

INDUSTRIAL CUSTOMISATION OF MARITIME SIMULATION AND INFORMATION SYSTEMS IN THE LATVIAN PORT AREAS

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ABSTRACT

The paper presents objectives and tasks of the EC project BALTPORTS-IT, aimed at promoting and supporting dissemination, industrial customisation and transfer of technologies and tools gained during execution of the successfully completed EC projects AMCAI and DAMAC-HP. Customisation of a simulation model of container terminal operation, as well as of maritime information systems, is discussed. Use of a special technology for development and customisation of maritime information systems, that is based on infological models of data processing operations, is presented.

INTRODUCTION

The following major problems in the Baltic Free Port areas can be listed:

- Determination of a transport mode to use,
- Understanding how transport systems work before changing and improving them,
- Cost/benefit assessment before making investments,
- Combining activities of different actors operating within a distributed transport system,
- Improvement of training processes.

Aiming to contribute to solving these problems, the following results were obtained in the EC projects AMCAI (Bluemel et.al., 1997) and DAMAC-HP (Bluemel et.al., 2000):

- Simulation model of the Baltic Container Terminal (Latvia),
- LISTechnology for maritime information systems design,
- Information system for marine insurance.

SIMULATION SYSTEM OF THE BALTIC CONTAINER TERMINAL

Simulation of logistics processes at the Baltic Container Terminal (BCT) was performed using the Arena simulation tool (Merkurjev *et.al.*, 2000). A sample animation view of the resulted simulation model is presented in Figure 1). One could see here the terminal layout (with its two berths, container yards, roads, railway centre and In/Out gate), elements of the outside transport flows (ships, trains and trucks), internal transport (trailers, forklifts, quay and yard cranes), and information about simulation results as well: berth productivity and number of containers on a ship. The model allows productivity evaluation for the terminal equipment as well.

Thanks to its enhanced visualisation feature, the model gives a clear impression of terminal operation under particular circumstances. On the other hand, this graphical clearness causes relatively slow execution of simulation runs. As far as it is planned to use simulation for evaluation of everyday operation of the terminal, that asks for faster execution, it was decided to simplify the model, modifying it toward a higher level of abstraction in describing terminal processes. This will be performed during customisation of the simulation model within the BALTPORTS-IT EC project. The customisation will incorporate

