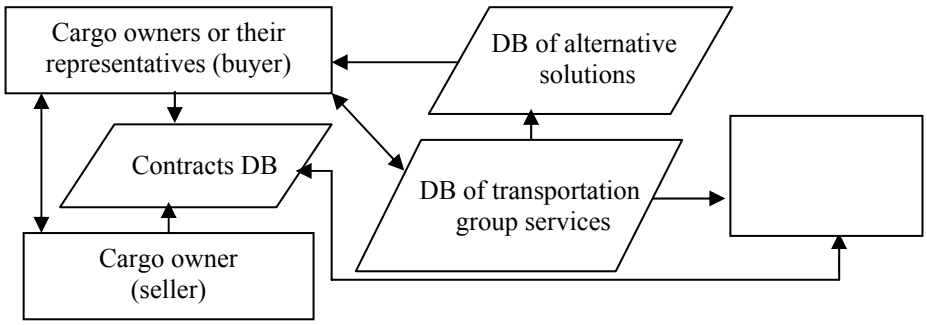

Figure 3: *Second Level*

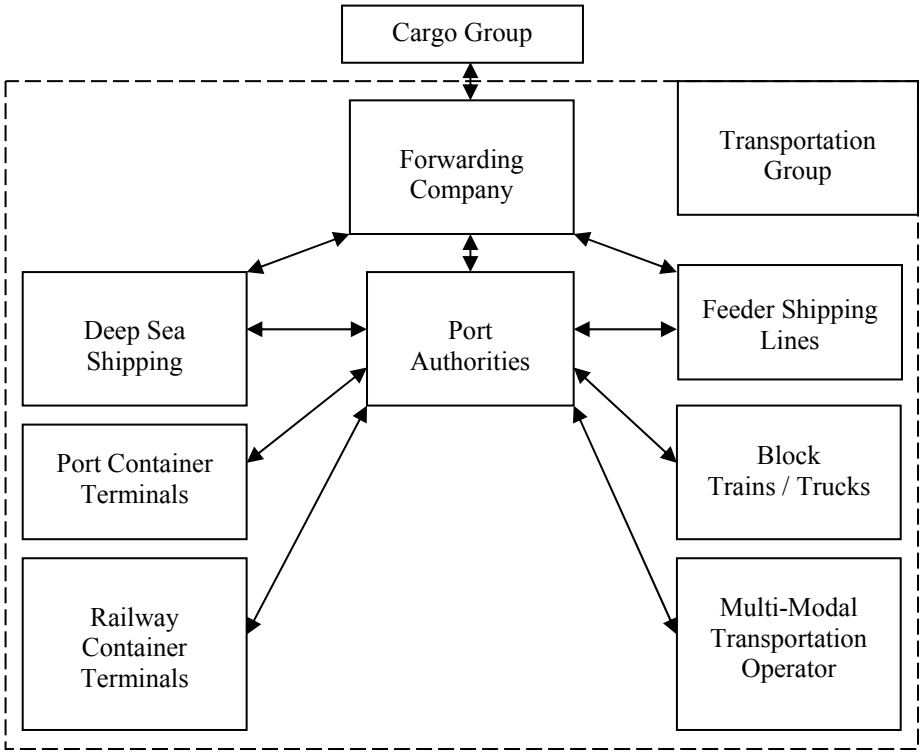

Figure 4: *Third Level*

The following business processes are supported by Web-portal:

1. Cargo group:
   - preparation of contract of Sale/Purchase.
   - looking for suitable actors from cargo transportation group in accordance with terms and conditions of a contract of Sale/Purchase and estimation a start-to-finish transportation rate.

2. Transportation group:
    - promotion of services by the way of distribution of information via Internet and mobile communication.
    - preparation of initial information regarding services and its maintenance.

3 Components of Web-portal in Transport Logistics

Each actor, who is involved in business processes of cargo transportation along the selected freight route, has a freedom to maintain the content of its part taking into consideration the specifics of the transport services. However, the portal will have a core of components and each of the actors has to contribute to its maintenance. This core of components contains:

- general information (overview of IT and Communication Solutions with transport logistics and maritime applications, overview of EU regulations, international standards and national laws, overview of opportunities and computer-based courses for training).
- information regarding solutions in transport logistics (initial information and algorithm of decision making). Initial information contains: sailing schedules of ocean and feeder lines, schedules of block-train services, characteristics of port and railway terminals, terms of freight delivery and transportation etc.

A Web-portal is aimed at supporting of decision making in transport logistics, using business processes models, general and initial information. Both target groups will benefit from Web-portal applications:

- actors from transportation group by promotion of their services and increasing cargoes flows.
- actors from cargo group by calculating and estimation a start-to-finish transportation tariffs and choosing better cargo carrier, who meets the required criteria.

4 Flowchart of Decision Making

Flowchart of decision making is presented in Figure 5.

As it was mentioned above, two groups of actors are involved in solving logistics tasks: **Group K1 –** transportation group; **Group K2 –** cargo group.

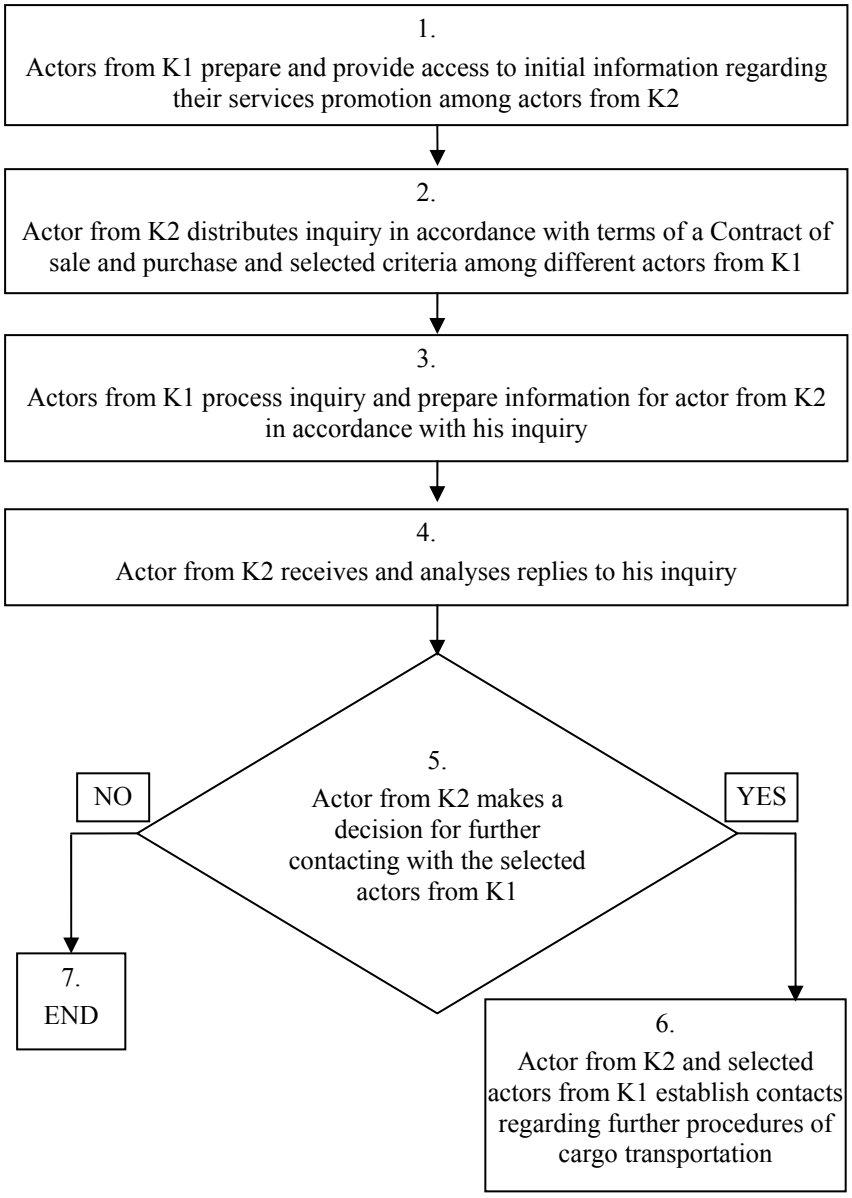

Figure 5: *Flowchart Showing Processes of Decision Making*

Block 1: For promotion of their services actors from transportation group must present information regarding their activities.

Block 2: Actors from cargo group prepare their inquiries in accordance with terms of a contract and distribute them among actors from transportation group using results of marketing analysis.

Block 3: Actors from transportation group study inquiries from cargo owners and prepare necessary information, which is based on transportation tariffs and delivery times.

Block 4 & Block 5: After receiving reply representative of cargo group studies it, compare with alternative proposals and make decision for further contacting with selected actors from transportation group.

Block 6: Different communication and organisational means are used for further establishing and keeping contacts between actors from two major groups to support cargo transportation process.

This flowchart of decision making implemented by the set of special functions of Web-portal.

The basic major criteria of a carrier selection are full cargo transportation tariff and estimated time of delivery. In accordance with European practice the following list of additional (extra) criteria for carrier selection is used (UNCTAD, 1997):

- readiness for negotiations about tariff reduction.
- carrier financial stability.
- additional equipment availability (for a cargo handling) containers.
- stability of services.
- extra services availability for set making an a delivering cargo.
- cargo safety (loss an pilferage).
- staff qualification.
- cargo monitoring.
- quality of transportation sales services.
- special equipment availability.

In practice any sub-set of these criteria can be applied.

5 Conclusions

1. Application of business charts and communication diagrams for modelling and presentation of transport logistics processes along the selected freight route is illustrated.
2. The major logistics principles of creating a Web-portal in transport logistics are described.
3. Logistics principles and models presented in this paper are used for developing a Web-portal of eLOGMAR-M.

Acknowledgement

The presented activity is supported by the eLOGMAR-M project funded under the IST Sixth Framework Programme of the European Commission.

References

Bluemel, E. et al. 2003. "Applications of Simulation and IT-solutions in the Baltic Port Areas of the Associated Candidate Countries". JUMI, Riga.

Ginters, E. et al. 2002. "Logistics Information Systems. Part 1". JUMI, Riga

UNCTAD. Multimodal Transport, Handbook, Fifth edition March 1995, April 1997. Geneva.

EDUCATION AND TRAINING: TOWARDS CONSTANT KNOWLEDGE TRANSFER IN GLOBAL TRANSPORTATION

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Keywords

Education and training, Transport logistics, e-Learning

Abstract

The paper describes current worldwide trends in education and training with special focus on transport logistics. The paper is based on a comprehensive research performed on existing courses provided in the area of transport logistics and maritime logistics in particular by the universities, international organisations and commercial companies. Basing on the results of the research a sample curriculum is proposed. Also more general conclusions from the state of the art are drawn and recommendations for future developments are presented

Introduction

It is commonly agreed that one of fundamental driving forces of the modern free-market economy is the ability of nations to adapt to changing and ever complicated conditions. The economy of XXI century is thus a knowledge economy, one based not only on capital, labor or natural resources, but more and more on education, and training, access to information and knowledge. More and more people worldwide understand this dramatic change, pay much attention to, and are very interested in high quality education as a necessary tool for shaping their future. Therefore, it is really crucial for decision makers all over the world to realize this shift in priorities in order to achieve economic, social and political goals. For those on the delivery end, like universities and other educational institutions it is vital to transform their organizations in such a way as to meet this steeply growing demand for high level educational services. One of the goals of eLOGMAR-M project is thus, to study this fascinating phenomenon in the area of transport and maritime logistics and basing on the state of the art to propose a unified, sample curriculum for a modular course in maritime logistics. It is a study of great importance as the proper functioning of the global economy depends on the effective running of the transport services, and the highly skilled and qualified specialists in this area are and will be of utmost importance.

1 Modern Education

At first, let us concentrate on the basic, general features of the modern education processes and their common characteristics. It could be said that education is a commodity in the sense of the good that should be affordable for most (if not all) of the people in the world. On the other hand education has to be provided on a high level which implies serious and still growing cost of its delivery. It is therefore, a merchandize, which has its price. It is not so obvious how to make those apparently conflicting requirements meet. There are several existing solutions, globally, but not all of them work properly (see e.g. Lambert and Butler, 2006 for a detailed description of ailing European university system). Also an important feature of the modern education (but one also historically valid) is its borderless capacity. Already in the Middle Ages the education was provided regardless of state, national or other borders. This was known as the *"Wandering Scholars"* phenomenon. Nowadays it is even more so with the overwhelming access to Information Technology. What is a characteristic of current education systems is the rapidly increasing number of people attaining the highest education levels, i.e. university education. It is quite probable that in not so distant future we may reach "university education for all" goal. People all over the world are extremely responsive to the demand of modern economy for the labor force of the highest qualifications. They see education, quite rightly, as an insurance policy against the uncertain future. As the environment changes so do we, and the high level of education is the most suitable tool in this process. Education is also very important on more personal level. It can be perceived as a provider of tools for continuous self-development. Hence, education is a life-long experience.

Last but definitely not least education is a very serious economic issue. Lest us have a look at some numbers and predictions related to this issue:

1. A 2002 IBM report forecast a threefold (US$4.5 trillion) jump in global education expenditure during the following 13 years.
2. The World Bank expects the number of higher education students will more than double from 70 million to 160 million by 2025.
3. Gartner predicted in 2001 that corporate investment in e-learning will grow from US$2.1 billion in 2001 to US$33.4 billion in 2005.

It can be easily seen that booming education activities are becoming a huge industry, one of the key factors in the future development of the leading states and nations.

2 Global Challenges

Joseph Schumpeter (1934), Austrian born economist in his famous book predicted that every 50 years or so, technological revolutions would cause "gales of creative destruction", in which old industries would be swept away and replaced by new ones. One may summarize some facts form the history of technology to support the Schumpeter's statement as follows:

- Steam Power - 1780s to the 1840s

- The Railways - 1840s to the 1890s
- Electric Power - 1890s to the 1930s
- The Motor Car - 1930s to the 1980s
- Information Technology - 1980s to ?

It should be pointed out, however, that the pace of changes has increased dramatically through the years. Here, one may see how long it took for three major inventions of XX century to reach 50 million users:

- *Radio*:
  - 50 million users in 38 years
- *Television*:
  - 50 million users in 13 years
- *The Internet*:
  - 50 million users in 5 years
- *Currently:*
  - Internet has over one billion users

It is also interesting to notice that internet population, already, less than ten years after its birth, has become truly global and international. Internet is available in most countries in the world and is growing rapidly. The numbers presented below for year 2003 are already surpassed by almost a factor of two globally and in some countries even more than that.

Table 1: *Internet population in millions*

• USA	165.7
• Japan	56.1
• China	45.8
• UK	34.3
• Germany	32.1
• South Korea	25.6
• Brazil	13.9
• Australia	10.6
• Netherlands	9.7
• Sweden	6.1
• Worldwide	>600

Source: A C Nielsen, June 2003

Taking into account the existing tools and technologies, as well as the needs and the capabilities for providing education we may say about four different knowledge transfer models.

- Model 1 – Same place, same time
  - Lectures F2F, labs, seminars, exams etc. Classical university model
- Model 2 – same place, different time
  - Libraries, e-libraries, computer classes, education centres
- Model 3 – different place, same time
  - Synchronous net of education - radio, TV, CATV, Sat TV, audio- and video teleconferences, net meetings – excellent for big companies, too expensive for individuals
- Model 4 – different place, different time
  - Self-education (books or multimedia CDs)
  - Asynchronous net of education (Internet, e-mail) – new tool for virtual universities

Of these, the one which is growing rapidly and is becoming more and more attractive for many potential benefactors of educational activities is the model 4, based on the global availability of Internet. Model 1 is a traditional and dominant model at the universities and other Higher Education Institutions (HEI). It is still used extensively but there are clear signs that many universities are enhancing it with some features of other models (e.g. Model 2 or Model 3). Model 4 is in a sense an evolution of Model 3, but its genuine features yield its much greater attractiveness. First of all it is much cheaper that Model 3, it does not need very expensive equipment and it enables the user to adjust the timing of the education to his/her own capabilities and possibilities. These are some of the reasons why many established educational institutions have already adopted the solutions based on Model 4 in full or at least partially. It is almost sure that many more will move in this direction. This approach will bring us closer to what many call *Knowledge-based Economy*. However one must realize that universities and HEIs all over the world face a huge need for changes, and a great effort is required on their part in order to meet the needs for appropriate level of education. Let us at the end of this section quote one of prominent specialists in the area of university education, *Professor emeritus of Science and Engineering and Former President of University of Michigan, J J Duderstadt.* In his statements (Duderstadt, 2001, Wulf and Duderstadt, 2003) he underlines the importance of education on the one hand and the importance of changes in the education system on the other hand.

My contention is that as the baby boomers get older and die off, we'll come to realize that the dominant national priority---and the dominant global priority---for the 21st century will be intellectual capital.

Ideas are the key to the new economy, and educated people produce the ideas.

"There are increasing signs that our current paradigms for higher education, the nature of our academic programs, the organization of our colleges and universities, and the way that we finance, conduct and distribute the services of higher education may not be able to adapt to the demands of our time."

(Duderstadt, 2001)

3 Study on Existing Educational Activities in Transport Logistics

One of the major tasks within the eLogmar-m project work on Education and Training was to research the existing educational offer on transport logistics with special focus on maritime applications. Therefore a detailed and comprehensive study has been performed. The study was designed to cover the following topics:

- Higher schools educational programmes worldwide,
- Vocational training courses,
- Internet / Computer-based courses in transport, logistics and maritime applications.
- Structure of a modular course in transport logistics
- The research had a really global reach and covered logistics education worldwide.

Research result is an overview of logistics education over the world. It covers 20 countries – in the EU: UK, Germany, France, Netherlands, Ireland, Finland, Scandinavia (Denmark, Sweden), Baltic States (Latvia, Lithuania, Estonia), Mediterranean (Greece), Poland, Hungary, non-EU European Economic Area members: Norway, and Switzerland, and major world powers in terms of education: China, USA and Canada, Russia.

During our studies we have divided the activities offered into the following:

- Undergraduate and postgraduate level
  - Universities,
  - other HEIs
- Post-diploma level
  - Universities,
  - other HEIs,
  - education companies
- Trainings and short courses also, vocational training
  - Educational companies,
  - organisations,
  - HEIs

- Distant learning (e-learning)

  Educational companies,

  organisations,

  HEIs

Public Education Institutions providing education in logistics

Public HEIs researched usually have full academic rights – can grant bachelor, master and doctor degrees

HEI types recognized in most countries covered:

- University – full plethora of courses, logistics usually part of engineering, economy or management e.g. U. Newcastle/Tyne, U. Bergen, Klaipeda U., U. Arkansas, U. Magdeburg
- University of Technology – main focus on engineering, but some economy, management and social sciences e.g. Chalmers UT, Eindhoven UT, Riga TU, Warsaw UT, Tallin TU, Budapest UT
- Academy of Economy – main focus on economy, but other social sciences and management also crucial e.g. SGH-Warsaw Academy of Economy
- Academy of Defence – main focus on military e.g. RMCS (U. Cranfield), National Defence Academy (Poland)
- Maritime Academy – main focus on maritime e.g. Latvian Maritime Academy, Gdansk Maritime Academy
- Scientific institutes e.g. IFF – Fraunhofer Geselschaft

It is fairly easy to distinguish the best in the business as there exist official and unofficial rankings e.g. RAE and TAE in UK or Carnegie Classification of Institutions of Higher Education in US

Public HEI offer

- Full academic courses

  - undergraduate B.Sc., BEng., Eng., Dipl-Eng. (FH)

  - postgraduate M.Sc., MA, Magister, Dipl-Eng.

  - Interdisciplinary studies e.g. – Transport and Telecommunication or Logistics and Management

- Post-diploma studies – extended qualifications
- PhD studies – scientific orientation
- Short courses – specific knowledge, in the university or company

- Distant learning – can be undergraduate, postgraduate, post-diploma or vocational
- Vocational training both for profit and non-profit – may lead to a nationally or internationally recognised diploma

Non-public Education Institutions providing education in logistics

- Non-public (private) HEIs – e.g.:
  - Transport and Telecommunications Institute (Latvia)
  - International High School of Logistics and Transport (Poland)

offer mostly undergrads courses, short courses and distant learning

- Logistics is also taught as a subject in numerous High Schools of management, business and economy, some international

Some of non-public HEIs are accredited by professional or administrative (state) bodies. They are generally perceived as more trustworthy

Commercial activities

Educational companies offer mainly the following educational activities on a purely commercial basis

- short courses,
- vocational training and
- distant learning

The training offered is very diverse and also the quality may vary.

In the sequel we shall concentrate on the details of logistics educations in public HEIs. We can classify the offer into the following groups:

1. Logistics is offered at Universities of Technology as part of studies in Engineering (Transport, Automation and Robotics, Computer, Mechanical), Management, Economy, e.g. RTU, KUT, WUT, NTUA, TU Crete, Chalmers, Eindhoven, NTNU, DTU, Budapest UT, Cranfield, Newcastle, Alabama A&M, Beijing, Shanghai, Dalian, Shenzhen etc.

Case study 1 – Warsaw University of Technology, Department of Transport

Specialisation – Logistics and transport techniques (LTT), further divided into LTT of railway transport, LTT of road transport and LTT of internal transport and warehousing.

2. Logistics is offered at Universities and Academies of Economy as part of studies in Management and Economy e.g. University of International Business and Economy (UIBE), China, SGH Warsaw, OvG University Magdeburg, AUEB Athens, University of Arkansas)

Case study 2 - Warsaw Academy of Economics (SGH), Department of Management, Chair of Logistics, Specialisation – Logistic Management

3. Logistics is offered at some National Defence Academies – little details is known (secret?)
4. Maritime Academies offer mainly postgraduate education for engineers or marine professionals. Follow the pattern of UT with more focus on port operations

Case study 3 – Latvian Maritime Academy,

Master program in maritime transportation Specialization in maritime transport management and maritime transport maintenance

Distant (e-) learning in logistics this is presumably the most important future way of development of new courses in the area. Following the general educational trends also education and training in logistics will be more on more based on the use of modern IT. So far, existing proposals can be grouped as follows:

- Pure open universities – e.g. Open University (UK), FernUniversitaet (Germany), Universidad Nacional de Education a Distancia (Spain)
- Dual-mode universities – both traditional and e-learning e.g. WUT (Poland),
- Consortia of universities – joint courses, administration, diplomas e.g. Virtual University (Poland), Federation Interuniversitaire d'Enseeignement a Distance (France)
- Professional and international organizations
- Education companies

4 Sample Curriculum in Transport Logistics

Basing on the results of the research conducted and the general trends observed, in this section we shall concentrate on a sample Curriculum of a modular course in Transport Logistics. It is based on the results of the study, and the experience that research team has gained in this area at Warsaw University of Technology

Institution: Warsaw University of Technology, Department of Transport

Specialization: Logistics and transport techniques (LTT)

Profiles: LTT in railways, LTT in road transport, LTT in maritime transport, LTT in internal transport & warehousing, LTT in multimodal transport

Sample program

Subjects: I year: General – Maths, Physics, CAD, Computer Science, Economy, Philosophy, International Relations,

Subject-specific – Transport systems & processes, material eng., Eng. design

II year: General – Electrical eng., operational research, mechanical eng.., Transport economics, Foundations of International Law

Subject-specific – Transport infrastructure, logistics

III year: General – Electronics, control, telecommunications, measurement eng., management

Subject specific – Traffic eng., rail traffic, road traffic, internal traffic, advanced transport systems, maritime transport

IV year: warehousing, cargo handling, management & organization, IT systems in transport, port operations, modeling & simulation, cargo flow in logistics, supply chain management, multimodal transport, electives (Control in rail or road or internal or maritime transport, …)

The course presented is an example of how a modern course in the area of transport logistics could look like. Our recommendations to the modern course on transport logistics may be summarized as follows:

Modern logistics education should:

- be mixture of engineering, economy, management and social/political sciences
- include strong international flavor
- adopt new ICT tools – e-learning, m-learning
- be continuous, life-long experience

Looking ahead in the future we may see some trends emerging which should be taken into account by all those interested in providing the highest level modern education.

- Full undergraduate and postgraduate Internet based studies – major or additional - will be a standard offer
- Technological breakthrough has come and still more to be expected
- World is approaching the university education for all
- Education becomes one of major driving forces in global economy
- Educational offer becomes very diverse, causing great interest and also making it more difficult (cost, schedule, timing, HR) to provide

5 Conclusions

1. Logistics education – major issue for universities, organizations and companies all over the world
2. Traditional economy – production focused
3. Knowledge economy – research, marketing, trade focused
4. Continuing education, Life-long education, Education society

Acknowledgement

The presented activity is supported by the eLOGMAR-M project funded under the IST Sixth Framework Programme of the European Commission.

References

Bluemel, E. et al. 2003. "Applications of Simulation and IT-solutions in the Baltic Port Areas of the Associated Candidate Countries". JUMI, Riga.

Ginters, E. et al. 2002. "Logistics Information Systems. Part 1". JUMI, Riga

Duderstadt, J.J., 2001. "Leading Higher Education in an Era of Rapid Change." Presentation at the Midwestern Higher Education Commission, Kansas City, USA,November.

Wulf W., Duderstadt J. J. 2003, "Information Technology and University", Issues in Science and Technology, 19 (4): 82-84

Schumpeter J., 1934 "*The Theory of Economic Development*", Cambridge: Harvard University Press.

Lambert, R. and N. Butler, 2006 "The Future of European Universities. Renaissance or decay", Centre for European Reform, London

A GUIDE TO RULES AND LEGISLATION FOR MARITIME- AND LOGISTICS FREIGHT TRANSPORT COMPANIES

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Keywords

Freight transport logistics, Legislation, Regulations, International Transport Conventions, EU Directives

Abstract

The International Transport Conventions, EU Directives, both present and future, as well as national legislation and regulations affect all modes of freight transport. Statutory instruments are briefly discussed and applied to the route of the EU sponsored e-LOGMAR-M project.

Introduction

Non-harmonised legislation, regulations and associated with that non-harmonised information requirements and procedures, may be considered as the primary cause for legal barriers. Non-harmonised procedures and forms, lack of data and non-compliance with data presentation formats, result in administrative barriers. Both delay the functioning of logistics processes and affect the movement of cargoes.

The statutory instruments governing the supply chain from the Northern Baltic via North-West Europe, and the Mediterranean to China, encompass:

- The international transport conventions enshrined by ratification into the statute books of the signatory countries.
- EU Directives that are transposed into the statutes of the EU Member States.

Legislation and regulations are enablers as well as inhibitors of freight transport. They need to be scrupulously adhered to. To aid the parties involved in national and international freight transport in keeping 'on the right side of the law', and thus avoid, say, costly delays and possible financial loss, and/or good-will from customers, a 'Guide to Rules and Legislation for Maritime and Logistics Freight Transport' has been developed as part of the EU sponsored eLOGMAR-M project. National detail has been restricted to the countries of the partners. With respect to the international conventions, the application of the 'Guide' is global.

The 'Guide' is publicly accessible through the web-sites of e-LOGMAR-M and of the Baltic Regional Competence Centre. It works in conjunction with a search facility. As legal instruments change with time, regular updates are foreseen.

1 Legislation and Regulations applicable to Surface Transport

The objective the 'Guide is to convey knowledge of legal and regulatory requirements to assist with, e.g. exporting, importing, packaging, marking, placarding, customs clearance, cargo handling and storage, transit, and the operation of interfaces between modes such as ports, as well as the operation of freight vehicles. In this case the vehicles are allied to international surface transport. Knowledge of legal and regulatory requirements further assists with effective routing and scheduling of consignments, selection of the mode of transport including the identification of suitable carrier(s). Legal instruments governing international surface transport of freight were considered as indicated in Figure 1 below.

Figure 1: *The International Conventions for Surface Transport*

The international transport conventions typically address:

- The period of responsibility of the carrier
- The basis for the carrier's liability
- The limits of financial liability
- The carrier's liability for sub-contractors
- Documentary requirements
- The consignor's liabilities
- Special provisions concerning dangerous goods
- The time limits for claims and limitation periods.

General industrial practice indicates that most freight journeys are preceded and concluded by road. Long international journeys by road, common practice in Europe, cause both congestion and environmental problems. They do not correspond to the European Common Transport Policy (CTP). For this reason the CMR Convention governing road transport has to be considered. Another reason to elaborate on the CMR Convention is the enormous importance of road transport in China as evidenced in a communication by the China National Communication Administration Information Centre.

1.1 Convention on the Contract for the International Carriage of Goods by Road (CMR Convention)

The Convention on the Contract for the International Carriage of Goods by Road (CMR) was devised by the United Nations Economic Commission for Europe (ECE) and agreed in Geneva on May 19th 1956. It was amended by Protocol on July 5th 1978. It became operative in July 1961. The convention applies to every contract of carriage of goods by road in 'vehicles' for hire or reward when the place of taking over the goods and the place of designated delivery are situated in two different countries of which at least one is a contracting party to the CMR convention. 'Vehicles' includes motor vehicles, articulated vehicles, trailers and semi-trailers. Containers are defined as 'goods', and for this reason the term 'vehicles' does not apply to containers. With respect to intermodal transport, the CMR applies as long as the container remains on 'wheels' throughout the voyage. This means that if a unit comprising of a container and a trailer is transported on board of a ferry, the CMR applies to the ferry transport. If the same unit is transported by rail, the CMR applies. However, if the container is lifted off the road trailer at a port or rail terminal, the link with the CMR is broken and the international conventions of either waterborne transport (Hague- / Hague-Visby- / Hamburg Rules) or rail transport (CIM) apply. It should be noted however, that even when the CMR does not apply by law, the parties can agree to apply its terms by contract. This is done by some operators.

1.2 Convention Relative Aux Transports Internationaux Ferroviaires (COTIF)

ELOGMAR-M has a bias towards rail- and maritime transport. It is concerned with rail transport of unitised cargoes to and from ports and maritime transport along the selected supply chain between the northern Baltic and China. Reference has been made to the International Rail Convention (COTIF/CIM)'s amendment regarding container- and intermodal transport.

The COTIF/CIM Convention applies to international rail transport of goods when the goods are carried over the territories of at least two contracting states and over specified railway lines that form part of the treaty network. Under the CIM, the railway authorities have quasi-common carrier obligations. The COTIF/CIM Convention applies to part transits by other modes, i.e. train ferries between Germany and Scandinavia.

On June 3rd 1999, the '1999 Protocol' for the Modification of the Convention concerning International Carriage by Rail (COTIF) of 9 May 1980, was included. The text of the Convention for the International Carriage by Rail (COTIF) was consolidated in Berne (Switzerland) in 1980 and came into force on May 1st 1985. It applies in over 30, mainly European, ratifying states. Appendix A of COTIF is concerned with passenger transport. Appendix B contains a revised version of CIM, the Uniform Rules concerning the contract for international carriage of goods by rail. The 3rd Annex of the Convention addresses the international transport of containers by rail (RICo). It needs to be noted that the provisions of the COTIF/CIM only apply where a CIM Consignment Note has been made out.

