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ELECTRONIC REPOSITORY AND STANDARDIZATION OF PROCESSES AND ELECTRONIC DOCUMENTS IN TRANSPORT

Summary. The article refers to the idea of the use of electronic repository to store standardised scheme of processes between a Logistics Service Provider and its business partners. Application of repository for automatic or semi-automatic configuration of interoperability in electronic data interchange between information systems of different companies based on transport (road, rail, sea and combined) related processes. Standardisation includes processes, scheme of cooperation and related to them, electronic messages.

REPOZYTORIUM ELEKTRONICZNE I STANDARYZACJA PROCESÓW I DOKUMENTÓW ELEKTRONICZNYCH W TRANSPORCIE

Streszczenie. Tematem referatu jest pokazanie idei wykorzystania elektronicznego repozytorium dla przechowywania standardowych schematów procesów zachodzących pomiędzy operatorem logistycznym a jego otoczeniem oraz zastosowania repozytorium do automatycznej lub półautomatycznej konfiguracji współpracy w zakresie elektronicznej wymiany danych między systemami komputerowymi różnych przedsiębiorstw na przykładzie procesów związanych z transportem (drogowym, kolejowym, morskim oraz kombinowanym). Standaryzacja obejmuje zarówno procesy jak i schematy współpracy oraz powiązane z nimi dokumenty elektroniczne.

1. INTRODUCTION

The growing number of flowing goods demands bigger requirements for transport, which now must be better and faster organized. on one side, harbours extend their infrastructure, but bigger harbours infrastructure is not enough, besides harbours extension is not infinitely. As important as harbours extensions, is to increase and speed up the flow of goods into the middle of countries. This is not possible without logistics centres (dry ports) where the goods from ports with the help of containers, trains or barges, could be transported fast and from there go to their final destination. The most important factor in such a fast transport organisation is the interoperability and cooperation between ports, hubs, companies and all related organisation involved in transport processes. Good planning is the key in modern transport which is now much more complicated, because of many entities involved, because of its international character and because of it's inter-modality air, sea, rail, road, in-water transport and operations in between transport stages. With realization of such multi-modal transport lots of information and fast exchange of this information is needed, different

transport documents are required. This information chaos can be well organized with the help of standardization of logistics processes and electronic documents exchanged between or involved entities during the planning and execution of transport chains.

2. COMPLEXITY OF INTERMODAL TRANSPORT CHAINS

If we compare single and multimodal transport we discover that the number of necessary operation, connection, information exchange is growing very much in case of multimodal transport. Figure 1, presents transport chains which may comprise one or more transport services in order for the cargo to be moved from its origin to its destination.

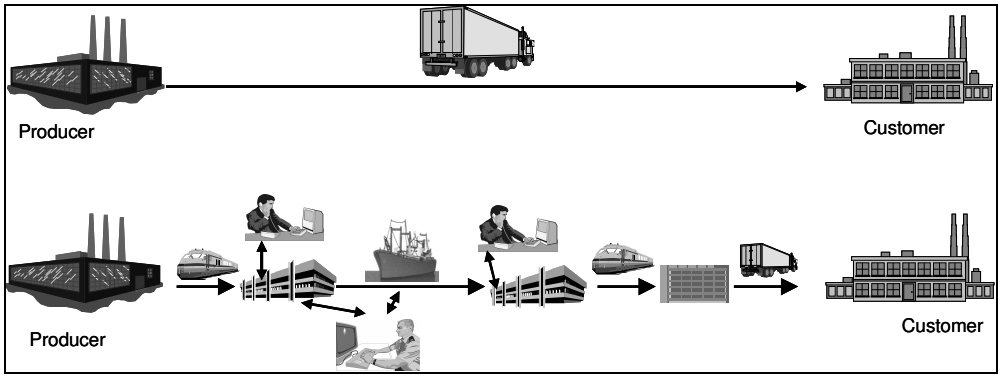

Fig. 1. Single and multimodal transport chain. Source: [LogitD2D systems]
Rys. 1. Pojedynczy i multimodalny łańcuch transportowy. Źródło: [Systemy Logit2D2]

The multimodal transport are different logistics services combined into comprehensive networks of services, covering the whole range of activities that have to be carried out in order to transport goods. These services may include apart from transportation itself (air, sea, rail), warehousing, loading and unloading goods, cool-house, warehousing and transportation.

