TransBaltic

Towards an integrated transport system in the Baltic Sea Region

Review of the ICT Tools supporting green logistics developed in the INTERREG transport projects

TransBaltic – WP5.3.

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Project part-financed by the European Union (European Regional Development Fund)

Baltic Sea Region Programme 2007–2013

Instytut Logistyki i Magazynowania

Region Skåne

Table of Contents

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
Instytut Logistyki i Magazynowania
Region Skåne

Table of diagrams

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Dictionary

ACL	Amber Coast Logistic Project In Baltic Sea Region http://www.ambercoastlogistics.com/
BSR	Baltic Sea Region.
GIAI	Global Individual Asset Identifier The GIAI is the GS1 Identification Key used in a diverse range of business applications such as recording the life-cycle history of aircraft parts. the GIAI is assigned by the owner of the asset and may be bar coded using Application Identifier (8004).
GINC	Global Identification Number for Consignment The GINC is the GS1 Identification Key used to identify a logical grouping of logistics units that are assembled to be transported together under one transport document. A consignment identifies a grouping for transport purposes and must not be confused with a shipment which identifies a grouping for trade purposes. The GS1 Identification Key comprises a GS1 Global Company Prefix and the Freight Forwarder's or Carrier's transport reference using the Application Identifier (401).
GRAI	Global Returnable Asset Identifier The GRAI is the GS1 Identification Key for types of reusable package or transport equipment that are considered an asset. It is used to enable tracking as well as recording of all relevant data associated with the individual asset or asset reference. The GRAI is assigned for the life time of the asset and may be bar coded using Application Identifier (8003).
GS1	Global System One, Global standardization organization. http://www.gs1.org .
GSIN	Global Shipment Identification Number - The GSIN is the GS1 Identification Key used to identify a grouping of logistics units that comprise a shipment from one consignor to one consignee (buyer) referencing a despatch advice and/or BOL. The GS1 Identification Key is comprised of GS1 Company Prefix, Shipper Reference and Check Digit using the Application Identifier (402).
GSRN	Global Service Relation Number is the GS1 Identification Key used to identify the recipient of services in the context of a service relationship. It is used to enable access to a database entry for recording recurring services. The GSRN is normally assigned by the service provider and may be bar coded using Application Identifier (8018).
GTIN	Global Trade Item Number provides the global supply chain solution for the identification of any item involved in trade (price, order, invoice).
ICT	Information and communication technology.
ILP	Integrated Logistics Platform conception described in this document.
INIS	Intermodal Node Information System being developed within the Rail Baltica Growth Corridor Project.
LIM	Logistics Interoperability Model (LIM) Work Group. The objective of the Logistics Interoperability Model (LIM) is to gain benefits for global supply chains by increasing the business interoperability and visibility of operations. The LIM achieves this by harmonizing

	the interpretation of the business processes, as well as standardizing the structure and content of the data interchanges.
SSCC	Single Shipping Container Code, Global logistics unit identifier.
UBL	Universal Business Language – standard for electronic messages worked out by standardization organization OASIS.
UN/CEFACT	Global standardization organization of the United Nations. Develop also the standards for electronic messages in transportation.
URL	Uniform Resource Locator - is a specific character string that constitutes a reference to an Internet resource.

Executive summary

An intensive development of logistics industry may be observed for dozen years. Efficient logistics became one of the most important factors of competitiveness for each company equally to price or quality of a product. This resulted in growing demand for the ICT solutions optimizing transport and logistics activities.

This is the reason that nearly each of the transport oriented research projects implemented under INTERREG program shows an ambition to develop an ICT tool being supportive for the freight transport decision makers in different phases of transport services. Some of the projects have established umbrella co-operation in greening transport corridors in the Baltic Sea Region. One of possible cooperation areas may be the use of Information and Communication Technologies in optimizing transport and logistics performance of enterprises.

The ambition of this study is to prepare an overview report on ICT tools being built within relevant projects. in particular, we would like to:

- make description of a tool and its functionalities, including users' profile, expected bottlenecks and challenges in the implementation phase.
- define synergies between individual tools and formulate recommendations for the further steps (like research areas, pilot cases etc).

In a further part of the study a proposal of integration of the developed ICT tools on common Internet platform is submitted, realizing that it is rather distant-future vision since the tools shall prove its' usefulness and meet market acceptance first.

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REGION SKÅNE

1. Review of the ICT tools being developed in the INTERREG transport projects

1.1.TRANSBALTIC

Towards an Integrated Transport System in the Baltic Sea Region.

1.1.1. Project general information

Start date:	10. 06. 2009
End date:	09. 09. 2012
Duration:	42 months
Budget:	€ 5.489.011,00
URL:	http://www.transbaltic.eu/
Lead Partner:	Region Skåne JA Hedlunds väg 291 89 Kristianstad SE, www.skane.se

1.1.2. Project Description

The overall project objective is to provide regional level incentives for integration of transport patterns and networks in the BSR, as stipulated in the EU Strategy for the Baltic Sea region, by means of joint transport development measures and jointly implemented business concepts. TransBaltic is based on outcomes of completed transnational transport projects in the BSR + several pan-Baltic initiatives, but will structure them into one framework and upgrade by selected pilot business actions.

1.1.3. ICT Tool description

1.1.3.1. Intermodal planning and execution system LOGIT 4SEE.

Logit 4SEE™ delivers a global, proactive , multi-modal freight planning and monitoring service that offers full visibility and supply chain event management, using web based applications that are extremely simple to use, whatever the complexity of logistics process is.

1.1.3.1.1.Problem description

The objective of the ICT Tool for planning intermodal chains is to deliver to transport users the possibility to choose the best transport alternative across all possible modes by providing the cost and time calculation and thus enabling the door to door transports with the use of optimal modal solution.

Transport decision makers may be supported not only in optimal modal choice but also in executing transport services obtaining full visibility along the whole transport chain in cooperation with existing systems of particular logistics service providers during the transport process.

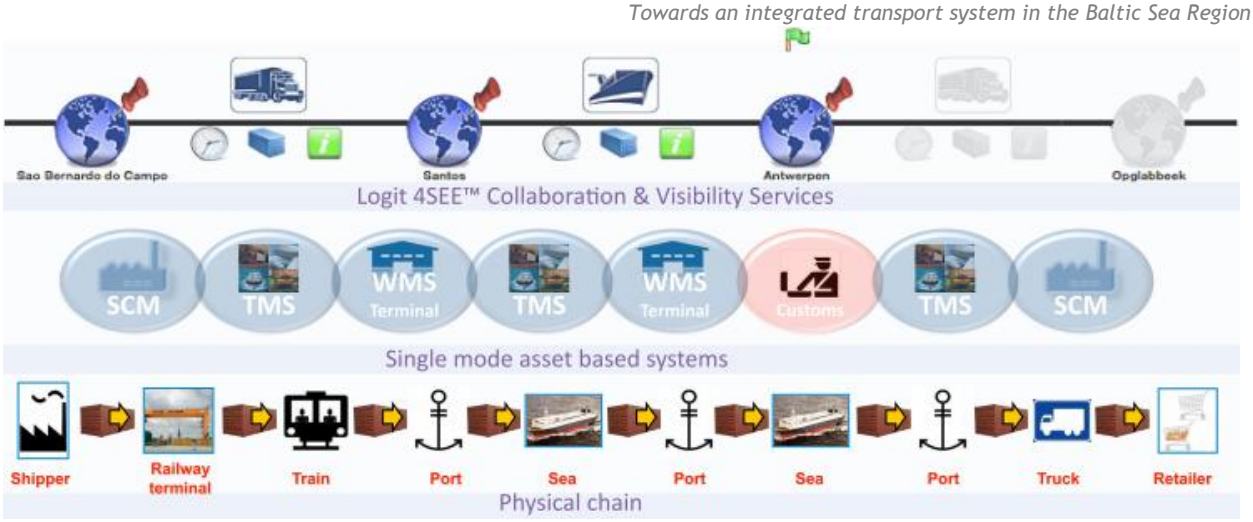

Figure 1 Visualization and collaboration with existing systems for end-to-end status
(Source: Logit 4See)

1.1.1.3.2. Functionality

The main focus of a tool is to optimization of a multimodal supply chain according to the following basic logistics processes:

- Operational Planning – selecting the optimal transport chain according to delivery time or cost criterions, negotiate final conditions of delivery with the selected service providers and booking loading surface with them
- Transport execution - after acceptance of transport order system allows to monitor transport progress. In case of deviations chain may be rescheduled
- Freight transaction completion – after accepting POD (Proof of Delivery) by a receiver there is time for possible claims settling , invoicing and payment.

Logit4See supports wide set for functionalities in two modules (planning and execution).

The following chapters provide more details of it architecture and functionality.

Specification of functionalities:

- Set up logistics services - Logistics service providers need to register their offers in the system. They can provide the data through the website user interface or using the electronic message sent from their home system. They also provide and update time schedules or duration of their transport services.
- Providing transport request - The transport requests are inquiries from customers for transport and logistics services containing transport instructions. They may be sent through an interface to

Logit4SEE system. Customers must be first registered in the system to be able to provide transport requests.

- Transport planning - The planning in Logit 4 SEE system might be generally carried out in two ways. The planning can be done automatically by the system while user only points the priorities for planning as transit time, costs or CO_2 emission. The other way is to use the predefined chain templates which are very useful for transport chain managers in planning delivery leg by leg. The last step of transport planning is booking services at the service providers.

- Transport execution and monitoring – When the actual transport starts, Logit system allows to monitor what is happening with the goods along transport chain. It allows to receive a status information about actual or estimated times of start or end of the service. It can also receive statuses from active equipment which may control temperature, humidity or seals.

- Supporting the electronic interoperability between business actors involved in multimodal transport chains using UBL electronic messages standards in transport worked out in European project Freightwise.

- Loads consolidation from different transport orders going in the same direction during the whole chain or partially.

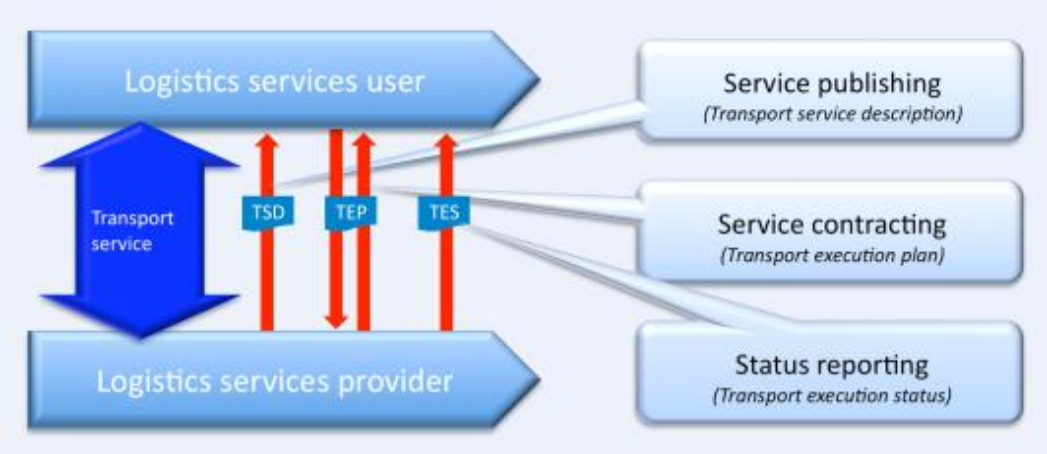

Figure 2 Logit 4SEE standard services and data exchange
(Source: Logit 4SEE)

1.1.3.1.3.Target groups

Main group of users of Logit 4SEE are **transport organizers** who plan the intermodal transport chains using own means of transport or hiring other carriers or logistics service providers in transport chain legs. The system is also supportive for **logistics service providers** who offer their services like :

- Transport

- Warehousing
- Handling in logistics Hubs and ports
- Insurance companies

Finally system is useful for **cargo owners** or **shippers** who need to order the door to door transport or want to cut their costs using alternatives routes or by consolidating goods with other shippers.

