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MODEL OF INFORMATIONAL SYSTEM FOR FREIGHT INSURANCE AUTOMATION BASED ON DIGITAL SIGNATURE

Summary. In the article considered a model of informational system for freight insurance automation based on digital signature, showed architecture, macro flowchart of information flow in model, components (modules) and their functions. Described calculation method of costs on interactive cargo insurance via proposed system, represented main characteristics and options of existing transport management systems, conceptual cost models.

МОДЕЛЬ ИНФОРМАЦИОННОЙ СИСТЕМЫ АВТОМАТИЗИРОВАННОГО СТРАХОВАНИЯ ГРУЗОВ С ИСПОЛЬЗОВАНИЕ ЭЛЕКТРОННОЙ ЦИФРОВОЙ ПОДПИСИ

Аннотация. В статье рассмотрена модель информационной системы автоматизированного страхования грузов с использованием электронной цифровой подписи, представлена архитектура системы, укрупненная блок-схема информационного потока в системе, компоненты (модули) и их функции. Приведена методика расчета затрат на интерактивное страхование груза через предложенную систему, представлены основные характеристики и опции существующих моделей управляющих транспортных систем, их концептуальные ценовые модели.

Financiers and economists all over the world warn of looming recession across the economy. But talk to supply chain executives and managers of a company in the $ 5 billion sales braked and they will tell you that there is a pressure to manage more transportation and more complex transportation requirements. That means - recession or no recession – that the pressure to improve service performance and reduce costs is greater than ever [1]. To respond to this, more and more companies (from simple transport owners to 3PL providers) are seeking to improve their dataflow, dataware of freight and transport management systems (TMS) as well.

One of the most important and influential document relevant to freight's dataware – is document, which guarantees freight safety and logistics circuit continuity. It is guaranteed by insurance companies and contracts, which are signed by shippers and these companies.

There are some features of cargo insurance, which mostly often used at organization and management of freight flow:

- Shipper hasn't ability of safety freight control on the step of dataflow formation.

- On the step of sale contract signing exists long period when sold freight has already stepped out from shipper's eyeshot but hasn't come to customer's eyeshot yet. Freight owners getting losses by either theft or damage and corruption.
- Shippers use software of different non-integrated transport and logistics management systems with insurance companies' software for automation of insurance process.
- Following the development of data flow, it's meeting the delivery of cargo challenge by several shipments in addition with using several modes of transportation.

When considering different types of freights, we have to mark such goods with short useful life, which need rapidly organization of transportation from shipper to customer to keep all contract conditions. We have to take these circumstances into account following the development of dataflow model for dataware and taking decision about insurance service abilities.

For getting right task solution and involving insurance of freights, as an important part of cargo dataware, we have to develop and deploy **effective model of informational system for freight insurance automation based on digital signature between shipper (suppliers, customers and 3PL providers) and insurance companies.**

Author basing on:

1) theoretical and practical experience in IT at logistics [2, 4], IT outsourcing and software development area since 2004 has been working a CEO of outsourcing software development company in Ukraine;
2) developed, patented and certified models of using new technical conception of electronic signature in information transport management systems [3, 5];
3) experience got from development of project (deployment electronic signature into the interactive sales of insurance services) for one of the biggest insurance companies in Ukraine – "Alpha-Insurance".

The main aim of proposing informational system model on the stage of freight insurance is time and costs reducing via supply chain organization. It's getting with the help of:

- ability for shippers to choose and order freight insurance service;
- familiarizing with conditions of insurance service ordering;
- calculating and getting results in interactive mode with setting individual cargo options by shipper;
- selecting an offer with the biggest benefit from all other offers have been taking by insurance companies, which take part via system in automatic mode;
- signing of electronic version of insurance contract with Insurance company via system using e-signature and paying the insurance service as well.

Representing macro flowchart of information flow in model at fig. 1 and representing macro architecture of the model at fig. 2.

Considering the functions of system software modules:

Shipper registration module

Functions:

- providing safety process of shipper's registration in the system via HTTP protocol;
- providing safety process of shipper's confirmation after registration;
- providing safety process of storing shipper's ID in the database of the system;
- automate activating of shipper's account.