In this simple chain provider services included are:

- truck loading;
- truck transport;
- truck unloading.

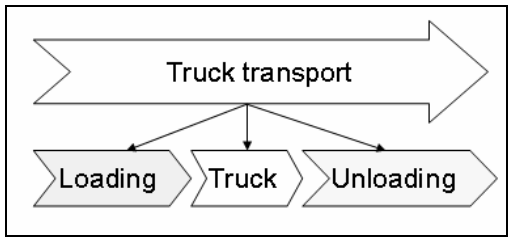

Fig. 2. Simple transport chain Source: [own preparation]
Rys. 2. Pojedynczy łańcuch transportowy. Źródło: opracowanie własne

On Figure 3 transport chain is far more complex than the simple truck transport chain. There are many service providers and all they need is the necessary information on time to be able to handle goods and forward them within the chain.

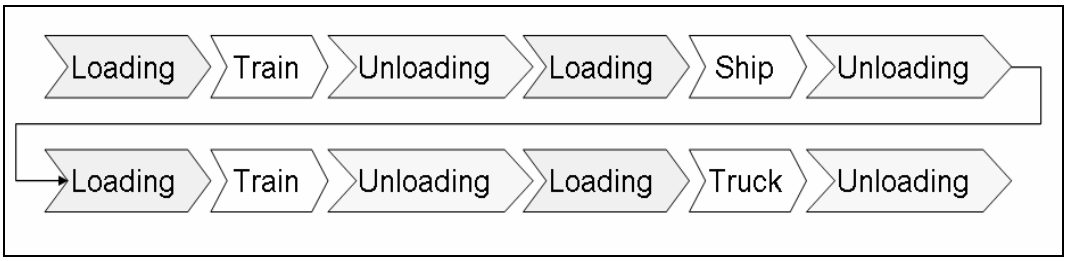

Fig. 3. Multimodal transport chain Source: [own preparation]
Rys. 3. Multimodalny łańcuch transportowy. Źródło: opracowanie własne

On Figure 4 we can see how much information has to be exchanged between different companies which takes part in multimodal transport chains.