1.1.3.1.4. Benefits

From the planning point of view we have operational planning based on fulfillment options, as: lead time, costs and carbon dioxide emission. Execution of a logistics chain in a network of services may be performed according to long-term arrangements or spot contracts. System offers end-to-end visibility umbrella over existing systems and platforms, not replacing them. Other benefits:

- Transparency that shows how problems can be mitigated .
- Ease-of-use of multi-modal logistics chains.
- Collaboration & information sharing within communities.
- High throughput and turnaround capacity on terminals.
- Agile & decentralized implementations.
- Interoperability with other standards and systems (also for SMEs).
- Leverage for existing investments (AEO, ICT).
- One single service to plan and follow up multi modal logistics chains.
- Aggregation of data to cover blind spots in the chain.
- True visibility in the logistics chain, predicting the delivery time.
- Proactively reduction impact of deviations by dynamic rescheduling.
- Fast + simple implementation – no software, no training.
- Loads consolidation.
- Taking control of transport chain.
- Increased transparency & reliability.
- Reduction of lead-time and safety of stocks.
- Less disruption of production processes.
- Simplified administrative, operational & customer service handling.
- Quickly respond to deviations.
- Better tracing of damages & loss of cargo.
- Acceleration of time to cash cycle.

1.1.3.1.5. Technical description

Logit4SEE is an internet based platform in JAVA and WEB 2.0. technology able to register services or transport orders either manually by user interface and with the electronic messages .It enables internal and external data available in real-time as a service.
Data sourcing through EDI/XML, screen scraping, web-based & mobile interfaces. System uses the open Freightwise electronic messages standards (UBL version 2.1)

1.1.3.1.6. Challenges, dangers and implementation bottlenecks

Supply chains are becoming more and more global and complex. The drive for more environment-friendly, decongested and secure logistics has led to the introduction of such concepts as Co-Modality, Motorways of the Sea, Secure Trade Lanes and Green Corridors. Effective logistics and supply chain management requires sharing knowledge and information along the supply chain. In this context, efficient cooperation between actors in integrated supply chains becomes more and more important. To achieve this, the information and communication systems used for managing transport and logistics operation need to interact efficiently, share information – they must be interoperable – and the actors must be able to share that information according to their own business rules.

The analyzed system is following the idea of a Travel Planner so popular among passengers planning their private or business trips using planes, trains or buses according to current time schedules and tariffs. This system transferred to freight transport sector proves some significant shortcomings,:

- Freight transport market is much more complex comparing to passenger one. Road transport prevailing in freight transport is rarely performed according to regular schedules. Building and updating database of transport service providers and their offers is very difficult due to large number of potential locations potentially involved in transport as well as number of routes

- System is based on reference freight rates. Final actual rates may be much different. In railway and maritime sectors pricing is based on volume discounts form tariffs. Road transport in turn is sensible to any change in demand-supply relation being typical spot market.

- A negotiation module is required to make planning reliable since supply chains build with the use of reference rates may differ much from those defined with actual market rates.

1.2. SCANDRIA

1.2.1. Project general information

LOGISTICS IN THE SCANDINAVIAN – ADRIATIC CORRIDOR

Start date:	10. 06. 2009
End date:	09. 09. 2012
Duration:	42 months
Budget:	3.773.500,00
URL:	http://www.scandria.eu
Lead Partner:	Joint State Planning Department repr. the capital region Berlin-Brandenburg Lindenstraße 34a, 14467 Potsdam, DE http://gl.berlin-brandenburg.de

1.2.2. Project Description

SCANDRIA contributes to efficient transport and logistics solutions as described in the Action Plan for the EU Baltic Sea Strategy linking "the Baltic Sea to the Adriatic through a corridor involving transport infrastructure and growth of innovation poles". Reaching from the Nordic Triangle via the Öresund region, Mecklenburg-Vorpommern to the capital region Berlin-Brandenburg it complements North-South and East-West transport links as developed within the twin project SoNorA for the Central European space.

In the corridor described, SCANDRIA will reduce travel times between major cities, establish efficient and multimodal logistic chains and upgrade the attractiveness of the corridor regions for industries and services. Main objective is to increase the infrastructural efficiency for passengers and freight and to improve the accessibility of regional economic potentials. By activating new value-added chains innovative, process-optimised logistic solutions shall be developed.

The corridor is the shortest connection between the Baltic Sea and the Adriatic regions. The potentials have not yet been used completely due to a historically caused cultural, economic and political heterogeneity. SCANDRIA shall push forward European cohesion by infrastructural, regional-economic and political measures.

1.2.3. ICT Tool description

The development of software solutions was not in focus in Scandria, however there were some activities, like use of the SoNorA (South-North Axis) Tool applied for Scandria Corridor and the EcoTransIT-tool which has been optimized for Baltic Sea ferry transport in the Scandria corridor

1.2.3.1. SoNorA Tool used in Scandria.

It is web-based tool for intermodal route planning, infrastructure information and for evaluating changes of intermodal freight nodes and networks. Although the geographical focus of the project is on the south north axis between the Adriatic and Baltic Seas the IT-tool covers the area of almost whole of European countries which were not yet considered as Iceland, Russia, Belarus, Ukraine, Turkey and the Caucasian region. The IT-tool includes road , rail, inland waterway, short sea shipping, and ferry networks.

1.2.3.1.1. Problem description

The Scandria Corridor is turning into a sustainable, i. e. cost and time efficient, socially acceptable and environmentally friendly corridor, fulfilling the general criteria of a green corridor. It is the direct connection from the Adriatic Sea to Scandinavia. Using the corridor means saving time, costs, and also reducing greenhouse gas emissions. The corridor is also less congested than the routes via Western Germany which makes transport more efficient and environmentally friendly. Green logistics is very important regarding climate change. The demand for efficient transport is growing among customers and thus among logistics operators. They can benefit from using the Scandria Corridor. The project is analyzing several innovative solutions for logistics and thus – among other topics – contributing to the “greening” of the Corridor.

1.2.3.1.2.Functionality

- **Intermodal routing**: The user can choose from routes between intermodal terminals or free addresses with up to two stopover terminals. It is possible to calculate various routings of alternative intermodal logistics chains.
- **Fixed relations** - The IT-tool offers the possibility to include fixed relations in the routing process (already existing intermodal transport service offers operated by a transport operator). Result of the routing is a map and a list showing the used sections per transport mode showing main data as delivery duration, distance, energy consumption and costs.
- **Accessibility analysis**: - The tool has the function to analyze the accessibility of intermodal terminals regarding the different optimisation modes (duration, distance, energy consumption, costs).The question to be answered is: how far can one transport unit be transferred in each direction within assumed time freight rate limits using all possibilities of intermodal transport. Results are presented on a map showing the reachable area within 33 %, 67 % and 100 % of the given value. Information is supplemented by the list and map of the obtainable intermodal terminals.
- **Terminal information**: The tool provides terminal information, e. g. number of gantry cranes or reach stackers, opening hours, special goods, container storage, etc.
- **Creation of scenarios**: A user can create different scenarios by changing the networks and parameters of intermodal terminals.
- **Editing nodes (intermodal terminals)**: A user may edit parameters of network segments (e. g. lengths, velocity).as well as add or delete intermodal terminal information.
- **Sharing scenarios with other users**: One can upload files concerning the scenario (e. g. description, idea) and publish the scenario to other users.
- **Comparison of scenarios**: Users may build different scenarios of the given route and compare them automatically with default one. Results are shown as map and list.

The users of the IT-tool can be assigned into two main groups: users and scenario administrators. Users have the possibility to use the basic functions “intermodal routing” and “accessibility analysis” as well as comparing scenarios if they are invited to a scenario by a scenario administrator. Scenario administrators are able to create scenarios and edit nodes and networks as well publish the scenario to other users, additionally to the rights of the users. The following figure shows the functions of the IT-tool and groups that can use them.

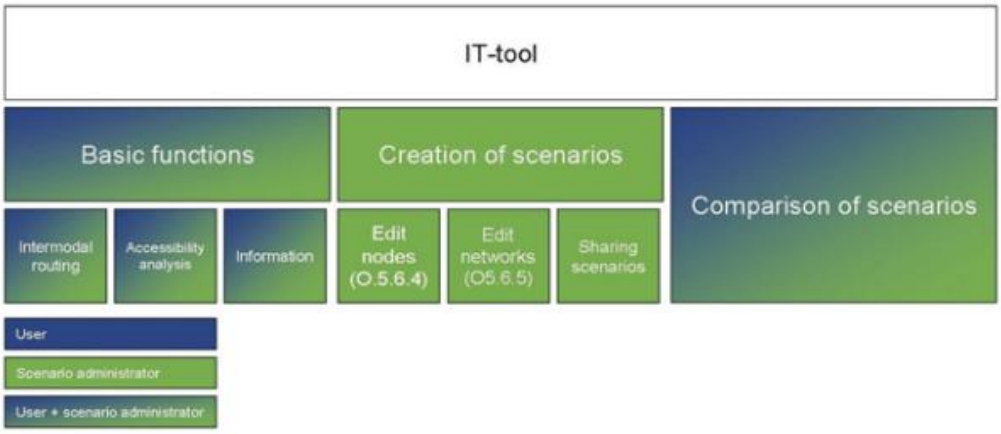

Figure 3 Access to the system functions dependent on an user role
(source : SoNorA Project)

1.2.3.1.3.Target groups

- Transport companies.
- Multimodal transport organizers in Scandria Corridor.
- Ports.
- Logistics Hubs operators.
- Shippers and cargo owners.

1.2.3.1.4. Benefits

The SoNorA tools gives a comprehensive information about terminal which is important for transport companies, transport organizers during the transport planning process. An important information about number of gantry cranes or reach-stackers, opening hours, special goods, container storage, etc. The Intermodal planning users are able to minimize time, distance, costs and energy consumptions. With this tools users can also evaluate nodes and transport network By changing the networks and parameters of the nodes (intermodal terminals) user can create scenarios.

1.3.EAST WEST TRANSPORT CORRIDOR II

1.3.1. Project general information

EAST WEST TRANSPORT CORRIDOR II

Start date:	10. 06. 2009
End date:	09. 09. 2012
Duration:	42 months
Budget:	5.912.400,00
URL:	www.ewtc2.eu
Lead Partner:	Region Blekinge Ronnebygatan 2, 371 32 Karlskrona, www.regionblekinge.se

1.3.2. Project Description

The project East West Transport Corridor II (EWTCII) aims at developing a green corridor connecting northern Europe with the Far East and Russia with particular focus on the Baltic Sea Region with the objective to strengthen and improve the efficiency of the transport system in the corridor. The conditions of carrying out transports vary between different countries. In order to assure high levels of transport safety and quality, Europe has developed mutual rules regarding driving and rest time regulations that professional drivers need to obey. However, truck drivers' needs for breaks and rests, as well as other needs of facilities to fulfil their responsibilities, are today met with different levels of quality.