1.3 European Agreements concerning the International Agreement of Dangerous Goods by Road (ADR); and the Regulations concerning the International Carriage of Dangerous Goods by Rail (RID)

In response to the events of 11 September 2001, the United Nations agreed to proposals to enhance the *security* of transporting dangerous goods. These proposals were published in the 13th revised edition of the UN Model Regulations in December 2003. The international bodies responsible for the international carriage of dangerous goods by road and rail agreed to adopt these Model Regulations, with some small changes relevant to their particular modes of transport. The European Commission adopted these new road and rail security measures in December 2004. This meant that all 25 member States were required to implement and apply them to all dangerous goods by July 2005. The requirements are split into two levels:

- A general level applicable to the carriage of all dangerous goods, and
- A higher level for the carriage of high consequence dangerous goods.

The later are defined as having the potential for misuse in terrorist incidents which may produce serious consequences such as mass casualties or mass destruction.

1.4 The Hague- and the Hague-Visby Rules

To resolve the ongoing conflict between the interests of shipowners and cargo owners the 'Hague Rules draft', as proposed by the Committee International Maritime (CIM), was signed in Brussels on 25 August 1924. Its official designation is "International Convention for the Unification of certain Rules of Law relating to Bills of Lading". The basis of the Hague Rules is an arrangement between shipowning- and cargo-owning interests. This arrangement is similar to that applicable under the United States' Harter Act, and those of the subsequent statutes adopted in Australia, New Zealand and Canada. They are based on compromises between the carrier's duties and the interests of cargo owners. The shipowner is bound before, and at the beginning of the voyage, to exercise due diligence to:

- Make the ship seaworthy
- Properly man, equip and supply the ship
- Make the holds, refrigerating and cool chambers and other parts of the ship in which goods are carried, fit and safe for their reception and preservation.

The Rules apply from 'Tackle to Tackle' only. They are subject to a list of carrier's immunities. The carrier shall properly and carefully load, stow, carry, keep, care for, and discharge the goods carried. The carrier is obliged to issue bills of lading. Any clause, covenant or agreement in a contract of carriage relieving the carrier or the ship from liability for loss or damage to or in connection with the goods, arising from negligence, fault or failure in the duties and obligations or lessening such liability otherwise than as provided in the Convention, shall be null and void and of no effect. A major loop hole exists in the Rules in that, if by custom no bill of lading is issued, the carrier is not legally bound to apply the Rules and can, subject to national law, apply its own terms. This situation has arisen on cross-channel routes where Ro-Ro operators do not issue bills of lading but only non-negotiable receipts. The Rules are not mandatory when deck cargo or live animals are carried.

1.5 The Hamburg Rules

In the second half of the twentieth century a new dimension of conflict between shipowning and cargo owning interests occurred. It was an attempt by 'third-world' countries to make up for their backwardness both in terms of economic interests and in terms of influence within the international institutions. The 'Visby' Amendment Protocol to the Hague Rules did not take this new circumstance into account. On the initiative of the developing countries, the rules governing carriage of goods by sea were profoundly re-examined. Therefore, the United Nations Conference on Trade and Development (UNCTAD) passed a resolution under which the creation of a working group on the law of carriage of goods by sea was proposed. 'Discussions' were moved from UNCTAD to UNCITRAL, the United Nations Commission on International Trade Law. Procedures resulted in the UNDTAD Code of 40-40-20 for sharing out of trade between ships flying the flag of the nations engaged in trading 40% each, and 20% to cross-traders and in the Hamburg Rules which in the main have been ratified by the developing nations only.

1.6 The York-Antwerp Rules 2004 (Marine Insurance)

An ocean marine loss that occurs through the voluntary sacrifice of a part of the vessel or cargo, or of an expenditure to safeguard the vessel and its remaining cargo from a common peril. If the sacrifice is successful, all interests at risk contribute to the loss based on their respective saved values. A party can insure their portion of such a loss under an 'ocean marine policy'. The York-Antwerp Rules 2004 govern how loss and or damage is apportioned between the ship and or cargo interests. Damage or loss is referred to as "Average" and a distinction must be made between

- "General Average" that can be conveniently defined as: "Loss arising in consequence of extraordinary and intentional sacrifices made, or expenses incurred, for the common safety of the ship and cargo"; and
- "Particular Average" where damage or loss occurs to ship and or cargo by accident.

Regardless of whether a specific cargo is affected by the peril leading to general average, there will be need for a contribution, either as a general average guarantee on the part of the underwriters or a cash deposit by the cargo owner before his cargo will be released either for delivery or onward transport. 'General Average' is a peculiarity of waterborne transport and does not occur in any other mode of transport.

In case of 'Particular Average', i.e. accidental damage either to ship or cargo, e.g. wave damage to the vessel or water damage to the cargo, each party bears its own loss against which they should have insured.

1.7 United Nations Convention on the Liability of Operators of Transport Terminals in International Trade (United Nations UNIDROIT Convention, 1994)

There are uncertainties as to the legal regime applicable to goods in international trade when the goods are not in the custody of carriers nor in charge of the cargo owning interests. Facilitating the movement of goods by establishing uniform rules

concerning liability for loss of, damage to, or delay in handing over such goods while they are in the charge of operators of transport terminals, and are not covered by the laws of carriage arising out of conventions applicable to the various modes of transport, is an important step. The United Nations' 'Convention on the Liability of Operators of Transport Terminals in International Trade, 1994' tries to achieve this.

The salient features of the Convention are: Definitions; Period of responsibility; Issuance of document; Basis of liability; Limits of liability; Application to non-contractual claims; Loss of right to limit liability; Special rules on dangerous goods; Rights of security in goods; Limitation of action; Contractual stipulations and Interpretation of the Convention.

2 EU Directives related to the Surface Transport of Freight

Specific issues related to EU Directives applicable to surface transport, maritime transport and ship operations, as well as port operations have been elaborated upon. Some details are shown in Figure 2 below.

Figure 2: *Aspects of EU Directives, Maritime Transport and Port Operations*

2.1 Road Transport

In the case of eLOGMAR-M, the Directives of the EU relate to surface transport, in particular rail- and maritime transport, and to pre- and post contract haulage where road transport is generally used. To be enshrined in law, EU directives need to be transposed into the national statue books of each member State. Naming, summarising and discussing applicable EU directives fall therefore under the auspices of each partner country. Due to the extent of the information from 17 partners they have to be excluded from this paper. However, an overview of EU directives applicable to surface transport of goods, whether they have been transposed into national law or not, is presented below, starting with road transport for pre- and post contractual carriage, Figures 3 and 4.

Figure 3: *EU Directives applicable to Freight Transport by Road*

Whilst Figure 3 relates to the Directives directly associated with goods transport by road, the Directives listed in Figure 4 below relate to the safety of road transport.

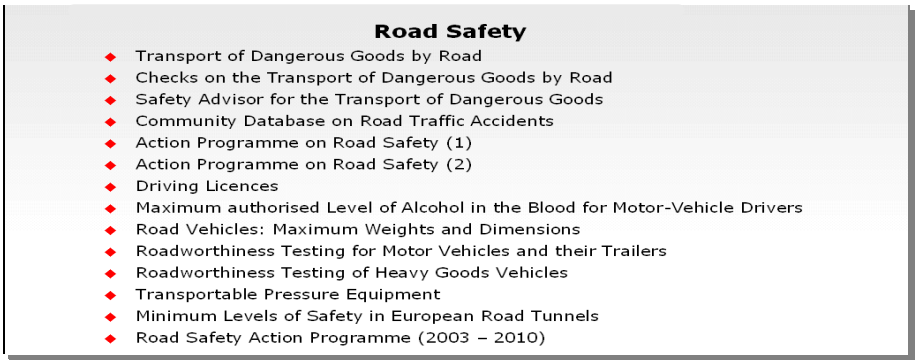

Figure 4: *EU Directives concerning the Safety of Road Transport*

2.2 Rail Transport

The EU Directives addressing rail transport are listed in Figures 5 and 6 below. Again, their individual transposition into the statutes of the member States of the EU is a matter for those States as long as the dates at which the directives are to come into force are met.

Figure 5: *EU Directives related to the Transport of Goods by Rail*

Figure 6: *EU Directives aimed at the Carriage of Goods by Rail*

Whilst the directives appear to be of a more 'general' nature, their implementation is important for harmonisation of rail transport and cohesion within the EU.

2.3 Maritime Transport

As with other directives, the implementation of the EU directives related to maritime transport is mainly a question for the member States. This applies particularly to ports and their operation. There is a move towards harmonisation through the "International Ships, Ports and Terminal Facilities Security Initiative" by the International Maritime Organisation (IMO). The '24-hour Rule' applies to international container transport including the transport of containers within the EU. Cargo that is not declared, or improperly declared, not cleared by Customs, and is not authorised to be loaded, stays behind. The law governing the operation of the vessels however is a different problem altogether. Apart from port state control when the vessel is in a port or within the territorial waters of States who ratified the Paris Memorandum on Port State Control, the law of the flag state where the vessel is registered applies. Figures 7 and 8 below offer an outline of the plethora of Legislation and Regulations applicable to Maritime Transport.

Figure 7: *EU Directives applicable to Maritime Transport*

With respect to maritime safety, EU Directives mirror the work of IMO. With respect to eLOGMAR-M the following international statutory instruments are of interest, e.g.:

- The International Convention of "Safety of Life at Sea" (SOLAS) and amendments since 1974.
- The International Convention on "Maritime Pollution from Ships" (MARPOL) 1973/78.
- The "Paris Memorandum on Port State Control" 1982.
- The International Convention on "Standards of Training, Certification and Watch Keeping" (STCW) 1978.
- The "International Safety Management Code" (ISM) 1993.
- The "International Ships, Ports and Terminal Facilities Security Code" (ISPC) 2003.
- International Convention on Civil Liability for Bunker Oil Pollution Damage 2001 known as the "Bunkers Convention"; and
- Directive 2002/6/Ec of The European Parliament and of the Council, 2002, on reporting formalities for ships arriving in and/or departing from ports of the Member States of the Community, based on the amended International Convention on Facilitation of International Maritime Traffic, 1965, (IMOFAL).

Directives targeted at the construction of tankers and the directives resulting from the 'Erika' disaster do not concern eLOGMAR-M. However, the introduction of the Directives forming the EU's '3rd Maritime Safety Package' will affect all maritime transport whenever they come into force.

Regarding ports, access to ports, port infrastructure, access to port services, and inland waterway navigation, several EU Directives apart from the latest Green Paper, are of interest. Figure 8 below yields some indication.

***Figure 8**: EU Directives related to Ports and Inland Waterway Navigation*

The European Maritime and Coast Guard Agency husbands the EU's interest in maritime safety.

3 Conclusions

The activities the actors are involved in and procedures they adhere to are governed by the contractual obligations of the individual actors within the framework of international conventions, legislation and regulations. The activities and processes involved in the sequence of 'buy-make-sell-move' along the supply chain, and compliance with associated legal instruments have the common denominator of information, i.e. data pertaining to, e.g. consignor, consignee, cargo characteristics, origin, transhipment, destination, mode of transport and vehicle, ports and terminals.

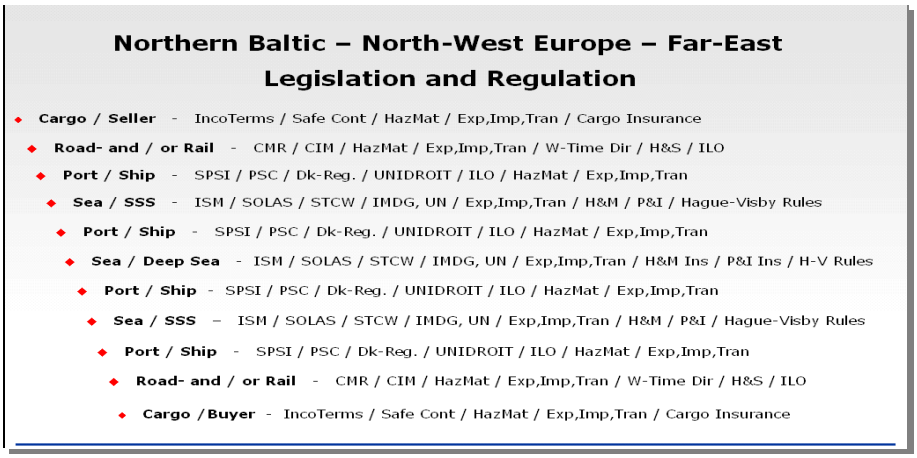

Figure 9: *Actors, Nodes, Links and Legislation of the Supply Chain*

Consignor, consignee, agents, carrier, operators of ports and terminals as well as underwriters, authorities and financial institutions need this data to carry out their individual tasks to push the goods along the supply chain. Non-availability of data or wrong data causes bottlenecks to form and activities involved in the tasks of the processes do slow down or worse, stop. Results are: inefficiencies and delays in the supply chain, uncompetitive goods and the loss of markets.

4 References

British International Freight Association. 1997. The International Freight Guide: The Handbook for Exporters, Importers and Forwarders, TT Club, LLP, London.

United Nations. 1956. Convention for the Contract of the International Carriage of Goods by Road (CMR).

United Nations. 1985. COTIF/CIM Convention (Rail Transport).

United Nations. 1924/1968. The International Convention for the Carriage of Goods by Sea – The Hague Rules and the Hague-Visby Protocol.

United Nations. 1978. The International Convention for the Carriage of Goods by Sea – Hamburg Rules.

DEMONSTRATION SCENARIOS OF WEB-PORTAL WITH MARITIME AND TRANSPORT LOGISTICS APPLICATIONS

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Introduction

A Web-portal is aimed at supporting of decision making in transport logistics which is based on logistics principles, business models, general and initial information presented in article (Vinichenko et al. 2006).

1 Technological solutions for Web-portal and mobile access demonstration

- HTML and PHP languages and MySQL database management system (DBMS) are used for Web-portal development and data storage. The general structure of Web-portal is presented in Figure 1.

The mobile access is demonstrated by the use of Pocket PC devices (Personal Digital Assistant, PDA) and provides practically the same set of functions as in Web portal and similar demonstration scenario. There is only simplified way of information presentation on a screen and some changes in information presentation in comparison with Web-portal (limited resolution only).

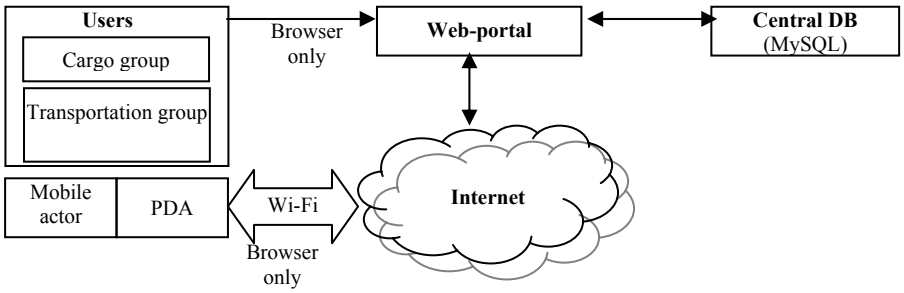


***Figure 1**: General Structure*

The model of Central DB is presented in Figure 2.

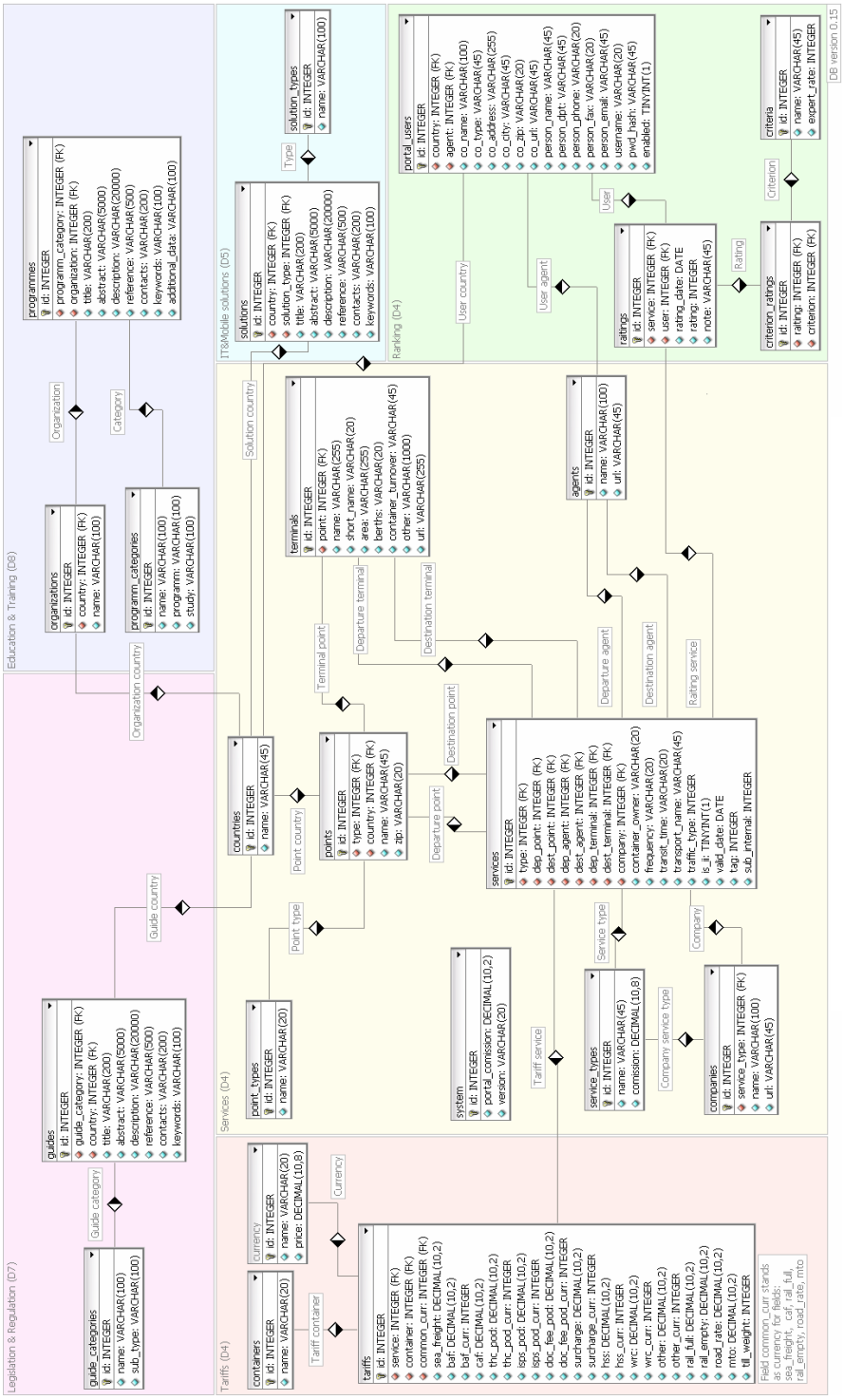


Figure 2: DB Model

Data connector is integrated in the web site for pocket PC users as the data abstraction layer for the purpose of independent DB platform. This option allows to have light system modifications in that case if data store would change from MySQL to other data store platform, there is no necessity to change the whole system.

2 Models of demonstration scenarios

2.1 General information

A set of business and flowcharts serves as a platform for the description of demonstration scenarios (Vinichenko et al. 20060

Operation of Web-portal is illustrated by unimodal and intermodal cargo transportation schemes (Figure 3).

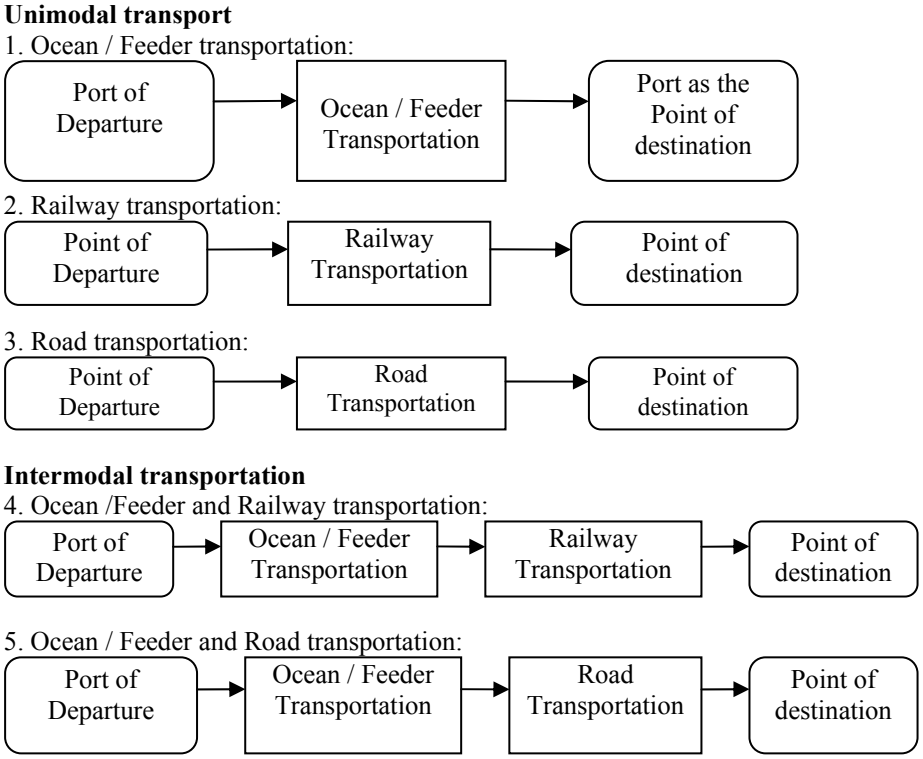


Figure 3: *Demonstration schemes of unimodal and intermodal transport*

General model of demonstration scenarios is presented in Figure 4.

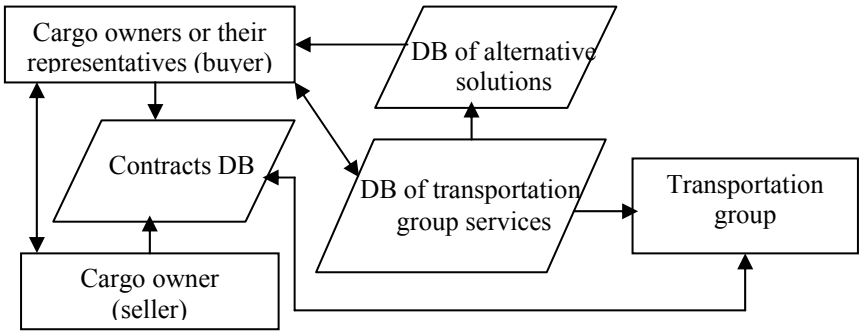


Figure 4: *General model of demonstration scenarios*

A set of demonstration scenarios reflects the general structure of a Web-portal and illustrates the application of essential logistics principles (Table 1).

Table 1: *Demonstration scenarios*

Identif.	Title	Comments
1	2	3
1. Group of scenarios: Promotion of services and searching of general (so-called "useful") information in transport logistics & maritime area		
S1.1	Promotion of services by actors from transportation group	
S1.2	Searching of general information in IT&T solutions	
S1.3	Searching of general information in legislation & regulations	
S1.4	Searching of general information in education & training	
2. Group of scenarios: Calculating of start-to-finish transportation tariffs and carrier selecting		
S2.1	On-Line transport Request	
S2.2	Mobile Transport Request	
3. Group of scenarios: Registration		
S3.1	New company registration as web-portal user	
S3.2	Expert groups registration	This functionality belongs to adjacent Web-site of BRCC and can be used for users involvement in validation process
4. Group of scenarios: Users assessment of carriers service level		
S4	Users assessment of carriers service level	
5. Group of scenarios: Maintenance of data regarding services and tariffs		
S5	Maintenance of services and tariffs data	

2.2 A brief description of the set of demonstration scenarios

Models of demonstration scenarios are presented in the forms of Interface Tables and Communication Diagrams (Bluemel at. al. 2003)

Scenario S1.1

Name: Promotion of services by actors from transportation group.

Function: To promote their services actors from Transportation Group present at a Web-portal information regarding their activities. The forms of presentation depend on a mode of transportation (deep sea shipping lines, feeder shipping lines, block train operators, road carriers, intermodal operator).

Interface tables (ITx):

IT_1 (deep sea shipping line):

- Shipping company,
- Hub Port of departure,
- Agent in a Hub port of departure,
- Terminals in ports of departure and destination,
- Sailing,
- Expected transit time.

IT_2, IT_3, IT_4, IT_5 have similar structure corresponding to the modes of transportation:

- IT_2 – feeder shipping line.
- IT_3 – block train operator.
- IT_4 – road carrier.
- IT_5 – intermodal operator.

Scenario scheme:

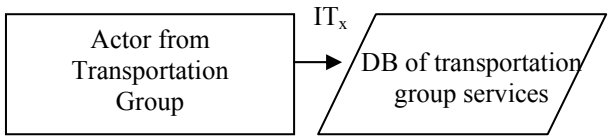


Figure 5: *Scenario S1.1 scheme*

2.2.1 Scenario S1.2

Name: Searching of general information in IT&T solutions.

Function: Users of Web-portal receive information in IT&T solutions with maritime & transport logistics applications from corresponding database (DB). Users are provided with different searching mechanisms: solutions name, type, country, references etc.

Scenario scheme:

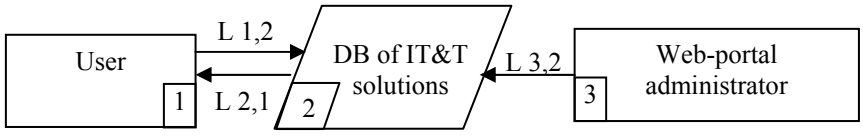


Figure 6: *Scenario S1.2 scheme*

Interface tables:

Table 2: *Interface tables of Scenario S1.2*

IT	L 3,2	- Overview of IT&T solutions
IT	L 1,2	- Request on searching
IT	L 2,1	- Reply on request

2.2.2 Scenario S1.3

Name: Searching of general information in legislation & regulations.

Function: Users of a Web-portal receive information on legislation & regulations (L&R) from corresponding DB.

Scenario scheme:

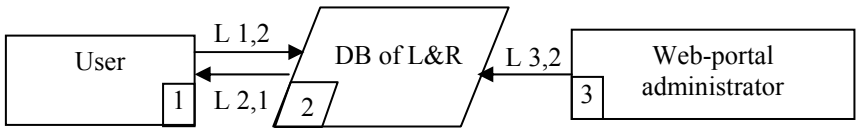


Figure 7: *Scenario S1.3 scheme*

Interface tables:

Table 3: *Interface tables of Scenario S1.3*

IT	L 3,2	- Overview of Legislation & Regulations
IT	L 1,2	- Request on searching
IT	L 2,1	- Reply on request

2.2.3 Scenario S1.4

Name: Searching of general information in education & training (E&T).

Function: Users of a Web-portal receive information education & training from corresponding DB.

Scenario scheme:

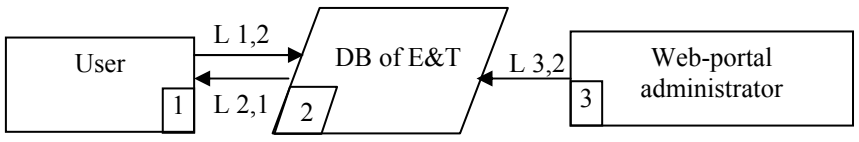


Figure 8: *Scenario S1.4 scheme*

Interface tables:

Table 4: *Interface tables of Scenario S1.4*

IT	L 3,2	- Overview of Education & Training
IT	L 1,2	- Request on searching
IT	L 2,1	- Reply on request

2.2.4 Scenario S2.1

Name: On-Line transport Request.

Function: Actors from Cargo Group prepare their request for cargo transportation in accordance with terms of a sale / purchase contract and distribute it among actors from Transportation Group.

Scenario scheme:

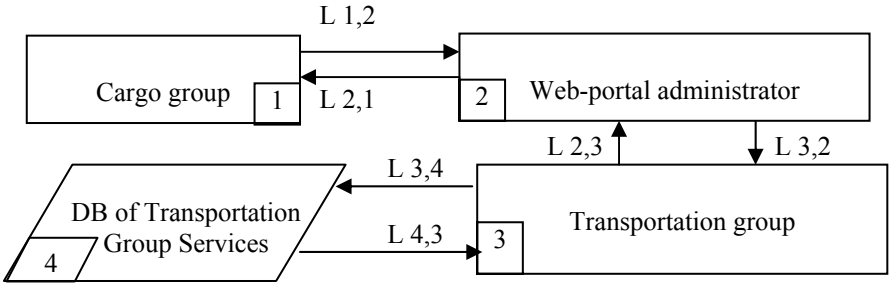


Figure 9: *Scenario S2.1 scheme*

Interface tables:

Table 5: *Interface tables of Scenario S2.1*

IT	L 1,2	- On-Line Transport Request
IT	L 2,3	- Request to carriers from Transportation Group (Block train, Shipping line, Road, Intermodal)
IT	L 3,2	- Reply on request (filled in Forms 2, 3 and 4)
IT	L 4,3	- Information from DB regarding tariff calculating and carrier selecting
IT	L 3,4	- Request to DB

2.2.5 Scenario S2.2

Name: Mobile Transport Request.

Function: Actors from Cargo Group prepare their request for cargo transportation in accordance with terms of a sale / purchase contract is simplified form and distribute it among actors from Transportation Group.

Scenario scheme: Similar to On-Line Transport Request.

2.2.6 Scenario S3.1

Name: New company registration as Web-portal user.

Function: Users from Cargo and Transportation groups have to be registered as a Web-portal users to be allowed for the use of some of portal's functions.

Scenario scheme:

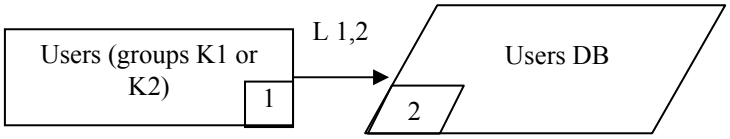


Figure 10: *Scenario S3.1 scheme*

Interface tables:

Table 6: *Interface tables of Scenario S3.1*

IT	L 1,2	- Company's information

2.2.7 Scenario S3.2

Name: Registration of Expert groups.

Function: Registration of expert groups via Web-sites of eLOGMAR-M project and Baltic Regional Competence Centre.

References: **www.elogmar-m.org**, **www.balticit.com** (section „expert groups").

2.2.8 Scenario S4

Name: Users assessment of carriers' service level.

Function: To provide a feedback Web-portal users have a possibility to estimate a level of services of selected carriers. The statistics is collected in corresponding DB of Web-portal.