Cargo insurance calculation module

Functions:

- choosing freight insurance service via this module by shipper;
- providing information about freight insurance conditions;
- approving the options of freight by shipper;

- providing the form for filling and *re*-filling freight options for calculation the price of service;
- getting all offers from Insurance providers and accepting the result with more suitable price and conditions;
- logging in the system with individual IDs or registering via *Shipper registration module;*
- generating of agreement;
- adding freight insurance offer to shopping cart.

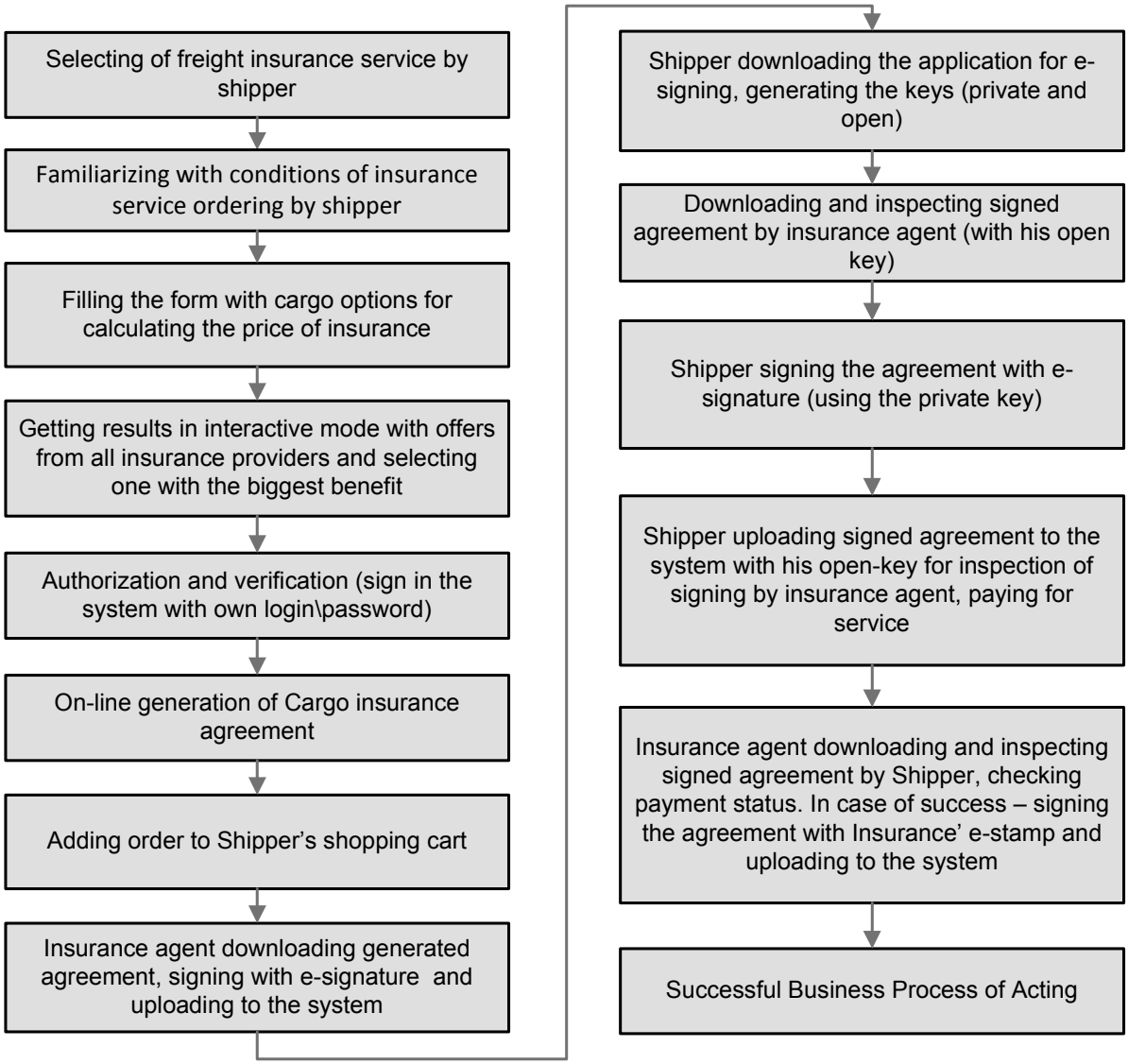

Fig. 1. Macro flowchart of information flow in the model
Рис. 1. Укрупненная блок-схема информационного потока в модели