The objective is also to identify suitable places for intelligent parking for trucks and to specify a system to make reservations for parking places in advance.

1.3.3. ICT Tool description

1.3.3.1. PARKING INFORMATION SYSTEM

It is an ITS system for parking information in the East - West corridor. The system develops pre- and on-trip ITS solutions with location information about the truck parking areas. It is the responsibility of the public authorities to develop basic digital information about the location of truck parking areas and add pre-trip information to ferries and truck stops about suitable truck stops on the continued journey.

1.3.3.1.1. Problem description

The Idea to start work on Parking Information System was caused by existing conditions of carrying out transports that are very different in different countries. In order to assure high levels of transport safety and quality the network of parking facilities along the corridor shall be available. The system was focused on the Batlic Sea part of the transport corridor from north Europe to Russia and further on to the Far East and was developed to enhance seamless traffic flows in the corridor.

The most important challenge in this case is not the technical solutions which would be able provide all necessary information for transport companies, drivers and all other stakeholders but to built the parking facilities where they don't exist. Parking areas owners and operators would be interested in sharing information about their facilities and services offered because this can bring more trucks to their parking area. The biggest challenges :

- Truck stops in a close proximity to larger cities and ports are often overcrowded with increasing road crime rates.
- Drivers are missing information about where suitable truck stops are located.
- Low capacity of truck parking along the corridor especially in Lithuania.
- Implementation of unified guidelines along the whole corridor, especially needed for Lithuania.
- Development of digital basic maps and databases with location information for pre-trip information solutions.

- Development of on-trip ITS solutions with information about location and occupancy information, especially around main nodes.
- Make deeper analysis and focus on the nodes to create new truck parking areas to support the drivers. This should be done in cooperation with the industry.
- One more important thing is to standardized the way of information exchange between the Parking Information System and parking areas as well as onboard and smartphones applications.

1.3.3.1.2. Functionality

ICT Solutions for the Corridor need to develop pre- and on-trip ITS solutions with location information about the truck parking areas.

- **Parking facilities information** - Information about local facilities for truck parking in countries around Baltic Sea.

- **Interoperability between national systems -** Connections to the national systems of parking information facilities.

- **Parking reservations -** Reservations of parking places by transport service providers.

- **Trip planning information -** Pre-trip information to ferries and truck stops about suitable truck stops on the continued journey.

- **Information for mobile devices -** Information provided on-line that could be used by on-board computers and smartphones .

- **Stops planning -** Truck stops planning**.**

- **Provision of possibility for automatic rescheduling –** if there is a delay the On-Board Equipment (OBE) realises that the estimated arrival time is not to be achieved and based on the current traffic conditions the system automatically rebooks the parking place.

1.3.3.1.3 Target groups

The parking information system has been designed for all stakeholders who are concerned with security and/or service truck parking. This includes the following parties:

- Drivers.
- Transport companies.
- Shippers.
- Truck parking areas owners / operators.
- Insurers.
- Policy makers at national and international levels.

1.3.3.1.4. Benefits

A 50 percent growth of freight transport is predicted within Europe until 2020. The enforcement of driving and the resting times for truck drivers is important for traffic safety since driver fatigue on long-distance trips causes many heavy accidents. Also, the experience tells us that when driver find parking areas overcrowded, he rather decides to park on dangerous and not designated areas than to exceed his allowed driving time. This sometimes leads to a lack of security for the drivers, the vehicles respectively for the goods. For example, goods of a value of 8,4 Billion Euros are each year stolen from European trucks. Therefore, an increased deployment of Intelligent Truck Parking is demanded within Europe. Intelligent Truck Parking has for example been identified as a core service within EasyWay. If truck drivers had better access to parking place availabilities as well as a reservation system, these problems could be mitigated. Let's specify expected benefits:

- Providing drivers with update information about the location of the truck stops and occupancy information around the main nodes.
- More secure Truck Parking Areas in the Corridor.
- More accurate and optimized planning for transport companies.
- Truck parking reservations.
- More parking spaces on the same area thanks to advanced information system trucks might arranged in rows depending on departure times. More space is utilized.

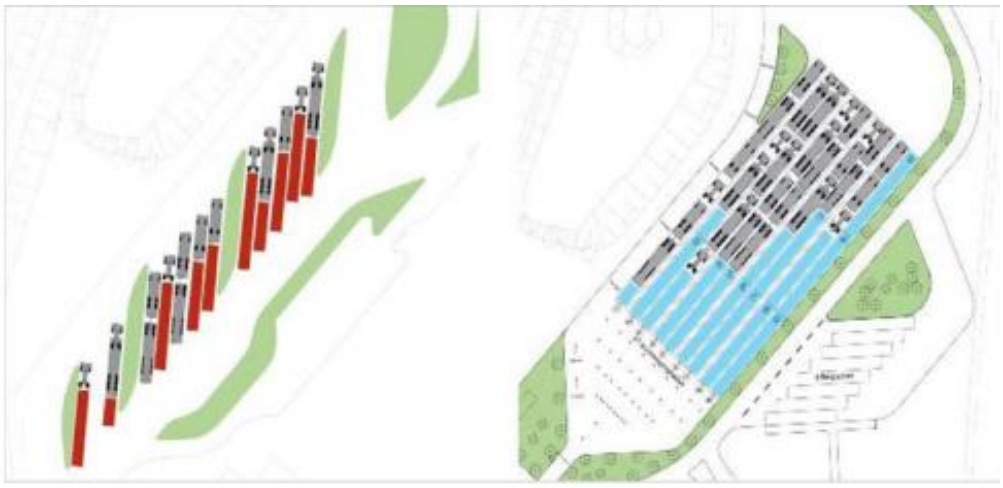

Figure 4 Arranging trucks in rows depending on departure Times utilizes more space
(Source: EWTC)

1.3.3.1.5. Technical description

The tool is an Internet based online solution which is able to get information from local (regional, national) parking information systems about the facilities, services offered, the actual occupation and security level. The online solutions should be able to provide this information to all the interested parties in

standardized way. This information would also be available for on-board equipment and smartphone applications for drivers.

1.3.3.1.6. Challenges, dangers and implementation bottlenecks

Important challenge would be to standardize the way of information exchange between the Parking Information System and parking areas as well as on-board and smartphones applications. Local parking systems in different regions and countries would have to speak the same language as far as electronic communication is concerned - to send and receive messages about free spaces, reservations and parking facilities.

What is required - development of digital basic maps and databases with location information for pre-trip information solutions and on-trip ITS solutions with information about location and occupancy information, especially around main nodes.

1.3.3.2. INFORMATION BROKER SYSTEM

An innovative IT-based "Information Broker System" for transport and traffic information which will increase efficiency and reduce the environmental impact. A basis for a green and efficient transport corridor is that users have access to the updated information. The information broker is based on an information hub that will make it easier for the actors in the transport corridor to exchange transport and traffic information.

1.3.3.2.1.Problem description

The transport system in the East-West corridor could potentially be much more efficient if the available information is used.

There is a need for information sharing between the actors of the transport process be it on the current traffic situation, weather or port access control e.t.c. As the volume of exchanged data and the number of connections grows, so does the complexity of the model resulting in difficulties in systems integration and availability. The problem is not the lack of information but the process of retrieving it.

Intermodal transportation is a typical example of a situation involving many actors where, due to lack of system interoperability or high integration costs, manual procedures have to be used. This significantly increases the risk of errors and slows down the information flow.

The Information Broker comprises a technical system architecture as well as a business model. A main activity is the implementation of a test case service called 'On-Time' that enables tracking of cargo carriers in combination with traffic information for road, rail and sea. The concept aims at providing solutions for the surface transport industry by offering simple means to reduce costs and problems associated with accessing and exchanging relevant information, e.g. traffic intensity and conditions, logistics services, weather conditions, custom clearance, e-payment, etc., for stakeholders in a transport corridor (consigners and consignees, transport and traffic operators, public administrations, etc.). The Information Broker is envisaged as a commercial organisation operating a multi-purpose real time Information Exchange. It is fundamentally a generic solution providing the possibility to access and

exchange information regardless of intended use, application type, and transport mode. Primarily, it enables access to data sources and services, but neither collects data nor develops services.

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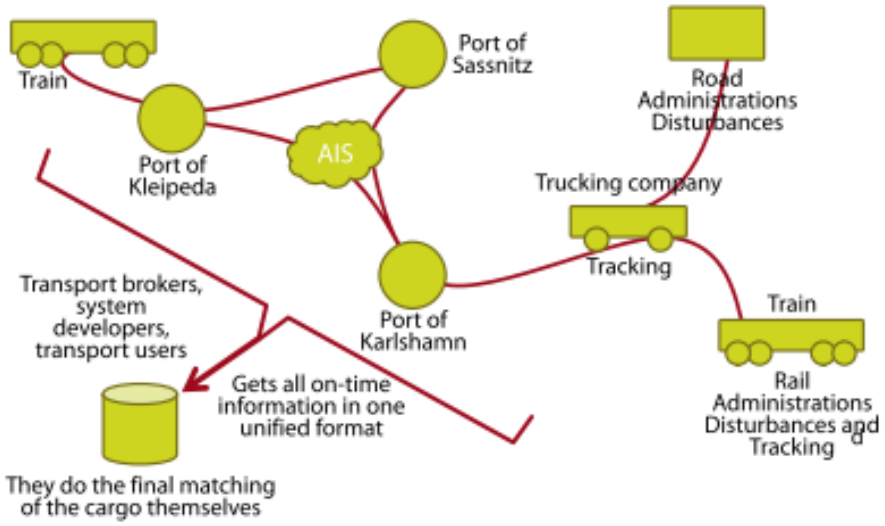


Figure 5 Enabling a more accurate ETA for cargo owners
(Source: EWTC)

1.3.3.2.2. Functionality

Infor24 is a digital and neutral information broker with the focus to gather and convey business-critical real-time data. Info24's innovative products and services makes it possible for companies and organizations to conveniently make information sources, such as external databases and physical resources connected to the system, available to employees. This facilitates the development and operation of real-time applications based on the information sources. Info24's clients include traffic administrations and authorities as well as private actors.

Information Broker System is a common information exchange, facilitating and promoting efficient information sharing for the benefit of the stakeholders in the EWTC and the environment. The main functions of the system are as follows:

- **On time tracking of cargo, carriers** - 'On-Time' will allow a much better computation of the estimated time of arrival of cargo in the East West Transport Corridor thereby giving shippers and consignees alike increased possibilities to mitigate the effects of any disturbances or delay.

- **Traffic information** - Traffic information for Road, Rail and Sea.

- **Technical solution for exchanging information** - Relevant Information about : traffic intensity and conditions, logistics services, weather conditions, custom clearance, e-payment, etc., for stakeholders in a transport corridor (consigners and consignees, transport and traffic operators, public administrations, etc.).

- **Multi-purpose (Generic)** - The Information Broker System should manage any type of data source, and not be technically constrained for use with specific application types or transport modes. It should also be possible to create connections between the Information Broker System and other information exchanges (e.g. Scandria and Freightwise).