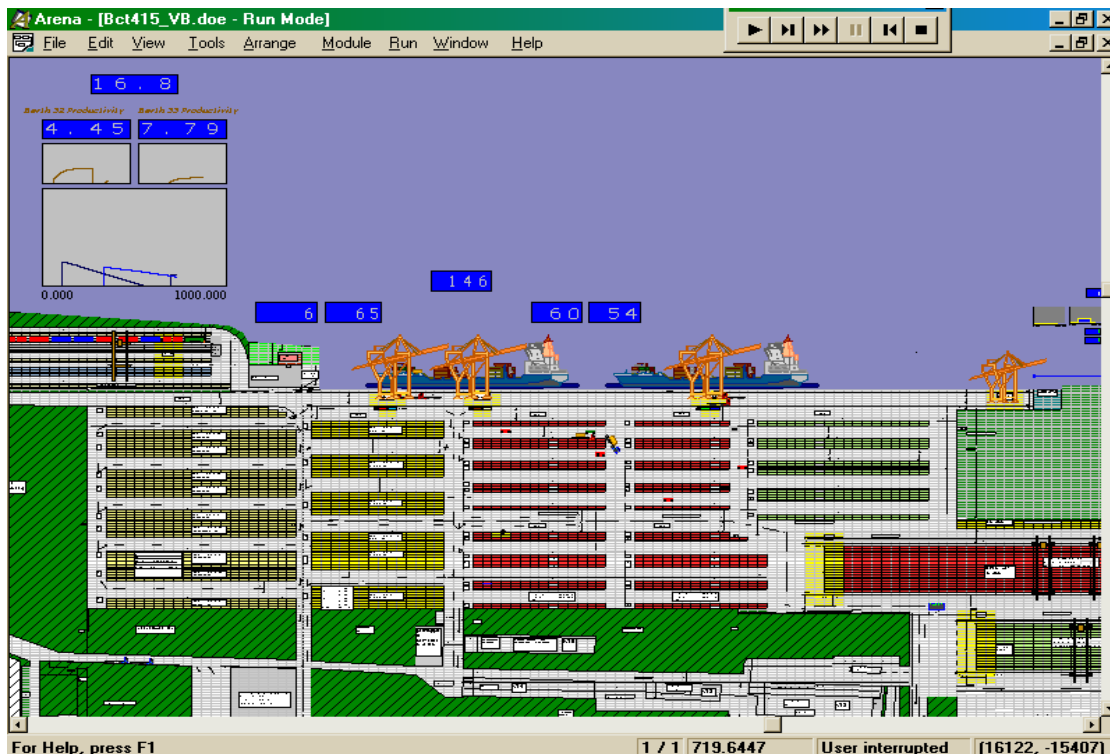


Figure 1. Sample animation view of the BCT simulation model

reviewing terminal business processes, followed by a corresponding modifying a structure of the simulation model, preparing simulation input data, calibrating and validating the simulation model. Simulation will be used to evaluate specific logistics characteristics of terminal operation, such as ship service time, utilisation of terminal equipment, berth productivity.

The customised simulation model will be connected to a terminal information system. This will allow using actual data from the information system as simulation input data, thus performing modelling of actual terminal operations (e.g., while preparing to serve an incoming ship, or planning next day operations).

INFOLOGICAL MODELLING FOR INFORMATION SYSTEMS DESIGN

LISTechnology is a technology for designing information systems that has been developed at an IT-company "Latvian Intelligent Systems" (Ginters *at.al*, 1998). It was used within the AMCAI and DAMAC-HP projects with the following aims:

- To design separate modules of an Information Management System for the Ventspils Free Port Authority (Latvia);

- To design infological models of business processes for insurance purposes, to be used by an insurance company BALVA (Latvia).

Three-level infological models (STATIC, DYNAMIC and EXPERTISE) were used to analyse the business information processing at the Ventspils Free Port Authority.

At the STATIC level, more important information objects and links were identified. At the DYNAMIC level, macro and micro process models of the information processing were designed and some critical contours were identified. At the EXPERTISE level, more accurate quantitative analysis of the parameters of critical contours was performed by using visualisation and simulation.

The analysed contours ensure realisation of certain data processing functions:

- Preparation and acceptance of instructions,
- Preparation and acceptance of board resolutions,
- Levying of port fees and charges,
- Accounting of cargo turnover,
- Environment protection,
- Book-keeping and financial planning,
- Logistic operations, etc.

Visualisation of contours is achieved by means of the WWW.

By storing the daily information in the database, it is possible to call up (through the Internet) data about cargo turnover in the port during the time period selected as needed. Particular benefits could be achieved by using Wireless Application Protocol (WAP) and mobile phone connections.

Information about the turnover stored in the database is used at the next level (EXPERTISE). Using collected data and general parameters of the port, it is possible to optimise a working load of the port.

Banks and insurance companies are among business partners operating in the free port areas. Providing effective processing of insurance and financial data and corresponding information exchange between financial and maritime companies is essential. The DAMAC-HP project consortium selected the insurance company BALVA as an external partner for collaboration in the area of information systems development and practical applications. Company BALVA works with all Latvian major ports.

The task of developing an integrated insurance information system is very important for BALVA. A set of business charts, interface tables and communication diagrams was created in the first phase of business processes analysis (Novitsky et.al., 2000). They define a static infological model of multilevel insurance business processes.

Further customisation of the above mentioned information systems within the BALTPORT-IT project foresees:

- Structuring business information and developing a business model of a gas enterprise "Ventamonjaks" operating in the Ventspils Free Port Area;
- Designing a marine insurance information system of the Latvian company BALVA based on the infological model;
- Incorporating the marine insurance system into the Information Management System of the company BALVA.

CONCLUSIONS

Simulation and information systems developed during execution of the EC projects AMCAI and DAMAC-HP will be further customised within the framework of the running BALTPORTS-IT project. Results of customisation will include:

- Simulation system of the Baltic Container Terminal,
- Information model for the company Ventamonjaks operating in the Ventspils Free Port Area,
- Integrated Information System for the marine insurance company BALVA.

The customisation is being performed by using the LISTechnology, ARENA simulation system, and Web- and WAP-based technologies.

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