Scenario scheme:

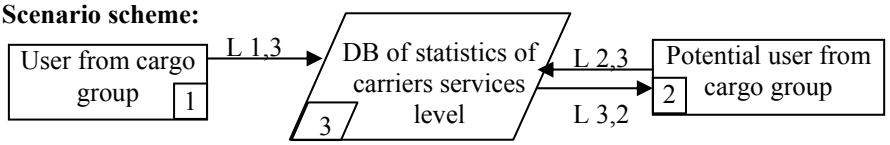


Figure 11: *Scenario S4 scheme*

Interface tables:

Table 7: *Interface tables of Scenario S4*

IT	L 1,3	- User assessment of services level of selected carrier (high, middle, low)
IT	L 2,3	- Request of potential user (actor from cargo group) to DB on statistics data regarding carriers services levels
IT	L 3,2	- Reply on request

2.2.9 Scenario S5

Name: Maintenance of services and tariffs data.

Function: To illustrate how actors from Transportation group (liner agents, train operators, road carriers, intermodal operators) maintain data regarding their services and tariffs.

Scenario scheme:

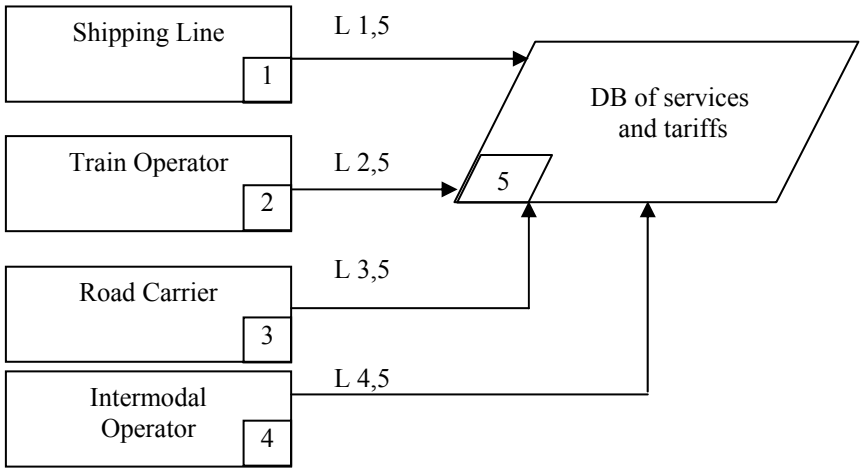


Figure 12: *Scenario S5 scheme*

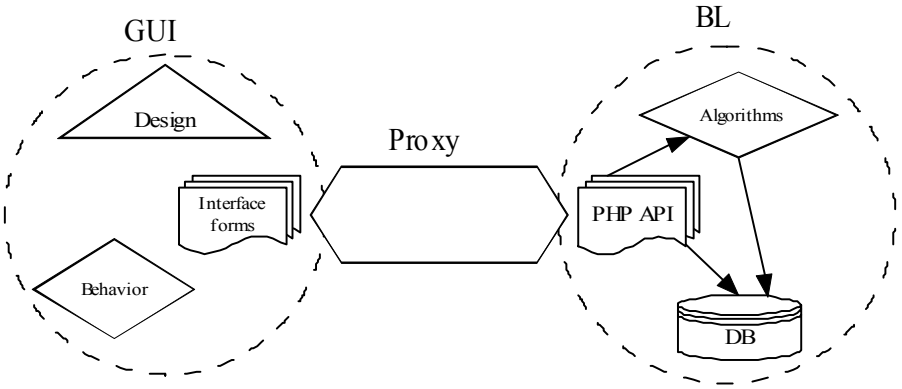
Interface tables:

Table 8: *Interface tables of Scenario S5*

IT	L 1,5	Update data (services and tariffs)
IT	L 2,5	
IT	L 3,5	
IT	L 4,5	

2.3 Implementation

The following scheme is used to realize a set of demonstration scenarios (Figure 13):



GUI – Graphic User Interface,

BL – Business Logics

Figure 13: *Web-portal scheme*

3 Conclusions

1. The general structure and database model of Web – portal are presented in the article.
2. Different demonstration Scenarios are presented in the form of communication diagrams and interface tables.

Acknowledgement

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References

Bluemel, E. et al. 2003. "Applications of Simulation and IT-solutions in the Baltic Port Areas of the Associated Candidate Countries". JUMI, Riga.

Ginters, E. et al. 2002. "Logistics Information Systems. Part 1". JUMI, Riga.

Vinichenko, S. et.al. 2006. “Essential Logistics Principles for Creating a Web – portal of Transport Services` Consumers”. In the same proceedings

Part II

Related Topics

COMPETENCE FRAMEWORK FOR MOBILE ON-SITE ACCELERATED TRAINING AND CONSULTATION ON LOGISTICS INFORMATION SYSTEMS

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Keywords

Logistics Information Systems, e-learning, m-consultation, Web-based solutions

Abstract

The rapid development of the modern knowledge-based economy determines the use of modern information processing and control systems, which have great impact on quality of provided logistics and transportation services. Quick changes of Information & Communication Technologies and Electronics (ICTE) ask for reducing the training time and regular upgrade of knowledge and skills. The LOGIS projects set started in 2000 is aimed to solving the problems mentioned above providing e-learning and m-consultation possibilities using Web-based solutions and cellular GSM/UMTS networks.

Introduction

The experience acquired in previous projects: INCO Copernicus Programme AMCAI 0312 (1994-1997) and DAMAC-HP PL976012 (1998-2000) approved lack of interdisciplinary knowledge of logistics managers and data processing systems administrators. Only some logistics managers demonstrated enough ICTE skills. Otherwise, data processing network administrators often were incompetent in logistics processes. This affects the introduction of modern achievements of ICTE in transportation systems. Taking these factors into, it was decided to launch the first step Leonardo da Vinci project LOGIS LV-PP-138.003 (2000-2002) *"Long-distance tutorial network in "Logistics Information Systems" based on WEB technologies"* (Ginters and Krecere 2003) and work out lectures, and training course printed and e-learning form (see http://www.teachsys.com or http://www.logis-edu.com) on Logistics Information Systems. Unfortunately, technology pressure is very high, and it asks for regular retraining of specialists.

The *2001 Annual Report of the European Foundation for the Improvement of Living and Working Conditions* indicated that more than 2 in 5 workers said that they do not have enough time to do their job. In reality, this means that they also do not have enough time to upgrade their knowledge in the traditional way – in the classroom. Primitive e-learning forms solve this problem only partially because is not a big difference to read the book or to study this material in electronic form with or without Internet access. Therefore, to reduce training time the Vocational Education

Training (VET) methods must be modified. It was the main task of the next step Leonardo da Vinci project LOGIS MOBILE LV/04/B/F/PP-172.001 *"Competence Framework for Mobile On-site Accelerated Vocational Training in Logistics Information Systems"*.

1 First stage in LOGIS development – e-learning

Within the framework of the Leonardo da Vinci programme project LOGIS LV-PP-138.003 (2000-2002) (Ginters and Krecere 2003) that involves experiences of both universities and transit companies the task how to prepare specialists for solving problems in analysis, design, and exploitation of logistics information processing systems was explored.

In order to accomplish the project work packages CFLI (Italy), University of Genoa (Italy), the University of Technology of Delft (The Netherlands), Linköping University (Sweden), Latvian Intelligent Systems, Ltd., Latvian Transport Development and Education Association (LATDEA), Riga Technical University (Latvia), Ventspils College (Latvia) and Ventspils Freeport Authority (Latvia) were invited.
All project participants were divided into two main groups. The first working group included specialists, which regarded logistics as technical system from ICTE point of view – "Technicians". The second group understood the logistics system more from the viewpoint of business processes – "Businessman's" (see Figure 1).

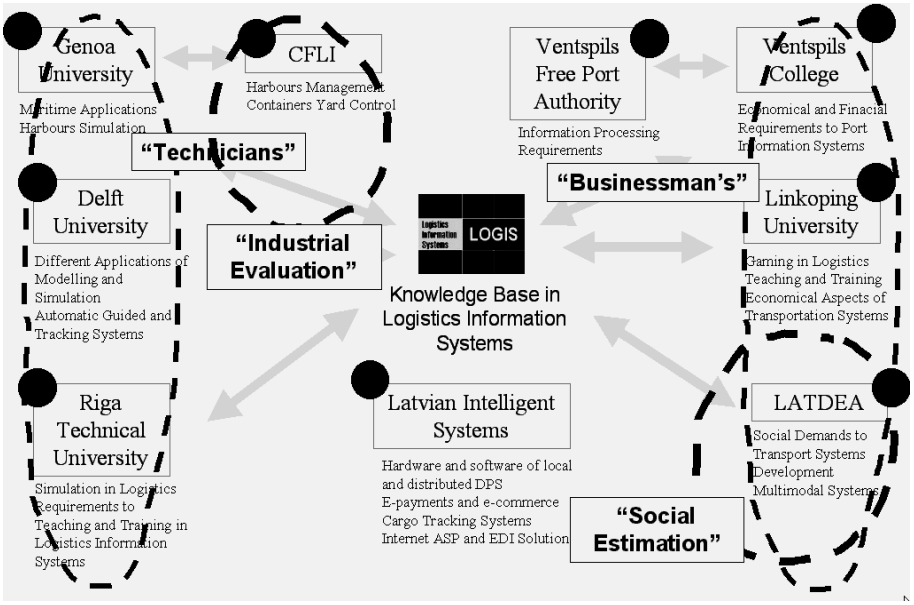

Figure 1: *LOGIS framework structure*

Each working group contributed to the project results, as well as evaluated other working group's results. It was the only way, how to reach cooperation between specialists who comprehend the same question different. On the other hand,

professional association LATDEA and logistics consortium CFLI evaluated social importance of the results and influence to the branch overall. As the project was interesting, external (silent) partners from Otto-von-Guericke University Magdeburg (Germany) and Vidzeme University College (Latvia) joined the working group and greatly contributed to the providing of the project additional value.

The programme of the training course:

- Involved overall principles of architectural analysis and design of logistics information processing systems;
- Provided insight into description of physical structure of a goal system, emphasizing common features and differences of software, as well as hardware elements and topology variety;
- Described possibilities of the Internet technologies and e-commerce techniques used to improve the quality of business processes;
- Examined modern simulation means, including use of different techniques in Logistics Information Systems research;
- Analysed use of Global Positioning Systems (GPS) and Geographical Information Systems (GIS) to control transportation fleet;
- Presented examples of existing Logistics Information Systems and elements.

Besides development of the lectures course, laboratory assignments and e-learning material were created.
In order to ensure successful dissemination and improvement of the prepared material, convenient e-learning environment (Learning Management System (LMS)) was necessary.

The following requirements were laid down for it:

- Automated course generation and e-learning material preparation possibilities;
- Textual and multimedia content;
- Customers self-registration and data protection;
- Tests generation;
- Test questions databases set generation;
- Cross linking of databases;
- Automated multi-session examination;
- Remote Web content management;
- Variable search options and reports generation;
- Multi-course management.

Each selected LMS was evaluated by the following criteria:

- Belonging to the open source and freeware solutions;
- Convenient maintenance;
- Affordable price.

Unfortunately, it should be pointed out that not only five years ago, but also now, it would not be easy to find suitable LMS, which would answer the abovementioned

requirements (EduTools 2005). Therefore, the partners elaborated their own cost-effective LMS (see http://www.teachsys.com) allowing to save money and introduce necessary modifications in short time limits.

Datalogical model (DM) of LMS *TeachSys* is based on relationships of five data sets (see Figure 2):

$DM =< LM, Questions, C_{DB}, Test, Exam >$, where

LM	-	e-learning material of different courses;
$Questions$	-	total set of test questions;
C_{DB}	-	test questions data bases of different courses;
$Test$	-	test questions data sets;
$Exam$	-	examination questions sets.

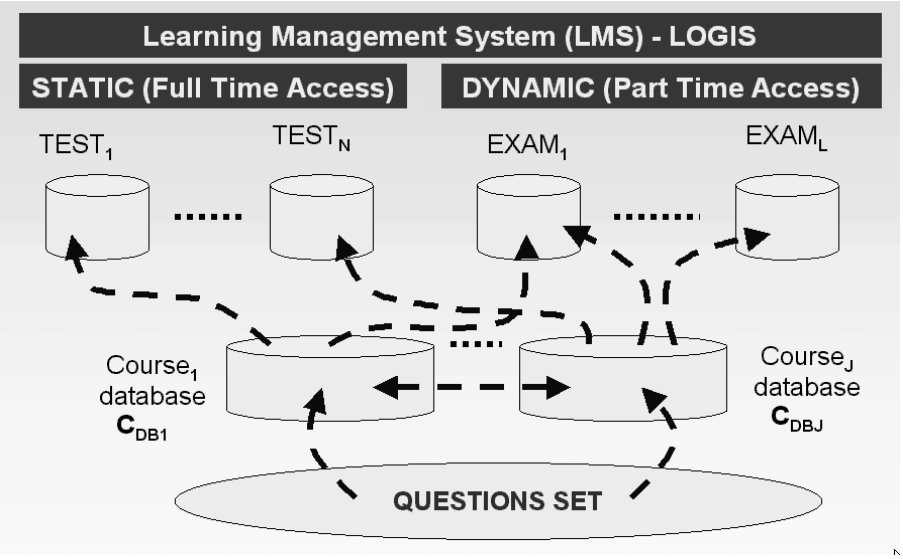

***Figure 2**: Datalogical model of LMS TeachSys*

It is possible to consider that:

$$Test_n \vee Exam_l \subset \bigcup_{j=1}^{J} C_{DB_j} \subset Questions$$

In order to check the knowledge the total test questions set $Questions$ is used. Using $Questions$ is possible to generate the separate test questions databases $C_{DB\,j}$ of different training courses. The relationships existing ensure questions exchange among these databases. Using C_{DB} is possible to generate the test questions set $Test_n$, which are permanently accessible by e-learning participants. Otherwise, examination questions set $Exam_l$ are generated only to examination time and are accessible only for authorized audience during the certain time.

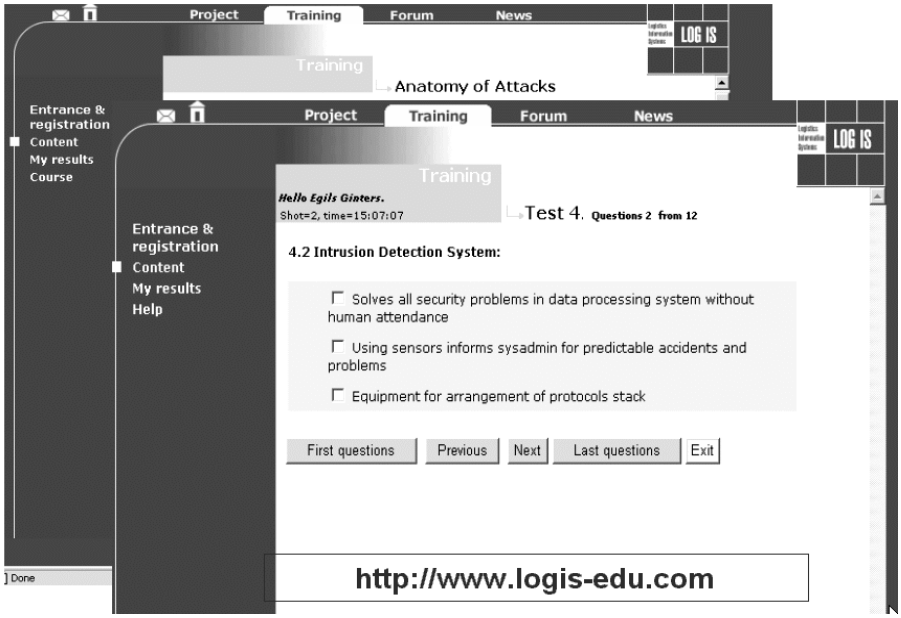

Figure 3: *LMS TeachSys layout*

The layout (see Figure 3) of LMS *TeachSys* is foreseeable and unpretentious. Any step of examination the student sees the time remaining. The system ensures gathering the testing and examination results for many shots, allowing observing of the applicant's knowledge developing.
It was the first step of e-learning tools development for training on Logistics Information Systems (see Figure 4).

Figure 4: *Substantial innovation – first step in LOGIS project development*

During the first step the content development were implemented and Web-based environment for learning management were created. The practice affirm the topicality of the direction selected, because if six years ago were only some curriculas on Logistics Information Systems could be found then today more than one hundred different training and learning activities are related with this direction.

LMS customers database shows that during last three years more than 6500 users have used the training Web site. Now the project results are disseminated to more than 25 countries of the world.

2 Mobile m-consultation – basement for second stage e-learning

Quick and rapid changes in technologies use are typical for developing knowledge society. Mostly these changes are related with introduction of the latest achievements of ICTE. Important changes in mobile and wireless telecommunication technologies reduce service costs and expand the coverage of cellular networks.

The functionality of the mobile phones during last years becomes similar to computer. Today only two obstacles restrict convenient use of mobile phones for training needs. These are limited screen size and deficient capacity of batteries, which are valid for typical phone functions, but unsuitable for complete handheld computer and GPS receiver functions transfer to cellular phone maintaining the same level of comfort and efficiency of costs. However, it is the question of close future, therefore at the second stage of e-learning development on Logistics Information Systems the mobile cellular technologies have been introduced.

At the end of the LOGIS project, it became evident that classical e-learning does not solve one of the 21st century problems – lack of time for studying. In fact, time for typical e-learning often is equal to the traditional learning in classroom. Otherwise,

elaboration of more effective e-learning environment and tools requires so many resources that e-learning becomes too expensive for cost effective training.

Every year new technologies appear on ICTE market and have pressure on business process management and control systems of logistics and transportation companies, therefore specialists should spend more and more time on rising of the proficiency and skills level. It is not possible without VET methods change.

The LOGIS MOBILE LV/04/B/F/PP-172.001 *"Competence Framework for Mobile On-site Accelerated Vocational Training in Logistics Information Systems"* project participants, who coming from Latvian Intelligent Systems, Fraunhofer-Institute for Factory Operation and Automation (Germany), Otto-von-Guericke University of Magdeburg (Germany), Autonomous University of Barcelona (Spain), Polytechnical University of Catalonia (Spain), Mettle Group (France), Klaipeda University (Lithuania), JSC Ventamonjaks (Latvia), IDC Information Technologies (Latvia), Latvian National Association of Freight Forwarders, Riga Technical University (Latvia) and Warsaw University of Technology (Poland) decided to change training methods fundamentally, changing e-learning with m-consultation reducing amount of the study material (see Figure 5).

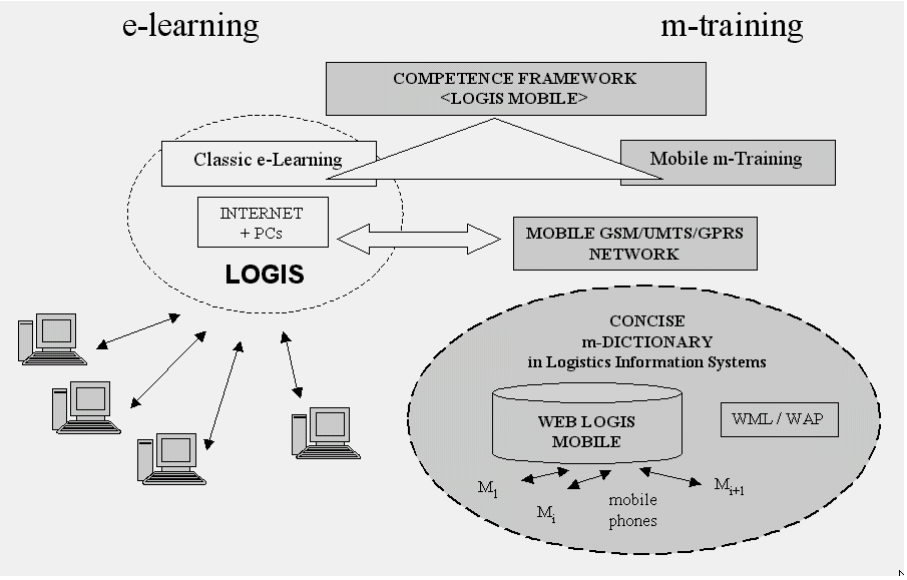

Figure 5: *Combined VET - e-learning with m-training*

Instead of comprehensive lectures and training book it was decided to prepare as compact as possible concise training dictionary in Logistics Information Systems. The dictionary was composed in wide spoken European languages – English, German, French, and Spanish. The 600 terms most frequently used in Logistics Information Systems were involved in the dictionary.

The all definitions were shared among seven categories:

- Data processing technologies;
- e-Business applications;

- Information exchange and security;
- Legislation;
- Logistics and Logistics Information Systems;
- Transportation;
- Warehousing and Enterprise management.

Each category involves predefined amount of terms or definitions (see Figure 6).

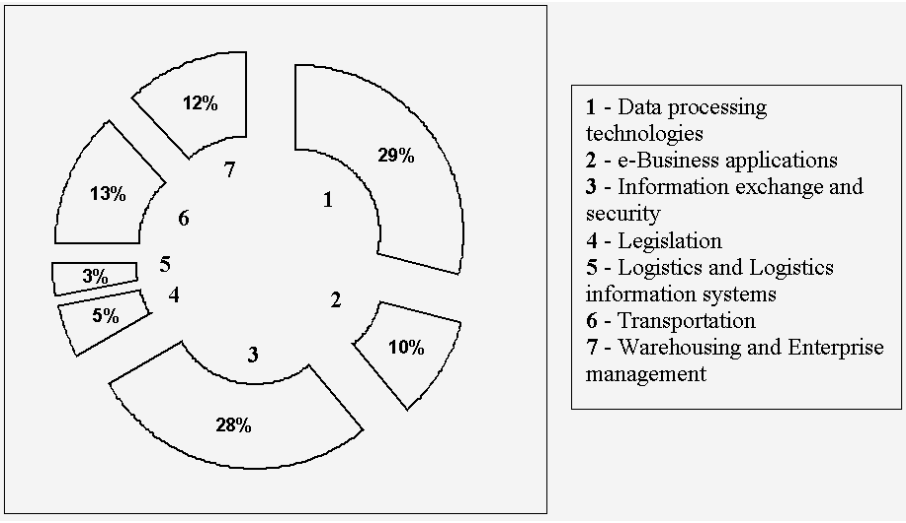

Figure 6: *Breakdown of categories*

The aim of the authors was not explanation the logistics and transportation definitions already involved in dictionaries assembled by professional associations. Their task was to select and explain the terms related to ICTE and the same time to logistics and transportation. It means to describe the set of specific ICTE terms that appears during introduction and exploiting of complex logistics and transportation systems.

The designing of reference material was based on exploitation of the information gathered during the first step project, reviewing existing dictionaries provided by professional associations and browsing the Internet resources using search engines. The definitions set involved into dictionary was determined by integral criterion. Only definitions given highest rate were added.

The total set of definitions involved into dictionary is $\langle KD \rangle = \bigcup_{GR=1}^{N} KD^{GR}$, where $< KD^{GR} >$ is the set of terms belonging to the category GR, but N is total amount of the categories, and $< KD^{GR} >= \bigcup_{i=1}^{M} KD_i^{GR}$, where KD_i^{GR} is the term belonging to the set of terms $< KD^{GR} >$. If we suppose that total amount of references for this term acquired from search engines $I_{KD_i^{GR}}$, but weight of the

category GR determined by experts is W^{GR}, then $KD_i^{GR} \in < KD >$, if it has $\max(I_{KD_i^{GR}} x W^{GR})$. The total amount of the terms included in concise training dictionary is equal to $N \times M$.

Each definition (see Figure 7) is combined with checking question. Answering on the question the applicant can check his knowledge more detailed.

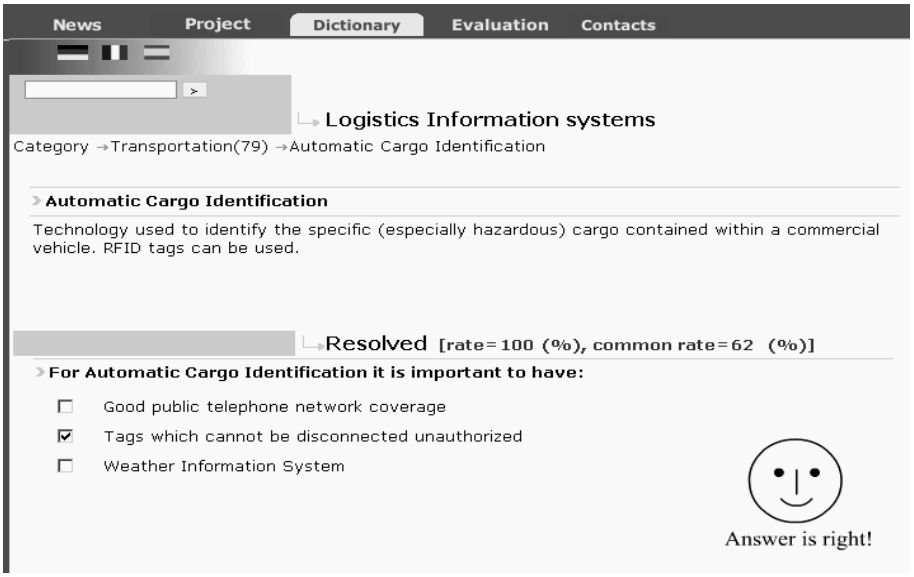

Figure 7: *Web-based layout of the dictionary*

The Web-based version can be accessed on http://www.logis-edu.com using typical browsers like MS Explorer, Opera, FireFox etc. Access to mySQL database is implemented on PHP. Any wired or wireless TCP/IP user passing self-registration should have access to e-learning material and the same time to the dictionary located on the Web site free of charge (see Figure 8).

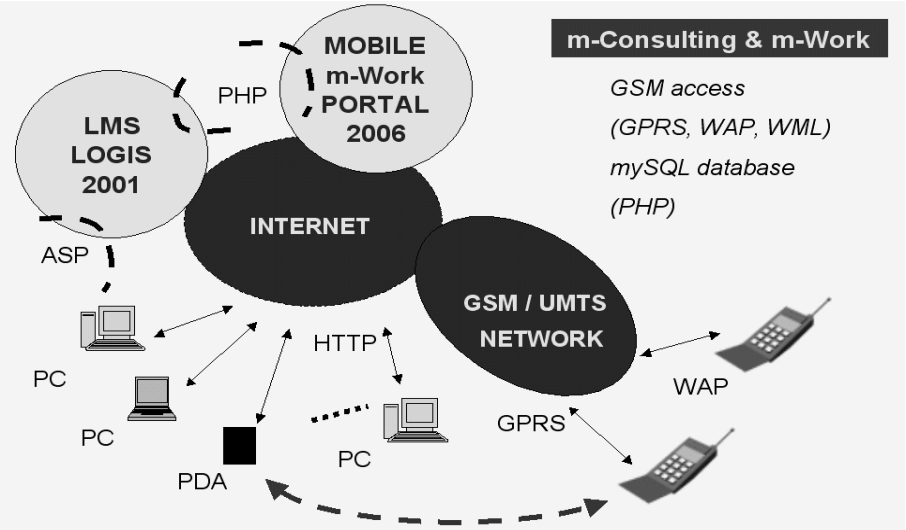

Figure 8: *m-Consultation platform on the LOGIS MOBILE network*

Mobile cellular network platform also support WAP/WML on http://www.logis-edu.com/wap. Of course, respecting limited screen size the functionality is reduced, but anyway most important functions are supported (see Figure 9). Any time the user can access dictionary having cellular phone with built-in WAP support. Such approach ensure m-consultation possibilities out of classrooms and out of the Internet without computer access.

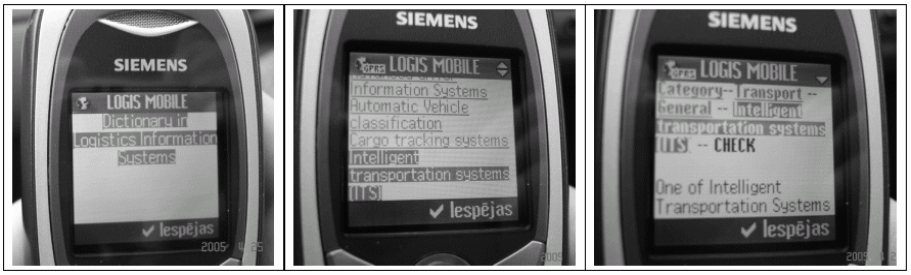

Figure 9: *WAP access of the Dictionary from mobile phone*

e-Learning and m-Consulting system on Logistics Information Systems of LOGIS MOBILE project now is a part of information resources of Baltic Sub-Regional Competence Centre for promoting and supporting the distribution of research knowledge and advanced IT-solutions in the field of maritime applications founded during 5th Framework IST project Baltports-IT No.33030 "Simulation and IT-solutions: Applications in the Baltic Ports` Areas of the Newly Associated States" (Bluemel et al. 2003). Today the collaboration with adjacent projects continues obtaining and adapting for vocational training needs the latest knowledge in Logistics Information Systems provided by 6th Framework IST project eLogmar-M No.511285 "Web-based and Mobile Solutions for Collaborative Work Environment with Logistics and Maritime Applications".

3 Conclusions

1. Rapid changes of ICTE technologies in knowledge society cause pressure on regularity of the knowledge renewal in areas with high technologies impact, but specialists have more and more less time for training due to job intensity growing.
2. Especially important and useful are interdisciplinary knowledge promoting easier introduction of complex management and control systems with high technologies dominance.
3. Classical e-learning is time consuming, but advanced e-learning is not cost effective.
4. To intensify learning the VET methods must be changed moving accents from e-learning to m-consultation using mobile cellular technologies.
5. The research and academic projects networking is one of ways to efficient gathering, introduction and maintenance of the latest knowledge in logistics and transportation.

Acknowledgement

The presented activity is supported by the LOGIS MOBILE project No.LV/04/B/F/PP-172.001 funded under the Leonardo da Vinci Programme of the European Commission. Many thanks to educational network ELA-LogNet of European Logistics Association and Poznan School of Logistics for cooperation and worthwhile advises during the project implementation.

References

Ginters, E., and L.Krecere. 2003. LOGIS Network for Knowledge Dissemination in Logistics Information Systems. HMS 2003. ISBN 9984-32-547-4. Riga, Latvia, September 8-20, 251-255.

EduTools. 2005. Course Management Systems. Available online via <http://www.edutools.info/course/productinfo> [accesses April 10, 2005]

Bluemel, E. et al. 2003. Applications of Simulation and IT-solutions in the Baltic Port Areas of the Associated Candidate Countries. Riga: JUMI.

CONTAINER TERMINAL INFORMATION MANAGEMENT SYSTEM OF THE PORT OF THESSALONIKI

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Keywords

Information Management System, advanced information technologies, container terminal, intermodal freight transport

Abstract

Container Terminals are complex Organizations performing a great number of operations and activities for the safe movement of containers through the port. They require fast and efficient handling of both the physical flows as well as the information flows that accompany each container.