- **Scalable** - The Information Broker System should be fully scalable. High volumes of real-time traffic between data sources and applications/user should not constitute any architectural problems.

- **Extendable** - The Information Broker System structure should support extensions of functionality (i.e. additional components and tools)

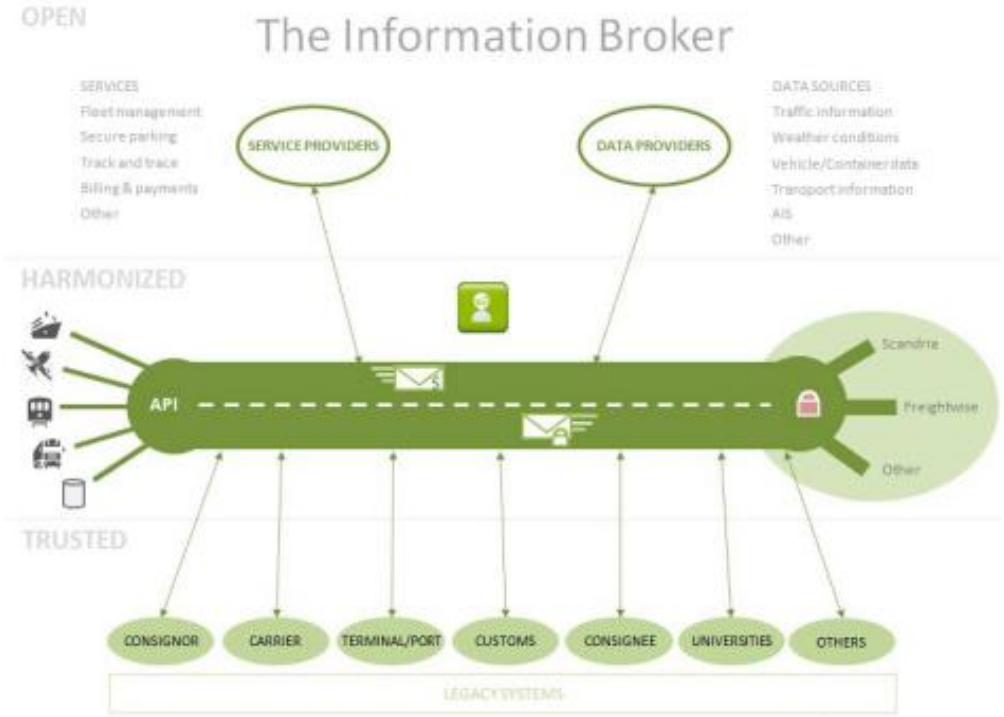


Figure 6 The Information Broker.
(Source EWTCII Report 1v1.2)

All interaction with the Information Broker is based on the following three roles:

- **Service Provider** is an organization providing software applications to EWTC stakeholders using the Information Broker as a platform.

- **Data Provider** is an organization providing data and information from databases and/or physical resources (e.g. vehicles and containers).

- **User** is an organization using services and/or data sources available via the Information Broker.

A stakeholder can have one or more of these roles, even all of them, at the same time. So, a stakeholder could use applications and data sources (User), at the same time give other stakeholders access to some of the stakeholder's own data sources (Data Provider), and let them use applications that the stakeholder has developed (Service Provider).

Stakeholders that have developed their own Information Brokers, digital communities of some kind, or are providers of digital applications and standards that use other information exchanges other than the Information Broker, could potentially be integrated with the Information Broker. Examples of such stakeholders are Scandria and Freightwise.

1.3.3.2.3. Target groups

Stakeholders of East West Transport Corridor mostly cargo owners who described the most important issues – 15 distinguish challenges for an efficient transport system.

- Cargo owners.
- Transport companies.
- Ports and logistics Hubs.
- Region environment and Society more efficient transport is greener for natural environment.

1.3.3.2.4. Benefits

The benefits are improvements in 15 challenges which were described by stakeholders of EWTC these are:

- Increase load factor for carriers.
- Replacement of manual waybills.
- Intelligent truck parking.
- Reduced waiting times for loading and unloading.
- Notification of disturbances.
- Increased use of AIS data
- Increased us of Weather data.
- Adequate transport related information.
- Facilitate Intermodal transports.
- Facilitate small cargo shipments by rail and sea.
- Increased capacity utilization of cargo carriers.
- Efficient management of oversized cargo.
- Intelligent Port Access Control.
- Hub to Hub Data Exchange.
- Tracking of goods.

1.3.3.2.5. Technical description

The technical architecture of the Information is characterized by the following high-level values: open and standardized, secure, multi-purpose, enable real-time visibility of data, scalable and extendable. It should use a loosely coupled interface with open, standardized APIs based on common standards (e.g.

web services and XML) in order to facilitate data access and application development – especially for small and medium sized companies with limited IT resources.

To achieve interoperability between different IT systems, the Information Broker System should use a loosely coupled interface with open, standardized APIs based on common standards. This strategy facilitates access to data sources and services available via the Information Broker System, and lowers development costs and time-to-market for application development. This also means that the Information Broker system will not interfere with the actors' existing IT systems. The strategy includes the following recommendations:

- Data sources and services should be called via the RESTful web services – a common and easily applicable API for application development and data access.
- eXtensible Markup Language (XML) should be the default format for data delivery. XML is common and its use wide-spread.
- Each web service should have an XML service description which describes the service to users and application developers.
- All data passing between data sources and applications/users should be converted into a generic message format and be delivered in the data delivery format preferred by the receiver (XML should be the default option).

1.3.3.2.6. System architecture

The Information Broker System should support system management, technical support and testing. The following is a tentative list of functionality that should be included:

- User management.
- System performance monitoring.
- Central security management.
- Data source management and device configuration.
- Central repository (data sources, users and other system objects).
- Search functionality (users, data sources, etc).

The other potential functionality could include for example multiple languages support, data history and traceability, event management, billing and payment, contractual agreements management, content management, a support ticket system, and basic track and trace functionality for physical devices.

Any tool provided as part of the Information Broker System that has a graphical user interface should use web standards and support the most common web browsers to facilitate the use among the stakeholders.

1.3.3.2.7. Challenges, dangers and implementation bottlenecks

The important challenge in implementation of the Information Broker System is general lack of information and harmonized digital communication between actors. In addition, small and medium sized enterprises rarely have the resources needed to meet the start-up costs for the technology required to adjust the information flow to the Broker Information System standards. Another danger comes from the very generic type of the system which perhaps will need a large number of customizations.

1.4. BALTRAD

1.4.1.Project general information

AN ADVANCED WEATHER RADAR NETWORK FOR THE BALTIC SEA REGION

- Start date: 25. 10. 2008
- End date: 24. 01. 2012
- Duration: 42 months
- Budget: 2.133.500,00
- URL: www.baltrad.eu
- Lead Partner: Sveriges Meteorologiska och Hydrologiska Institut
  Folkborgsvägen 1, 60176 Norrköping, SE

1.4.2. Project Description

The BALTRAD project's overall objective is to create a sustainable weather radar network for the Baltic Sea Region, operating in real-time, with high-quality data, and with demonstrated value to forecasters and decision-makers. Achieving this goal requires harmonization of practices such as creating common communications protocols, shared database technologies, and a common production framework. The technology developed by and for BALTRAD will be proposed as the standard for exchanging weather radar data in the World Meteorological Organization Information System. The objective of the task is also to identify suitable places for intelligent parking places for trucks and to specify a system to make reservations for parking places in advance.

1.4.3. ICT Tools

1.4.3.1. ICT-NETWORK ARCHITECTURE WEATHER RADAR

Radar network in the Baltic Sea Region facilitating the exchange, production, and use of real-time weather radar data. Delivers accurate, timely, and high resolution information about rain, snow, hail and wind to help save lives, infrastructure and property, attract local and regional bodies to use the forecast to improve their services for their citizens. The Baltrad system now includes functionality for data exchange, managing a catalogue of data, and scheduling of various activities. Data processing is being organized through a concept which we refer to as the "toolbox". In practice, the project is collecting contributed data processing algorithms and making them available in a harmonized way. This means that all projects

partners, and inevitably all organizations that run this system, have access to the same collection of algorithms and may use them in ways that suit them best. The toolbox itself is designed to facilitate the application of the various algorithms, but the use of the algorithms themselves is decided locally in each country. This is the power of the decentralized Baltrad concept: everyone has the same toolbox with the same tools in it, but the use of the tools is not dictated centrally.

1.4.3.1.1. Problem description

Accurate precipitation information supports weather forecasts, and helps to optimize activities in several sectors of the economy. About 90% of natural disasters are meteorological or hydrological in origin. Due to various sources of hazards different meteorological data may be useful for the civil protection services. Weather radar data enables the users to real time monitoring of the meteorological fields, decision-making aid fast and reliable, warning, etc. Moreover, using radar data a forecaster can determine the nature of any existing weather systems and follow their movement and evolution. Customized weather warning system can improve services such as road- and railway management,.

1.4.3.1.2. Functionality

The Baltrad system includes functionality for data exchange, managing a catalogue of data, and scheduling of various activities. Data processing is being organized through a concept which we refer to as the "toolbox". In practice, the project is collecting contributed data processing algorithms and making them available in a harmonized way. This means that all projects partners, and inevitably all organizations that run our system, have access to the same collection of algorithms and may use them in ways that suit them best. The toolbox itself is designed to facilitate the application of the various algorithms, but the use of the algorithms themselves is decided locally in each country. This is the power of the decentralized Baltrad concept: everyone has the same toolbox with the same tools in it, but the use of the tools is not dictated centrally.

- **Accurate weather information** - delivers accurate, timely, and high resolution information about rain, snow, hail and wind to help save lives.
- **Data exchange between catalogues** - data exchange, managing a catalogue of data, and scheduling of various activities.
- **Toolbox** - toolbox to functions and algorithms which might customized by customer himself for his own needs.

1.4.3.1.3. Target groups

- **Local authorities**. Weather hazard phenomena monitoring and warnings are main goal of this kind of institutions. GIS-based real-time systems supply by weather radar data are developed for such usage. The systems are designed in such way that work with the system is simple and based on user's intuition.
- **Rescue and emergency services as well as transport companies** – in case of warnings of disasters e,g,;

- **Fire and chemical disasters**. Meteorological data are essential for forest fire risk from coming into being to development of the fire and chemical disasters. Climatologically and meteorological factors are by far those that have an overwhelming importance on the events occurrence. Software models are employed.

- **Air pollution forecasting**. Meteorology is one of the major factors contributing to air-pollution episodes. Improvements in the meteorological observing systems, data assimilation and modelling lead to operational forecasting of air quality in Europe.

- **Floods**. The local authorities are interested in output from rainfall-runoff model. However, especially in the cases of flash floods, overall information about present and future precipitations is expected.

1.4.3.1.4. Benefits

As real time tool supporting weather forecasting and decision-making processes, the Baltrad offers customized tools to integrate the real-time weather forecasts to improve decision making systems and processes. Main sectors which can benefit from applying the Baltrad tool's services are:

- Flash flooding, storm water and urban hydrology warning system.
- Road and railway management, control and protection.
- Local rescue services.
- Management of airports and air-traffic control.
- Management of nuclear and chemical accidents.
- Hydropower industry.
- Agriculture.

Baltrad develops pilot applications for some of these areas to demonstrate added value for end users.