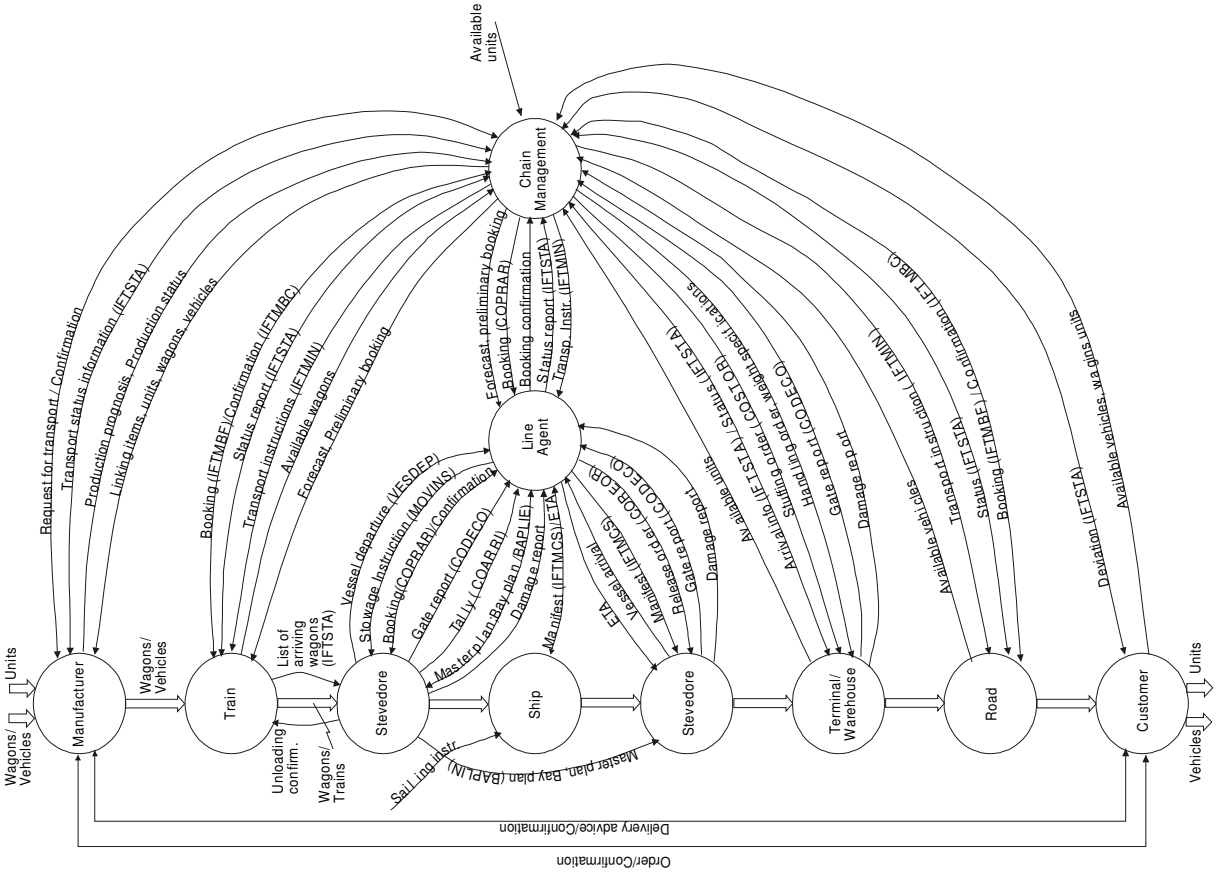

Fig. 4. Complexity of inter- modal transport chains. Source [logitD2D systems]
Rys. 4. Złożoność wewnątrz-modalnego łańcucha transportowego. Źródło [Systemy logit2D2]

Without standardization of processes, transactions and related electronic messages that would be a very difficult task to manage the information flow between all interested parties.

3. LOGISTICS SERVICE PROVIDERS – BUSINESS PROCESSES, TRANSACTIONS AND RELATED DOCUMENTS

In such complex environment like those for planning and executing multimodal transport it is very important to use as much as possible common business processes and related electronic messages. The

multimodal transport chains will not be effective if each side of business process will use different standards for communication or there will be major differences depending on in which country we are. We are not able to operate with many standards from around the world. Luckily there are standardising organisations like UN/CEFACT or GS1. Already a lot of work has been done and lots of standards developed and are now available free of charge. In GS1 exists Logistics Interoperability Model Group (LIM group) which works on business processes related with logistics service providers to be most common and easy to implement for everyone. Now they are going to publish the Final report of what they achieved so far. Further steps of LIM group are to analyze and change if necessary the existing standards of electronic documents. at the same time, they started work on extending the report of multimodal transport and it will respect requirements of rail transport, sea transport and international character of transport.

Standardization of processes and documents is the key for fast organising of transport goods and multimodal transport chains. On the figure below you can see processes identified by Logistics Interoperability Model Group.