FRETIS-IFT FRETIS (*FRE*ight *T*ransport *I*nformation Technology *S*olutions – *I*ntermodal *F*reight *T*erminal System) is an innovative state of the art tool for Container Terminal management that has been developed for the Port of Thessaloniki but which can be applied for most Medium sized Container Terminals.

It consists of 11 interconnected and interoperable modules that support the operational and administrative operations of a container terminal.

This paper provides a comprehensive presentation of FRETIS-IFT system and the main conclusions from the operation at the Container Terminal of Thessaloniki Port Authority.

Introduction

The Port of Thessaloniki plays an important role in the greater South East Europe area due to its strategic geographical position. This role together with the evolution in the area of telecommunications and telematics combined with the development of the intermodal transport, impose the small and medium size ports to take initiatives towards modernisation. Thessaloniki Port Authority appreciating the new circumstances adopts Advanced Information Technology Applications at the Container Terminal, which will allow its entry in the club of the leading competitive ports in the Mediterranean Sea.

The fully comprehensive and integrated Container Terminal Management Information System FRETIS-IFT has been developed, deployed and supported by TREDIT S.A. at the Container Terminal of Thessaloniki Port Authority.

1 Descriptions of FRETIS-IFT modules

A presentation of the eleven interconnected and integrated modules of the FRETIS / IFT software package is given below and in the next pages.

Each module, or group of modules, can be installed and work independently thus allowing for maximum flexibility and expandability.

Figure 2: *IFT's modular structure*

1.1 Central Information Management Platform

A relational database management structure, coupled with appropriately developed interfaces, constitutes the backbone of the overall system and facilitates the dynamic integration of all applications. Using modular application environment technology, the peripheral subsystems are fully interoperable and interconnected, thus allowing the full integration of the various sections in the Container Terminal.

1.2 Document Submission

The electronic Document Submission is a robust document control mechanism eliminating much of the bureaucracy and paperwork. With a friendly, multi-functional interface and unlimited interoperability capabilities, it is an ideal point of contact between the port and its clients.

This module can send and receive electronic documents in multiple ways, ensuring total business flexibility. XML versions of all standard container based EDIFACT messages are used for commercial transactions. This offers generic compatibility and capability for integration with client software of any format and ICT capacity.

As an alternative, it also contains web forms of all standard EDIFACT messages, allowing customers to submit electronic documentation via the Internet. This service is particularly favourable with smaller customers for easy/low cost access to the Document Submission System.

1.3 Customer Service

The Customer Service module offers an interactive web-based/M2M application, providing accurate and real time information to the port customers through the Internet.

This Information Dissemination enables the port clients to monitor the cargo status as it progresses through the operational /administrative in port activities chain. It also enhances the port into an added value service provider. The web-client has been designed with the most advanced Internet tools, offering maximum security and robustness and delivering messages in XML format that can be further processed in the Customers MIS systems, printed etc.

1.4 Entry / Exit Control

The automatic control of the container movements from the landside is carried out through the Integrated Entry/Exit Control module for containers, vehicles and drivers entering through the land gates of the Container Terminal. A reliable mechanism identifies the container and vehicle IDs through the installation of an Optical Character Recognition (OCR) system while the automatic identification of the driver is performed through the “smart card” identification system. The expected arrivals / departures are compared with the actual ones and the result is stored in the main database. An automatic barrier and traffic lights system undertakes the required physical control of the gate towards the inner area of the terminal, while the entries / exits are also presented on the GIS.

It is fully integrated with the Resource Management Application, also providing automatic vehicle guidance and parking control. At the gate, the operator provides to each driver a printed message regarding the exact position/slot within the parking area. This information is also made available to the yard management for the collection/delivery of the containers to/from the stowage area.

Entry/Exit control is ideal for minimizing vehicles waiting time and congestion at terminals and exercising a high degree of security on inbound/outbound flows of containers, vehicles and drivers.

1.5 Loading / Unloading Control

The Loading/ Unloading Control module handles the control and electronic storage of data relating to the loading and unloading of either ships or trains. It comprises a set of client-server applications, which check loading/ unloading rights and track all relevant activities.

The Loading/Unloading Control is also equipped with a user-friendly application for real-time monitoring of the loading/ unloading process. This enables the terminal manager to organize efficiently the distribution of human and mechanical resources, monitor productivity either in real-time or through cumulative statistical projections and provide clients with estimates about the process completion time.

Integrated with other applications of the MIS package, it checks for outstanding administrative or financial liabilities associated with containers, communicates with the resource management module for the transfer of containers to/ from the stacking area and projects every container moves on the Geographical Information System.

1.6 Yard Planning

The Yard Planning module offers effective yard utilization and minimizes the lead time associated with the stacking activities. It also has an advanced housekeeping function, which maximizes the available space by concentrating sparse containers.

With the Yard Planning, container placement decisions are made quickly and easily using a Geographical Information System as a user interface. A variety of planning rules and controls, support the execution of the port terminal operational objectives.

For full and user friendly control, it comes as an internal module in the Geographical Information System giving full graphical flexibility.

1.7 Yard Inventory Control

The Yard Inventory module is the ultimate tool for ensuring 100% accuracy in recording the yard status. It provides the ability to “walk the yard” collecting electronic data, thus eliminating all previous human errors.

It comprises a GIS based central management application and a batch application for handheld terminals. Yard Inventory Functionality provides the flexibility to determine which areas to survey, frequency and resources application.

1.8 Geographical Information System

The Geographical Information System (GIS) is the user's ultimate monitoring tool in FRETIS - IFT. All activity taking place in the Terminal is projected in real-time, while many functions are activated through this system. Information such as space occupancy, container sizes, types and registration numbers are made available at the press of a button.

The GIS provides the user with a graphical environment capable of managing the stacking area and coordinating all activities required for supporting the terminal's operation.

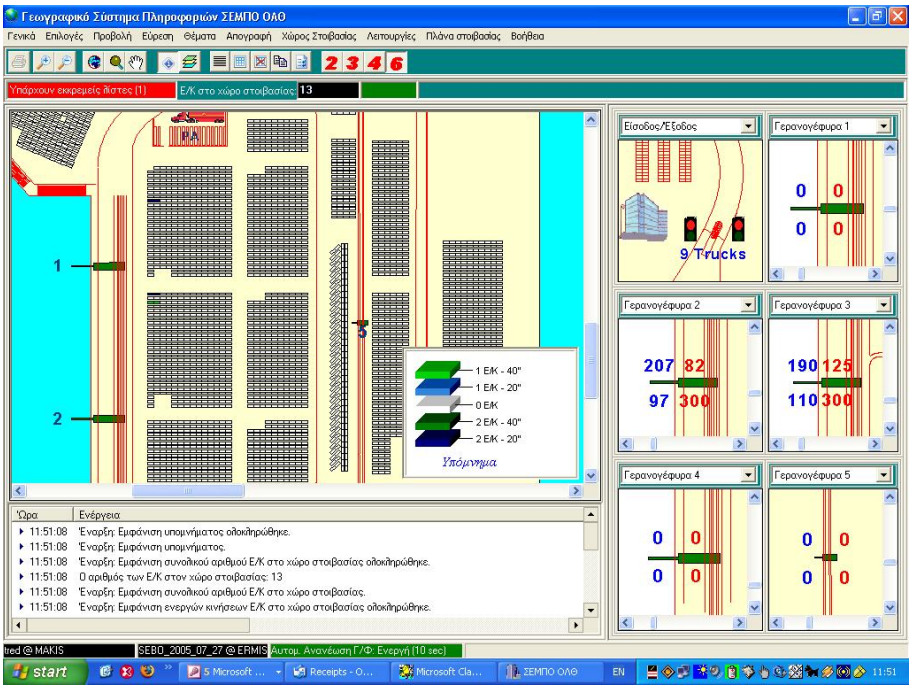

Figure 3: *GIS's front interface*

1.9 Resource Management

The Resource Management module performs the automated organizing, delegating and monitoring of all container transfer activities within the terminal. With a user-friendly interface and an array of intelligent tools, container carriers are distributed according to the operational needs. Using a wireless local area network (WLAN), it exchanges messages and commands in real-time with the equipment operators.

The Resource Management Application allows for better utilization of existing equipment for minimum carrier idle time. It also contributes to reductions in operating costs and improvement in performance level.

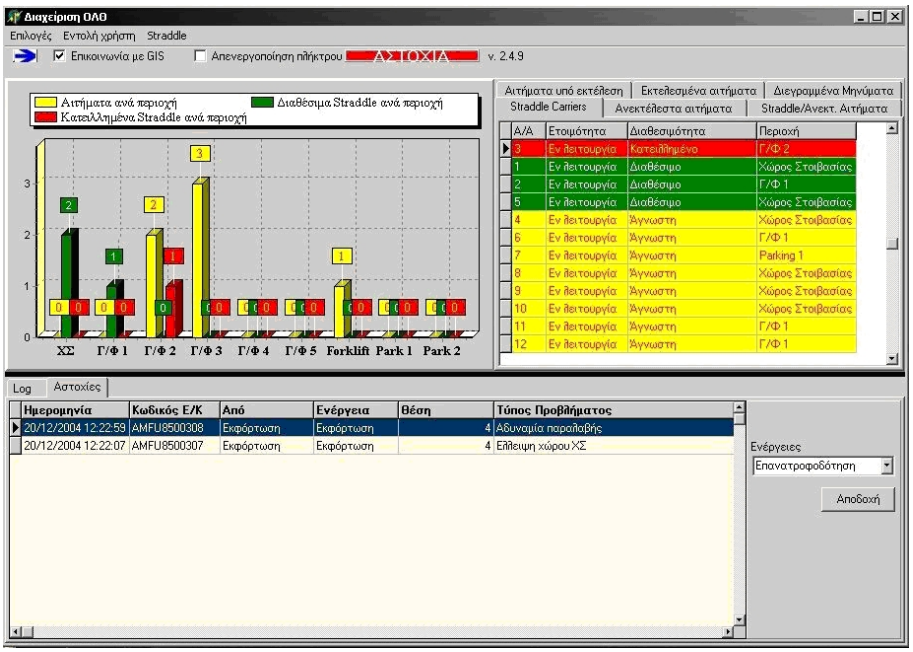

Figure 4: *The Resource Management System's front interface*

1.10 Administration

The electronic Administration reduces the volume of the paper work required for the distribution of containers through the terminal. Crucial administrative operations such as issuing transfer / cargo permits, maintaining logistics warehousing records, electronic storing of customs documents and several more, are carried out through a user-friendly environment. The migration of administrative works to an electronic environment ensures quick and accurate execution.

All of the functions allow manual intervention, previewing and printing, allowing for paper and electronic environments to be combined in the most optimum way.

1.11 Invoicing

Container terminals have to implement complex pricing policies, resulting in numerous combinations of invoicing cases. TREDIT's Invoicing application is fully integrated with the IFT and allows for timely and automatic calculation of the clients' financial obligations to the terminal. It covers both ship and quay services, as well as those related to stuffing, stripping and shifting of containers within the terminal.

It also offers easy-to-use menus, print preview functionality and a variety of invoicing capabilities based on the client's requirements.

The Invoicing module can be easily integrated with the terminal's existing Accounting System.

2 Conclusions

In full deployment at the Port of Thessaloniki's Container Terminal, FRETIS-IFT has accelerated the physical and administrative handling of cargo, reducing customer waiting time and ship turnaround time. The search of information and cargo as well as the coordinating of machinery and human resources is now efficiently monitored and executed. As a consequence, human and mechanical resources are released sooner, increasing customer serving capacity. This further reduces per-customer amortized costs while increasing per-unit-time income, therefore improving profitability.

These results can be further assessed from the management of Thessaloniki Port Authority in order to adopt an attractive economic policy, having in this way a major competitive advantage to attract new customers.

The introduction of FRETIS-IFT has lead to a Business Process Reengineering procedures since the existing processes have been reviewed, evaluated and changes have been established.

In addition the involvement of the port personnel in the early stage of study and design has helped them to obtain the required maturity and expertise in order to run the system.

An effective policy and methodology have been used for the establishment of the required cooperation with the outer environment of the ports (i.e. its customers). Workshops and meetings with the responsible organizations have been held in order to include their needs and requirements into the system. In this way, they were well aware about the new operational and organizational structures that the introduction of FRETIS-IFT has imposed.

The system has been appreciated by the users as an effective and user friendly "tool" that enables their every day operations. The extensive training programme has provided them with the necessary confidence to run the system.

References

TREDIT S.A., D2: System Design, Integrated System for the Container Terminal of Thessaloniki Port Authority and Electronic Communication with their clients

TREDIT S.A., Aristotle University of Thessaloniki, D3: Evaluation Report, Integrated System for the Container Terminal of Thessaloniki Port Authority and Electronic Communication with their clients

INFORMATION AND COMMUNICATION SYSTEMS AT THE PORT OF HAMBURG

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Keywords

Information Systems, Communication Systems, Port Handling, Web-based solutions, Hub Port

Abstract

This article represents requirements and sequences of significant information and communication courses on the Port of Hamburg in connection with the handling and trans-shipment of containerized cargo. The vast number of the partners involved in the different processes in the chain of transport is contingent upon the complex sequences in the transportation and turnover of ocean cargo, and the parameters geared to competition in a globally geared port.

Introduction

Within the last years Ports in the Hamburg – Antwerp Range have been faced with a tremendous growth in handled containerized cargo. The main reason for that was in the year 2001 The Peoples Republic of China joining the World Trade Organization (WTO) and on the other hand the number of cargoe being containerized increasing constantly. Container vessels became larger (up to 9500 TEU in 2006) and faster. As a consequence of that the infrastructure of the information and communication platforms had to be adapted to this development to meet the requirements of all parties concerned.

1 Development of Turnover Rates in the Port of Hamburg

Increased turnover is conditional upon the rapid development of cargo volumes transported over the ocean, particularly in the transportations between the Far East and Europe and the feeder transportations to the Baltic area.

With regard to the dynamic increases in the re-loaded and re-directed quantity of goods, the Port of Hamburg took and still holds a traditionally exposed position, since for example approximately 30% of the cargos coming in from Far East are further transported to the Baltic area.

Significant stimuli for growth also started with the disproportionate quantity development in the trade with Central Europe and the Baltic States. The end result was a heavy increase of feeder services for line services from the Baltic area.

1.1 Development of re-loaded Container Units in the Port of Hamburg

1990	TEU	1,968,986	
1995	TEU	2,890,180	+ 45.9 %
2000	TEU	4,248,247	+ 47.0 %
2005	TEU	8,087,545	+ 90.4 %
2010	TEU	12,920,000	+ 59.8 % (forecast)

2 Communication and Information Systems Requirements

This extraordinary development, particularly in the years 2000-2005, required immediate adaptations and optimisation of the information and communication systems in the transportation sector.

It was also contingent upon the annexation of Central and Baltic States into the European Union in 2005, as well as a number of new and amended acts and legal provisions, i.e. in customs law, anti-terrorist regulation of the EU, ISPS Code, etc.

In global markets the increasing need for information by all competitors in the transportation chain, in respect of time and quality, and the availability of capable and efficient instruments of communication, is a development of great significance. This is all the more important as web-based applications are used, thereby being capable of providing quick and competent information platforms.

The ideal solution is to provide each participant with access to precise information on the status of the container at any time:

- Where is the container?
- What are the contents of the container?
- What is the condition of the container?
- When and where is the container available?

All companies involved in the transportation links are considered as target groups, such as:

- Liner agents and shipping lines
- Road carriers
- Rail carriers
- Feeder carriers and river barges
- Quasi operators and container packing stations
- Tally companies
- Exporters/importers/manufacturing industries

In addition, public authorities such as:

- River Police Stations
- Fire Service Headquarters
- Environment Authority
- Hamburg Health and Safety Authority
- Local Customs Offices
- Federal Customs Departments

3 On offer to Customers and Public Authorities in the Port of Hamburg

Owing to the competitive situation in the Port of Hamburg there are no totally homogeneous systems with consistent applications available. However, the information and communication systems of a worldwide acting shipping firm (Hapag-Lloyd), the greatest container terminal (Hamburg Hafen and Logistik AG), and a well-established IT provider, are eminently suitable and described in brief form below:

3.1 Hapag-Lloyd Information System

With the acceptance of a container in the empty depot at the place of loading the unit is recorded in the central system, whereupon each additional movement can be detected, documented and registered, and status checked (when loaded, expected arrival at port of discharge, onward transportation and arrival at recipient, if necessary), provided that authorisation exists. The subsequent transparency gives an overall view.

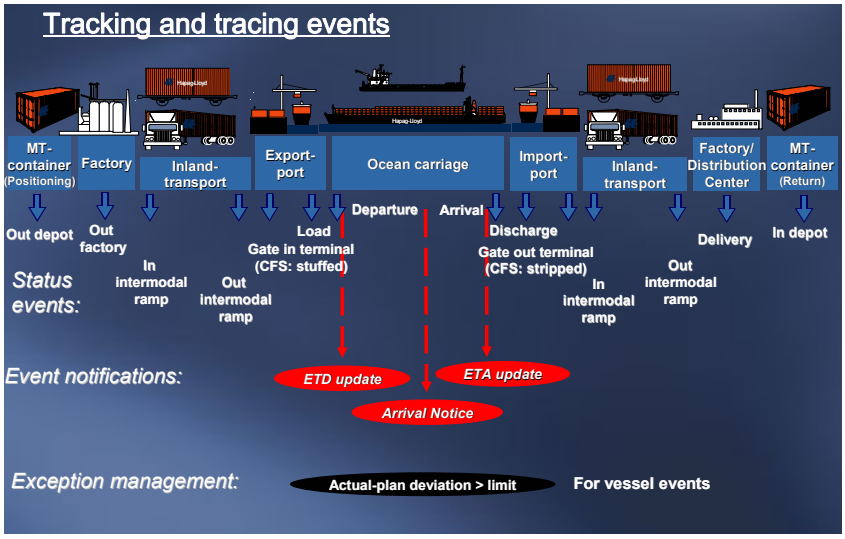

Figure 1: *Structure Tracking and Tracing system oceancarrier*

3.2 Hamburger Hafen and Logistik AG Information System

The COAST information system developed by HHLA informs customers and public authorities about relevant discharging and shipping data, status reports, container contents, directives, etc. Further details may be accessed through a protected domain, and instructions for the further use of containers or the cargo can be added, if necessary.

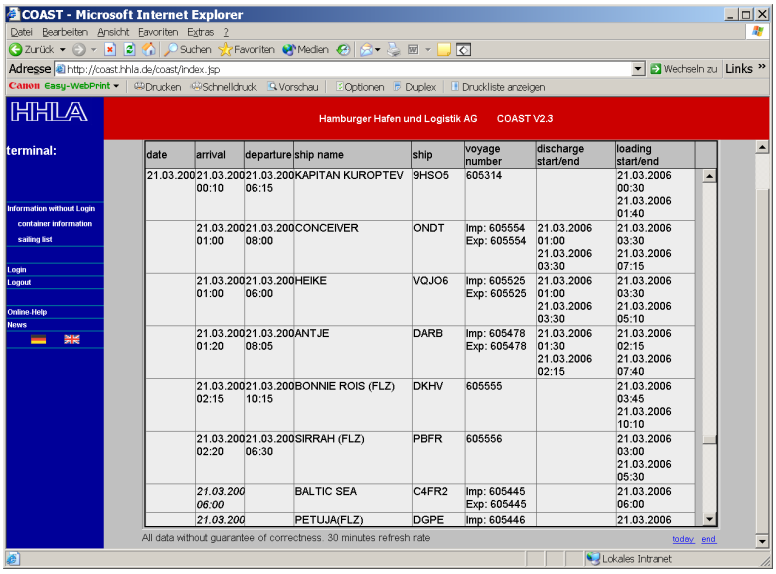

Figure 2: *COAST vessel information screen*

3.3 Dakosy Information Systems

Figure 3 gives an overall view of the partners of the transportation link involved in the Dakosy data pool, who are obligated to disclose that they use this pool as a data source. It is a question of making the necessary data (e.g. quasi orders, bill of loadings, import notification, export specifications, etc.) available only once so that Dakosy may edit it in a suitable way for all other partners.

The following section gives a short introduction into the various modules of the Dakosy systems.

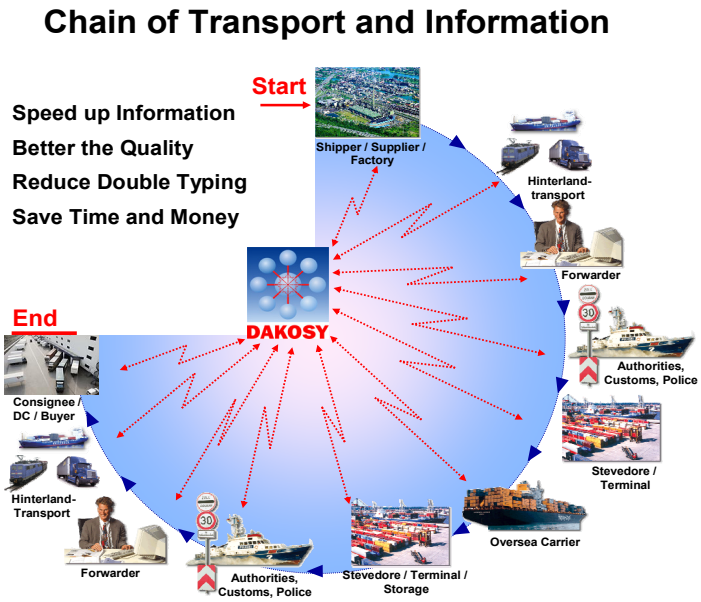

Figure 3: *Dakosy pool partners*

3.3.1 Seaport Forwarders Documentation System (SEEDOS)

User: Forwarders, exporters

EDI partner: Liner Agents, Shipping Lines, Terminals

SEEDOS users are situated in Hamburg, Bremen and other locations from where overseas forwarding is carried out. The application supports documentation of import and export and data communication with customers and all other business partners involved. SEEDOS supports the following functions:

Processing of consignments (forwarding documents, quay orders Hamburg/Bremen, house and sea Bills of Lading for individual and joint consignments)

Export presentation report to Customs Offices in Hamburg (ZAPP) and Bremen (BHT)

Invoicing (including interface to accounts department)

Forwarding accounts (including interface to accounts department)

Others, like Warehousing, Master data files handling , individual design of forms and lists and Statistics.

Order data require recording only once. Basic order data capturing can even be reduced when the data were sent via the Internet-interface "transport order forwarder" or via a bilateral interface from the forwarder's customer to SEEDOS. All documents and information produced with SEEDOS can be sent to any business partner at the touch of a button. The user benefits from further applications by interfaces within the system: e.g. the forwarder can easily access the dangerous cargo information system GEGIS and the customs import application ZODIAK and process his export presentation via ZAPP. These intelligent interfaces connect the customer to the Hamburg Water Police, the Customs DP Centre in Frankfurt (ATLAS, ALFA/DOUANE) and the harbour customs office Waltershof - Ericus, which is responsible for export via the Port of Hamburg.

3.3.2 ZAPP (Export)

Customs Export Monitoring in the Paperless Port

User: Local Customs Habour Offices

EDI-Partner: Exporters, Forwarders, Liner Agents, Terminal Operators

Export A covers all customs and technical dispatch requirements for export processing. This means all necessary customs formalities can be completed and processed quickly and problem-free. The origin and destination features of the consignment are used to automatically create the legally-required customs documentation.

Export A offers all legal and other current forwarding forms and labels. Master data files are stored and can be used as format copies. Auto text and the comprehensive access to basis data (eg country codes, Incoterms) simplify work. Interfaces to pre-stored production systems (ERP, WWS and PPS) can be used to transfer basis and movement data into an interface file. In this file data can be checked and if necessary information added or corrections made.

With the help of consignment control, this data can be used to create the necessary customs documents and dispatch papers. An option available is an interface to the European dispatch process NCTS.

In addition, EXPORT-A also supports INTRASTAT, EXTRASTAT and OBRA (AKM process). A module for licence administration (export refunds) is available.

3.3.3 ZODIAK (Import)

Customs Documentation System for Import Handling and Communication

User: Importers, Forwarders

EDI-Partner: BMF – Federal Authorities for Finances (German Customs)

ZODIAK - The fast IT connection to ATLAS

With ZODIAK, some 700 DAKOSY customers throughout Germany use a universal and innovative E-customs application. The ZODIAK interface to ATLAS and the

successful certification for all ATLAS processes currently available provide the perfect basis for a problem-free data exchange with German customs authorities. As a ZODIAK customer you can be certain:

All new ATLAS processes will be rapidly made available in ZODIAK.

ZODIAK was for example the first to achieve the certificate for the ATLAS software for customs warehouses. This means the process can be immediately used without problems as soon as it is approved by the ATLAS customs authorities.

Another advantage:

All customs tariffs can be called up using the electronic customs tariff (ECT) either separately or automatically integrated into the electronic customs declaration.

ZODIAK can be integrated into all existing networks without problems, enabling you to handle internal company processes in addition to communications processes with customs. The capability to re-use customs documents created with ZODIAK makes repeated input of data or other routine work unnecessary.

These ATLAS processes and modules are available:

Creation and printing of all current versions of the master data file

Access at any time to all base data, eg addresses, article type, exchange rate etc ECT (electronic customs tariff)

ZDA: 10 year automatic archive storage of all documents and EDIFACT messages including receipts Creation and processing of all current customs documents , like Customs presentation ledger, Customs clearance, Customs summary (supplementary customs declaration) and Dispatch (NCTS), departure and arrival.

3.3.4 ACTION

Agents' Container Transport Improving and Organizing Network

User: Forwarders Liner Agents, Shipping Lines

EDI Partner: Carrier Rail/Truck/Feeder

Agents' **C**ontainer **T**ransport **I**mproving and **O**rganizing **N**etwork

ACTION electronically supports Liner agents / brokers, ship owners and forwarders in the processing of container Hinterland transportation. DAKOSY was commissioned to develop ACTION by DIHLA (DAKOSY Interessengemeinschaft Hamburger Linienagenten GmbH), an organization of liner agents in Hamburg.

Users of ACTION can communicate electronically with the carriers Rail (HABIS, WADIS, DB AG, TFG - via corresponding applications such as Infokette, Polzug, NetLOG etc.), Water (feeder owners, river barge owners), and Road (container-trucking companies). And in addition, ACTION provides interfaces to further partners in the transport chain e.g. quay operators, customs, etc.

Transport orders, gatepasses and status requests can be entered and transmitted via ACTION. Interfaces to SEEDOS and GEGIS allow customers to send quay orders to quay operators and to download dangerous goods information from the regulations lists. Users of ACTION can receive status information from their business partners reporting about the development of an order. Quay operators could report about the actual status of the loading process. ACTION supports customers in the day-to-day running of the business: it contains tariff frameworks (for calculations and comparisons of rates), supports calculation of distance (for road and rail), invoicing, provides interfaces to accounts department, maintenance of master data files, and assists in the individual design of forms and lists as well as in statistical functions.

3.3.5 HABIS

Port Rail Operating and Information System

The development of HABIS represents a special achievement for DAKOSY. The application was commissioned by the City State of Hamburg and is operated from the DAKOSY DP Centre. DB Cargo operates the Harbour Railway (one of the biggest not federally-owned railways) on behalf of the City of Hamburg.

HABIS connects the EDP systems of the Deutsche Bahn AG (German Railways) with those of the shipping and transport industry and facilitates an IT-supported operation of the Harbour Railway System. There are HABIS functions for DB AG, rail operators, cargo-handling (quay-operators, companies with rail connections), and customs office providing specialized modules for railway forwarding and rail way customers.
Using HABIS-Kundenstation (HABIS Customer Station) Railway customers can - alternatively to ACTION - create, process and transmit transport notifications and transport orders, download status information, produce gate-passes and pre-advices to be transmitted to the gate house and/or quay operators. Acknowledgements of receipts are issued and can be printed. Transport orders are received, checked and forwarded as rail orders via the HABIS-Verkehrsführerstation (HABIS Station for Traffic Control). Prior to processing and transmitting rail transport orders even the number of wagons required for those orders may be ascertained by the system. Customers can track the status of their rail orders and access various information and printer functions.

3.3.6 GEGIS

Dangerous Cargo Information System

User: Liner agents / ship owners, quay operators

EDI Partner: Hamburg Authorities

The dangerous cargo information system GEGIS was developed for the City State of Hamburg and is operated from the DAKOSY DP Centre. GEGIS helps the Water Police and the Fire Brigade to monitor all movements of dangerous goods within, to and from the Port of Hamburg. Since 1997 Hamburg's Port Safety Regulations require that all companies involved in the handling of dangerous goods (liner agents / ship owners, quay operators) must report all movements of dangerous goods electronically to GEGIS. They also must comply with the "HAZMAT" regulation (EU Directive 93/75/EEC), which stipulates that all registrations must be forwarded to the Federal Registration Centre in Cuxhaven. Both regulations are harmonized, i.e. the registration with GEGIS automatically registers the movement in Cuxhaven

4 Final Remarks

Bearing in mind powerful developments of ship-sizes and requirements to operational services one of the biggest challenges for the ports for the future will be to adapt and harmonize the existing communication and information systems to the demands of their clients. This will be one of the most crucial criterias for all competitors.

References

Michael Inman Hapag-Lloyd Container Linie GmbH
e-biz consulting Europe
www.hlcl.com

Andree Rüder CTA HHLA Container-Terminal Altenwerder GmbH
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PORTNET – A NATIONAL MARITIME LOGISTICS INFORMATION HUB

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Keywords

Portnet, Port information system, Finland

Introduction

PortNet is an information system aimed towards providing a national single window facility for collecting all authority notices required for ships arriving to a Finnish port or departing from a Finnish port. PortNet also distributes the information to all parties concerned, within the limits of their privileges to that information.

1 What is PortNet?

The PortNet system is presently managed by the Finnish Maritime Administration, but is owned by the PortNet community. The PortNet-community consists of the Finnish Maritime Administration, the Custom's as well as the 20 largest ports. Contrary to what the original idea about a commonly owned system for all actors was, it is planned that PortNet ownership is in the future going to be limited to governmental authorities only.

PortNet is, however, not a regular Port Information System or Port Community Systems, although some PIS/PCS have features that are identical. PortNet declines addressing port-specific issues. The typical difference is that PIS/PCS operates only on a local level whilst PortNet is national.

The core content of the PortNet system is operative time table information and cargo information regarding ship traffic. All other information and services are derivatives of or attributes to this base information.

The availability is at present 24h/7d, but the support level is at present only 8h/7d. This is going to change within a few years. In spite of this, the user availability achieved has been quite high.

PortNet entry can be found at the web portal of PortNet, www.portnet.fi. A number of different applications including PortNet can be accessed through this portal. To use these applications requires registration, but full access privileges are not issued to anybody but authorities. Figure 1 gives an overview about the PortNet modules.