1.4.3.1.5. Technical description

Web based interface - Configuration, maintenance, operations, and display tasks shall all be managed through an interface that is made available through a standard web browser. This interface shall work with at least Firefox and Microsoft Internet Explorer browsers. Visualization of data and products shall also be obtained through web-based technology with the use of Google Maps.

1.4.3.1.6. Challenges, dangers and implementation bottlenecks

One of the challenges for BALTRAD is to develop customised applications that can improve services such as road- and railway management, forecast of flash flooding in urban areas, local rescue services and management of nuclear- and chemical accidents.

Standardization of information exchange between local weather radar systems in different countries and many systems working is one of the priority in the implementation.

1.5. Rail Baltica Growth Corridor

RAIL BALTICA GROWTH CORRIDOR

1.5.1. Project general information

Start date:	11. 06. 2010
End date:	10. 09. 2013
Duration:	42 months
Budget:	3.587.090,00
URL:	www.rbgc.eu
Lead Partner:	City of Helsinki, Pohjoisesplanadi 15-17, FI-00170 HELSINKI, FI

1.5.2. Project Description

Rail Baltica Growth Corridor aims at fostering the competitiveness of the Eastern BSR by improving the accessibility through Rail Baltica in line with green growth corridor principles. Transport connections in Eastern BSR are inadequate due to low interoperability and weak cooperation along the Rail Baltica route, which is a major obstacle to mobility of freight and passengers. Project facilitates prerequisites to fully exploit the Region's potential in economic growth as focal gateway for global trade flows between Asia and Europe, as emphasized in the EU Strategy for BSR, as well as development of well-functioning logistics and transport networks in North-South direction. It includes transnational cooperative actions to support logistics service providers and to promote multimodal connections and sustainable passenger and freight traffic, as called for in the Action Plan of the Strategy.

RBGC is building on cooperation of cities and regional authorities ensuring both relevance of the Project and ability to implement it. Project consists of research modules (WP3-4) and concrete transnational Pilot activities (WP5-6) where the gathered knowledge is applied. Research know-how is ensured with 5 educational and research related Partner organizations. Strong political support is secured with Ministries of Transport and geographical coverage with Russian associated organizations. Transport and logistics knowledge is enhanced with 5 railway operators and 3 logistics associations.

The concrete objective is to form a transnational platform in BSR for joint development and cooperative activities of public and private stakeholders interested in improvement of RB railway line. The aim is to bring together national, city and regional authorities, service providers, transport operators, interest groups, universities and other relevant actors in the field of transport.

RBGC facilitates the high-level regional and transnational Roundtable discussions (WP7) on the Rail Baltica development among political decision-makers, regional and local authorities and business.

Based on in-depth and extensive analysis on relevant stakeholders, networks and decision making processes in public and private transport (service) sector (WP3-4), the aim is to build a stakeholder partnership model to be tested by Pilots of transnational integrated travel information system (WP5) and increased co-operability of logistics centers (WP6). Pilots create cooperation and service models to be utilized during the following phases of improvement/introduction of Rail Baltica. Gradually, Project supports

the transformation of Rail Baltica from isolated transportation zones towards one integrated macro-region even widening the viewpoint from single transport corridors to extensive multimodal transport networks.

1.5.3. ICT Tools

1.5.3.1. Intermodal Node Information System

The internet based intermodal node information system offers users from business, politics and public administration sectors a comprehensive overview of the access to the railway system via transshipment points.

System provides with the following information:

- The main operating company for each operational transshipment point.
- Information about the five public terminals for intermodal transport, located along the Rail Baltica and designated for closer co-operation.
- Additional information regarding the side operators.
- Information on non-operational transshipment points.
- The map supporting the search for certain transshipment points.
- Technical and geographical information.
- Link to a Google-map, link to the operator, Link to the regional administration.

1.5.3.1.1.Problem description

Main reason to develop the INIS system was the road situation in the countries of Rail Baltica Growth Corridor.

The main reason to develop the INIS system was position of the transport sector in the countries of Rail Baltica Growth Corridor. i.e. - need for increase transport accessibility of Poland and the Baltic states taking use of the railway infrastructure along Via Baltica requiring however serious investments in container terminals and logistics centres – facing significant increase of volumes in intra-regional trade e,g, mainly between Germany and Finland.

To provide information about logistics hubs – transshipments points The Ministry of Infrastructure and Agriculture Brandenburg (MIL) and the IPG GmbH developed an dedicated internet portal.

1.5.3.1.2. Functionality

The internet based intermodal node information system search the information about logistics hub in a given region with support of Google maps. The users may query the systems with the geographical criteria and also with requirements criteria for logistics hub.

- **Searching mechanism** - The main operating company for each operational transshipment point, information about the five public terminals for intermodal transport, additional information regarding the side operators, information on non-operational transshipment points.

- **Map visualization** - The map supports to search for certain transshipment points.

- **Transshipment points** – information scope : technical and geographical information, link to a Google-map , link to the operator, link to the regional administration .

- Other:
  - Collection of transshipment points data along the Rail Baltica.
  - Display of the transshipment points data on Google maps or regional systems.
  - Internet portal available in English, Russian, Polish and German (suggestion).
  - Connection with each national database.
    Result: e.g. Polish Logistic Service Supplier can search information in Polish about multimodal terminals for his transport from Germany to Finland
  - Searching mechanism enabling finding market information concerning transshipment points along the Rail Baltica.
  - The map will support an user in search for transshipment points.

1.5.3.1.3. Target groups

Intermodal Node information system has been built for the transport companies, transport organizers, multimodal transport organizers who need the information about the multimodal nodes in the region.

1.5.3.1.4. Benefits

The internet based intermodal node information system offers users coming from economy, politics and administration sectors a comprehensive overview of the access to the railway system via transshipment points
Important goals of the system are:

- Strengthening of rail freight traffic,
- Presentation of access points to the railway system and
- Provision of detailed information for the individual transshipment points in friendly way (information in German, Polish, Russian and English)

1.5.3.1.5. Technical description

The tool is an Internet portal with database search engine of logistics hubs in the region. At the moment available only in German language. There are plans to extended also to other languages like English, Polish and Russian.

1.5.3.1.6. Challenges, dangers and implementation bottlenecks

The biggest challenge for implementation of the INIS system would be the standardized description of logistics nodes and sharing this information among interested companies. The most important is that the database has to be updated and data should have a good quality. There is a question who will be responsible for this database, will logistics nods update the information by themselves using an user interface for them or the administrator or operator of the INIS platform will do that.

1.5.3.2. Multimodal International Travel Planner

The system provides information from a network of existing local, regional and national travel information systems which are interlinked with technical interfaces. Moreover a traveler may retrieve information in his mother tongue so the travelling around Europe becomes simpler. The following steps are planned to be taken during the project duration:

- Ferry and rail information services will be integrated into EU-Spirit. Therefore, a technical update of the EU-Spirit system infrastructure will be done to define the interfaces between different transport modes, especially in the area outside of the current EU-Spirit network

- Transnational pilot Berlin-Poznan-Warsaw: feasibility study for a future Poznan travel planner and the implementation of all necessary functionalities and interfaces for integrating the Poznan travel planner into EU-Spirit. Improve the functionalities of the Warsaw travel planner to serve as travel planner in EU-Spirit

- The extension of the integrated travel information systems to the whole Rail Baltica region will be explored by implementing feasibility studies investigating on how to connect the missing regions of Helsinki and the Baltic States to the integrated travel information system EU-Spirit.

To put it differently: there is not a special single travel planner for the Baltic Sea Region. There are several travel planners which are connected with each other. Between these different local systems there is a central component which technically coordinates the journey request of the customers. Besides the local/regional/national systems there is additionally a central long-distance time table data server. This long-distance server will be used every time a journey is required between two regions which are not neighboring ones. To bridge the distance between the starting and destination locations the long-distance server will provide Europe wide train and flight connections.

Within the RBGC project the long-distance server will be enhanced: ferry connections for the Baltic Sea region will be available so that all connected systems will be able to calculate journeys across the Baltic Sea.

1.5.3.2.1. Problem description

The goal of Rail Baltica Growth Corridor (RBGC) is to establish an accessible integrated multimodal pan-European travel information system. Passengers should be able to find all the relevant information for an individual cross border door-to-door journey on their local information website. For this RBGC uses the EU-Spirit technology to connect the existing travel planners in the Baltic Sea Region.

RBGC aims at improving the accessibility of Baltic Sea Region by introducing an integrated door-to-door information service in terms of long-distance and local public transport, covering multimodal (road, sea, rail and air) time table information.

The system is innovative and inexpensive. The innovative EU-Spirit technology enables access and combination of several travel planning systems from different service providers very inexpensively. A task for the future is to establish simple interfaces between local and regional (covering suburban trains, trams, busses) and long distance information services (trains, ferries and airlines) even further.

The future belongs to real time data systems. This means more and reliable information for passengers during a trip. The use of real time data allows reporting of disturbance messages or exact departure and arrival times. With the help of appropriate users portal a passenger will be free to choose alternatives and to save time.

The South Swedish public transport authority, Skanetrafiken (Malmö region), and the Danish national journey planner, Rejseplanen, were the first that integrated real time data into the EU-Spirit network. The Oresund Bridge connects two countries and two regions so closely that it is melting two regions into a single economic area. It could only grow together because of the cross-border travel option. Denmark and Sweden marked the commencement of cross-border timetables in the EU-Spirit system. The availability of cross-border information including real-time data caused a clear increase of quality in public transport services for passengers between Denmark and Sweden. The number of passengers has increased ever since.

1.5.3.2.2. Functionality

The simple set up enables local information systems to interlink with all partners of the network. The following innovations are now available for all passengers and information system providers:

- International passenger travel planner.
- All information are available internationally.
- Local, regional and national websites will be extended.
- Costumers do not need to change their tested website.
- Fast, simple and inexpensive integration of new travel planning systems.
- Limited maintenance effort.

1.5.3.2.3. Target groups

The users of International Travel Planner are:

- Passengers.
- Travel agencies.
- Passenger transport companies.
- Local travel information systems.

1.5.3.2.4. Benefits

In times of rapidly increasing touristic traffic a traveller is getting access to wide range of valuable information about time schedules and tariffs enabling precise travel planning time wise and pricewise.

The simple set up of the EU-Spirit system enables local information systems to interlink with all partners of the network. EU-Spirit is still expanding the coverage of existing systems.

1.5.3.2.5. Technical description

Multimodal International Travel Planner is a web-based solution with internet portal for passengers and travel offices with electronic interfaces to the national databases of passengers connections on rail, buses and ships.

1.5.3.2.6. Challenges, dangers and implementation bottlenecks

In this ICT tool the most important challenge is to connect an existing national or regional travel planners from different countries. Standardized schedules and transport services description have to be created for easy sharing with International Travel Planner. Not only sharing but also prepare for booking and payment transactions in the near future.

1.6. North East Cargo Link II

1.6.1. Project general information

Start date:	11. 06. 2010
End date:	10. 09. 2013
Duration:	42 months
Budget:	2.696.320,00
URL:	www.midnordictc.net
Lead Partner:	Länsstyrelsen i Västernorrlands län, Nybrogatan 15, SE-871 86 Härnösand, SE

1.6.2. Project Description

North East Cargo Link II —project aims at developing and promoting the East-Mest Midnordic Green Transport Corridor as a cost-effective and environmentally friendly transport route. We aim to show the possibilities, potential and benefits of the Corridor to business life, decision makers and other related actors. NECL II -project has delivered statements for national infrastructure authorities. The first statement was done after a study tour in Finland and indicates following:

- It would be to the benefit of Finland as a whole if common development actions were to be directed to promoting both national and international transportation and to adopting the supportive European quality systems. By this means, new permanent employment opportunities would arise and the operational conditions of export companies in Finland would be improved.

