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

EBERHARD BLUEMEL
Fraunhofer Institute FhG/IFF
Sandtorstrasse 22, 39106 Magdeburg, Germany
E-mail:
Eberhard.Bluemel@iff.fraunhofer.de

SVETLANA VINICHENKO
Logitrans Consult Ltd.
Kellamae 18-34, 74113 Maardu, Estonia
E-mail:
svetlana@logitrans.ee

LEONID NOVICKIS
Riga Technical university
Kalku str.1, LV-1658 Riga, Latvia
E-mail:
idc@balva.lv

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 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.
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.
Keywords: Transport logistics, Modelling, Web-based solutions.

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. In 2004 the eLOGMAR-M project (Web-based and Mobile Solutions for Collaborative Work Environment with Logistics and Maritime Applications), funded by the Commission of the European Communities within the Sixth Framework Programme (DG INFSO), has been strated. 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 supply chain.

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 will be 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.

The Baltic Sea Region is selected as the sample of feeder shipping and Port of Hamburg as container hub for this region. IT- and Communication support of intermodal transportation is illustrated by logistics supply chain "Baltic feeder ports ↔ trains ↔ Customers".

Special attention will be also devoted to the study of maritime and logistics processes in the Baltic Sea Region as they form an integral part of the above mentioned freight route. This region has specific requirements: after the candidate countries (Lithuania, Latvia and Estonia) joined both the EU and NATO, they play the role of a new border between EU and CIS.

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;

2) **Transportation group (K2)**: cargo owners, forwarding companies, traders.