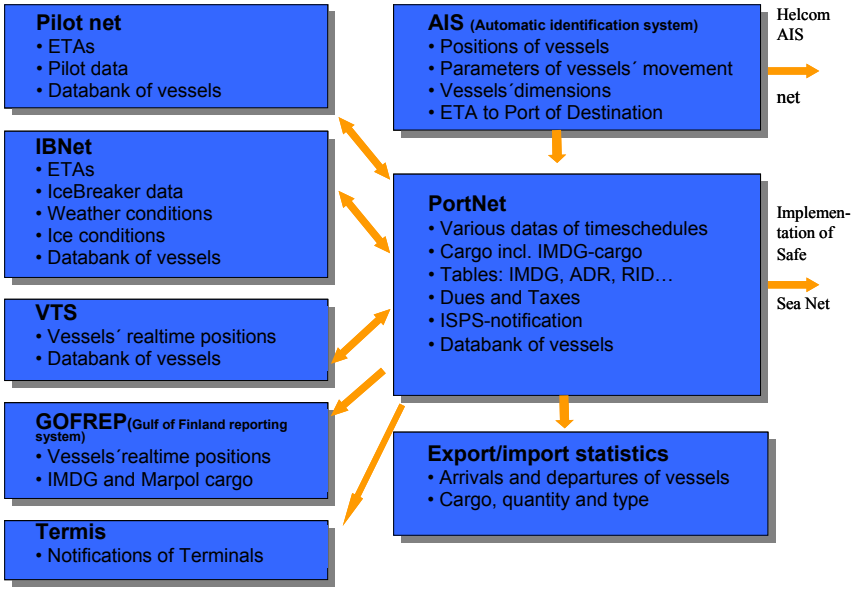

Figure 1: *PortNet Architecture*

Time tables, however, may be accessed without any registration through the **Intermodal Portal**, found in the application list of the PortNet portal. Also that all important Customs reference number is shown. It is issued individually for every port call and has to be used in all dealings with the Custom's throughout that particular port call.

2 PortNet authority notices

Presently following notices are supported:

- Advance notice on the arrival of a ship given 24 h before the arrival. Custom's directive THT 194/2003. Based upon the monitoring directive 93/75/EEC
- Security notice given by the ship before arrival (ISPS). Finnish law 1.6.2004/485
- IMO general declaration regarding the arrival of a ship into port (IMO/FAL Form 1) Directive 2002/6/EU. Custom's decree THT 194/2003
- Fairway due notice as a consequence of the port call. Finnish law regarding fairway dues 708/2002 (this is about change 2006)
- Cargo declaration notice for arriving cargo attached to the port call (cargo manifest that meets regulations issued by the Custom's concerning the presentation of the cargo to the Customs) Customs codex (EU) Nr 2913/92

- Cargo declaration notice for departing cargo attached to the port call (cargo manifest that meets regulations issued by the Custom's concerning the presentation of the cargo to the Customs) Customs code (EU) Nr 2913/92
- Notice on the arrival of dangerous cargo, based upon the regulations from IMO as well as the Maritime Administration. The notices are based upon EU directive 2002/59/EC.
- Notice on the departure of dangerous cargo, based upon the regulations from IMO as well as the Maritime Administration. The notices are based upon EU Directive 2002/59/EC.
- Cargo information for official import and export statistics. Delivery of this information is based upon the Finnish law regarding the Maritime Administration, 939/2003.
- Terminal notices regarding imports and exports. The notice regarding exports is based upon the Custom's decree THT 182/2004
- DG notification to the port, for the port to issue an official DG reception permission
- Waste notification regarding the ship generated waste can be given according to the Directive 2000/59/EC

The following authority decisions are printed out on PDF-forms, when required:

- Fairway dues decision regarding the port call
- IMO general declaration regarding the ship arrival (FAL 1)
- ISPS-notice regarding ship security

All decisions made within PortNet are distributed to parties concerned, according to the user privileges and using the PortNet-system.

PortNet in annual numbers:

- Port call notices are received 40.000 off
- Cargo notices are received 70.000 off
- A cargo notice may contain up to 900 cargo lots
- Dangerous cargo notices are received 15.000 off
- 70 % of all notices are dealt with by file transfer
- The amount of cargo to/from Finnish ports is close to 100 million tonnes
- Nearly one million TEUs are handled
- PortNet has about 2000 registered users
- Even if the notice is sent by file transfer, all PortNet notices are handled using the web-interface as well, as the party issuing the notice

has to confirm the correctness of the notice and then the Custom's formally acknowledges the notice

Information stored in PortNet is used by all authorities mentioned in the law about maritime security: Maritime Administration, Frontier Guard, Custom's, Marine defence forces and the ports. The information is also used by the Ministry of Agriculture, as an information source for inspections of imported food stuff and vegetables.

All those who give information into PortNet may freely look at their own information in PortNet and print out reports accordingly.

All notices may be input using the web-interface of PortNet. An increasing amount of notices are sent using XML or Edifact file transfer. Future developments strongly support the use of XML file transfers. File transfer documents are usually confirmed by the user to be correct using the web interface.

Notices into PortNet are input by ship representatives, ship owners, goods handlers and ports.

The information is used and handled by a number of authorities and ports.

The following notices in XML/EDI file transfer format to Customer systems or from Customer systems are available:

- An EDI-message concerning the ship call (CUSREP), which corresponds to the 24 h advance notice required by Customs for ship arriving into a Finnish port. This notice is sent to PortNet by the ship representative or the ship owner.
- An EDI-message concerning arriving or departing cargo (CUSCAR), which to its content corresponds to the general declaration required by Customs. This notice is sent to PortNet by the ship representative or the ship owner.
- An EDI-message concerning dangerous cargo (IFTDGN), which to its content corresponds to the regulations issued by IMO and the Maritime Administration. This notice is sent to PortNet by the ship representative or the ship owner.
- An XML-message concerning the ship port call (the information content corresponds to the CUSREP-message), which corresponds to the pre-notification required by Custom's, 24 h before the arrival of a ship in a Finnish port. This notification is sent to PortNet by the ship representative or the ship owner.
- An XML-message concerning arriving or departing cargo (corresponds to CUSCAR), which to it's content corresponds to the general declaration required by Customs. This notice is sent to PortNet by the ship representative or the ship owner.
- An XML-message concerning dangerous cargo (IFTDGN), which to its content corresponds to the regulations issued by IMO and the

Maritime Administration. This notice is sent to PortNet by the ship representative or the ship owner.

- An XML-message sent by the port containing time table information (ATA, ATD) concerning mooring or un-mooring the ship. This message is sent to PortNet by the port.
- Messages sent to ports, regarding port calls to that particular port, with information from CUSREP, CUSCAR and IFDGN-messages, and security information from the ISPS-notice and ship waste information.
- A XML-message regarding ship calls and supplementary base information about ships is sent to the VTS
- A XML-message regarding ship calls and supplementary base information about ships is sent from VTS to PortNet
- A XML-message regarding ship calls and supplementary base information about ships is sent to IBNet, a system used for winter traffic management
- A XML-message regarding status information ship calls and supplementary base information about ships is sent from IBNet to PortNet
- A XML-message regarding ship calls and supplementary base information about ships is sent to PilotNet, a system used for piloting management
- A XML-message regarding ship calls and supplementary base information about ships is sent from PilotNet to PortNet
- Messages are sent to the SafeSeaNet index-server of EMSA (European Maritime Safety Administration) on port calls, routes, security measures and dangerous cargo notices. These messages are sent directly from PortNet. No additional information is required at national level. The service requires 99,8% availability:
    - Ship port call notice (Port_notification)
    - Ship base information, route and position message (Ship_notification)
    - Ship dangerous cargo message (Hazmat_ notification)
    - Ship security notice (Security_ notification)
- Fairway dues decision information message is sent to Custom's systems for invoicing use

The "security amendment" of Customs Code Nr 648/2005 requires pre-arrival and pre-departure electronic cargo manifests. The formal implementation has to be from the beginning of 2009 at the latest. The security amendment, as well as implementation of the eCustom's concept, is probably going to require a completely

new set of new notices and messages in addition to the changes in the present PortNet messages.

3 PortNet services

All the messages listed above are of course a part of the PortNet services structure, but there is more.

The time table facility has to be seen as a set of different times, from different sources: e.g. advance ETA/ETD, updated ETA/ETD (several sources) and finally ATA/ATD (formal). The providers of that information are the ship agents, the ship captains, the pilots, ice breakers, VTS and the ports.

The nationwide AIS base station network is shortly going to be connected to PortNet and AIS-information is going to be automatically matched and connected to port calls, even if that in some cases may cause mismatch problems. In most cases it will be possible to estimate the ship arrival times with close to minute accuracy.

4 Cost recovery issues

At present, no PortNet user charges are applied. It is not thought to be appropriate to charge the user for supplying mandatory information to authorities, as the user does not have any choice, except sending the information by fax, the actual handling cost of which is manifold. Hence the cost is incorporated in the fairway dues. Many Finnish ports are, however, using PortNet information as a convenient way of producing information for invoicing. In the future this kind and other kinds of value-added services will probably be charged for.

5 Collaboration with other countries

It is logical to conclude, that a departure notice in a Finnish port could ideally constitute an identical arrival notice in the destination port of another BSR country. FMA has tried to resolve the problem and to find interested collaboration partners within BSR. It has become painfully evident that there are several severe problems involved. Establishment of a PortNet system requires a seamless co-operation between several authorities and agreement about sharing information and mutual trust. This seems to be particularly difficult to establish on voluntary grounds. An effort in that direction is now in progress within the EU BaSIM project, where the aim is to establish three collaboration projects. The other party is probably going to be just ports, as the project time frame does not give time to wait for the establishment of a countrywide PortNet system in any of the Partner BSR countries. Denmark has already created a national PortNet community and has decided to build a national PortNet system within a few years. At present it is on hold. Also Norway has good potential, provided that the present internal two-prong collaboration develops into one.

The EU MARNIS project also addresses the problem but does not and cannot address the issue about authority co-operation but concentrates on the technical solution.

One challenge is the free movement of goods between EU-countries, which does not require stringent custom's procedures. On the other hand the increased security regulations, ISPS etc. probably require more and more information on goods transports between EU countries.

Another logical possibility would be that EU would take the initiative and assume the responsibility of developing the idea on EU-scale. The problem within the EU Commission is, however, precisely the same as in the member countries. Maritime safety, security and logistic issues are handled by different entities within the Commission, who possibly do not have the ability and vision to see the advantages of a common process over Directorate and entity borders.

The Finnish Maritime Administration does not pursue the idea about creating a single EU-wide PortNet system. A cluster of autonomous national PortNet-systems exchanging relevant information, however, would be the ideal solution. An interoperable system is perhaps easier to build up than an integrated one.

6 Future

The present PortNet has been in production since year 2000. Although it has served well, the amount of traffic it handles has exceeded all expectations. The system has been updated several times but we have realised that it is time for major overhaul of the system. A new PortNet project has been initiated called PortNet 2. PortNet 2 is projected to start production in the beginning of 2009, at same time when the Directives on eCustom and the electronic manifest are officially coming into force.

At the same time the system is going to be 100% government owned and financed as well as supported with a 24h/7d regime.

7 Conclusion

PortNet is prime example of both a "single window" application as well as authority co-operation. PortNet implication studies have shown that effects of PortNet are considerable. The quality of information is increased to a completely new level and still it saves a considerable amount of money in all stages of the logistic chain, perhaps not directly as much as indirectly.

More information

Look for more information on the web portal www.portnet.fi or write to rolf.backstrom@fma.fi or antti.arkima@fma.fi. If more Custom's specific information is required, olli.tuomisto@tulli.fi might be a good option. If you want to test the PortNet system we can possibly issue temporary access to a test database, identical to PortNet.

INTERNATIONAL BROKERAGE OF FREIGHT HOLDING EQUIPMENT

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1 Web-based Networking Solutions for Cargo Transport and Accessories

1.1 Globalisation and its Challenges with Regard to Logistics Enterprises

The worldwide economy and the spread of information technology is confronting international traders with a dramatically raised demand for high speed delivery. A thorough co-ordination of goods transport is a necessity, and therefore it is also vital to avoid any detours when exchanging information with business partners.

In order to maximise mutual benefits, all resources must be working to their maximum capacity. Traders of goods and logisticians must have access to reliable information from and about one another. Therefore we serve as a platform and as mediators between both parties.

1.2 On-line Exchange of Information Concerning Means of Transportation

The company RTSB has launched the internet-portal www.containeronlineshop.com in order to cut out unnecessary obstacles for traders when searching for the right transport service provider.

The broker needs not actively step into the business process, but merely serves as a catalyst, as can be seen in **Figure 1**.

The agreement develops directly between the two clients.

The owner of a freight container has the opportunity to offer it for sale or for rent and can enter all the information his customers might request.

The customer is then offered a complete list of all the containers at a certain location with all their possible destinations. A separate freight rate calculator lets him retain control over the potential costs.

In addition he can compare the prices for containers at different positions.

A special program serves as an interface for the company's clients and allows them to organise all relevant data.

There is also a software interface for forwarding agencies, which allows them to make local calculations globally accessible.

In order to reach a broader range of customers, there is also an on-line platform.

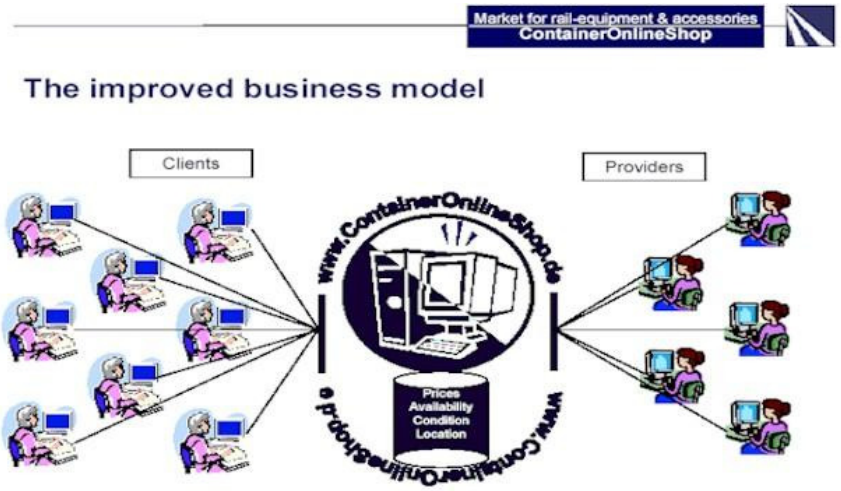

Figure 1: *Overview of the online-platform's function in the business process*

As a result of the depicted process, clients have access to an international schedule of arriving and departing containers.

A provider of shipping space, who might have discharged at a distant port, can easily acquire new contractors for the way back to his base; the long queue of middlemen is cut out.

1.2.1 Stepwise Description of a Business Transaction

- At the beginning, the interested potential customer queries the provider on the availability of his shipping compartments and his service rates. For this, he uses the on-line form provided by our company.
- The provider then enters his offer into the same set form.

Should the client accept the offer, it is converted into an order.

- The supplier then issues an order confirmation and a bill. All ingoing and outgoing amounts are then summarised in a chart.
- After the bill has been paid and the order has been conducted, the transaction is completed.

It is not necessary to re-enter the information. This saves important resources and provides continuous transparency for both parties.

2 Working with Logistics-Management Software

2.1 Advantages of Interactive Rail Transport Management with enyTrans

The program accumulates all the information you would usually need an extensive database for and makes it accessible for possible partners.

Individual cost calculations can quickly be transferred into actual offers and these can then be forwarded to clients.

Users also have the opportunity to telephone partners directly from their contact list.

Each transaction and all its individual processes are consolidated in a special folder. In addition, automated e-mails can be sent to contacts, containing, for example, personalised payment reminders or new offers.

All in- and outgoing costs can be calculated in order to allow the user a detailed overview of his business balance. There is a detailed help manual and the program can be restricted to a certain user, to prevent unauthorised interference.

Most important of all, it is network-compatible and makes all relevant data globally accessible.

This software-based work environment gives the user one crucial advantage on the open market: time.

Since information can be exchanged much quicker over the world wide web, he is always a step ahead of his competitors who rely on old fashioned communication technology.

2.2 On-Line Transactions with Transoffice

Transoffice is an online-only solution, which partners can access from any internet connection world-wide to keep track of their ongoing projects.

All they need is their user name and their password, the data is stored on a central server.

The user then has access to information like his business data, container stock, his finances, in- and outgoing costs, etc.

He also has an overview of his partners and the development of their transactions.

They key feature is a function, with which the client can let the program calculate financial developments and then graphically display them in a diagram.

Transoffice takes over essential tasks for the customer and saves him the effort of communicating through a long line of intermediaries.

3 Conclusion

The development of global economy has reached a velocity, which is unparalleled throughout history.

Entrepreneurs, who want to face the challenge, need to rely on fast global networks, which take as few detours as possible.

The high demand for transportation utilities makes it necessary for clients in the logistics business to plan the route for their vehicles in advance, time- and money-using middlemen are out of demand.

Our platform is a passive organ, a marketplace for providers and customers alike, therefore all necessary communication happens directly between the business partners.

The range of possibilities offered by the world wide web is not yet fully visible to us, but we work to make the view a little bit clearer.

RADIO FREQUENCY IDENTIFICATION (RFID) TECHNOLOGIES FOR CONTROLLING AND OPTIMIZING SPECIAL LOGISTIC PROCESSES

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Keywords

Radio Frequency Identification, RFID

Abstract

Modern identification technologies like RFID can play an important role for optimizing and controling logistics chains. This article presents approaches for coupling RFID systems for asset identification with telematic modules. This generates new products and services implementing a »secure chain of goods«. The Fraunhofer IFF as a main competence center for RFID is offering services and products in this context and helps customers to streamline their logistics processes with this modern technology.

1 Material Internet: Radio Technologies Are Conquering the Logistic Asset

Information on the identity, current position and status of goods and loading equipment/means of transportation/vehicles as well as this data's real-time availability in expediting systems is assuming a pivotal role in logistics. The trend toward miniaturizing equipment as costs are simultaneously falling is opening a new market for autonomous logistic assets equipped with sensor technology and communication modules to optimize operational and logistics processes. At present, coupling RFID systems for asset identification with telematic modules is generating new products that fall under the »secure chain of goods«. As a consequence, technical logistics systems have entirely new properties. Thus, goods are enabled to communicate with a system on as low a level as possible. This in turn will make it possible to decentralize the IT and control architecture. Ideally, based on its communication with the system, the logistic asset itself will decide which path it should take. Consequently, the complete system will be able to react more quickly to changes and it will be possible to delegate decisions close to the operative level.

The concepts of »pervasive computing« and »ubiquitous computing« in the milieu of RF technologies represent a new development in information and communication technologies. In the course of this development, everyday objects will be equipped with microelectronics in the future. The thusly created »intelligent« objects, also called »smart objects« or »smart devices« will affect nearly all areas of daily life and naturally logistics too. Initial applications are being created in which smart devices on individual items establish communications links to one another and pass on information to a central location.

Concepts such as the material Internet describe the paradigm change from hierarchical control mechanisms to autonomous, intercommunicating object structures that integrate functionalities for identification and localization.

2 RFID and Telematics in Industrial Plant Construction

In industrial plant construction, the processes in a plant's life cycle of manufacturing, transport and storage, construction, assembly and startup, operation and maintenance or modernization are fields of application that provide great potential both from the perspective of logistics and maintenance for improving productivity by using RFID and telematics (Fig. 1).

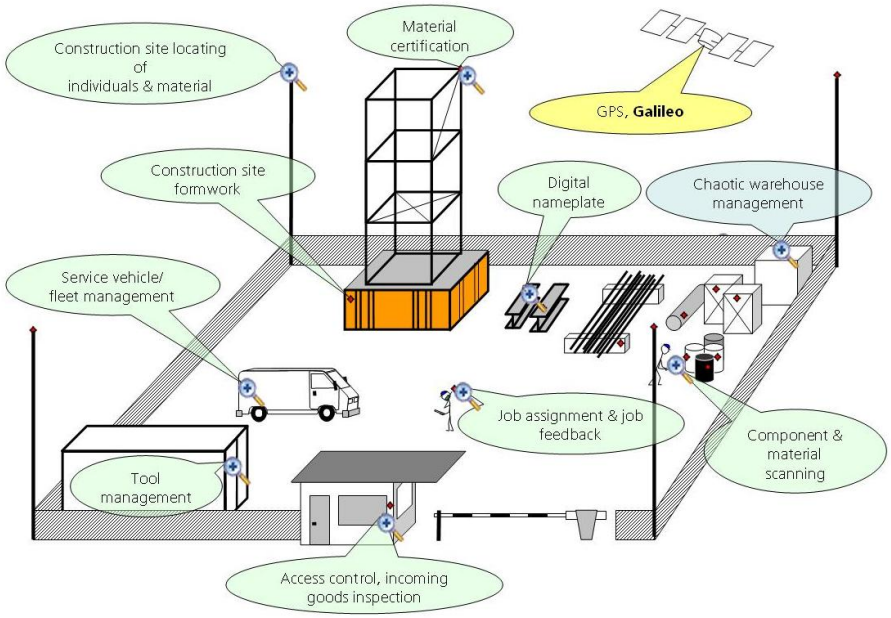

Figure 1: *Application of RF based methods in construction site logistics*

The increasing complexity of technical installation and the requirements for reliable and cost effective plant operation are generating rising demand for information in logistics and maintenance. Engineering effective and efficient logistics and maintenance processes necessitates being able to store and retrieve assured and up-to-date information about configuration, state changes and past measures as well as

requisite documents in real-time directly on site on components, assemblies and equipment. In addition, there are general requirements for international flows of goods ranging from product identity to problems of traceability, minimization of packaging and product liability up through safety issues. Consequently, different user communities must be enabled to access master and dynamic data in the maintenance process without it being imperative to access a central plant information system to do this. The rapid development and spread of RF technologies are providing the technical prerequisites for distributed data storage. However, local conditions in industrial plant construction make high demands on the load capability of RFID transponders and the reliability of RF technology overall to transmit information to the receiver.

From the standpoint of logistics, beneficial aspects of using RF technologies are:

- Status detection of logistic assets (e.g. construction material and humidity) and related jobs (delivered – manufactured – packaged - shipped – received at the construction site – stored – used),
- Representation of the secure supply chain beyond company and territorial borders (components, transport unit, spare parts, tools, etc.),
- Precise identifiability of logistic assets (units of goods, personnel, tools, etc.) in the company/at the construction site,
- Precise localizability of logistic assets (units of goods, personnel, tools, etc.) in the company/at the construction site.

From the standpoint of maintenance, beneficial aspects of using RF technologies are:

- Secure history of a maintenance asset (parts, tools, consumables),
    - Certification data
    - Who did what when? (maintenance history)
    - Replacement part tracing
    - Status (inspected, calibrated, etc.)
- Precise identification of maintenance assets (e.g. for identical parts in the plant structure with different maintenance intervals; identification of points for lubrication or diagnostics),
- Precise localization of maintenance assets (e.g. chaotic storage at a construction site, sequence for actuating distributed shut-off valves).

Studies[1,2] have demonstrated that the operating conditions (e.g. dirt, dust, extreme climate, abrasive material, metallic environment) equipment can be subjected to as well as the logistic conditions (e.g. large proportion of third party suppliers, international transport chains, the specificity of maintenance measures for

[1] Project: “Konzeption und Analyse webbasierter Service zur Unterstützung von Shutdownprozessen”, 2003-2005, Fraunhofer Institute for Factory Operation and Automation, supported by the State of Saxony-Anhalt, ZB-Nr.: 0504 / 00001

[2] Project: “RFID-gestützte Baustellenlogistik”, 2005-2006, Fraunhofer Institute for Factory Operation and Automation, supported by the Stiftung Industrieforschung, ZB-Nr. S697

construction sites) generate the widest variety of requirements on formulating the technical concept for the use of RF technologies (cf. Fig. 2).

Technical Ambient Conditions	Organizational Ambient Conditions
Rough Environment Metal / dirt / dust Weather / climate / temperature Type of maintenance / cycle	Approx. 5% material losses (Reason: Deliveries cannot be found) [8]
Global Export Locale third party service providers Customs / transport delays Missing I&C / different standards	Approx. 30-50% productive hours of work (Reason: Searching for, identifying, transporting, transferring material) [7]
Large Share of Purchased Parts High logistics expenses	RF technologies can save approx. 25% of the hours of work in building construction spent on inspecting deliveries and entering data in material management systems [9]

Figure 2: *Ambient conditions in construction site logistics*

The mobility of the resources (material, equipment, personnel) in job site assembly substantially increases the variety of production processes in terms of space, time and complexity. Existing supply chain management software inadequately incorporates this aspect because it is geared toward stationary manufacturing. Insufficient material supply at the construction site, which can cause productivity to drop up to 50%, is frequently considered to be a primary cause of failures (cf. [4]). Hence, information and document management for industrial plant construction projects to reliably supply information about decisions has been gaining importance in recent years ([4], [2]). RFID transponders, RFID location systems and mobile terminals are increasingly being used as information carriers ([1], [3], [5]).

Large scale deliveries of material and equipments have to be managed whenever plants are being erected, modernized or shut down. The secure transfer of goods between supplier and customer or between supplier, carrier(s) and customer is growing more and more important in international supply chains. RF technologies have enormous potentials here too. New computer-aided logistics products that support the secure transfer and transport of goods are already being developed or launched on the market (Fig. 3).

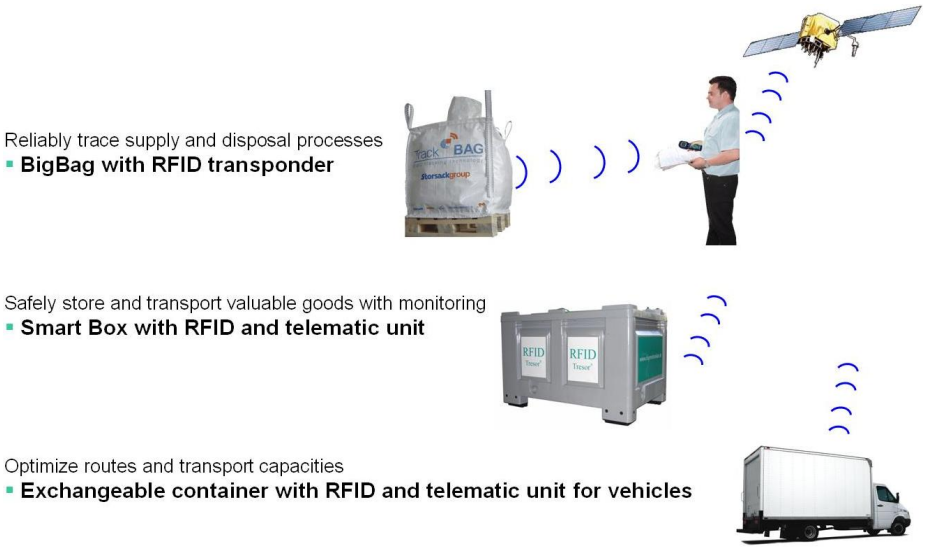

Figure 3: *New logistics products with integrated telematic solutions*

The Smart Box for example embodies a paradigm change from keeping track of logistic assets at fixed measuring points to continually keeping track of a logistic asset even within multimodal supply chains. Guaranteed value added services based on RF technologies such as the envisioned Galileo value added services can be instrumental in safeguarding these processes even better.

3 Standardization and Certification

RF technologies are on the threshold of entering the mass market. Various sectors such as commerce and parcel service companies are making great efforts to create a stable, standardized environment for the introduction of RFID technology in the complete value added chain. To this end, users are forming strategic partnerships in order to establish a close relationship between the developers and users of hardware and software. Both sectors are endeavoring to standardize both RFID based applications and technologies and products to make it easier for companies to start using the new technology and to clearly communicate its advantages.

Current activities in these fields are having and will have an impact on other sectors such as construction site logistics. The continued use of tags already installed by suppliers (cf. [6]) for various processes (e.g. warehouse management, assembly and disassembly, maintenance, shutdown) is giving the sector of plant construction a competitive edge too.

The multitude of different logistics processes in a plant's life cycle involving third party service providers is making it difficult to apply a standardized approach to integrating RF based technologies. A classification based on the field of application, the logistic asset being analyzed and the packaging unit can provide a foundation for making RF based processes standardizable and certifiable in the future (Fig. 4).

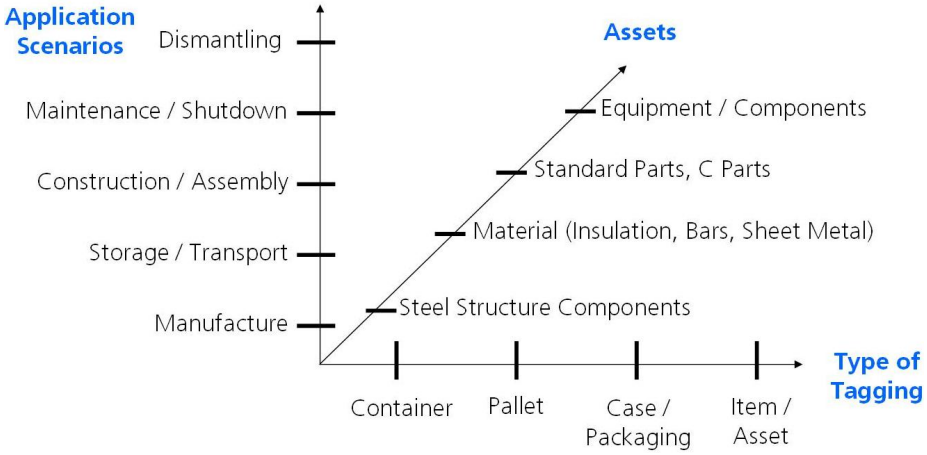

Figure 4: *Classification of RF based scenarios the basis of standardization and certification*

The LICON consortium's (www.licon-logistics.com) goal of establishing an industry-based guideline for secure chains of goods fits into these standardization efforts. The LICON group's work involves specifying the requirements of RF supported logistics processes that have to be met in order to receive LICON certification. These requirements have been developed into inspection plans used to review a process being certified for its compliance with LICON requirements. The LICON certification process specifies all process steps needed to secure international supply chains as a network of transport, storage and distribution operations

- significantly incorporating RF based technologies and others (sensor technologies) for identification, authentication, status monitoring, communication and control and
- incorporating sector-specific check routines for anti-forgery protection, reliability, usability (e.g. minimum shelf life).

The technology drivers RFID and telematics are generating new potentials for a logistics platform of products geared toward construction sites [10], software tools and services in the plant construction sector. Along with automated identification and inventory management, RFID and telematic functionalities will increasingly improve the capability to continuously determine components' position and status. Further development of transponders in metallic environments, coupling of transponders with sensors, development of universal readers and adaptation of location systems suitable for rough construction site use from the perspective of cost and handling are needed [11]. Precise location information with the tag's geometry information constitutes the basis for VR scenarios suitable for PDA, which support the optimization of installation processes. These technologies are leading to smart supply components for the secure chain of goods (RF delivery slip, RF container, RF pallet, etc.) as the technical infrastructure and as certifiable smart supply reference

processes for plant construction. RFID best cases (Metro, SAP, Airbus) have to be integrated in the concept so they are upwardly compatible.