- Funding must be allocated for implementation of the basic rehabilitation of the Seinäjoki-Kaskinen railway starting from 2012. Deepening the port channel of Kaskinen is part of this work, and it ensures the conditions for the transportation of new streams of goods from the port.

- Parikkala-Syväoro's border-crossing station must promptly be given the status of a permanent international facility of this kind. This will enable it to fully serve the passenger and freight traffic traversing the border between Finland and Russia.

The second, made by Midnordic Committee after a joint east-west communication seminar in Norway, demands better infrastructure in order to improve competitiveness in the Midnordic region. The importance of improvements is highlighted by the forthcoming sulphur directive, which will change the transportation routes of the Baltic Region.

1.6.3. ICT tool

1.6.3.1. Logistic ICT solutions for transport matching

Logistic ICT -solution for transport matching. Development of a ICT portal in work package 5 of NECL II includes transforming an existing ICT system prototype into a fully operating transport matching system. Working in the daily operations at freight managers and logistics centers, for instance ports and decreasing

the big volume of empty or partially loaded transports of today. The importance of its further development has been pointed out by several cargo owners and transport operators. The system will be connected to the logistics centers data handling systems.

A pilot tests will be an attempt of implementation of a system using real time data and being extension of the existing modules. The development work will be done in close cooperation between experts in ICT, external consultants and potential users representatives of ports , transport operators and cargo owners.

The attention will be also paid to risk-factors, in other words, the system will make it possible to handle different types of risk and uncertainties in the optimization module and be able to perform correct weighting of alternatives.

1.6.3.1.1. Problem description

The general idea of the Midnordic Green Transport Corridor was the design an ICT solution which considers not only optimisation by cost and time factors but first the environment pollution. The existing system of intermodal transport planning and execution do not support optimizing transport by CO_2 emissions.

1.6.3.1.2. Functionality

- Choice between alternative transport routes.
- Comparison of alternative transport routes.
- Possibility to optimize routes by cost, time, CO2 emission.
- Multi-criteria optimization.

1.6.3.1.3. Target groups

The target groups are : transport operators in NECLA (North East Cargo Link Alliance) and the stakeholders of this transport corridor, ports, chamber of commerce in the area.

1.6.3.1.4. Benefits

Like in other tools for optimisation of transport and intermodal door-to-door connections, time and cost savings are main criterions. But it is increasingly important for the societies, regions, local and global authorities to be able to optimise transport by lowering CO_2 emissions. If this could a measureable value the authorities could provide some kind of concessions or tax relief for the companies which use the "green" option.

1.6.3.1.5. Technical description

Web based solution for planning intermodal transport chains.

1.6.3.1.6. Challenges, dangers and implementation bottlenecks

The general challenges are :

- Standardization in information sharing between logistics service providers and customers,
- Transport monitoring - cooperation with track and trace platforms , providing status information by logistics providers.
- Make CO_2 emission optimization attractive among freight, as they focus today entirely on costs and on-time delivery.
- Find companies for pilot implementation.

2. Comparative analysis of the ICT tools' functionalities

In this chapter we would like to compare functionalities of the ICT tools defining synergies , differences as well as important issues not covered so far.

2.1 Routes planning.

Routes planning allows to define logistics nodes, logistics services of different logistics service providers. Using these information a transport manager is able to plan transport routes based on those services , defining transport corridors, transport chain templates. During the planning process a transport manager is able to create a detail plan for transport chain with given time of departing and arriving particular legs of the chain. He may use electronic communication channels to book loading space with transport service providers. Electronic communication require common language being clear-cut and understandable for every stakeholder e.g. Common Framework – comprehensive information system built within EU financed project called " Freightwise "

Functionality of routes planning may be found in the following ICT tools developed in projects around the Baltic Sea.:

- Transport Matching system of NECL II – ICT portal is developed for optimisation freight transport in the corridor with free access for companies, public authorities or private persons. Based on real market data allowing optimisation of transport chains including CO_2 emission.
- Logti 4 See from Transbaltic project – Intermodal transport chain planning, executing and monitoring with focus on electronic interoperability between actors.
- SoNorA tool for intermodal route planning, infrastructure information and for evaluating changes of intermodal freight nodes and networks.

The intermodal transport chains planning is the common main functionality of all those ICT Tools however some of them present specific focus:

- Comprehensive handling of whole transport process from planning, negotiating and ordering up to service execution control, invoicing and payment (LogiT4SEE).
- The use of electronic communication with open standards, (Information Broker System , LogIT4SEE).
- Interoperability with other systems like systems used for tracking and tracing of goods or means of transport in different transport modes rail, maritime, inland water, air and road. (LogIT4SEE).

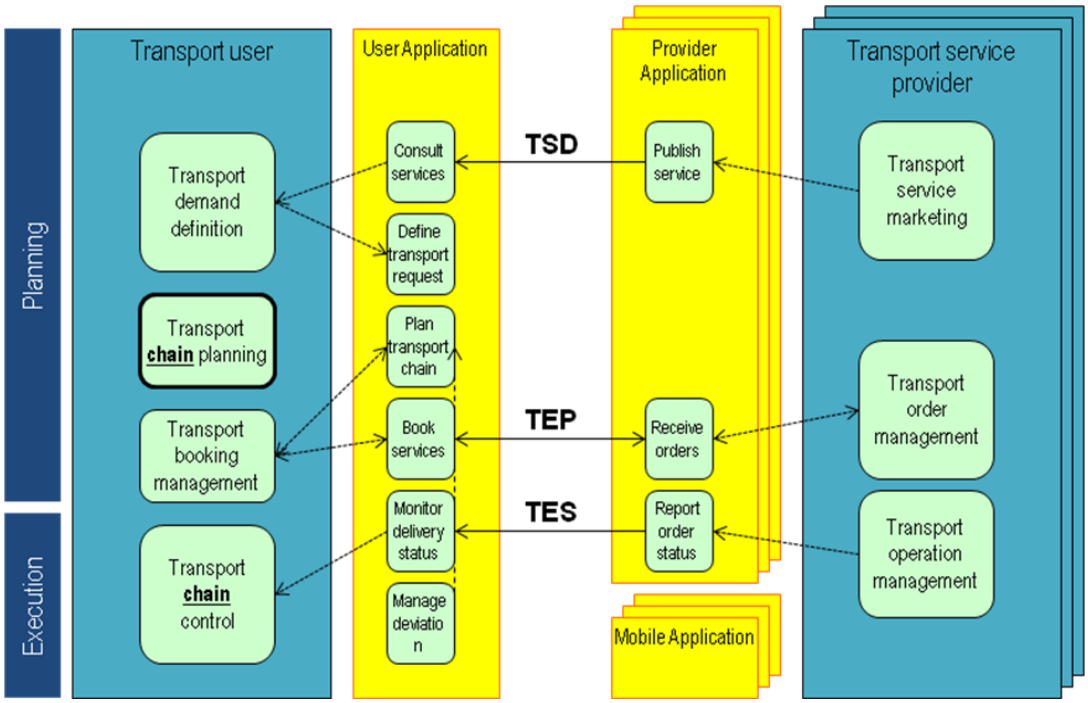


Figure 7 Transport planning process in Logit 4See

(Source Logit 4See).

Summary

Majority of the ICT tools being developed within the INTERREG transport projects are focused on optimisation of modal choice basing on a travel planner concept. The main idea of attracting sustainable modes of transport is supply of market information concerning time schedules and freight rates enabling easy comparisons of a competitive power of different modes.
More advanced applications have to allow purchase of transport services what requires modules for negotiating final conditions of the freight transport contract.
The next level of application maturity is transport management modules requiring communication between companies co-operating along supply chains. In the figure below the level of synergies between the tools are presented.
There are two ICT tools focused on different areas supplementing supply chain managers with information concerning vacant parking places, significant events affecting traffic including weather reports.

Fuctionality	TranBaltic	Scandria/Sonora	EWTC II	RBGC		NECL II
	Logit4SEE	Intermodal route planning tool	Information Broker System	Intermodal Nodes Information System	International Multimodal Travel Planner	Transport Matchung System
Intermodal route planning	X	X		X	X	X
Transport optimization	X	X	X	X	X	X
Loads consolidation	X					
Cost calculation	X	X			X	X
CO? emmissions calculation						X
Contract negotiations						
Purchase of transport services	X					X
Electronic data interchange	X		X			X
Transport monitoring	X		X			
e-payments	X					

Figure 8 Synergies in functionalities of the ICT systems for intermodal supply chains planning
(ILiM own study)

2.2. Open architecture

In today's world dominated by Internet and mobile Technologies it is very important that architecture of an internet based ICT tool should have an ability to integrate with other existing or developed tools.
Open architecture of the systems used in different projects gives such possibilities of integration however all depends on standards of interoperability. Using the same standards of transmission protocols like Web is equally important as using the same semantic standards of the business messages and documents required for trade and transport transactions. During the whole transport process there are interactions between business actors involved in the process between customer (the goods owner, shipper) and transport organizer or logistics service provider. Besides interactions between business actors there are interactions between other systems or dedicated logistics platforms like rail, maritime, air or inland water tracing systems, transport exchange (typical for spot markets) and many others.

Important issue with data interchanging is use a common standards of messages and identifiers that can be easily recognized during process. Some of the systems have this ability to integrate like:

- Broker Information System which is built as kind of framework for exchanging information.
- Parking information system basing on concept of integrated network of local parking systems.
- Weather Radar from the Baltrad project being connected to the national weather systems.
- Node Information System basing on sharing the information provided by network of nodes.
- Logit4SEE is an attractive platform thanks to developed system of exchange the information between different business actors engaged in the transport chain.

2.3. Interfaces (Standardization)

If we compare single and multimodal transport processes - we discover that the number of necessary operation, connection, information exchange is growing very high in case of multimodal transport. Figure 9, 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.

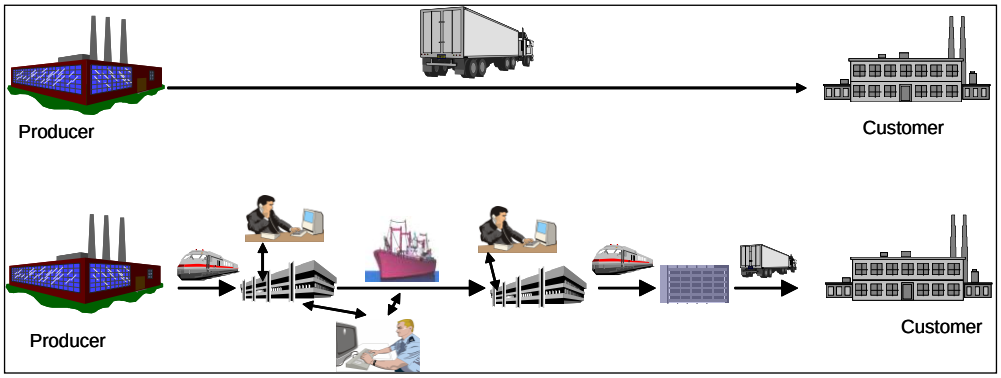
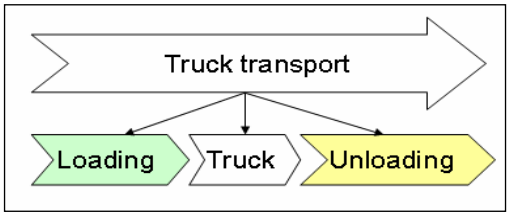


Figure 9 Single and multimodal transport chain. Source
(Logit D2D system)

In the multimodal chain different logistics services are 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 of transportation itself (air, sea, rail), warehousing, loading and unloading as well as different Value Added logistics services.