Module of changing Shippers IDs for access

Functions:

- requesting for a new password in safe mode via this module;
- reset shippers' IDs after the answering to the secret question that shippers note when following the registration;
- safe changing access information.

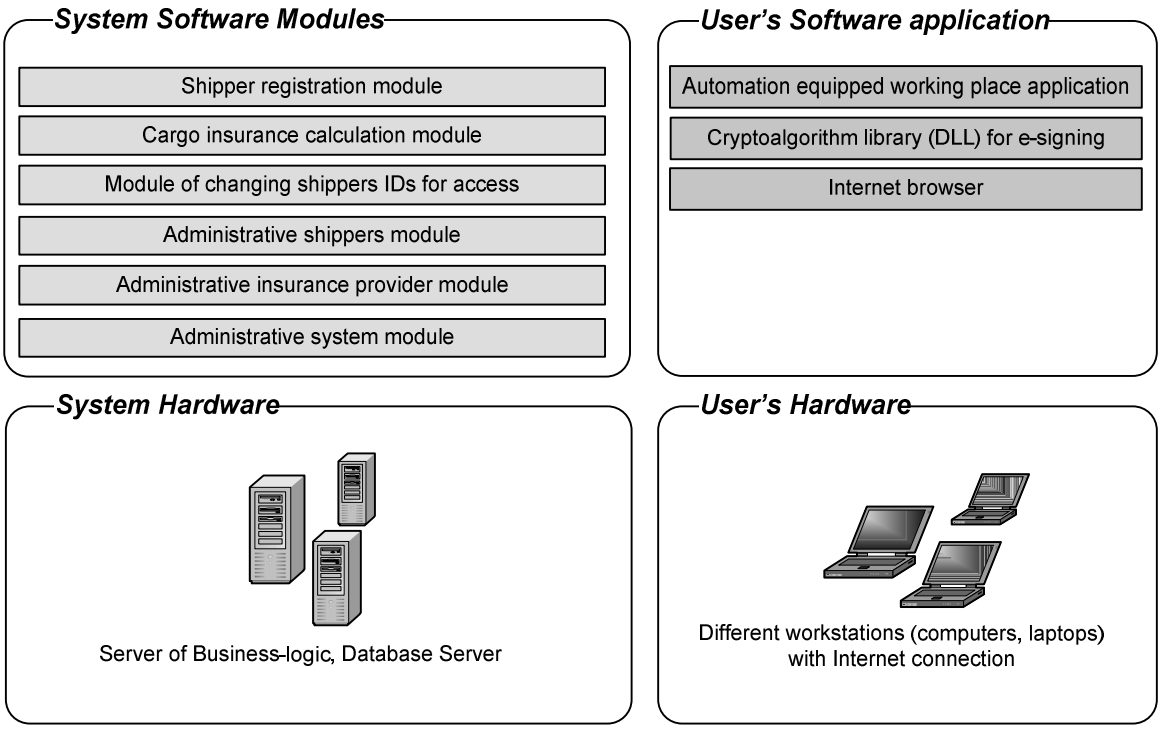

Fig. 2. Hardware and software architecture of informational model
Рис. 2. Аппаратная и программная архитектура информационной модели

Administrative Shippers module
Functions:

- personal information managing (viewing and editing);
- current order managing (viewing of summary information, managing of order documents, managing of payment status, discussion of order issues);
- application downloading for e-signature using;
- management of public keys (digital certificates);
- instructions reviewing (system processes, e-signature, etc.).