Standardization may not impede the agility and flexibility of process changes. Standardization is focusing on processes and architecture so that a specific functionality can be produced even with little custom software. International construction site logistics needs standardized solutions, yet these will no longer generate any competitive edge after the break-in period. Strategies for flexibly defining RF equipment and services are in demand in order to obtain competitive advantages. Construction site logistics in industrial plant construction provide extremely scalable areas for RF based solutions that can be turned into a competitive edge.

4 References

[1] Elgar Fleisch (Herausgeber), Friedemann Mattern (Herausgeber): Das Internet der Dinge: Ubiquitous Computing und RFID in der Praxis. Visionen, Technologien, Anwendungen, Handlungsanleitungen – Springer, 2003 .

[2] Karen M. Furlani, William C. Stone: Architecture for Discrete Construction Component Tracking – Gaithersburg, 2004.

[3] Jan Reinhardt et.al.: Using Customized Navigational Models to Deliver more Efficient Interaction with Mobile Computing Devices on Construction Sites, Carnegie Mellon University, 2004.

[4] Jose Luis Perdomo-Rivera: A Framework for a Decision Support Model for Supply Chain Management in the Construction Industry – Blacksburg, Virginia, 2004

[5] Tomohiro Umetani et. al.: Parts and Packets Unification for Construction Automation and Robots – Osaka, 2004.

[6] Müller, Wolfgang: Anwendung der RFID-Technologie im Elektromaschinenbau, 14. Goslarer Instandhaltungstage, Gesellschaft für Instandhaltung e.V., June 7 and 8, 2005, Goslar.

[7] Schmidt, Norbert: Wettbewerbsfaktor Baulogistik. Neue Wertschöpfungspotenziale in der Baustellenversorgung. Hamburg: Deutscher Verkehrs-Verlag, 2003.

[8] Fraunhofer IFF: Survey of General Contractors and Plant Construction Suppliers on Problems at Plant Construction Sites, Internal Document from the Project “Analysis and design of Web-based Services to Support Shutdown Processes”, 2003-2005, supported by the State of Saxony-Anhalt.

[9] Breakthrough Strategy Committee: Breakthrough Process and Charter, BTSC Document 2003-02, 2003, p. 51.

[10] Plate, Cathrin; Roeben, Helmut; Richter, Klaus: Einsatz von RFID Systemen im Shutdown-Management komplexer Anlagen, Tagung Informatik 2005, Gesellschaft für Informatik e.V., 19. bis 22. September 2005, Universität Bonn; p. 282-286., ISBN 3-88579-396-2.

[11] Schenk, Michael; Richter, Klaus: Intelligently Controlling Logistics, in: IFFOCUS 1/2005, p. 12-16.

Part III

Selected Papers from the China-Europe Forum on eLogistics

DIGITAL TRADE AND TRANSPORT WEB SYSTEM (DTTWS)

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Keywords

Logistics information platform, alliance, transport networks

Abstract

To realize the transport networks, integrations and visualization through hub function of logistics information platform so as to perfect logistics transport routes and cargo distributions.

Articles

In the current web economic society, the web can either bring the opportunities or the threads and challenges to the enterprises. The block limit among the enterprises is required to break up and the close and mutual communications are expected accordingly. The internet has entered a time of web commerce, and majority of the internet users have become the web businessmen. The main past and sole purpose to access the internet has been developed into the current commercial behaviors with some purposes.

1 The Logistics Information Port

With the leadership and strategic cooperation of the local government, and at the beginning of the year of 2005, the Commerce and Trade Logistics Information Port (CTLIP) (www.logsw.com) was planned and designed by Shenzhen East Rainbow Information Technology Co., Ltd. (ERIT), which is covered sufficient and huge information related to enterprises, commerce, trade and logistics. Meanwhile, with the top satisfactory of the demands of the memberships, one commercial exchange platform based on web is successfully established for all the enterprises so as to fully use and develop the information resources supplied by the real users.

The trusts degree of the enterprises can be standardized and improved with the leadership and control of the local government and with the operation of the enterprises. On the other aspect, the current resources of the enterprises in Shenzhen can be well integrated and deeply developed so as to fasten the exchange of commerce and trade among the enterprises, and to realize the mutual growths and developments of the regional enterprises. The demands and supplies are well matched in markets for the entire supply chains related to producers, traders,

commercial enterprises and logistics operators through fast information access of web and the close exchange of web localization. Our web platform can cut down the cost of the enterprises, save the time of exchange and improve the core capability of the enterprise profits.

2 Application of Logistics information

In the Long Gang District of Shenzhen there are over thousands of the manufacturers, and traders enterprises with huge logistics quantity. In order to cut down their cost and improve their competition, these enterprises will gradually seek the outsourcing of their logistics business from the third party of logistics enterprises for the same steps of the global developments. These enterprises themselves will focus on the improvements of the core competition respectively. The detailed information related to logistics services providers and

logistics services bids inside and outside Long Gang District has collected at the CTLIP, and the information related to empty trucks, cargoes, logistics enterprises, producers and traders inside and outside the district is well integrated accordingly, which has constructed one efficient information platform in the region so as to improve the local exchange of the information, to strengthen the further cooperation and to highlight competition.

Our main objectives are to improve the multi-collaboration of the enterprises inside and outside Long Gang District of Shenzhen, and to strike the reasonable assignments of the local cargo and logistics resources, such as the cooperation between manufacturers and traders, and the collaboration among the manufacturers, traders and logistics services providers etc. in the region so as to seek the reliable logistics service providers to cut down the transport cost and to improve the development and growth of the local logistics enterprises.

3 Data exchange and connection among logistics parks

One of our model clients is Shenzhen Bao Ding Wei Logistics Park (BDWLP)(www.bdwhy.com) . This is one large scale logistics park focusing on the inter-model transport services. There are over 300 logistics enterprises in the logistic park and thousands of trucks resources from the whole country for the supply chains operation. Through the information match and data exchange on the platform system based on web, the cargoes information of many large scale of wholesale markets can be displayed on time at the rolling screen in the BDWLP so as to have an efficient integration of the information related to empty trucks and logistics for the wholesales operators. This can save the trading time, cut down transport cost and increases profits as well.

The logistics center or logistics park has played a major role in America and Europe. Cargo owners are not aware of the truck drivers mutually, but they can exchange the logistics information based on the logistics center or logistics park platform for the integration of the resources and optimization of the trucking routes and cargo assignments, and for the real tracing and control of the entire logistics process. The Information application of the logistics center or park is widely used in the overseas

areas, but in our country there are over one thousand logistics parks serving as the CFS and starting station in the large and middle cities. The logistics information exchange has become important operational business. Our next development trends are to set up the data exchange and connection among all the national logistics parks for the realization of the shares and links of the information in the whole countries and for the improvement of the clear logistics information and for the" just in time" exchange with the cut down of the cost after our completion of the information platform construction in the single local logistics park.

4 Collaboration platform of the logistics parks

BDWLP is now leading the construction of the national collaboration platform of the logistics parks so as to realize the use and integration of the cargoes, empty trucks inside and around logistics parks based on our exchange platform bridge of the logistics information in the big cities of the whole country. This can strongly improve the core competition of the collaborative companies. With the increase and growth of the collaborative logistics, the trucks from main cities of the county will actively enter BWDLP while they arrive in Shenzhen or reach regions around Shenzhen. The membership enterprise will be entitle to assign the cargoes with priority of service. In the meantime, the logistics network system is enlarged in the whole country. The integration of the trucks resources from the whole countries has cut down transport cost of the purchasing and distribution logistics supply related to producers, traders, logistics service providers and the wholesale markets in the Long Gang District of Shenzhen in order to ensure the smooth and immediate logistics operation and management.

Supported by the internet and the internal web of the enterprises, the cargoes and empty trucks information can be on time released and displayed on the big screen of the freight exchange hall of BDWLP. The two modes of exchange at site and on line is applied so as to have a better solution of the connection of the empty trucks and cargoes and to cut down the empty driving rate of the return trucks. The three systems related to logistics, membership and coordinating control which are designed and developed by our company has improved the intelligent level of the logistics services, and become a leader of the logistics information industry in China. Based on the web and memberships and our added value measures, we have established one modern logistics park with the functions related to logistics, trucks coordination, memberships, safety control, warehousing, express delivery and consultancy etc. in the region. We have realized the scale operation and management of logistics and the web operation of logistics in the national regions. For the present moment, our DFHIT has set up the strategic and collaborative partner relations with over 18 national level logistics park based on the BDWLP of Shenzhen.

After our feasibility analysis and site inspection, we are aware that over 60% of the empty trucks in Pearl River Delta areas intends to reach the regions of Yangtze River Delta, and over 60% of the empty trucks in the Yangtze River Delta intends to come to Pearl River Delta areas, plus the entire logistics quantity of both Pearl River Delta and Yangtze River Delta covers over 60% of the national logistics general quantity, we have set up the strategic logistics network in the most active top 2 delta regions of Yangtze River Delta and Pearl River Delta based on our system platform.

In 2005, we realized the information exchange between logistics parks of Shenzhen and Wuxi cities. At the beginning of year of 2006, we participated the whole plan and design of Suzhou Yangtze River International Logistics Park as one of the consultants, and accept the whole construction of the information platform of the logistics park. With the increase of the strategic web dots in the park, the information flow and the cargo exchange information flow will be increased as well, which bring up the higher requirements of our web platform operation and management..

5 The future of Logistics Park

Logistics Park is one logistics operational platform, and the real unit of the logistics operators is the third party logistics enterprises. Through the application of the advanced the information technology, the third party of logistics can realize their informatization, latticing and intelligent standardization of logistics operation and management so as to establish the fast feedback system for the quick transmission of information and the set up of standard business process to realize the perfect of transport routes and cargo distributions.

Based on the logistics information platform, the digital trade and transport web system will be finally constructed through the physical links between the e-business webs and logistics parks, with the competition of the information supply and localization of the information exchange, with the real tracing and control of the logistics operation, and the collaboration of the enterprise of the supply chains in China.

References

Li Jun “Network Start Calculation Method related to Vehicle Coordination Issues with Time Window”□the Economy Management College of Southwest Jiaotong University,China

CONSTRUCTION OF THE EDI AND LOGISTICS INFORMATION PLATFORM OF SHANGHAI

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Keywords

Electronic data internet (EDI), e-business, gateway information

Abstract

In order to strenghen capability of policy implementation, improve efficiency of customs declaration, cut down cost of enterprise and perfect investment envrionment of busines, Shanghai E&P Internaitonal, INC is registered with supports of Shanghai Municipal Government for improvement of gateway informatization work, for construciton of the fast customs declaration project, for the unification of gateway logistics information platform based on four circles of trading, supervision, logistics and settlement; the integration of information basic conditions can be provided with strategic implementation of the fast customs declaration in Shanghai and Shanghai International Maritime Centre and through completion of some great projects and integration of gateway iformation resources. Shanghai EDI platform will be developed into one integration platform of the great gateway logistics information, e-business and will become one information hub of international maritime to cover the servies in the regions of Yangtze River Delta and the whole China.

1 Briefing of Shanghai Gateways Informatization Development

Under the development trend of global economy integration, the realization of trading convenience through gateway informatization has become the striving goals of the gateways worldwide. As the leader of the Yangtze River Economic Regions and one of the front line of realization of the open to the public and fast connecting with the international development, Shanghai gateway urgently needs to strengthen the capability of implementation of the policies, increase efficiency of customs declaration, to cut down the cost of enterprise and to perfect the environment of trade and investment. For such a reason, Shanghai Municipal Government has earliest focused on the development of gateway informatizaiton. In 90's middle period, acting as one of the five major projects of Shanghai Information Ports, the International Economic and Trading EDI Network has been constructed in Shanhgai, which is included city class ETD center and several industrial EDI centers. In 2001, Shanghai E & P International, INC was established based on the modes of improvement by government, operation on markets and management by enterprise and with integration of the former three EDI centers to construct the " Fast Customs Declaration" project. Based on the successful implementation of the 'Fast Customs

Declaration" project, in October, 2004, the cooperative memorandum related to Shanghai EDI construction was made between Shanghai Municipal Government and PRC Customs Administration. Under the three principals of unifications. " unifications of brand, certification, and criteria", all the information system platform related to fast customs declaration and gateway logistics has been integrated accordingly. The EDI construction of Shanghai officially started as well. With the great supports of the PRC Customs Administration and concerned Ministries of PRC, with the great efforts of each divisions of Shanghai gateway and the consolidated collaboration, the periodic achievements of Shanghai EDI construction has obtained accordingly.

2 The Development Concepts of EDI and Gateway Logistics Information Platform

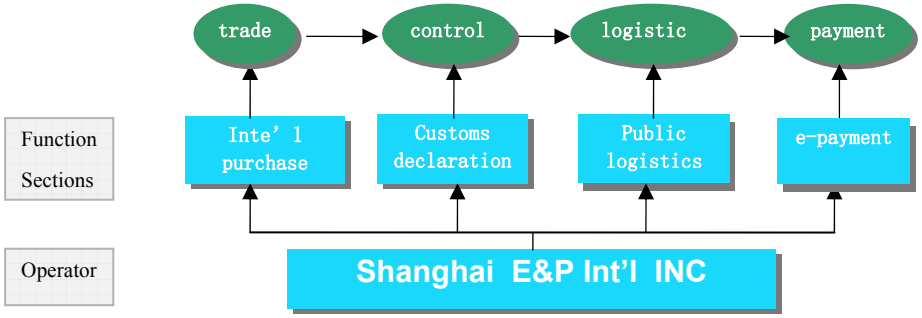

Figure 1: Platform Structures

Platform definite: the major part of Shanghai EDI informatization construction and technical supports of Shanghai gateway management provides information application and services for the gateway logistics and international trades (government terminals and enterprise terminals). It is the sole platform of the e-customs declaration operation in Shanghai, e-logistics and e-business. It has the significance of the improvement of the policy implement of Shanghai gateways, customs efficiency, cut down of the enterprise cost and perfect of the trade and investment in Shanghai.

Platform Forecast: to provide the services with logistics information in the Yangtze River regions and the National large gateways, and to set up the unification platform of e-business and the hub of international maritime information.

Platform Construction Idea: based on the practical demands of Shanghai EDI and the relevance between the system platform and core module, the entire platform will be divided into three phrases for the gradual construction.

Phrase I: to combine three network into one, integration of resources

Phrase II: to set up frame of application development

Phrase III: to enrich functions for the spread to the whole country

Platform Structures: to consider the four operational sections of the international business: trade, control, logistics an payment, and to design and construct the one sub platform with four functions: international purchasing, EDI customs declaration (that is fast Customs Declaration), public logistics and e-payment for the organization of the whole information services system of the platform and for the providing the unification of information basic environment of Shanghai fast customs declaration and the strategic implementation of Shanghai International maritime center.

The 4 Major Core Functions:

1. e-transmission of documentations and data handlings.
2. logistics and business information services: to provide the information services related to gateway logistics and e-business through Shanghai EDI network and the gateway website of our Shanghai E & P International, INC.
3. control services of the government: all kinds of the customs declaration documentation and process trade control information is operated in our platform so as to provide the transmission path of information supervision with enterprises and each gateway control division for the integration of the mutual applications and for improvement of the efficiency of gateway supervision and customs logistics.
4. e-payment function: the application service function of the large amount payment of the enterprise levels has been set up in the platform and the unification of the secure certificate management system is constructed as well, and the special line links with the major domestic commercial bankers has been realized accordingly.

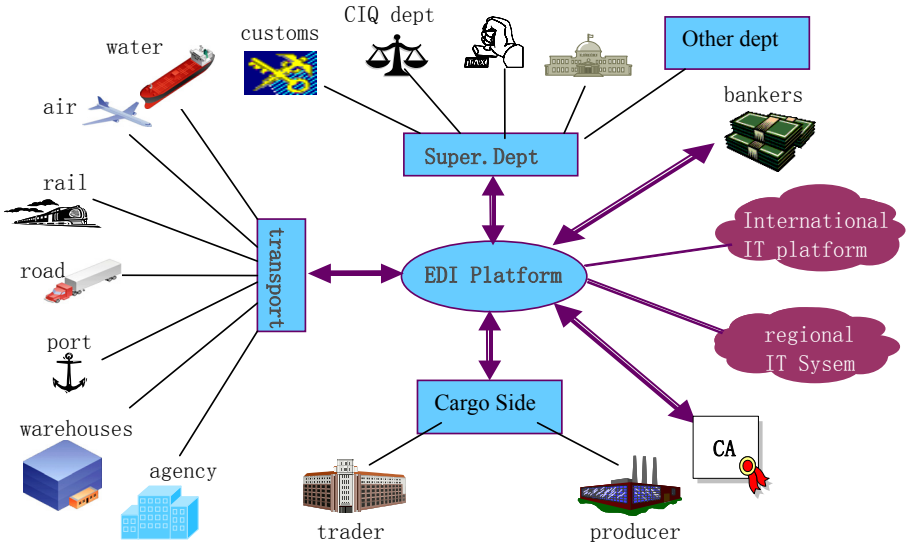

***Figure 2**: Platform Construction Progress and Achievement*

The General Construction Summary:

After the over four year's development, the basic structure of the unification platform of the fast EDI logistics information and e-business has been constructed accordingly, and basic system links including the unification information system of the gateway supervision units related to customs, commodity inspection and testing, the networks are covered the seaports, airports, and the major industrial parks, the functions have the key business divisions of trade, supervision, logistics, and payment. After our participation of the important projects and integration of the gateway information resources, we have provide the unification of the information basic environment for the fast customs declaration at Shanghai Gateway and the strategic implementation of Shanghai International Maritime Center. Our services have expanded the regions of Yangtze River Delta and and Yangtze River areas. Our platform will gradually connect with the international EDI service network as well.

We have basically set up the functional facilities and services facilities to satisfy the demands of Shanghai EDI technology. First, we have set up the machine room of Shanghai EDI facility, to form the mode of centralization management of the customs declaration and logistics of Shanghai gateway, international trade and foreign data. There are over 20000 subscribers of data transmission on our platform, most of them are the forwarders, charters, shipping companies, terminals, stacking yards, warehouses and large scale process trade enterprises etc. In 2004 the total 25 million declaration papers were handled on the annual base, daily handling capability reaches 68,000 papers; in 2005, the annual handling capability reached 51.84 million papers, and the daily handling reaches 142,000 papers, with increase rate of 107.50% than that of the past year. There are over 41 kinds of documents has realized e-declaration among the normal 58 kinds of gateway logistics documents, the electronic rate reaches 71%. Secondly, we have set up the special city LAN to cover the seaports, airports, main industrial parks, gateway administrative divisions and relative enterprise and affairs work units, and have realized the mutual connections with PRC Customs Administration and Commodity Quality Inspection Administration of PRC, the main seaports of Chongqing, Ningbo, Nanjing of Yangtze River regions and in the Yangtze Delta areas and the main cities in China. We have set up the better foundations for the platform expanding to the regions of Yangtze Delta and Yangtze River regions. Thirdly, we have set up the door website for Shanghai EDI – the website of Shanghai EDI for the centralization of release of all kinds of information related to policies and affairs, and provide " one shop window" of information enquiry related to customs declaration and gateway logistics, the consultancy of gateway business, technical supports on line etc for our clients. In the meantime, it is the efficient door website for the access of Shanghai EDI applications. For the present moment there are over 40000 registered subscribers, and daily access reaches 10,000 times. There are over 2000 senior subscribers who are mainly the forwarding enterprises, customs declaration agents and cargo groups. The subscribers are covered the six provinces and one city in the East of China, and among them 46% of the subscribers is from Shanghai, 9% is from Jiangsu and 10% is from Zhejiang, and 35% of the users is from other regions. The Forth, we have set up one unification of call center which has successfully connected with the Number of 0119 of Shanghai Customs Technical Management Service Call Center(SCTMSC), the Call Center of the First Enquiry System of Shanghai Customs, the Call Center Number 95599 of Tele-Banking System of

Agriculture Bank Shanghai Branch and the hotline number of PRC Foreign Currency Administration Shanghai Branch. Finally, we have set up the multi-layer safety protection system of damaged data protection recording center and double networks operational facilities etc.

With the further construction of information basic facilities, the development and promotion of information application project is actively put forward at Shanghai gateway with the perfect and complete system of gateway logistics services functions. On the platform there are over 56 major applied projects related to the 16 membership work unit of Shanghai EDI construction, and 11 commercial bankers. Among the projects, 13 application projects are related to transfer and promotion of China EDI Policy Implementation systems, and 43 application projects are related to self-development or cooperative development of Shanghai regional projects. The users are covered the transports of water, sea, air, rail, road, port, warehouse, forwarder, charter, customs broker, importer and exporter and manufacturer etc. enterprises, commercial banker and insurance etc. financial institutes, administrative divisions of gateways and relative work units, and all kinds of logistics parks and industrial parks. The service scopes of the platform are covered the most of the provinces and cities of Shanghai and Yangtze River Delta and Yangtze River regions.

3 The integration of trade, control, logistic and payment for the logistics information platform

With the further development of the fast customs declaration of Shanghai, and with the gradual expanding of the current information services of the unification gateway platform of Shanghai, our Shanghai E&P International INC. will focus on the integration and utilization of the resources of trade, control, logistics and payment for the lock up of the special export bonded region of Shanghai, Yangshan Deep-Water Terminal and gateway financial information services etc. major fields, to accept large number of information construction tasks for the further promotion and deep development of Shanghai EDI application and gateway logistics information platform construction respectively.

The First Major Platform Application – the informatization of bonded business based on internet supervision system of the special district logistics.

The internet supervision system of the special district logistics is the major parts of e-management system of Shanhai import boned business and process trade so as to provide the " One Shop Window" of service of process trade supervision and logistics information for gateway supervision work units and process trade enterprises. The systems are covered the services related to customs declaration, e-account internet supervision , domestic material distribution, district material distribution, and material control of temporary entry and exit of the district, materials distribution within districts, check-station material recording etc. business functions. The system has realized the registration, modification, verification, and customs declaration of import and export on line, the entire web-based process control, and the mutual exchanges of logistics information of bonded cargoes within the special districts and centralization management, which has greatly improved the

efficiency of the gateway supervision and logistics information of both special districts and the regions as well.

In 2004 the system design completed and in the same year it put into use with the better achievements. After the completion of the project, the account -book registration time of the process enterprise in the district is saved greatly from a few days to several hours, and time of the customs declaration is shortened from a few hours to several minutes. The material distribution at Waigaoqiao Free Trade Zone and at other export process district is shortened from 1-2 days, to about 4 hours. It takes only a few minutes for the approval of the Customs Declaration. The average 20-30% of the non-manufacture trade cost has been cut down for the import and export of the enterprises.

The Second Major Platform Application- Based on the Comprehensive Information Services of Yangshan Free Trade Terminals for the Development of the Gateway Logistics Informatization.

The project of Yangshan Deep-Water terminals is the major body project of Shanghai International Maritime Center which includes the important strategic trends of Shanghai future development and it is the logistic hubs of Shanghai gateway, Yangtze River Delta and the whole Yangtze River regions. Our company, with the use of the current resources of unification platform application of the gateway, and according to the demands of special logistics modes, has taken 3 months to complete the first phrase of the construction task of comprehensive information service platform of Yangshan Deep-Water terminals with the site information exchange shares of our platform and the function of urgently handling and business supports etc. for the further providing of all kinds of the information services and supporting services of customs declaration at Yangshan District for all the shipping companies.

The Third Major Platform Application: to combine the informatization of Pudong Airport Hubs Logistics Park for the Promotion of e-Business

The informatizatoin of Pudong Air Hubs logistics park is concerned the overall situation of Shanghai Air Hubs Construction and Shanghai International Maritime Centre Construction. We have provided the ASP e-exchange services for the park enterprises for the improvement of the e-business while we plan and construct the informatization of Free Trade Logistics Park of Pudong Airport and according to the demands of the supply chain management and self-development of the enterprises, starting from e-logistics exchange markets and e-order and e-payment aspects. For the example of the e-logistics exchange market, it is regarded as a perfect logistic exchange market of e-business to provide the door to door services for the logistics service partners related to clients, truck team,, manufacturer, freight agent, shipping company and airliners etc. for the realization of the information exchange of logistics supply chain management and e-logistics service on line and to provide the entire solution of the logistics transport.

The Forth Major Platform Application: based on the core business of the e-payment of regulation fee for the provision of e-payment service of B2B to the enterprises

As the major components of the basic project of unification environment of fast customs declaration project approved and supported by Shanghai Municipal Government and Gateway Supervision Department of Shanghai, Shanghai Great Gateway Logistics Information and e-Business, the gateway e-payment system is the e-application system of realization of all kind of the payment and collection of taxations and fees of Shanghai gateways which is developed with the utilization of modern information network technology to provide the e-payment service of Business to Business to the enterprises who need the gateway customs declaration. Based on the basic network facilities of high capability and with the international advanced IT technical structure, the e-pay system can provide the perfect gateway e-pay functions of all the duties and fee related to import and export of customs circles and the all weather services of 7 x 24 hours, to realize to take 30 seconds to handle each business, and to provide the clients with a fast, high efficient and safe e-pay path for the new exploration of the bottle-neck problems of e-business and e-government affairs. After the over two years of professional operation and based on the foundation of e-pay duties and fees of Shanghai Customs, the system has expanded into the e-pay operation with the enterprises fields, apparently showing the features of the public service platform of e-pay system of enterprises and it is developing into the financing information services fields in the near future.

4 Coverage of the Regional Development: Integration of Logistics Information in Yangtze River Delta

Considering the daily important functions and positions of Shanghai gateways in the economy open to the public in China, the construction of Shanghai EDI is required for the collaboration with the regions. Apart from the provision of the technical supports and information services to the enterprises of import and export , logistics and relevant governmental departments in Shanghai, we are currently and actively cooperating PRC Customs Administration to innovate the customs declaration process in Yangtze River Delta based on the advantages of the local platform resources and with the close collaboration with the brother's provinces and cities so as to strive the information integration in the Yangtze River Delta for the exploration of the mutual connection of logistic information between the gateways of Yangtze River Delta and cargo origins. Based on the achievements, we will set up the information system of inter-model transport in the Yangtze River regions for the high efficiency of the regional customs declaration logistics and for the improvement of the economic mutual development between Shanghai and Yangtze River Delta and further with Yangtze River regions. During the promotion work of the information integration in the Yangtze River regions, we have started the entire cooperation of the informatization plan and logistics information share platform with Nanjing, Ningbo, Nantong and Lianyungang port etc. such as, the cooperation of data transmission with Chongqing, Nantong and Nanjing etc. for the implement of fast customs declaration outside the regions, and for the transferring formalities of import and export cargoes which can be done by the outside enterprise in advance at the local customs office; have researched and edited the handbook of " General Plan Related to International Container Inter-model Transport Information System of

Yangtze River Regions"; have assisted to prepare the local information system plan for Chongqing, Wuhan, Wuhu and Jiangyin cities; for two years, we have organized the sub-forum on logistics information integration of Yangtze River Delta of Asia Pacific City Information and have established the promotional system of the logistics information integration in Yangtze River Delta, and have accepted related research topics; we have set up the relationship with the major administrative departments of the cities in Yangtze River Delta and create the good conditions for the early realization of the logistics information integration in the Yangtze River Delta after over half year's research.

5 The Future Development of our Platform – to Develop the Bone Platform of Shanghai Modern Logistics Public Information Services

The higher requirements have brought up with the progress of Shanghai International Maritime Centre, the development of the key industrial parks related to export process districts and logistics parks. We must fix the current platform services, and in the meantime, actively involve in the platform business of public data transmission of non-gateways with the development of the public logistics information services as the major hands. Based on the logistics control functions of Shanghai EDI platform, actively make the research on the industrial chains related to logistics parks, logistics distribution bases and industrial parks for the development of the design of the entire solution of informatization, software development, system integration and consultancy services; with the use of the influence and control capability of the unification platform for the further involvement of the business management and logistics management of the large scale import and export enterprises, the informatization of the large scale logistics enterprises, the entire solution of design, software development and system integrations of logistics informatization for several industries related to petroleum and chemicals, commercial distributions etc., to make the research of the relevant logistics standards, and the testing station of FRID application in the gateway logistics fields, and try our best to construct and develop Shanghai EDI platform into the bone platform of the Shanghai modern logistics public information services.

6 For the Development of Hubs Platform of Integration of Yangtze River Delta Information

We will have the further expanding of the network covers of the unification platform of Shanghai EDI system and have the further development of the platform services into the major gateway cities in the Yantze Riever Delta and along Yangtze River and into the key logistics distribution bases in the whole countries for the entire upgrades of the levels of the platform services and public degree and for the services of the economic development of the Yangtze River regions without any conditions and restrictions. Through the mutual connections with the logistics information platform of the main cities in Yangtze River Delta, the services of Shanghai EDI platform will finally become the hub platform of integration of logistics information

related to customs declaration in the Yangtze River Delta with its spreading into the whole Yangtze River Delta and Yangtze River regions.

7 Services for Process Visualization of entire International Supply Chains

We will actively develop added valued services of logistics information for across regions and overseas countries, provide the information services of global supply chain management (SCM), try to construct the platform as the international maritime information hubs covered the domestic and overseas enterprises services demands, and eventually provide our added value services of logistics data of entire process visualization for the international supply chains and trading chains through the collaboration projects related to information visualization of Taiwan, Macao and Hong Kong, and Global Alliance of e-Ports, with learning the international successful experiences and with utilization of the international standards accordingly.

References

None

LOGISTICS EDUCATION BY COMBINATION OF PRODUCTION, STUDYING AND SCIENTIFIC RESEARCH

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Keywords

Combination of production, studying and scientific research, Talents of logistics, cultivating and training

Abstract

Through basic knowing of higher professional education and analyzing of our national professional education and training the paper introduces the way of logistics college in Wuhan. International Trade University, and gives some advice about developing logistic professional work.

1 Basic Understanding About Higher Vocational Education

Higher vocational education is an important component of higher education, is a fairly strong theoretical knowledge and practical ability, to the grassroots level and the production, management and service-oriented frontline occupational status applied, skills-based expertise for the purpose of career and technology education, vocational and technical education is higher stage. Vocational education directly feed on the economic development needed to provide direct economic development for the human resources. Fundamentally speaking, vocational education is a direct employment services for the education.