In this simple chain provider services included are:

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

Figure 10 Simple transport chain
(Source: ILiM own study)

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

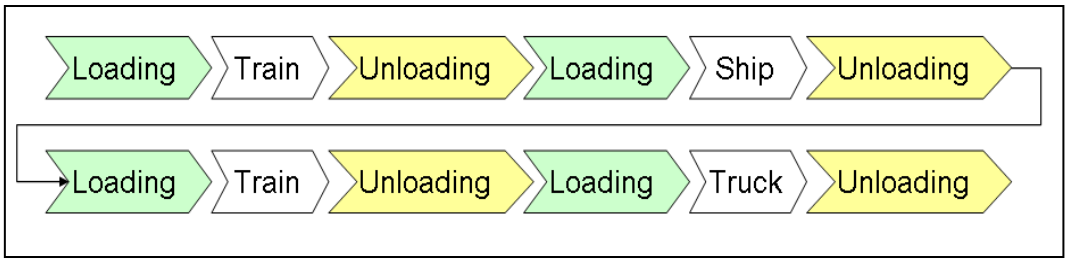


Figure 11 Multimodal transport chain
(Source: ILiM own study)

Information exchange between business actors in intermodal transport chains if we consider the interoperability with more ICT tools like tracking and tracing systems for goods and shipments, traffic and weather systems logistics nodes information system transport optimization the green transport calculators there would be much more connections on this figure. That is way we need a standard messages for all of this transactions.

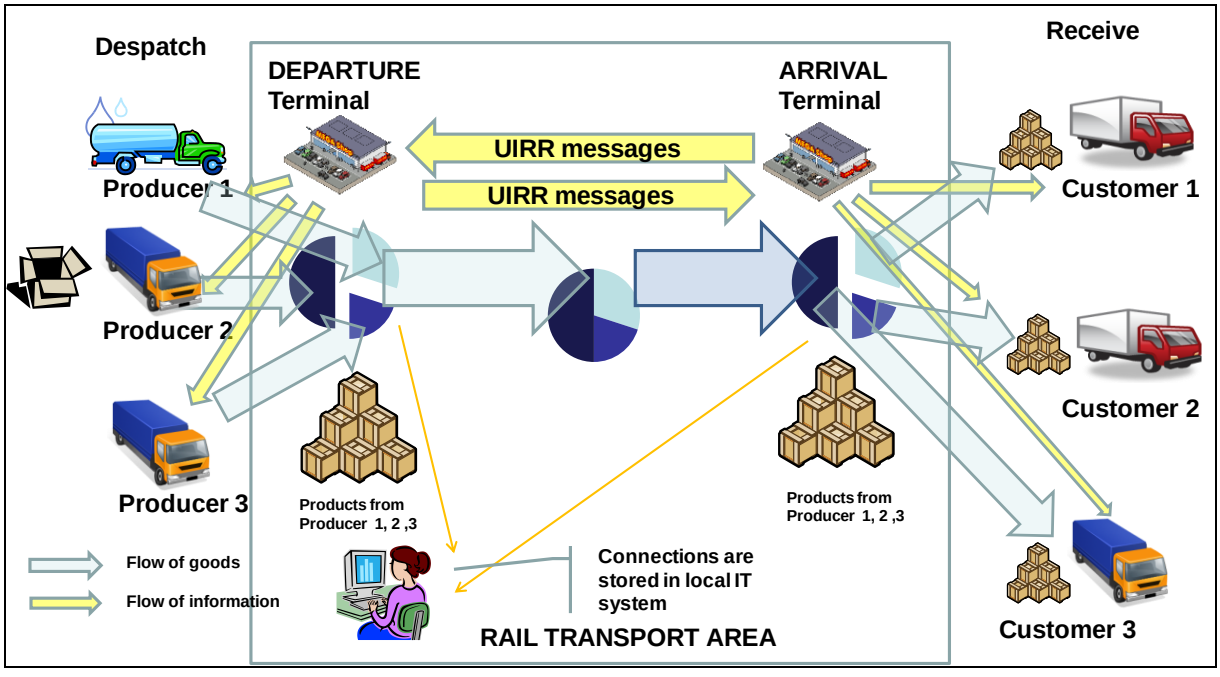


Figure 12 Data flow and shipment consolidation in multimodal transport
(Source: UIRR – International Union of Combined Road Rail Transport Companies)

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.

In such complex environment like those for planning and executing multimodal transports it is very important to use as much as possible of 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 standardizing organizations like UN/CEFACT, GS1 or OASIS/UBL. Already a lot of work has been done and lot 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.

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

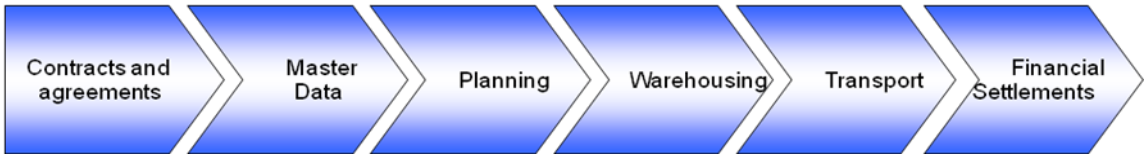


Figure 13 LIM interoperability processes
(Source: LIM)

Based on that, another set of messages has been developed for transport management process . Transport Management is the process that controls the transport operations from instruction until completion. With respect to transport modes the LIM model aims to be mode independent so it can be applied to road, rail, ocean and air. Focus is on continental transport modes. For road transport this includes Full Truck Load (FTL) transport, Less Than Truck Load (LTL) transport and Parcel distribution.

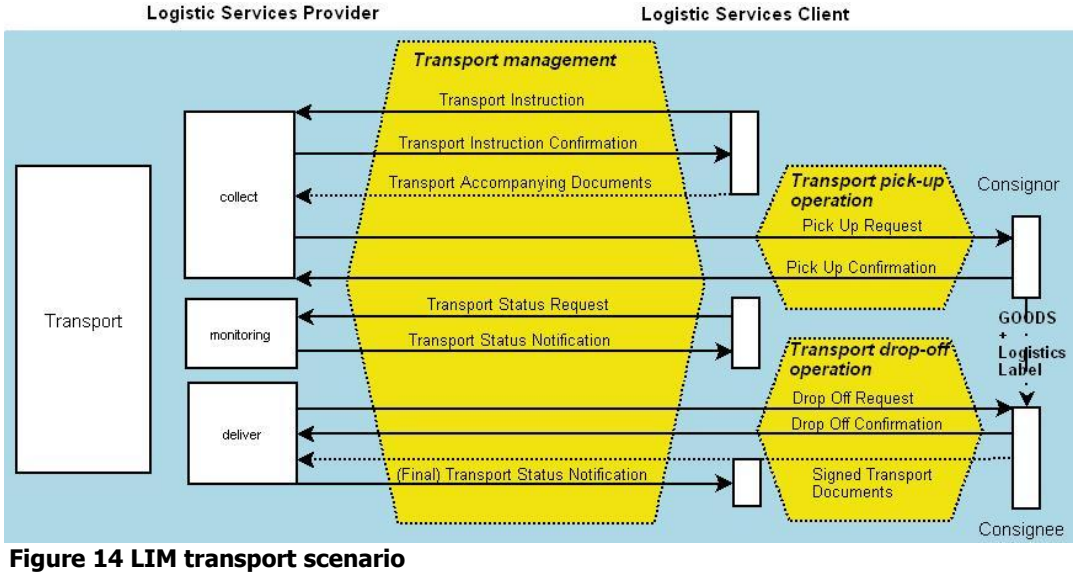


Figure 14 LIM transport scenario
(Source: GS1/LIM report)

Agreed standards of transport messages:

Transport Instruction: The process to arrange the transport of the goods between parties including the delivery of goods, whether by request or as response.

Transport Status: The process to exchange the actual state of the transport between parties involved in the transport, whether by request or as a response.

Transport Pick Up Operations: The process to arrange the loading of the goods, whether by request or as response.
Transport Drop Off Operations The process to arrange the unloading of the goods, whether by request or as response.

In the OASIS there is a transportation subcommittee which developed following standards for electronic documents :

Forwarding Instruction – document used by any party who gives instruction for the transportation services required for a consignment of goods to any party who is contracted to provide transportation services.

Bill of lading – document stating the details of the transportation, charges and terms, and conditions under which transportation service is provided.

Waybill – A document which is the same as Bill of lading but is not negotiable and cannot be assigned to a third party.

Packing List – A document stating the details of how goods are packed.

Freight Invoice – A document stating the charges incurred for the logistics services.

Certificate of Origin – A document required by foreign governments declaring that goods in a particular international shipment are of a certain origin.

Application Response – A documents responding to the Seller to indicate the application of Certification of Origin and also the result of Certification of Origin query.

There are also standards for transportation messages of EDIFACT (UN/CEFACT) and representative of that in GS1 EANCOM with use of GS1 identifiers. Because of long time that these standards are present on the market their implementation is widespread and should not be forgotten when we want to integrate with existing systems.

These standards will be responsible for correct communication between logistics services providers and customers. For the cooperative systems there is still a challenge to work on some standards and framework for different type of information exchanged between ICT tools.

Besides the standards for electronic messages exchanged in transport process, identifiers are also very important. Here are some examples of identifiers standards used in transport and logistics most common are the GS1 identifiers which are widely used around the world. These are: SSCC for load units identification, GTIN for trade unit, GLN for locations, GSIN and GINC for shipment and consignment, GRAI for returnable packages, GIAI for tracing the equipments or parts used in transport, GSRN for services. There are also other important identifiers besides GS1 widely used around the world these are container international identification (standard DIN EN ISO 6346), in rail transport there is a wagon, coach identifier approved by the International Union of Railways (*Union internationale des chemins de fer* or *UIC*) and is used in a similar way to that used for the locomotives and multiple units. This standards are included in TAF-TSI (TSI Telematics Applications for Transport of Goods).

Using of global identifiers in whole transport chain make it possible to track and trace the logistics unit, shipments, consignments, transport equipments or means of transport on every stage of the chain.

2.4. Transport optimisation

One of the main tasks of a Baltic Sea integrated platform will be solving complex decision problems with the use of multi-objective optimization methods taking into account interest of all participants. The optimization is required while deciding on internal processes as well as in cooperation with other partners. This elaboration will focus on presenting the common or divergent interests or priorities of different categories of freight market actors, areas for multi-objective optimization as well as optimization drivers.
In general there are 3 main categories on the B2B freight market active:

- **Transport User (Customers) -** This category includes organizations, companies or individuals which are ordering transport service and paying freight according to contract price base. Cargo ownership is neutral for our considerations.