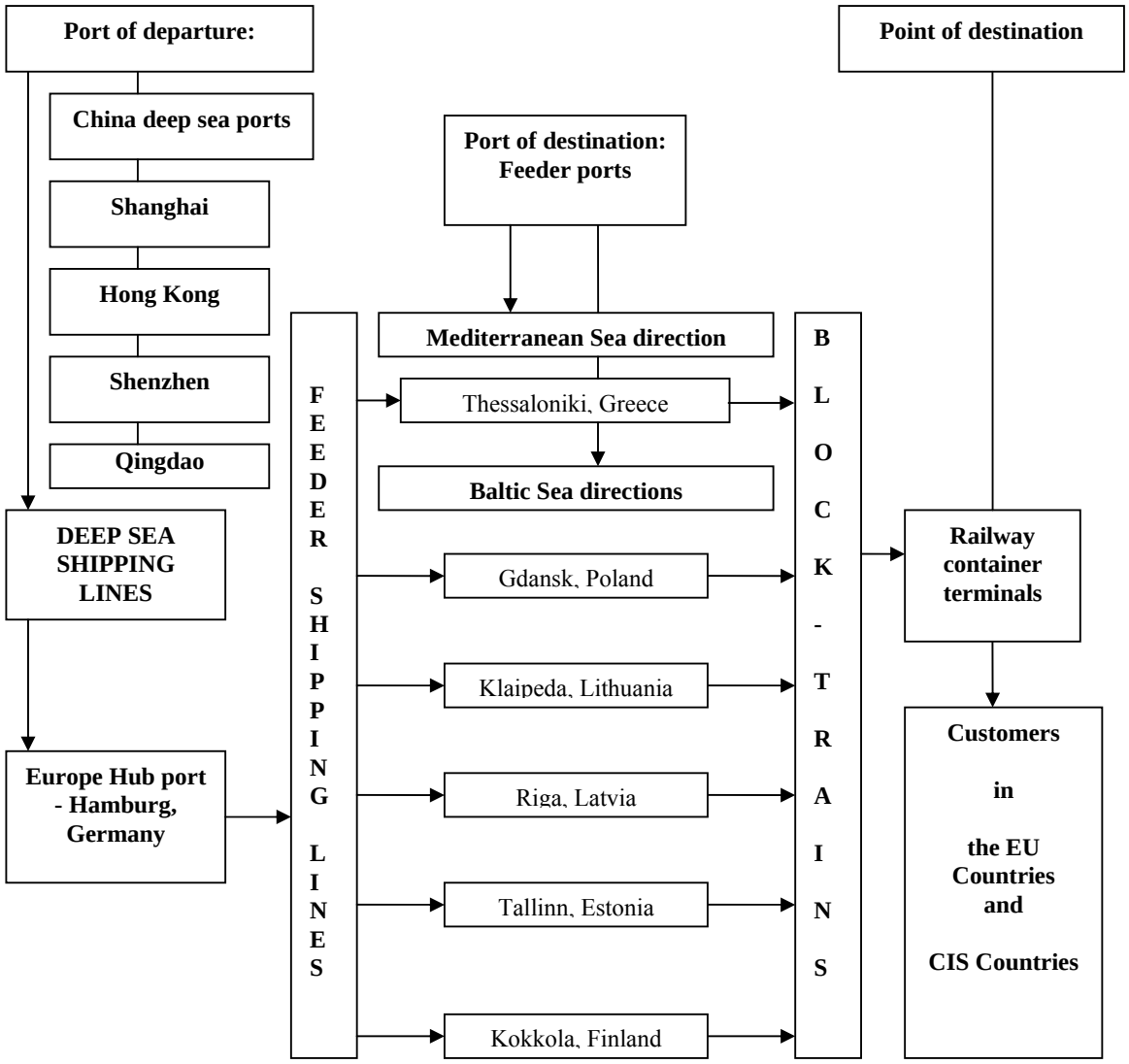

Figure 1: Multilevel Logistics and Transport Business Process.

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 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.

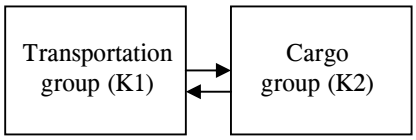

Figure 2: First Level.

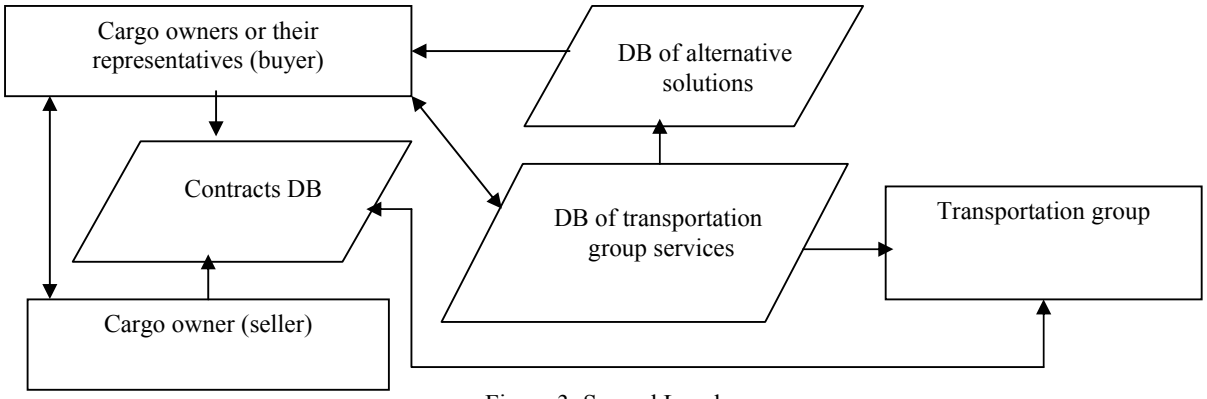

Figure 3: Second Level.