Vocational education is different from the ordinary secondary, higher educational system. Its development with the development of the productive forces and social progress and life gradually improved. The developed countries of the world in the 20th century 50-60 years, will focus on vocational education to higher education level, and China account for the 80-90 age vocational education and awareness policies, basically remains in secondary vocational education and primary education level technicians, although once set up a group of "workers University" But because traditional education and the impact of lack of theoretical guidance and school norms, unknown location, direction unclear, the majority of our colleges and universities into a general or specialist, career and technology education lost identity, thereby affecting the industrial structure from labor-intensive to technology-intensive transformation process. At the turn of the century until the beginning of higher education will be popular advanced vocational technical education as an important component of the popular development of higher education in the schedule.

As we enter the 21st century, our economic development has encountered skills-based applications talent shortage of challenges: First, as the trend of economic globalization has been greatly enhanced, national technical talent widespread shortages, leading to the competition, globalization, developing countries are facing technical personnel for the pressure applied, skills talent shortage is a growing problem. Second, the rapid development of science and technology revolution to the traditional system of production technology system into a new phase of technical theory. For its outstanding performance in high technology to transform traditional industries and accelerate the development of high-tech industries is the health of our industrial development objectives, in addition to its research and development is key talent, but also have a large number of requests to a variety of technical principles and practice applied familiar with the production of technical personnel.

Recently, the state department of education administration and logistics professionals in 12 categories of skills as a national one-scarce talent. 10-2005, April 2004, by the Ministry of Education, China Federation of Logistics and Procurement organizations including Wuhan commerce logistics College Vocational College, the top 10 institutions in the development of vocational training institutions scarce logistics professional training programme guidance on vocational training institutions scarce logistics professional training recommendations.

2 Vocational Education and Training of Logistics in China

(1) To set up a logistics professional institutions of rapid growth, has been expanded significantly. According to a survey, currently there are 460 higher vocational colleges opened a logistics professional, independent institution established logistics category level 1. By the end of 2005, a group of top graduates of 5400 logistics, enrolment in 8600, a fall enrolment of nearly 200 individual institutions, the current National Health 100,000 people in the school.

By the China Logistics and Procurement Association, the National Standardization Technical Committee to promote the flow of logistics with the logistics vocational qualification certification training has been in full swing. By the end of 2003, has established 28 examination centres nationwide, 99 training centres. In 2003 there were 8,686 people attended the training, 5,229 people received Wuliushi or Assistant Wuliushi national vocational qualification certificates.

(2) local governments, the relevant departments, the opening of the logistics system to the industry professional enthusiasm high, especially some badly needed areas such as logistics professionals Jiangsu, Shanghai, Guangdong, Tianjin, Shandong, Zhejiang, attaches great importance to the training of logistics personnel. And logistics-related rail, posts and telecommunications, transport, storage industries departments also hold great interest for the logistics industry professional education and training.

(3) the market in the allocation of logistics professional career technical education resources preliminary role to play, in recent years, the logistics professional advanced vocational colleges and secondary vocational school students is the "buyer's market" features advice Entrants very unpopular, the initial formation of a

new school management mechanism, and also embodies the parents of logistics professional recognition.

(4) the establishment of some institutions in the professional, educational activities, internships and other practical aspects of building bases on the local economy and the building industry need to integrate attention to capacity-building, training and teaching links Shixun gradually formed its own characteristics and advantages. 2003, the Shanghai Industrial University with our two modern logistics enterprises Chinese ship out groups combined Division shipped out international cooperation in the establishment of a logistics institute, shipped out by the Group to provide professional laboratory equipment shipped out scholarships, internships and practice positions. New school stand strong impetus to cooperation not only with the professional disciplines building, and enhanced technology applied talents, but also for staff training ship out joint scientific research enterprises and schools, providing favorable conditions.

(5) The power shortage of teachers. First, the overall number of small; Second, the logistics school education less qualified teachers. Existing knowledge and skills of teachers often in the traditional structure of heavy logistics characteristics are difficult to adapt to the logistics Kwajalein're more style development. Especially the lack of both a modern logistics concepts, familiar with the operation of modern logistics, and master the skills in this field and related fields type applied professional teacher.

(6) to improve the logistics system disciplines, fostering training programmes, curriculum development and do not take into personalized training of composite personnel needs.

3 Logistics Vocational Qualification Certification Work

Against domestic logistics personnel and the urgent need for logistics staff knowledge and skills of poor and ageing situation, the State Ministry of Labor and Social Security and China Federation of Logistics and Procurement jointly developed the "Wuliushi national professional standards" and the preparation of teaching materials, and initiated a logistics personnel training and certification activities. The significance of this work lies in :

(1) logistics vocational qualification certification is the major component of logistics personnel strategy, the national organization of industry, fill our national Wuliushi vocational qualification certification and examination system gaps.

(2) Logistics Workers Vocational Qualification Certification system introduced attaches great importance to the quality of training and certification. The system stringent operating standards for the accreditation of training logistics market in recent years has played a regulatory role confusion.

(3) This work should improve with improvement is the need to work with education and training required to be organic. Vocational qualification training program with the "higher vocational education logistics management skills-based training programme guide" in teaching, ability to integrate structural requirements.

4 The Work of Education and Training in our Logistics College

(1) employment-oriented

Higher logistics vocational education mainly logistics industry production, technology management, and service for the first line of a train to, ill at the time, well kept, with the necessary logistics and strong theoretical basis logistics vocational skills frontline staff applied, skills-based high-level talent, and to that end must focus on the logistics career positions against the needs of organizations with the implementation of teaching.

I should pay attention to the student employment center education and employment guidance to school students to enter careers through education concept through education to enable students to understand the logistics enterprises in the future employment situation and logistics professional in the socio-economic status and role. To the mid-learning entrepreneurship education students, the venture is a form of employment in the new era is the era of development, students in the intense market economy tide survival, and development must take the road. Graduate students to stage a comprehensive employment guidance, including policy guidance, and guidance, technical guidance and employment, and requests the logistics enterprises employing units to the school on the logistics of logistics enterprises Chi industry professionals, Beijing Fukuda Motors to me by the hospital to recruit graduate students staff requirements are : First, there must be a good sort; Second, the actual operation of a logistics professional experience; Third, have a certain logistics expertise skills; Fourth, with good communication skills; And familiar one, two common types of logistics software.

After efforts, I Homes 06-360 graduates who have completed basic employment units and the introduction of employment.

(2) Create logistics personnel training mechanism between school and cooperation

Main practices :

- Establishing enterprises, professional organizations in the construction industry steering committee. Our academy in October 2002, after many efforts, the establishment of the "College of Wuhan commerce logistics professional career building steering committee" to the Chinese Association of logistics technology but Trong of Mou, Central China University of Science and Technology Management School Professor Xu told the Beijing College Graduate School of material just Weng Sum Professor China supplies storage Corporation Hankow Sunrong branch general manager, general manager Luoshaolin Wuhan Rail Logistics Companies, Wuhan Iron and Steel Company Jiabao military experts Assistant General Manager for I Homes construction guidelines and training objectives, curriculum, internships Shixun base building, such as teaching plans to be the guide. Over the past few years, in three years I can develop into the hospital in 2500 were students of the National College of the largest professional development steering committee made.

- Logistics technology associations in China, the Chinese Federation of logistics and procurement, a team member units. China Association of modern logistics logistics technology school collaboration will stand in my home office is located. The Association strongly supports China's logistics technology, I Homes has several national organizations of colleges and universities and higher education institutions will be prepared. Sponsored organizations in the preparation of logistics for 80 items. Meanwhile in teacher training, internships Shixun, base-building, and students are in employment and thoughtful guidance.
- Logistics enterprises in the modern school collaboration will be pursued on the basis of "orders-style" training model Orders style training model is signed training agreements with the business schools, to develop training plans, jointly organized teaching students employment after graduation directly to the enterprise personnel training model. This model for employment-oriented, according to the needs of employers to develop training plans, the use of common school education and enterprise resources to help students develop the abilities and qualities at the core of integrated career, a combination of classroom teaching and practical work of teaching. Its basic features : First, school personnel and personnel training enterprises signing agreements; Second, school personnel training plan developed jointly by the two sides enterprises Third, the use of school resources in the common stand of both sides to implement education training for logistics posts request practical ability to constantly assess the quality of talent in the enterprise in accordance with the agreement between the student ratings enterprise employment.

Now, with Yuanchen Limited, Golden Valley Supermarket chain management of the limited liability company has signed a "orders-style" training agreement. And the establishment of Wuhan commerce colleges and vocational colleges far into logistics business career Wuhan Academy Golden Valley logistics College. March 15, China's logistics and procurement, executive vice president of the Federation of Ding made for my home inscription : the integration of production and research, and to make contributions to fostering a new generation of logistics personnel.

5 Some advices for the future work on vocational education of the logistics

According to China's socio-economic development and the objective requirements of the labour market characteristics, taking into different areas of economic, technical, social and vocational education and training level of development and characteristics, and make efforts to enhance the ability of students technology applications and technical service capabilities, the logistics professional skills shortage talents training should reflect the following basic principles :

1. Based on overall quality, capacity-based
To the labor outlook science and technology perspective as a guide, to help students understand the correct technological development, production labor and labor organizations in the activities of the relationship fully understand vocational and technical practice of economic development and personal growth of meaning and value to enable students to establish healthy working attitude, good work ethics and

positive values, comprehensively improving the quality of the laborers. Skills-based training to enhance students scarce talent vocational capacity in a prominent place, the strengthening of practical teaching to meet industry enterprises on production, management, frontline services to the needs of high-quality workers.

2. Demand as the fundamental basis for enterprises to employment-oriented Working to meet the needs of enterprises as the starting point for the development of curriculum, education and training to improve the targeting and adaptability. Exploration and the establishment of enterprises employing under "orders" to education and training mechanisms. Vocational Technical College should closely follow the development of industries and enterprises demand, timely adjustment of professional orientation, determine the size of a training, development, design and implementation of training programmes for sex education. Related industries and enterprises to participate in vocational institutions in the education and training activities, to determine market demand, and personnel requirements, knowledge and skills structure, curriculum, teaching and learning into the class assessment play a leading role.

3. The enterprise technology and management development, the advanced nature of teaching
According to the countries and regions of the latest technological developments, through various forms of off - cooperate in the timely adjustment of curricula and teaching, highlighting the areas of expertise of new knowledge, new technologies, new materials, new processes, new ways to overcome existing professional teaching outdated content, updating slow, one-sided emphasis on discipline system integrity, meet the needs of enterprise development defects. In connection with the professional demands on a solid grasp of basic knowledge and basic skills of the professional basis of this field in a timely manner with the latest technology development and related skills, and achieve professional teaching basic and advanced reunification.

4. Student-centred, reflect the teaching and application of scientific organizations According to the local economic and technological developments, taking fully into students cognitive level and have knowledge, skills, experience and interest, for each student to the labour market needs and career development prospects, modular learning resources to the learning content, teaching organization, teaching respect to the evaluation of teachers and students with options and innovative space a system of open courses, the students personalized development needs. Introduction of modular courses in a flexible learning system to meet the different needs of businesses and learners. Skills-based training courses and teaching resources projects, not only to academic education to vocational institutions, but also to serving the needs of staff to update their knowledge and skills.

5. Strengthen professional teacher ranks, change the role of teachers Skills-based training to personnel training shortage of full-time teachers and part-time teachers to establish a combination of teachers employed and management mechanisms. Existing professional teachers must regularly account internships, local teachers and schools to create the conditions necessary for the practice of business. Special attention should be paid to enterprises that are engaged in production technologies and rich practical experience of managers to serve as part-time teachers of vocational institutions. Enterprises should organize vocational schools through

professional teacher training courses, teachers receive practical training, the provision of technical information means constantly updating professional knowledge and skills of teachers, improve teacher practice. In the teaching process, teachers must adapt to the new teaching requirements, change roles, and strive to become learning process plotters, organize and mobilize people and advisory.

Recently, the Ministry of Education to implement the "State Council's decision on vigorously develop vocational education," presented the school with a higher vocational schools, work-study observations. We should vigorously promote the study of, a training model school enterprises cooperation, and gradually establish and perfect work-study system. Let us further enhance our understanding, thinking, and actively explore and be bold in practice for our modern logistics cause tens of thousands of high-quality workers and train highly skilled professionals.

Conclusions

The reform and development of higher logistic professional education must follow the prescription of professional education itself,try its best to make intense expectation of logistic enterprises in China turn into the impetus of improving the quality and benefit about professional education.

Three rules must be grasped about cultivating and training logistic speciality talents

- Emphasizing the cultivating of professional skill;
- Setting up courses with comprehensiveness and cases which have absolute professional feature;
- Spreading widely the way of education by practice.

References

Chen Jinshan, Liang Jun logistics technology, 2005, No(10) “The practice of logistic speciality construction and development .”

Zhou Jianya, China logistics yearbook, 2005. “The developing of logistic professional education in China.”

Part IV

PhD Student Papers

3D VISUAL FRAMEWORK FOR MODELLING AND SIMULATION OF SUPPLY CHAIN SYSTEMS

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Keywords

Simulation, modelling, supply chain, visualization, visual simulation model development

Abstract

The integration of 3D visualization is a feasible and effective strategy for the performance and quality improvement of current discrete event simulation technology. 3D visualization helps users to understand the simulation system more effectively, allows to visually analyze large sets of simulation related information and improves confidence while studying and analysing the simulation results. This paper describes the design and development of a virtual 3D visual simulation environment for modelling and simulation of supply chain networks. The virtual environment provides a unified framework for development and representing of simulation models in 3D encapsulating the static and the dynamic behaviour of the supply chain system.

Introduction

Simulation models are widely used in design and implementation of supply chain systems. Supply chain systems become more and more complex by simultaneously growing requirements for quality and flexibility, and also decreasing lead time of manufacturing process and batch size of production. These tendencies show also new requirements for simulation modelling that as the main thing creates necessity to speed up process of creation of simulation models. This problem can be overtaken by using new methodology and tools for simulation modelling.

Visualization is rather widely used in simulation modelling, but, mainly, only for the runtime animation of simulation models. There is a sight (Jain 1999) that visualization is that area where systems of simulation modelling will change most dramatically. Certainly computer graphics do not make an invalid simulation model valid, but there are several ways that visualization and graphics add value in the simulation process.

In many systems of discrete event simulation modelling, for example Arena, are offered also 2D graphical tools for creation of simulation models. But here the big problem is that the screen of a computer has very limited visible surface area that complicates creation and presentation of big and complex 2D graphical models (Small Screen Problem) (Henderson and Card 1986). Using the regular 2D notation

tools it is difficult for the user to get a full-scale overlook on nontrivial model if it contains too many of graphical elements (Scaling Up Problem) (Burnett et al. 1995).

Therefore there is a question concerning to opportunities of use of 3D computer graphics and visualization methods for creation of a unified virtual 3D simulation modelling environment which will provide also process of development of graphical and interactive models, their verification and validation, and presentation of models in action.

1 Integration of the Discrete Event Simulation and 3D Visualization

In the development of simulation models of supply chain systems there are some aspects of modelling which are convenient for representing in a graphical kind. For example, the material or information flow from the supplier to the consumer is more convenient for representing graphically, than, using other means. Creation of graphical simulation models provides to the user a stable feedback that shows when the model is developed correctly. Visualization can help in many areas of development of simulation models (Rohrer 2000):

- Verification and Validation
- Understanding of results
- Communication of results
- Getting buy-in from non-believers
- Achieving credibility for the simulation.

3D visualization, compared with 2D depiction, has three important advantages which concerns to visual programming and simulation modelling:

- Opportunities to depict more information in a little space
- Realistic expression of visual model structure
- Capability of flexible layout.

1.1 V-DEVS Formalism

In order to support the conceptualization and specification of simulation models of complex systems, several formalisms and paradigms exist. One such general and universal formalism is the discrete event simulation specification (DEVS) (Zeigler 1984) intended for specifying the dynamics of discrete event state systems.

To enable integration of the DEVS formalism and visualization concepts into a unified visual simulation framework the visual DEVS (V-DEVS) methodology (Lektauers 2005) can be used. V-DEVS extends the DEVS formalism by supporting 2D/3D visualization of simulation models. A V-DEVS model can be described as:

$$VM = \left\langle X, S, Y, \delta_{\text{int}}, \delta_{ext}, f, \lambda, ta \right\rangle$$

$S = \left\langle S^{disc}, S^{cont} \right\rangle$ is the sequential state set,

S^{disc} is the discrete state set,

$S^{cont} = \langle T, G, V \rangle$ is the geometric visualization set,

$T = \begin{bmatrix} & R & & P \\ 0 & 0 & 0 & 1 \end{bmatrix}$ are the local coordinates,

R is the local orientation (3x3 matrix),

P is the local position (3x1 vector),

G is the geometry data,

$V = \langle Color, Texture \rangle$ describes the visualization attributes,

$f : Q \to S^{cont}$ is the rate of change function.

In order to model the continuous change required by animation purposes, the sequential state set S is decomposed into the discrete state and continuous states.

2 Development of 3D Simulation Models

In the area of graphical programming and discrete event simulation modelling different types of 2D diagrams, for example, dataflow diagrams, state charts, Petri nets, UML (Unified Modelling Language) diagrams are used. There are also several attempts to adapt these graphical notations for modelling in virtual 3D environment. However in the field of using 3D interface still exist only few activities, focused on effective visual and interactive modelling. More of the research is connected with the development of 3D graphical notation for UML diagrams (Dwyer 2001). This notation allows visualization of the stages and aspects of software elaboration. There are also several systems that use visualization and 3D computer graphics as a basis of programming, for example SAM (Geiger and Müller 1998). In the field of discrete event simulation modelling software environment Flexsim (Nordgren 2002) is developed which suggests users of an opportunity in perfection to create and animate simulation models in virtual 3D environment where logic and the physical system in model development is connected in unified process.

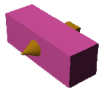
2.1 3D Simplified Hierarchical Activity Cycle Diagrams (SH-ACDS)

For visual process-oriented as well as DEVS based simulation modelling purposes there are suitable 2D/3D simplified hierarchical activity cycle diagrams (SH-ACDS) (Odhabi et al. 1998; Lektauers 2003). To each functional simulation object corresponds a determined 3D graphical object (Table 2). A basis of 3D simplified hierarchical activity diagrams are the following elements:

- Activity nodes: for certain time to provide delay of entities. Entities are necessary for maintenance of different activities in model. Activity nodes have no restrictions of capacity, they can process several entities simultaneously.

- Queue nodes: perform delay of entities, before reception of the message from determined activity node. Conditions of creation and support of lines are established by the developer of model. Queue nodes can also perform a holding of an entity for a given a signal or condition to be true.
- Source nodes: units of an output are initial elements of simulation models that generate active elements of models - entities.
- Sink nodes: sink nodes finish entities which arrive in them. Sink nodes can finish modelling completely if in them arrive the certain amount of entities.
- Assign nodes: They are necessary to change some attributes of model and tokens during simulation.
- Branch nodes: performs routing of decisions into models. For example, entity can be routed depending on the entity's name and values of attributes.
- Transformation nodes: perform converting one type entities to other type. This type of converting is determined by developer of model. Transformation nodes can be also used as signalling elements allowing a process synchronisation between different queue/hold nodes.
- Hierarchical nodes: allows the user to define more complex and hierarchical logic for processing within a specific simulation model.
- Separate nodes: these modules can be used to copy an incoming entity into multiple entities.

Table 2: *Elements of 3D Simplified Hierarchical Activity Cycle Diagrams*

	Activity		Queue / Hold
	Source		Sink
	Assign		Branch
	Transform / Signal		Hierarchical Node
	Separate		

With the help of 3D computer graphics it is possible to improve the symbolism and esthetical aspects of the model. By graphical linking of the chosen model objects, it is possible to create a simulation model diagram that defines the model element

couplings and execution logic. Every model element has a certain subordinated metadata that contains run time parameters for the given element, for example, processing duration, generation frequency etc.

2.2 System Architecture

The proposed framework implements the former discussed V-DEVS formalism and consists of several components supporting simulation design, execution and control, as well as 2D/3D visualization and interaction capabilities. The architecture of the given system is made by three base components – modelling engine, visualization engine, and DEVS simulation engine. In Figure 2 is illustrated the architectural structure of the proposed visual simulation environment.

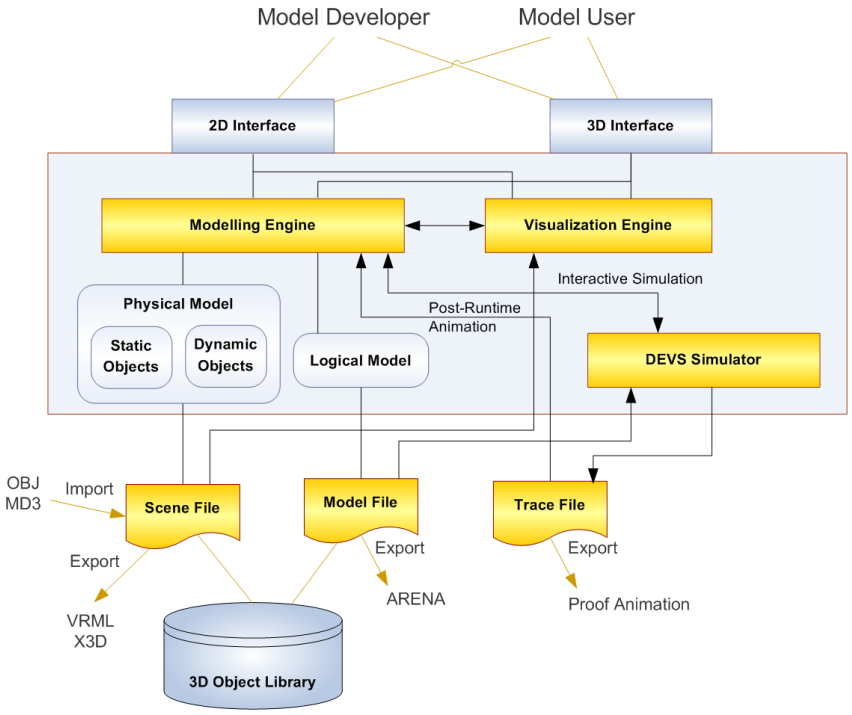


Figure 2: *Architecture of simulation environment*

The modelling engine is provided for designing of simulation models in virtual 3D modelling environment, including static and dynamic images, as well as 3D geometric objects. Simulation models are based on the physical and logical description of the simulated system. The physical model defines the layout and geometry of virtual scene as well as the visual attributes of virtual objects. It is possible to make the physical model with the tools that are built in the virtual modelling environment or to import from external 3D modelling and CAD software, using widely used 3D file formats, such as MD3, OBJ. The created physical model is saved in scene file or exported, for example, in X3D or VRLM formats for use in other 3D software tools. The logical model contains all the necessary information about the dynamical behaviour of the simulated system.

DEVS simulation module is the main component of discrete event modelling system that manages the execution time processing of simulation model and the generation and acquisition of simulation results. This simulation engine is the basis for the above described V-DEVS formalism and allows combining the processes of simulation and visualization into a unified visual simulation process. Still the functions of simulation modelling and animation are separated, therefore the simulation model can be activated independently from other system modules, but at the same time during its operating it can use visualization model, in order to provide interactive runtime animation. For execution of simulation animation there is necessary a synchronization between simulation model and visualization engines. This task is directed and controlled by the given simulation system, implementing V-DEVS formalism.

Model file is used as a source of input-information that contains the data about logical activities of simulation model. The results of simulation modelling execution can be saved in Trace file that allows post-runtime activating of animation without need to activate simulation process.

Visualization engine is used for generating of 3D objects in virtual environment (for example, assembly parts, vehicles, user interface elements), executing all the necessary tasks of computer graphics rendering and animation. Visualization model is used in all simulation modelling phases, beginning with building of simulation model, ending with representing and analysis of modelling results. One of this model's tasks is to provide realistic synthetic object illustration, so that this object can be better virtually integrated in the flow of real video frames.

For the visualization system there are established high graphical rendering performance requirements because practical 3D graphic scenes contain objects with big amount of polygons that makes the rendering process more difficult. In order to provide acceptable speed of graphic depiction, there can be used level-of-detail (LOD) criteria, allowing reducing the total amount of polygons.

2.3 Implementation Details

The 3D visual simulation program prototype VizSim3d is developed in the Java/Eclipse programming environment, including the following packages: VizSim3d, jVRS and DSOL.

Handling of the 3D graphics objects is achieved with the jVRS package, which is built atop the industry standard OpenGL graphics library. Although there exist several 3D Java based software libraries suitable for 3D visualization purposes (Java3D, JME, Aviatrix3d etc.), a new Java based 3D computer graphics library was developed to allow better adaptation and integration of visualization and simulation modelling. The design and implementation of jVRS is fully based on the concepts of open source C++ based 3D graphics library called Virtual Rendering System (VRS) (Döllner and Hinrichs 2002).

The simulation capabilities provides the DSOL simulation engine – Distributed Simulation Object Library (Jacobs 2005), a Java-based simulation suite that offers simulation services for the development of DEVS/DESS distributed simulation models. One of the main reasons for choosing for DSOL is that it has an open,

extendable and well-designed object-oriented architecture suitable for DEVS based simulation modelling of supply chains.

3 An Experimental Example

This section introduces a 3D modelling and simulation example for a supply chain system whose structure is shown in Figure 3. The supply chain adopted in this study is based on the generic modelling structure proposed by Vieira (2004).

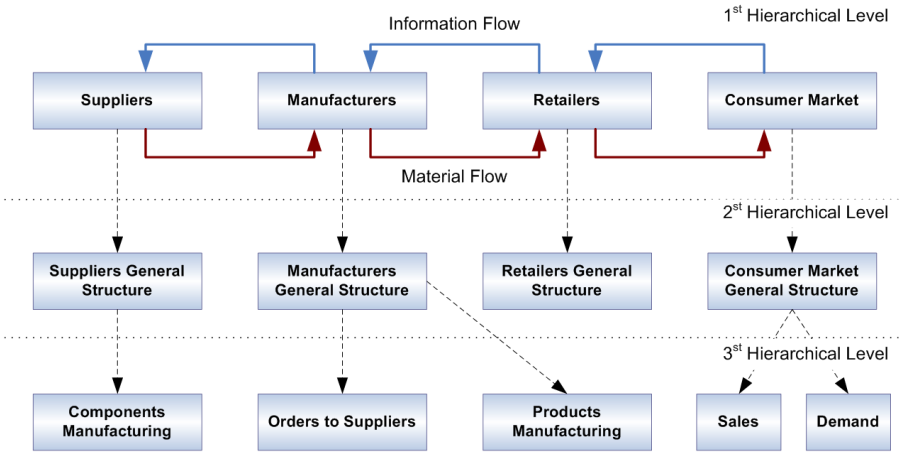


Figure 3: *General modelling structure of supply chain (Vieira, 2004)*

For inventory control purposes there is made an assumption that next period's demand will equal the current's period's demand. Each supply chain element will try to maintain ending inventory equal to the current period's demand. Assuming that the period's demand for a supply chain element is of size q, the element will place an order of size 2q for its predecessor stage (Vieira and Junior 2005). When an inventory level gets lower than a minimum specified, an order for the component or product purchase is placed. The optimal order size and the safety inventory levels are given by the decision maker.

All of the presented simulation models are designed by using of 3D techniques. The hierarchical modelling concept transfers the level of detail (LOD) technique of visualization to discrete simulation modelling. Using the LOD technique the visual representation of the designed model can be separated down to several levels to support different simulation levels and stages. The developer will benefit from this hierarchical modelling concept as the whole model can be divided into many sub models with hierarchical links in between. The developed simulation model is adaptable and variable to different input and output parameters as well as different count of suppliers and retailers.

The structure of the supply chain model is composed of three hierarchical levels following the principle of pull (or just-in-time) production. The first level, the most general, is composed by four elements integrated by material and information flows: suppliers, manufacturers, retailers and the consumer market (Figure 4).

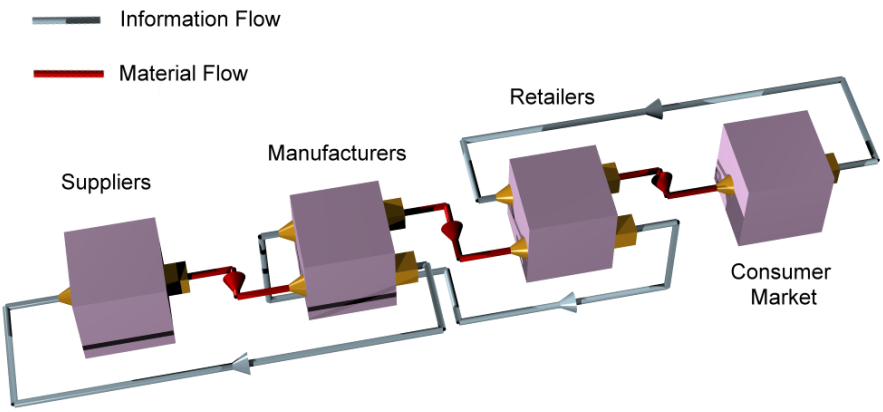


Figure 4: *Generalized model of the supply chain*

At the second and third levels a detailed modelling of specific functions is designed by using of 3D simplified hierarchical activity cycle diagrams. Figure 5 shows the supplier's simulation model at the second hierarchical level. A supplier receives orders for component from a manufacturer. If the supplier does not have the quantity needed in stock, it will then manufacture the component and then deliver it to the manufacturer.

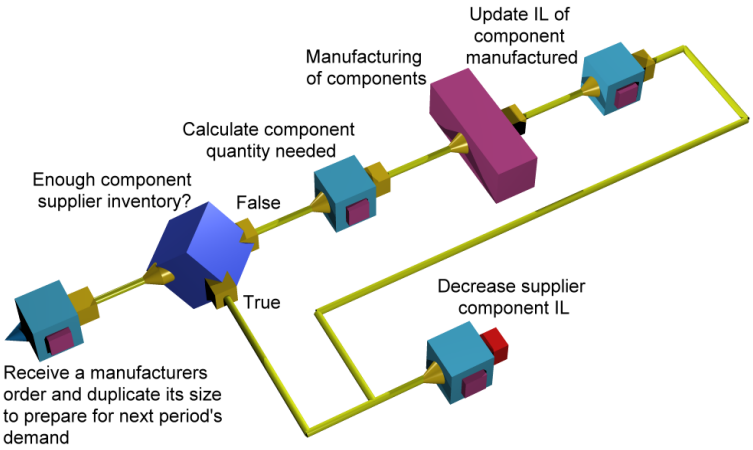


Figure 5: *Suppliers simulation model*

Figure 6 shows the simulation sub-model of manufacturers at the second hierarchical level of simulation model. When a manufacturer receives an order from a retailer, the quantity is dispatched and the order is closed if the manufacturer has sufficient inventory. The order, however, remains open until the manufacturer produces the product and delivers it to the retailer.

The retailer's simulation sub-model is similar to manufacturer's simulation model, except for the product manufacturing and components ordering procedures. Due to the space limitations in this paper the 3D simulation models of retailers and consumer market are not shown.