Administrative Insurance provider module
Functions:

- orders managing (viewing and managing of all orders, nontreated orders, intraprocess orders by shipper, orders with discussion of issues, orders with requesting of documents checking, dismiss orders, orders with requesting of e-stamp, successful orders, deleted orders);
- current order managing (viewing of summary information, managing of order documents, managing of payment status, discussion of order issues);
- customers' (shippers's) information;
- payment managing (committed payments for orders, non-committed payments for orders);
- application downloading for e-signature using;
- management of public keys (digital certificates);
- instructions reviewing (system processes, e-signature, etc.).

Administrative system module
Functions:

- content managing;
- application uploading for e-signature using;

- payment managing;
- users managing (roles and polices managing);
- shippers managing;
- insurance providers managing.

Following [6] formula 1 it's possible to calculate costs on electronic documents circulation for industrial transport dataware and cargo insurance process as well.

$$C_{\partial} = N_{cert}\left(C_{cert} + C_{S}\right) + \sum_{H=0}^{n_{il}} n_i \left[\varphi\left(C_i + C_t + C_{tel}\right) + C_{\Pi i}\right] \quad (1)$$

where:

C_{∂} - all costs for industrial transport dataware and cargo insurance process;

i - mode of document transportation;

N_{cert} - e-certificates quantity for persons, signing the cargo documents (insurance documents);

C_{cert} - annual fee for one e-certificate keeping;

C_S - costs for studying of 1 contact person, who interacting via system;

n_i - transport (insurance) documents quantity, which are signed on level - i (il – insurance level);

φ - quality of e-document preparation coefficient;

C_i - costs for internet service following document sending and receiving ;

C_t - worker timetable for e-signing and sending\receiving documents;

C_{tel} - costs for telephone (voice\mobile) service, which sometimes supports workflow;

$C_{\Pi i}$ - costs for e-digital signature of insurance e-document and uploading it via informational system.

As the supply chain has become more integrated [1], access to logistics and transportation information across multiple functions and groups has become more common and more important. In order to provide greater shipment visibility, an increasing number of companies are looking at options for transport management system (TMS) to replace antiquated legacy systems or to augment standard ERP functionality. The choice for a TMS solution is no longer limited to the stand alone (or perpetual license) system. Basically, there are three types of TMS options (software models) available today (Tab.1):

- Perpetual License/Perpetual License with Hosting;
- Multi-Tenant Software as a Service;
- Partial Outsourcing/Private Software as a Service Transportation Management Systems, as introduced in the 1990s, were specialized stand-alone systems designed specifically for transportation-mode users. At that time these systems had limited capability to manage large amounts of data efficiently.

CONCLUSION

Proposed model can be used basing on each type of considered TMS software models. The model can reduce dataware costs from 15 to 45% due to:

1) usage of automated mode for freight insurance and reduce time costs as a majority;
2) getting acceptance of insurance offer with insurance company, which provided the best conditions for cargo;
3) using e-signing for minimizing time and money on dataware supporting (transportation).

Tab. 1

Types of TMS software models

Characteristics	Perpetual License and Perpetual License with Hosting	Transportation Process Outsourcing With Private Software as a Service (SaaS)	Multi-tenat Software as a Service
Timing of Buyer's Cash Outlays	Software license and services paid at beginning plus periodic payment to host vendor	Periodic payment (e.g. monthly) over life of contract for license, services & hosting	Periodic payment (e.g. monthly or transaction-based) over life of contract for license, services & hosting
Time to Implement	4-6 months depending on functionality needed	3-5 months depending on functionality needed	2-3 months using current built-In configurations and if system infrastructure is already set up
Need for IT Staff Involvement for Hardware	High	Low	Low
Need IT staff for network connections	High	Medium	Low
Need for Implementation Consultants	High	Included	Low
Ease of Upgrade	Medium	Low	Low
Hardware Uptime Responsibility	IT Staff (or host if using hosted model)	Provider	Provider
Ready Access to EDI Links to Carrier Base	Low	Medium	High
Data Security	High	High	Potential Problem
Restricted Access to Shipper Information	High	High	Potential Problem
Performance at Peak Times	High	High	Potential Problem
Ability to Customize Configuration	High	High	Low
Ability to Control Scheduled System Maintenance	High	High	Low

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Received 18.05.2009; accepted in revised form 23.12.2009