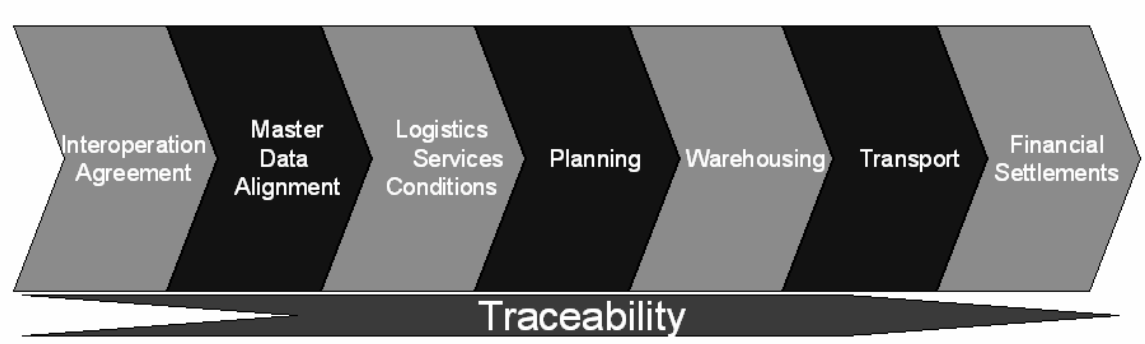

Fig. 5. Scope of processes for standardization procedure of LIM Group. Source: [own preparation]
Rys. 5. Zakres procesów dla procedury standaryzacji Grupy LIM. Źródło: opracowanie własne

The other interesting idea of standardisation of trade and transport documents is a "single window" project supported by such organizations like: UNECE (United Nations Economic Commission for Europe, UN/CEFACT its centre for Trade Facilitation and Electronic Business, WCO – World Customs Organisation and a few more. The implementation of single window system allows international (cross-borders) traders to submit regulatory documents at a single location and/or single entity. Such documents are typically customs declarations, application for import/export permits, certificates and trading invoices. Nevertheless, they have connection with the cross-border transport.

In the demanding world of transport goods, business requirements are changing very quickly and business processes, electronic messages as well. So it is important that the latest version of standards were easily available.

4. EBXML REPOSITORY IN INTEROPERABILITY MODEL

4.1. EBXML REPOSITORY

EbXML (Electronic Business using eXtensible Markup Language), is a family of XML based standards sponsored by OASIS and UN/CEFACT whose mission is to provide an open, XML-based infrastructure that enables global use of electronic business information in an interoperable, secure, and consistent manner by all trading partners. Provides web-services for sharing content and metadata between entities. EbXML repository contains any type of electronic contents such as: XML schema, XML instance, WSDL and images. The repository which would be useful for our transport purposes

will contain database of companies, XML schema of CPP (collaboration protocol profile), CPA (collaboration protocol agreement) and business documents specifications. EbXML repository must be associated with ebXML registry which contains a metadata instances of the objects and which are helpful for discovering content of repository. Registry also contains information of available services and protocols which has to be used by all entities to get and put data to the repository.

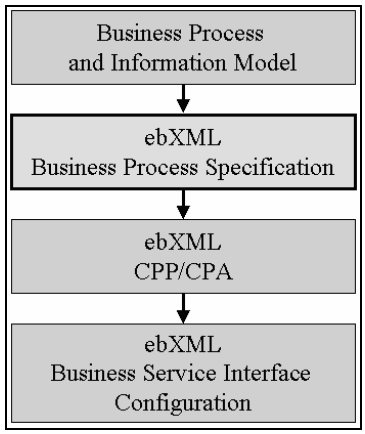

Fig. 6. Business Process Specification and Business Service Interface Configuration. Source: [Business process specification schema v.1.01 Business Process Team, 11 May 2001, Copyright © UN/CEFACT and OASIS]

Rys. 6. Specyfikacja Procesów Biznesowych i Konfiguracja Biznesowego Interfejsu Obsługi. Źródło: [Schemat specyfikacji procesów biznesowych v.1.01 Zespół Procesów Biznesowych, 11 maja 2001, Wszelkie prawa zastrzeżone UN/CEFACT i OASIS]

An ebXML Business Process Specification contains the specification of Business Transactions and the choreography of Business Transactions into Business Collaborations.

This ebXML Business Process Specification is then the input to the formation of ebXML trading partner Collaboration Protocol Profiles and Collaboration Protocol Agreements (CPP and CPA).

These ebXML trading partner Collaboration Protocol Profiles and Collaboration Protocol Agreements in turn serve as configuration files for ebXML Business Service Interface software.