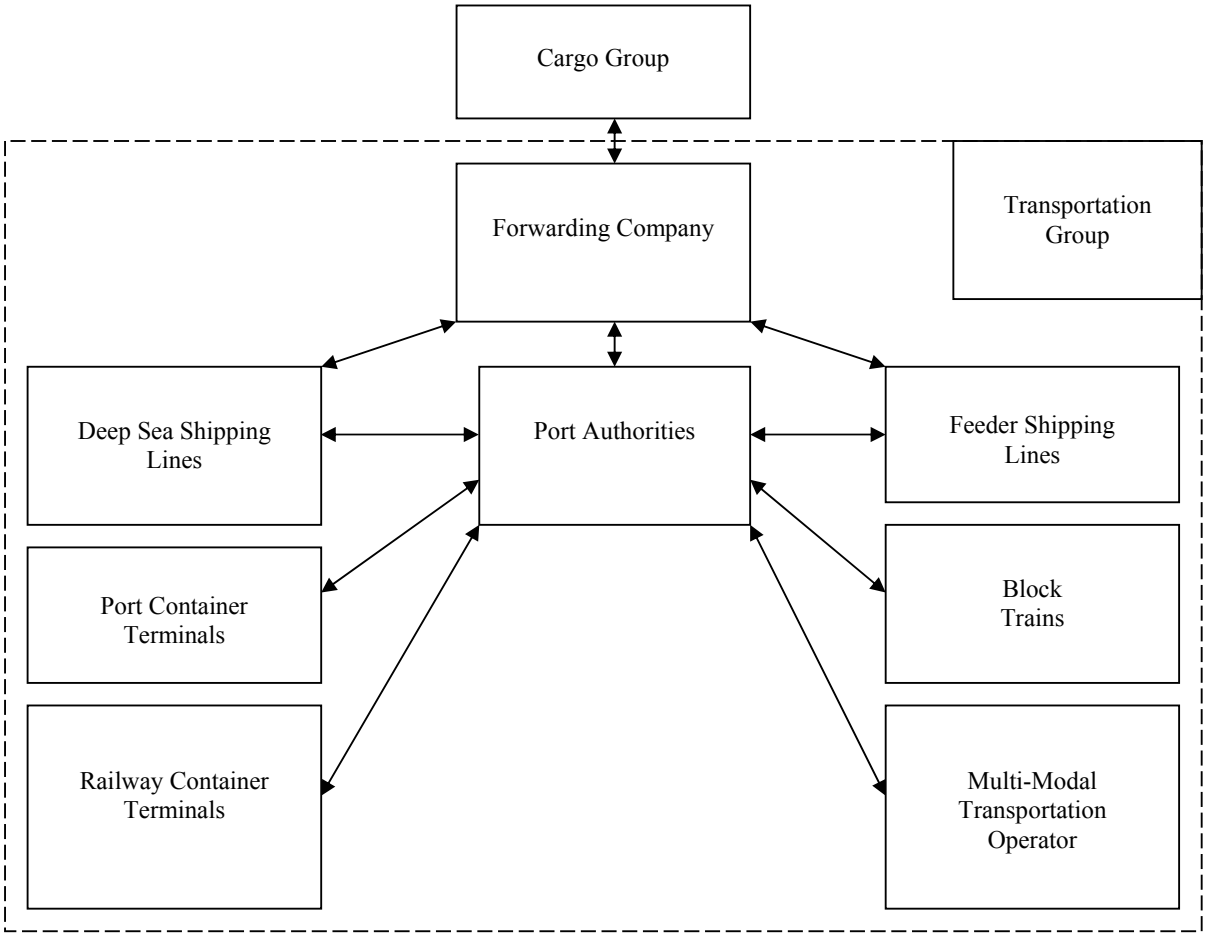

Figure 4: Third Level.

The following business processes will be supported by Web-portal:

1) Cargo group – preparation of contract of Sale/Purchase;
2) Cargo group – looking for suitable actors from cargo transportation group in accordance with terms and conditions of a contract of Sale/Purchase;
3) Transportation group – promotion of services by the way of distribution of information via Internet;
4) Transportation group – preparation of initial information regarding services and its maintenance.

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.

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.