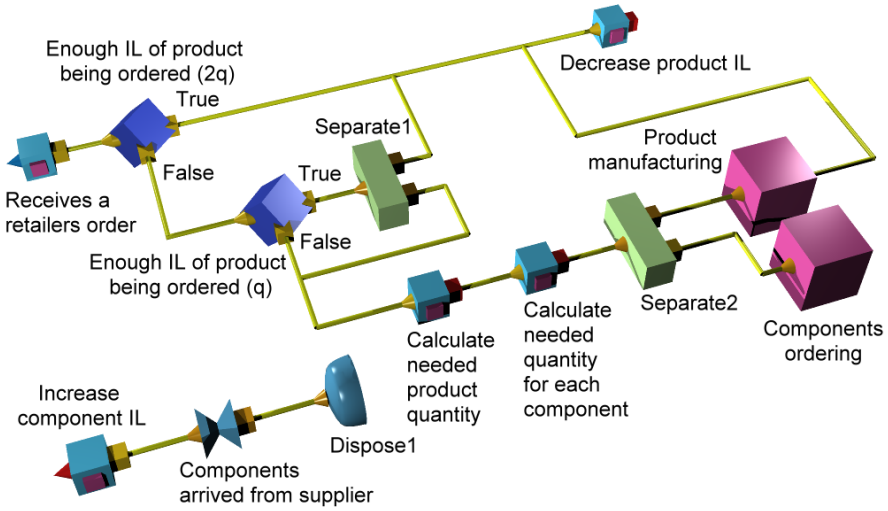


Figure 6: *Manufacturers simulation model*

4 Conclusions

In this article the concept of designing simulation models of supply chain systems in virtual 3D environment is offered, based on modification of 2D simplified hierarchical activity diagrams. Such system is intended for creation of an integrated 3D graphic representation of the simulation models. The accomplished work shows that 3D visualization allows overcoming many restrictions that exist in traditional 2D visualization systems, e.g. 2D symbolism of simulation objects, a formalism and shortage of aesthetic style, and also restricted 2D visual space of the computer display.

Despite all the advantages, 3D visualization does not provide universal solution for all visual simulation modelling aims and needs. A further research is needed in the field of effective visualization methods, graphical 3D notation, automatic layout and user interface design for visualization systems. 3D virtual development environment can be used also as good subsidiary tool for other existing visual and text-oriented modelling languages.

References

Burnett, M.; M. Baker; C. Bohus, P. Carlson, S. Yang, and P. van Zee. 1995. Scaling Up Visual Programming Languages. *IEEE Computer*, Vol.28 No.3, 45–54.

Döllner, J., and K. Hinrichs. 2002. A Generic 3D Rendering System. *IEEE Transactions on Visualization and Computer Graphics*, 8(2), 99-118.

Dwyer, T. 2001. Three Dimensional UML Using Force Directed Layout. *In Proceedings of the Australian Symposium on Information Visualization* (Sydney, Dec. 3-4).

Geiger C. and W. Müller. 1998. Visuelle Spezifikation, Modellierung und Animation im Systementwurf. In *Proceedings der Tagung „Simulation un Visualisierung '98" der Otto-von-Guericke Universität Magdeburg* (March 5-6), 206-220.

Henderson, D. A. and S. K. Card. 1986. Rooms: the Use of Multiple Virtual Workspaces to Reduce Space Contention in a Window-Based Graphical User Interface. *ACM Transactions on Graphics*, Vol.5, No.3, 211–243.

Jacobs, P. H. M. 2005. The DSOL simulation suite: Enabling Multi-Formalism Simulation in a Distributed Context. Doctoral Dissertation. Delft University of Technology, Delft, The Netherlands.

Jain, S. 1999. Simulation in the Next Millennium. In *Proceedings of the 1999 Winter Simulation Conference* (Phoenix, Australia, AZ, December 5-8), 1478-1484.

Lektauers, A. 2003. A Virtual 3D Environment for Logistics Modelling. In *Proceedings of the International Workshop on Harbour, Maritime and Multimodal Logistics Modelling & Simulation* (Riga, Latvia, Sept 18-20), 242-248.

Lektauers, A. 2005. A Mixed Reality Framework for Visualization and Execution of DEVS-based Simulation Models. In *Proceedings of the 19th European Conference on Modelling and Simulation* (Riga, Latvia, June 1-4), 271-276.

Nordgren, W. B. 2002. "Flexsim Simulation Environment". In *Proceedings of the 2002 Winter Simulation Conference* (San Diego, CA, December 8-11), 250-252.

Odhabi, H.; R. Paul and R. Macredie. 1998. Developing a Graphical User Interface for Discrete Event Simulation. *In Proceedings of the 1998 Winter Simulation Conference* (Washington, DC, December 13-16), 429-436.

Rohrer, M. W. 2000. Seeing is Believing: The Importance of Visualization in Manufacturing Simulation. In *Proceedings of the 2000 Winter Simulation Conference* (Orlando, FL, December 10-13), 1211-1216.

Vieira, G. E. 2004. Ideas for Modeling and Simulation of Supply Chains with Arena. In *Proceedings of the 2004 Winter Simulation Conference* (Washington , DC, December 5-8), 1418-1427.

Vieira, G. E. and O. C. Junior. 2005. A Conceptual Model for the Creation of Supply Chain Simulation Models. In *Proceedings of the 2005 Winter Simulation Conference* (Orlando, FL, December 4-7), 2619-2627.

Zeigler, B. P. 1984. *Multifaceted Modelling and Discrete Event Simulation*. Academic Press, London.

WIRELESS COMMUNICATION TECHNOLOGIES IN MULTIMEDIA SYSTEMS

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Keywords

Wireless applications, mobile phone, 3G, Web-based solutions

Abstract

The past century has brought about many changes in information and communications technology, from the invention of the telephone and broadcast technologies to the invention of the personal computer and the Internet. These changes have enabled us to exchange information with other individuals and to retrieve data from vast databases practically instantly. Anyone is certainly familiar with these changes and has most likely played a role in developing some of the content accessible via the Internet and allowing users to connect with each other through time and space.

Introduction

Wireless technology is the method of delivering data from one point to another without using physical wires, and includes radio, cellular, infrared, and satellite. A historic perspective will provide you with a general understanding of the substantial evolution that has taken place in this area. The common wireless networks of today originated from many evolutionary stages of wireless communications and telegraph and radio applications. Although some discoveries occurred in the early 1800s, much of the evolution of wireless communication began with the emergence of the electrical age and was affected by modern economics as much as by discoveries in physics. Physical networks, and their limitations, significantly impacted wireless technology. Another significant impact to wireless is the invention of the cell phone

1 Mobile Phones as Wireless Modems

One of the earliest methods of getting a wireless connection for your PDA or laptop was to use a cable to connect it to your mobile phone. Many mobile phones are capable of serving as wireless modems, and software is also available to install a soft modem on your laptop for those handsets that don't have a data feature. You can even do the same by means of the infrared link built into most PDAs and laptops, although this requires you to keep your device and phone precisely aligned. In either case, you then use your phone to dial up a regular Internet Service Provider (ISP) and establish an Internet connection. However, both of these methods limit you to

the 9.6 Kbps data rate of your phone. This is, however, an option if you have an older PDA, such as a Palm III, that doesn't have a wireless modem available. It may also be a fallback option if you regularly find yourself traveling outside of the coverage areas of some of the other wireless services we look at next. In Europe, it's not uncommon to find people sitting at train stations and airports with a mobile phone velcroed to the lid of their laptop, and a cable running to the serial port on the back.

The first widely available integrated wireless option for laptops (and subsequently PDAs) in Europe was basically a mobile phone shrunk to the size of a PCMCIA card—the Nokia Card Phone. With this card in a laptop or PDA, the user essentially got a mobile dial tone. She would then use the cellular modem just as if it were a regular wire line modem to dial up an ISP. Ubinetics manufactures a similar GSM modem that clips onto the back of a Palm V. Once connected to an ISP, the user has a regular Internet connection, although the speed is limited to about 28.8 Kbps. To achieve these speeds, carriers use a technique known as High-Speed Circuit-Switched Data (HSCSD). HSCSD combines several wireless channels, each of which has a rated speed of only 9.6 Kbps, and bundles them together to achieve higher speeds. This is analogous to wiring two dial-up modems and two phone lines together to get a faster dial-up connection. HSCSD is offered only by a few carriers and only in a handful of European countries. It is unpopular with carriers because it uses up more than one voice channel, thus reducing their capacity, but they can't charge accordingly for the extra channel. Although it is still an effective way of getting a wireless connection in Europe, HSCSD is likely to fade in importance as services such as GPRS become more widespread.

2 Future Networks

You may have seen the terms 2.5G and 3G mentioned in relation to wireless. The first generation (1G) was the original analog cellular phone services. The next generation of wireless connectivity, sometimes also referred to as 2.5G, includes services such as GPRS. GPRS promises data speeds of up to 200 Kbps, and early proponents talked about wireless multimedia applications such as full-motion videoconferencing. The reality is that most services will initially offer speeds of between 64 to 144 Kbps, which is not much faster than a traditional wired modem, although still quite a step up from today's meager speeds. However, as a packet switched service, the always-on nature of the connection and relatively workable speeds are sure to launch a host of new wireless services and applications. As GPRS service becomes more widely available, modems will no doubt be offered in both PC Card and CF formats.

Carriers in Europe, Japan, and Australia have begun to cautiously roll out these services, although early trials have been plagued by technical delays, a shortage of available handsets, much slower actual data speeds, and lackluster reception in the marketplace. Carriers around the world have spent vast sums of money to purchase blocks of the wireless spectrum to use for so-called 3G services. 3G (3rd Generation) promises high speeds and always-on connections, and is expected to usher in an age of wireless broadband, with mobile devices capable of downloading information at high speeds, enabling such services as video e-mail and downloading

music files to your mobile phone. The path to 3G however, will not be easy. It requires huge investments in new transmission equipment, and a complete replacement of all current handsets. Europe is already conducting trials of 3G services and handsets, but industry analysts expect it will be at least 2007 before full 3G service is available in Baltic states.

3 Applications

The landscape of Internet usage is dramatically changing because of the rapid evolution of access to wireless communication with its associated mobility. Consumers in both business and residential markets are becoming increasingly dependent on ubiquitous access. Such access is enabled by the proliferation of wireless communication. Consumers realize the benefits of many new business applications such as those in e-commerce, collaboration, supply chain, and telemedicine. They also start to appreciate the benefits for their family and personal needs such as communication with friends, entertainment, gaming, and location and safety services.

As the speed and quality provisioning of wireless communication increase, consumers' dependency on applications delivered through the wireless media will increase. They will also enjoy improved graphics as the wireless media will be able to deliver content-rich applications through their higher speed wireless networks.

This new era of ubiquitous wireless communication will provide an array of applications supported by the ability to access the Internet everywhere and anytime. Wireless communication will be available at home and at the office. For example, Microsoft installed a wireless local area network (WLAN) that lets workers connect to the corporate intranet from any spot on its 265-acre Redmond, Washington, campus. Such accessibility is becoming possible also during travel via automobile, plane, ship, and train. Wireless connectivity supports Telematics, which allows drivers to access the Internet via a screen in their cars. Whether one walks in the city, suburb, or remote desert, wireless connectivity to the Internet can be established via satellites provided by companies such as Hughes Spaceway, as they can cover any point on the continent. Other types of global networks are envisioned once high-speed 3G cellular phones become available by companies such as AT&T (United States), Vodafone (United Kingdom), Orange (France), Omnitel (Italy), and DoCoMo (Japan). In the regional domain, Wireless Local Loop technologies will provide the basis for connection. WLANs provided by many companies such as 3Com, Linksys, and Cisco will cover local areas. Wireless Personal Area Networks (WPANs) provided by companies such as Ericsson will provide an option for coverage of personal areas in which communication needs to be established between neighboring devices.

Some of the applications that currently use wireless networks as their transmission media were previously available via wired media and some applications are new. Here is a partial list of these applications:

- Streaming video
- Streaming audio
- Collaboration

- One-way and interactive multimedia messaging
- Gaming, including interactive peer-to-peer (p2p) gaming
- Digital money transactions
- MP3 music download
- Video- and audio-supported shopping
- Long-distance learning, education
- Video and audio conferencing
- File sharing and transfer (pictures, video clips, and text)
- Feeding of real-time news and information about the weather, financial markets, sports and so on
- Geographic location services
- Safety services such as Enhanced 911 (E911)
- Gambling
- Entertainment

These applications will be delivered to consumers in many shapes and forms depending on the devices and wireless communication media available to the consumer.

The wireless network has a profound role in the effectiveness of the application delivery. When higher speed connections are available, the applications can deliver richer content, improved graphics, and more vivid colors. When the network can support Quality of Service (QoS), the applications can improve interactivity, reduce jitter, and provide continuous video and voice experience. When latency is high, applications that tailor location-based information for consumers may provide outdated information.

Likewise, the device architecture has a strong effect on the consumer experience. For example, a larger screen can accommodate larger pictures and more information. This dimension is amplified in the wireless environment, since devices tend to have much smaller screens. A more powerful central processing unit (CPU) can expedite computations associated with the applications, its graphics, and various communication protocols. More memory can enhance the graphic visualization experience. Moreover, such memory can be used for caching various multimedia contents for future view.

The potential list of applications that can benefit consumers in the wireless mobile environment is long and covers all aspects of life and business. I describe some applications in order to give an idea of the broad range of benefits that consumers can expect.

4 Conclusions

The wireless applications represents a revolution in access to online information that will have profound impact on our society—greater even than the Internet revolution of the past decade. Although the skills learned by programmers over the short but tumultuous life of the wireless applications will provide a solid foundation for this new world, new skills will have to be developed and some old habits changed.

The sheer variety of different mobile devices is the first big change a programmer will have to deal with. However, you'll find that devices fall into a few general families with similar characteristics, simplifying the presentation task somewhat. Device detection, coupled with on-the-fly, server-side generation of markup is one way to solve this problem. Here, XML transformed to appropriate markup via XSL, provides a future-proof option.

References

R. D. Nee and R. Prasad, OFDM for Wireless Multimedia Communications, Artech House, Norwood, MA, 2002.

M. K. Simon, J. K. Omura, R. A. Scholtz, and B. K. Levitt, Spread Spectrum Communications Handbook, McGraw-Hill Professional, New York, 2002.

A. Tanenbaum, Computer Networks, Prentice Hall, Upper Saddle River, NJ, 2002.

RFC 2814, R. Yavatkar, D. Hoffman, Y. Bernet, F. Baker, and M. Speer, "SBM (Subnet Bandwidth Manager): A Protocol for RSVP-Based Admission Control over IEEE 802-Style Networks," May 2005.

Y. Bernet, Networking Quality of Service and Windows Operating Systems, Que Publishing, Indianapolis, IN, 2001.

A. Croll and E. Packman, Managing Bandwidth: Deploying QoS in Enterprise Networks, Prentice Hall, Upper Saddle River, NJ, 2000.

IEEE 802.11 WG, IEEE Std 802.11e/D3.0,"Draft Supplement to STANDARD for Telecommunications and Information Exchange Between Systems—LAN/MAN Specific Requirements—Part 11: Wireless Medium Access Control (MAC) and Physical Layer (PHY) specifications: Medium Access Control (MAC) Enhancements for Quality of Service (QoS)," May 2002.

IEEE 802.11 WG, IEEE Std 802.11g/D2.1, "Draft Supplement to IEEE Standard for Information Technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements—Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications: Further Higher-speed Physical Layer Extension in the 2.4 GHz Band," January 2002.

COMPUTER-BASED TRAINING COURSES IN MARITIME & TRANSPORT LOGISTICS AREA

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Keywords

Computer-based training, courses, logistics

Abstract

Different CBT courses for logistics self-study are considered, including comparative analysis of given solutions. The work is a part of activities carried under eLOGMAR-M project within the EC 6th Framework Programme

Introduction

Education in logistics can be realized in many different ways, including lectures, workshops with case studies and problems discussions, exercises and many others. In addition to these classical learning methods, student can choose computer-based training (CBT) courses for self-study in different areas of logistics.

Logistics as a discipline will increase in importance, according to Prof. Kersten, president of the Hamburg School of Logistics (HSL) (Kersten, W. 2004). It is central to the globalization of economic development as more and more elements of the value chain are distributed around the globe. A further reason for the growth in demand for logistics managers is the growing e-business sector and direct ordering of goods over the internet, rather than locally based purchasing through retailers. So, logistics education and training also need to change their contents taking into account international aspects and globalization, and move from traditional to networked environments.

Information and communication technologies (ICT) as well as mobile technologies open up new possibilities for supporting logistics education and training. CBT courses are not only available and more accessible than traditional school programs, but they are also mostly more cost effective and one can find short focused modules for precisely the topic in which additional learning is required. This is extremely important due to the dynamic nature of business today. However it is important to note, that online short courses in many cases are not a true substitute for full educational degree in logistics disciplines. It's expected that these courses will grow faster and further as users become more familiar and comfortable with online education. Nevertheless, there are many activities undertaken in this field, including

different CBT courses, so, there is always an opportunity to reinventing existing or repeating errors and bad experience. To avoid this, it is useful to overview and compare existing solutions.

1 Instructional strategies in CBT courses

Traditionally, in a teacher-centered classroom, instructors control their environment because they have a monopoly on information. In an online course, with instant access to huge amount of resources of data and information, students are no longer totally dependent on teacher for knowledge. As many educational institutions are beginning to teach online, learning is becoming more collaborative, contextual and active. Educators must first design their curriculum, goals and objectives and then consider how the online environment can best serve the instructional objectives and activities of that curriculum. This requires changes in pedagogy, with instructors taking the role of facilitators of information while guiding students toward solutions. In order for online learning to be successful, teachers as well as learners must take on new roles in the teaching-learning relationship.

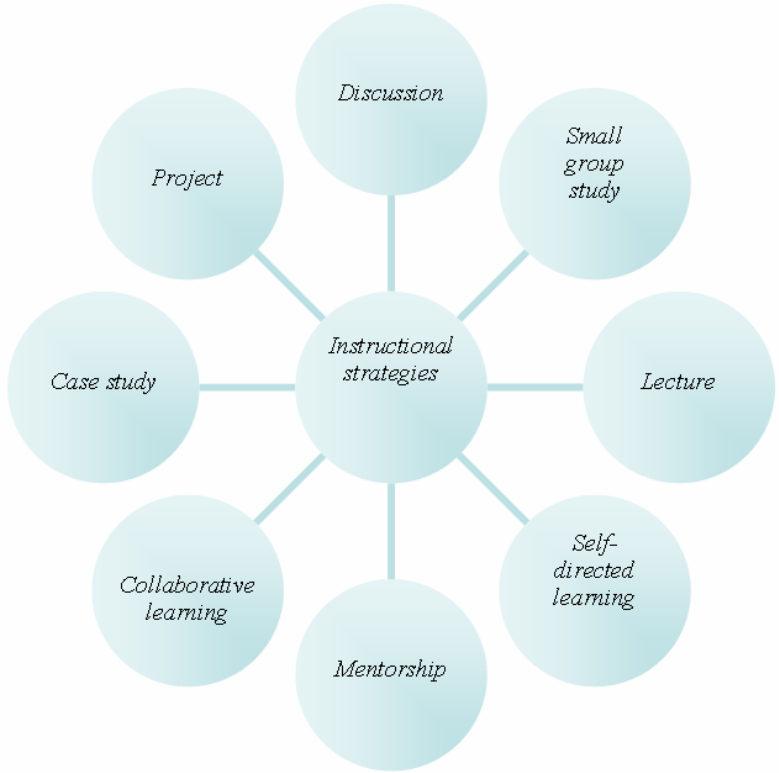

Figure 1: *Instructional strategies*

Online learning environments permit a full range of interactive methodologies, and instructors have found that in adapting their courses to online models, they

should pay more attention to the instructional design of their courses. As a result, the quality, quantity, and patterns of communication students practice during learning are improved.

Of the many instructional strategies available for use in the online learning environment, most have not been developed specifically for online instruction, but are currently used in traditional classrooms, and can be successfully adapted for facilitating online learning. Educators should choose instructional strategies that are most effective for accomplishing a particular educational objective. From this perspective, instructional strategies are tools available to educators for designing and facilitate learning. Below are some instructional strategies which have been effectively used in the traditional classroom and can likewise be used in the online learning environment (ION, CLIC, 2006) (Figure1, Table 1).

Table 1: *Instructional strategies*

Instructional strategy	**Description**
Discussion	Discussion is the instructional strategy most favored by adult learners because it is interactive and encourages active, participatory learning. The Internet offers several modes for discussion including mailing lists (listservs), which focus on particular topics and online conferencing programs. Both of these options utilize asynchronous communication. Synchronous (real time) communication can be offered by utilizing chat rooms or text-based virtual reality environments, better known as Multi-user Domains (MUDs) or Multi-user Object Oriented Environments (MOOs).
Small group study	In small groups learners can discuss content, share ideas, and solve problems. They present their own ideas as well as consider ideas put forth by others. In this way, they can be exposed to a variety of viewpoints on a given subject. There are many small group formats that encourage and provide opportunities for interaction. One of them is the discussion group, which allows learners to reflect on a subject under discussion and present their views.
Lecture	The lecture is one of the most frequently used instructional methods in adult education. Online lectures can be presented in a variety of ways. Lecture notes can be placed on a web page for the learner to review. Notes can be put together in a packet and either downloaded from the Internet or sent via e-mail. Lectures can also be presented via audio or video over the Internet.
Self-directed learning	Self-directed learning is learning initiated and directed by the learner and can include self-paced, independent, and individualized learning as well as self-instruction.

Mentorship	The aim of mentorship is to serve as a guide rather than a provider of knowledge, introducing students to the new world, interpreting it for them, and helping them to learn what they need to know to function in it. A major benefit to online mentorship is the opportunity for frequent, convenient communication between mentor and student.
Collaborative learning	Collaborative learning is the process of getting two or more students to work together to learn. Each member of the team is responsible for learning what is taught and for helping team-mates learn.
Case study	The case study is a teaching strategy which requires learners to draw upon their past experiences, is participatory and has action components which are links to future experience. In the online environment case studies can be presented on web pages and discussed in conferencing groups.
Project	Online projects give students an opportunity to pursue their special interests and can be done individually or within groups. Projects also provide students with practical experience and a sense of accomplishment. Group projects can include simulations, role playing, case studies, problem solving exercises, group collaborative work, debates, small group discussion, and brainstorming.

2 Case studies

Different case studies in logistics online and CBT courses are considered, identifying used instructional strategies and technologies (Table 2).

Table 2: *Case studies*

Name of the learning course	Country / Organization	Short description
1. Online Logistics	Toronto, Canada / George Brown "The Toronto City College"	Online learning courses in logistics at George Brown "The Toronto City College" include different sub-courses such as "Logistics Fundamentals", Inventory management", "Transportation", "Warehousing", "Importing & Exporting", "Supply chain management" etc. These courses use "asynchronous" discussions as a key element, to discuss what students are learning with their fellow students and teachers. Students are broken up into groups of maximum ten people per group, and will be in that group for the duration of the course. So,

Name of the learning course	Country / Organization	Short description
		the small group study instructional strategy is used. Each week students are given at least one discussion topic related to that week's learning, and everyone in particular group must make an initial comment over the internet of 10-20 lines by a cutoff day, for example Thursday midnight. "Online Logistics" at George Brown "The Toronto City College". Available online via <http://www.lscmcourse.com> [accessed March 15, 2005].
2. Different courses under "TrainForTrade" Programme	Geneva, Switzerland / United Nations Conference on Trade and Development – UNCTAD	TrainForTrade is UNCTAD's leading programme for training and capacity-building in the fields of international trade, trade-related services, investment and port management. Specific methodology is used - the TRAIN-X systems approach to course design, development and delivery. The methodology includes the regular updating and adaptation of training courses to the needs of beneficiary countries or regions. The approach consists of three stages (analysis, development, and implementation) and nine phases. "TrainForTrade" Programme at UNCTAD. Available online via <http://r0.unctad.org/trainfortrade/uk/TrainForTrade/indexTFTUk.htm> [accessed March 15, 2005].
3. Logistics Management Series Online	Atlanta, United States / Georgia Institute of Technology, The Logistics Institute	The LMS Online is an integrated curriculum of short courses providing all-inclusive coverage of logistics management topics. The online courses are expanded and enhanced versions of the live short courses offered by Dr. E.H. Frazelle. Each e-course contains learning materials, multi-media presentations, web links, video clips, textbook chapters, examinations, diagnostic tools, decision support tools, and case studies integrated to provide warehouse managers and planners with the ultimate learning and problem solving tools for warehouse and logistics operations. Participation is handled via WebCT learning

Name of the learning course	Country / Organization	Short description
		management system. "LMS Online" courses. Available online via <http://www.tli.gatech.edu/lmsonline> [accessed March 15, 2005].
4. Fridays with Frazelle Webinars	Atlanta, United States / Georgia Institute of Technology, The Logistics Institute	Each two-hour webinar is presented live online and archived for participants (participants may view archive for up to two weeks after a live session). Once registered, participants will be given access to join the live online session as well as an opportunity to download the session presentation. Participants may submit questions to Dr. Frazelle before, during, and after the presentation. "Fridays with Frazelle" webinars. Available online via <http://www.tli.gatech.edu/fridays/> [accessed March 15, 2005].
5. Distance Learning in Logistics	Davie, Florida, US / Logistics Training Systems, Inc.	This program is especially designed for the person who can't possibly make it to a classroom module, but comprehends the energy and self-confidence that comes from interacting with an instructor one-on-one. This is how it works: • student receives study materials and directions; • there are several exams, including a final exam online, results are automatically submitted to an instructor with possibility to contact him; • some tests are provided online for self-evaluation; • at so called "Students Corner" different materials are provided, such as PowerPoint REVIEW of the Textbook, etc.; • audio CD is also available for student convenience. "Distance Learning in Logistics". Available online via <http://www.logisticsts.com/programs/distance

Name of the learning course	Country / Organization	Short description
		_learning.html> [accessed March 15, 2005].
6. Computer Based Training	USA / Defense Logistics Information Service	Different CBT courses delivered on CD. There are different web-based courses available via WWW, delivered using Authorware Web Player. CBT & web-based courses. Available online via <https://www.dlis.dla.mil/training/cbt.asp> [accessed March 15, 2005].
7. Logistics Training Services	Office locations – on 6 continents, Corporate Headquarters – Virginia, USA / Booz Allen Hamilton	Booz Allen Hamilton company follows the classic Instructional Systems Design (ISD) methodology developed by Florida State University and modified by federal agencies and military services. Training analysis determines the scope and content of the training to be developed. This includes the most appropriate knowledge, skills, and abilities (KSAs) to address in training and critical participant characteristics. In designing a training solution, Booz Allen combines the data from the job/task analysis with cost and audience analysis to develop the training approach that will achieve the desired goals. Training process evaluation ensures a high level of quality and integrity throughout the training life-cycle. "Booz Allen Hamilton" Logistics Training Services. Available online via <http://logworld.bah.com/logistics_training_services.html> [accessed March 15, 2005].
8. Raising the Level of One's Qualification – Distance Education	Moscow, Russian Federation / International Logistics Training Center	The form of the education is a distance course. The training programme is a module-based and it presupposes an opportunity of choosing separate specialised blocks. Learning materials include books and tasks. Distance course in Logistics. Available online via <http://www.mclog.ru/eng/> [accessed March 15, 2005].
9. Logistics Training	SCILNET (Supply Chain Improvement	Most training is by flexible delivery, including on-the-job and online study as well as Virtual

Name of the learning course	Country / Organization	Short description
International	through Learning)	Classrooms. Logistics Training International. Available online via <http://www.scilnet.com.au/> [accessed March 15, 2005].
10. Fundamentals of Supply Chain Management	California, USA / Supply Chain Online	Supply Chain Online sells modules by seat licenses. Each seat license of a module provides the license holder with online access to the material for one year and the ability to print the material for personal use. Courses are available online, delivered using JavaScript and Macromedia Flash engines. Supply Chain Online. Available online via <http://www.supplychainonline.com/cgi-local/store> [accessed March 15, 2005].
11. Global Logistics Specialist Online	Long Beach, USA / California State University, CITT – Center for International Trade and Transportation	The Global Logistics Specialist (GLS®) program is designed in a flexible format, grouped into six modules. Interactive cross-modal problem-solving classroom activities are complimented by integrated on-site experiences away from the classroom setting. Students will participate in a facilitated learning environment with industry experts and fellow class mates throughout the nation and the world. During the course students should complete a comprehensive project in which they will apply the knowledge and skills learned in the program. "Global Logistics Specialist Online" Program. Available online via http://www.uces.csulb.edu/CITT/GeneralInfo.aspx?vMID=168> [accessed March 15, 2005].
12. Function-Specific Hazmat Training Online!	USA / LION Technology inc.	Lion provides a variety of function-specific courses online to help you provide the appropriate training for all of your hazmat employees, maximizing your training budget and assuring compliance with the regulations. Training methods include public workshops, onsite training and two types of computer-based trainings: online multimedia training and webcasts with live instructors.

Name of the learning course	Country / Organization	Short description
		Function-Specific Hazmat Training Online. Available online via <http://www.lion.com/Catalog/HMTRCtraince nter.htm> [accessed March 15, 2005].

3 Conclusions

After many years of development, e-learning has become an important business process for corporations, which are now exploring how to better educate and manage their employees who rely on fresh knowledge to perform. E-learning is also at the top of the agenda of public and private universities, which are looking for ways to extend their influence and reach new types of customers. And e-learning has attracted the attention of the investment community as companies have emerged to capture market opportunities in technology, content, and services. The emphasis of most e-learning programs to date has been on the accumulation, organization, and delivery of content. To illustrate the current situation, different available CBT courses in maritime and transport logistics area were considered in this article from the point of used instructional strategies and technologies.

In order to stay competitive, logistics companies should focus on their knowledge. Improving the knowledge intensity is not only provided by investing in new ICT services, but also considering use of appropriate instructional strategies for CBT courses

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References

Kersten, W. 2004. Interview with Prof Wolfgang Kersten, President of the Hamburg School of Logistics, HSL. Available online via <http://www.hslog.de/downloads/interview_hsl_president.pdf> [accessed March 20, 2005].

ION (Illinois Online Network). Instructural strategies for online courses. Available online via <http://www.ion.uillinois.edu/resources/tutorials> [accessed June 10, 2006].

CLIC (Content Literacy Information Consortium). Instructural strategies resources. Available online via <http://curry.edschool.virginia.edu/centers/clic/instructional_strategies_resources.html> [accessed June 2, 2006].

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eLOGMAR-M builds on the results from three successful predecessor projects, all concerned with optimizing the logistics processes in maritime environments. Using modern information and communication technologies, these projects have created innovative solutions for port and logistics transport management.

eLOGMAR-M takes the next step of customizing these solutions for web-based and mobile usage by the actors directly involved in maritime applications.

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