The architecture of the ebXML Business Process Specification Schema consists of the following functional components:

- UML version of the Business Process Specification Schema
- XML version of the Business Process Specification Schema
- Production Rules defining the mapping from the UML version of the Business Process Specification Schema to the XML version
- Business Signal Definitions

Together these components allow you to fully specify all the run time aspects of a business process model. These components are shown (inside the dotted box) in Figure 7 below.

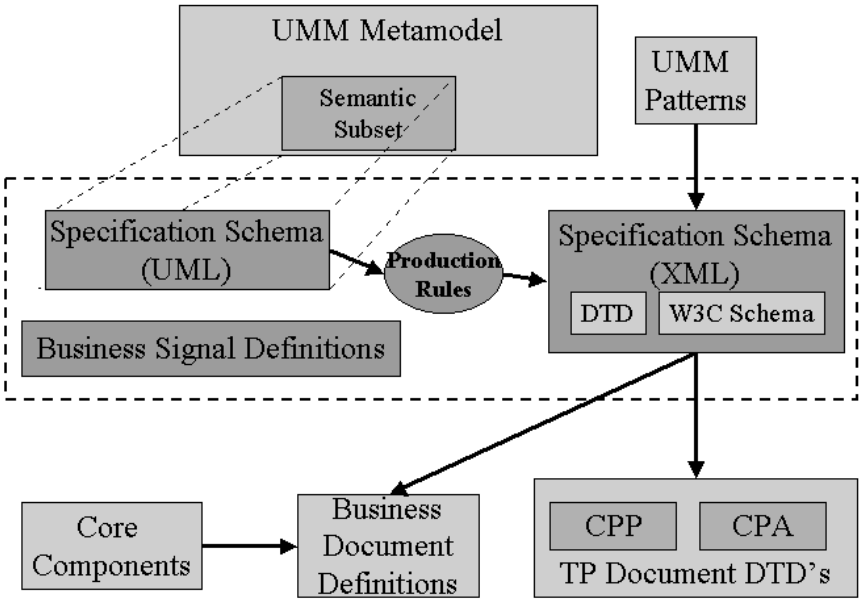

Fig. 7. Relationships of ebXML Business Process Specification Schema to UMM, CPP/CPA and Core Components. Source: [Business process specification schema v.1.01 Business Process Team, 11 May 2001, Copyright© UN/CEFACT and OASIS]

Rys. 7. Stosunek Schematu Specyfikacji Procesów Biznesowych ebXML do UMM, CPP/CPA oraz Komponentów Rdzeniowych. Źródło: [Schemat specyfikacji procesów biznesowych v.1.01 Zespół Procesów Biznesowych, 11 maja 2001, Wszelkie prawa zastrzeżone UN/CEFACT i OASIS]

4.2. EBXML REPOSITORY IN TRANSPORT MODEL

In this chapter we apply ebXML repository as a l tool helpful for planning multimodal transport in the Baltic Sea region where we have sea, rail and road transport connections. First we have transport and logistics service providers besides transport we need to sometimes store goods, load and unload ships, trucks and containers. For all those services providers should describe accompanying transactions as their business profile and provide these data as collaboration protocol profile into repository, then the customer, other logistics service provider or freight integrator or someone who will organize transport for his customer finds this in repository and on the basis of providers CPP he knows what electronic messages he expects, sending by which protocol and when. These information connected with standards of electronic messages also stored in ebXML repository gives us the greatest opportunities for better cooperation and thanks to that, better and faster transport organisation. Of course this is only the beginning of the road, standards of electronic messages from repository should be filled with proper data and this should be done by mapping information from the database of individual computer systems of company's with those standards. That is a full integration.

There also exists and commonly used - applications which in a dynamic way generate a form for specific documents standards and sends it in described in CPP way to the destination's address.