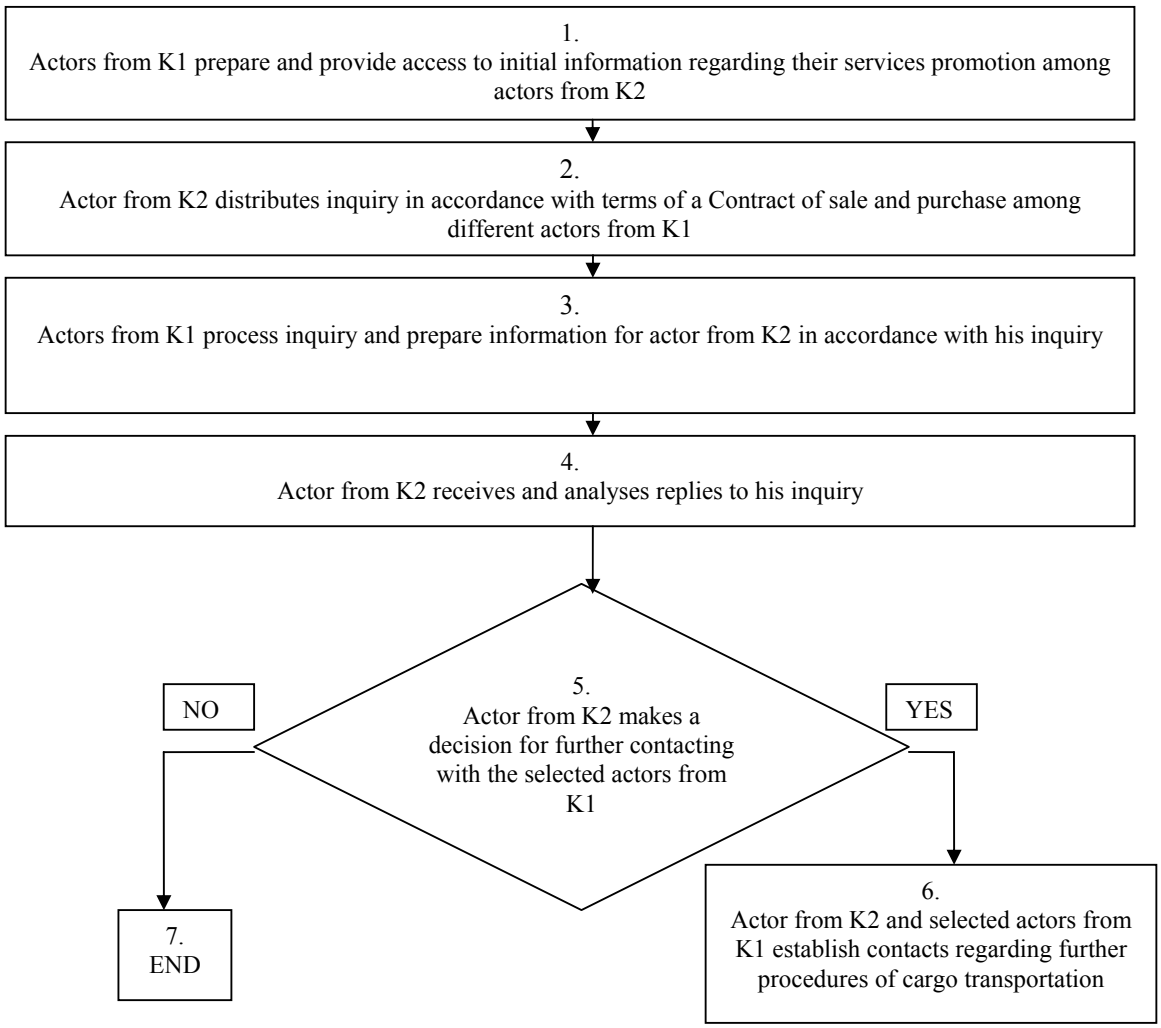

Figure 5: Flowchart Showing Processes of Decision Making.

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.

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. The brief description of the structure of Web-portal is presented.
4. Some of results could be further also used in creating a dictionary in logistics information systems within LOGIS-Mobile project "Competence Framework for Mobile On-Site Accelerated Vocational Training in Logistics Information Systems" (Leonardo da Vinci Programme).

ACKNOWLEDGEMENT

The presented activity is supported by the eLOGMAR-M project funded under the IST Six 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.

AUTHOR BIOGRAPHIES

EBERHARD BLUEMEL is Director of the Division of Virtual Development and Training (VDT) at the Fraunhofer IFF in Magdeburg. He holds a Ph.D. in Natural Sciences from Otto-von-Guericke University in Magdeburg. His research fields include Virtual Reality, Computer-Based Training, Simulation.

LEONID NOVICKIS is Head of the Division of Applied Systems Software at the Riga Technical University. He holds a Ph.D. from Riga Technical University (1980) and Dr. Habil. Sc.ing. from Latvian Academy of Science (1990). His research interests include software engineering, computer science, design and development of applied software systems.

SVETLANA VINICHENKO is Director of "Logitrans Consult Ltd." (Estonia). She graduated from Odessa Marine Transport Institute. Her research interests include transport logistics and business process modelling.