On Figure 8, we have a model where there is a freight integrator who collects service from logistics service providers and then on the basis of those services offers one or more alternatives transport chains for his customers. For better collaboration freight integrator and its business partners use an ebxml repository to store their business processes and requirements regarding electronic messages, technical protocols and business rules. Upon that information each partner can configure their own computer systems to be able to communicate with others. shipping company has CPA with a freight integrator and sends information of his services. For example service about ship from

Shanghai to Hamburg is send to freight integrator, then rail operator provides data regarding rail services from Germany to Poland. Road Transport Company provides road services in Poland. Upon those info freight integrator can built a chain from Shanghai to any place in Poland, but this is what he is able to do thanks to his own database of services sent by providers. To execute this transport chain he has to interchange a lot of information with all entities connected to this chain, he has to book a place on the transport means with each service provider, gets booking confirmation, customer confirmation and all necessary documents related with the transport of goods. And for that we need a repository which is independent on any of the connected systems, he always has the actual information of business profiles, transactions and electronic messages standards.

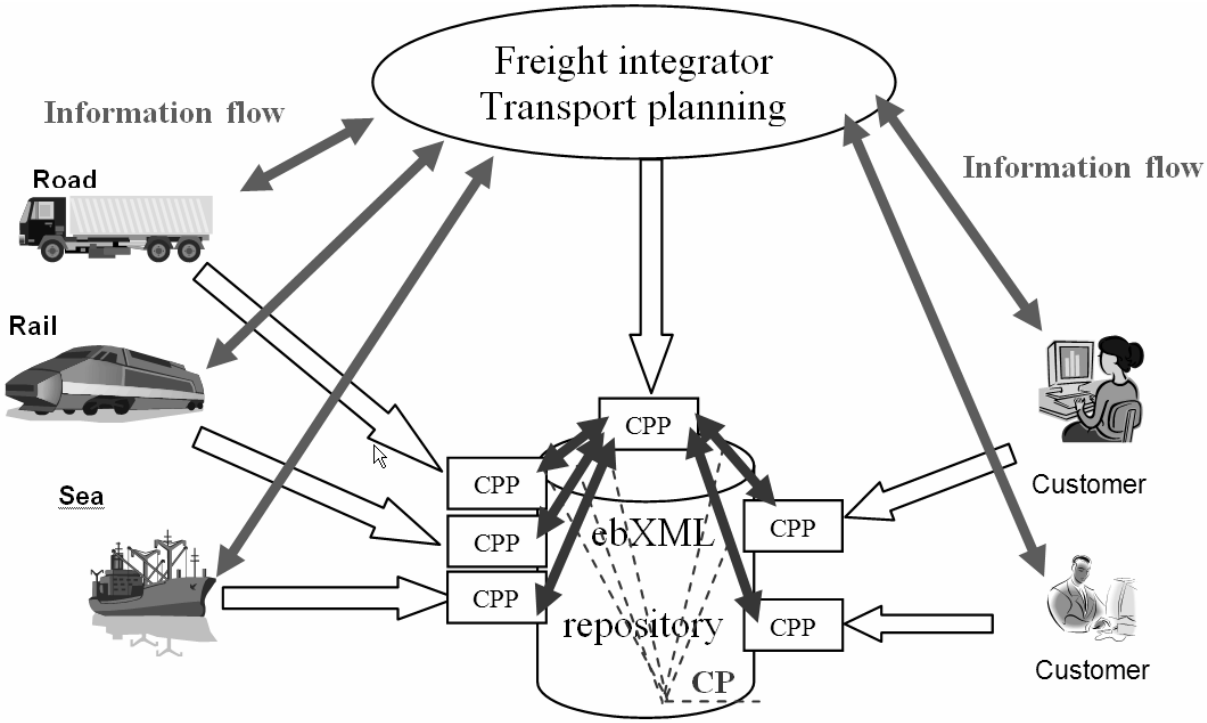

Fig. 8. Implementation of ebXML repository for multimodal transport purposes. Source: [own preparation]
Rys. 8. Implementacja repozytorium ebXML dla celów transportu multimodalnego. Źródło: opracowanie własne

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