- **Transport Service Provider -** There are a lot of different companies in this category performing transport and auxiliary activities (e.g. warehousing) such as: transport operators, logistic service providers (so called 3PL), integrators of logistics services (so called 4PL), freight forwarders, freight carriers, The category is not homogenous. The Transport User may place and order with a Transport Service Provider who sub-contracts this order in whole or partially to another Transport Service Provider. There is specific relation between Transport Service Organizer and Transport Service Executor partially similar to the relation between Transport User and Transport Service Provider.

  For the purpose of this analysis the category of transport service providers will be divided into 2 sub-categories:
  - Transport Service Organizer.
  - Transport Service Executor.

- **Transport Nodes Operators -** There is a specific category of companies participating in transport chain operating transport nodes such as: ports, intermodal terminals and logistics centres. This category is especially important for co-modality.

The following types of interrelations between the different stakeholders will be analyzed:

- Transport User – Transport Service Provider.
- Transport Service Organizer – Transport Service Executor (sub-contracting).
- Transport Service Provider – Transport Service Provider (cooperation).
- Transport User – Transport User (cooperation).
- Transport User – Transport Node Operator.
- Transport Service Provider – Transport Node Operator.

2.4.1. Relations between the B2B freight market stakeholders

2.4.1.1. Relations between Transport User and Transport Service Provider

- **Freight transaction preparation phase**
  - Definition of time and size of shipment.
  - Choice of mode of transport.
  - Definition of transport route.
  - Contact to potential transport service provider.
  - Definition of transport execution plan.
  - Definition of freight transaction conditions.
  - Acceptance of transport execution plan and freight transaction conditions.
- **Freight transaction execution phase**
  - Resources allocation.
  - Transport service execution control.
    - Freight transaction completion (1) by the Transport Service Provider (invoice).
    - Freight transaction completion (2) by the Transport User (invoice audit and payment).

2.4.1.2. Transport Service Organizer – Transport Service Executor (sub-contracting)

Subcontracting is common practise on the freight market being sometimes multileveled. In this business model the role of Transport User is replaced by Transport Service Organizer who orders a transport service with sub-contractor (Transport Service Executor) on behalf of his client (Transport User) and for his account. The scope of authority may vary. Transport Organizer is usually entrusted by Transport User with

defined transportation task as far as volume, loading and unloading places and dates as well as mode of transport are concerned. Basic decisions relating to size and time of transport and modal choice are Transport User domain. All remaining decisions on ordering party side are transferred from Transport User to Transport Service Organizer.

In this business model a new area of contradictory interest appears. While Transport Service Provider tries to negotiate with Transport User the maximal high freight rate and short payment conditions but when becoming a Transport User the Organizer tries to negotiate with Transport Service Executor the lowest freight rate and longest payment time possible

2.4.1.3. Transport Service Provider – Transport Service Provider (co-operation)

Some small Transport Service Providers build consortiums and alliances to reduce operational expenses, rationalize logistics operations (e.g. reduce empty vehicles running) and to offer to the market a wider range of the logistics services in order to have wider geographical coverage. There are few spheres of optimization of the common activity of consortium members. Some of them are internal as e.g. common assets and material purchasing to receive quantitative discounts. As far as operational issues are concerned consortium members are interested mostly in consolidation of volumes and arranging backloads. Drawing up the transport execution plan for their clients consortium members may take advantage of its bigger volume to obtain better vehicles' loading surface utilization.

2.4.1.4. Transport User - Transport User (co-operation)

For Transport Users prices depend on volume ordered with Transport Service Providers. This dependence is equally visible in massive transports requiring plenty trucks, containers or carriages as in distribution of small shipments (groupage or parcel networks). Thus, some Transport Users consolidate volumes to receive significant freight discounts. The positive effect of consolidation depends on many factors as route, delivery time, cargo neutrality (to be transported on the same vehicle) e.t.c. It is clear common interest of all participants consolidating their volumes. A source of potential conflict could be the rules of dividing freight discount.

2.4.1.5. Transport Service Provider – Transport Node Operator

Transport Service Providers often cooperate with Transport Node Operators (represented by sea or river ports, container terminals or logistics centers). Transport Service Providers are expecting from Transport Node Operators quick and accurate handling services from cargo receipt from the previous transport operator to make cargo available for the next transport operator. Whereas the Transport Node Operators expect good connectivity of the node with the national and international transport networks it makes the node more attractive for the users increasing handled volumes.

2.4.1.6. Transport User – Transport Node Operator

Transport Users are interested in fluent work of Transport Nodes for strategic purposes while planning their transport chains. Operationally they are rather seldom bounded due to the common fact of outsourcing of transport activities to Transport Service Providers.

Summary

In the B2B freight market there are several areas for multi-objective optimization. Some of them refer to companies internal decisions the other concern companies cooperating in supply chains.

Multi-criteria optimization which is now available in presented tools supporting intermodal transportation is time, costs , CO_2 emission in some cases internal or external rank of KPI of the logistics services or logistics service providers. This complex optimization might be achieved thanks to integration of the ICT services from different ICT tools and the standardization process between them.

2.5. Real time data information systems.

ICT tools can improve the transport planning or executing process by delivering important information in real time. This can be information about delays, accidents, traffic jams, bad weather conditions, not accurate conditions of storing or transportation. The real time information systems may be divided to the following categories:

1) Transport execution supporting systems.
2) Transport planning additional information systems .

In the first group there are systems which are able to deliver information about shipments, consignments, logistics units, transport equipments or transport means. These information might be provided by logistics service providers on the particular stages of transport chain, or by consignees or consignors. It can be either provided manually in web platforms dedicated to it or send with electronic messages from their home systems. The information which are connected with tracking or monitoring might be send by the electronic devices on container, trucks and other transport equipment. These information can be send in standardized way to the transport monitoring systems.

In the second group of systems there are information systems about the actual situation of logistics nodes, ports, parking and weather reports which may influence the planning of transport chains. In this document we mentioned a few systems which delivers or support real time data interchange in transportation; Parking Information System of EWTC2 project and Broker Information System as an infrastructure for delivering real time data , BALTIC Weather Report System from Baltrad project is giving information about actual weather in the regions, Node Information System from RBGC delivers information important during planning or re-planning transport chains about the possible logistics nodes.

Summary

As far as the technical solutions are concerned we had a very different level of technical descriptions of different ICT tools because some of them are still in the early stage of development and the documentation is not very detail. However what we can see is that all of the solutions are internet applications available through the internet web browsers. When we have a data exchange then technologically it is supported by Web-services. However only a few ICT tools descriptions mention about the standardization necessity

although in such tools and projects interoperability and information sharing is crucial. The mobile application besides the ideas of the Parking Information Systems were not mentioned either.

Technical description	TranBaltic	Scandria/Sonora	EWTC II	RBGC		NECL II
	Logit4SEE	Intermodal route planning tool	Information Broker System	Intermodal Nodes Information System	International Multimodal Travel Planner	Transport Matchung System
Web-browser application	X	X	X	X	X	X
Web-services for communication	X		X			
Standardised electronic communication system	X		X			
EDI between transport chain stakeholders	X		X			
Mobile communication available			X			
Multi-language	X			X	X	

Figure 15 Synergies in technical solutions of the ICT systems for intermodal supply chains planning
(ILiM own study)

2.6. Not supported areas

We found the following issues which are import but not yet supported by any of the analyzed ICT tools:

- The majority of the ICT tools supporting planning of intermodal transport focuses on technical and organizational aspects of planning. Real business is performed in much complex environment. In the systems being analysed more attention has to be devoted to negotiations phase of transport contract conditions as well as invoicing and payment services are hardly mentioned.

- The other not supported area is return of logistics assets mostly containers. Large number of containers have immediately to be returned to the ship owners just after delivery is completed. It involves big traffic of empty containers. The module supplying information of empties that may be used for the next loadings may reduce the cost of containerized traffic and thus make transport more greener.
- Applications of Transport Planner kind base on the transport orders bookings based on the carriers' tariffs gathered in the tool database. In freight transport however freight rates are flexible being mainly spot ones in road transport or subject to volume discounts in case of tariffs used by railway and maritime carriers. Thus negotiation modules have to be integrated in the supply chain planning tools.

3. Integrated ICT logistics system – feasibility analysis

The objective of this deliverable is verifying possibility to integrate the developed ICT tools in selected transport projects into one tool of extended functionality thus better adjusted to the optimisation needs of transport decision makers. Due to information delivered by different tools a transport planner is able to

utilize capacities more efficiently as well as choose more optimized routes what contributes in changing logistics into more "greener". In parallel to economic criterions stakeholders may include environmental ones in their planning process by taking use of CO_2 emissions calculator. The integration process will require establishing a regional cluster for coordination.

3.1. ICT tools supporting creating green corridors.

The described ICT tools can help directly or indirectly in better utilization of transport means and transport equipment in the whole region. Interoperability of tools exchanging information is another step forward in multimodal transport integration in the Baltic Sea Region.

Implementation of planning tools supporting modal choice may contribute in greening transport corridors in the Baltic Sea Region. Some of the tools support green logistics directly by calculating CO_2 emissions by given mode on given routes (as in NECLII project). Other improve it indirectly by optimizing transport solutions leading to reduction of cost by choosing cheaper modes or due to consolidation of loads.
Exchange of experience may lead to delivery of comprehensive tool being helpful both for companies and public authorities.

3.2. Integration chances and challenges

3.2.1. Chances

Integrated transportation system which can be used by big market players in logistics and trade as well as small and micro companies will bring a cheaper and more environmental friendly transport.

The integrated system will offer:

- Increased accessibility of intermodal freight transport solutions. For logistic services clients it will be easier to find door-to-door co-modal solutions matching their requirements and to compare solutions on environmental as well as logistics performance attributes. For logistic services providers it will be easier to be included into intermodal services offers.

- Increased synchronization of logistics processes and utilization of logistic resources, by integrating individual service providers' plans into an optimal plan covering the entire logistics chain.

- Increased reliability of intermodal services and adaptability of logistics solutions to changing circumstances, by dynamically updating all related plans to reflect all relevant changes and exceptions.

- Reduced costs and effort required for managing complex transport chains, by delegating process portions to autonomous self-regulating objects like, e.g., planning agents and intelligent cargo units.

- There is a chance to start use the standardized electronic waybill all along transport chains where it will be valid around the world. Standardize the customs information which also could be process

electronically. Thanks the smart phones and onboard computers technology and application which are connected to the integrated logistics platform this could be used also by small carriers and companies.

3.2.2. Bottlenecks and Threats

All of those wishes are imposing the additional requirements for already developed or being developed software to have an open architecture to be able integrate and exchange information with other systems.

The standardization bodies like GS1, UBL, EDIFACT did not recognize the needs of transportation process with new objects like logistics internet platforms for managing transport chains. Some of existing standards like transport instructions, statuses, dispatch advice may be adopted and some still need to be developed and standardized like logistics service description, logistics node description and many others. The standardization associations have solutions which are used in some regions or branches but there are not much experience in multimodal transport sector. There is problem with choice of standards covering most of requirements.

There is similar problem with identifiers. GS1 has own identifiers for transport equipment, transport means, containers, shipments, consignments or locations, simultaneously to the other standardisation organizations that cover the same area with their own standards. Too many of them do not help in integration process. Unification of standards is required or creating converters to translate communication of enterprises using different sets of standards.

The integrated platform has to be user friendly in obtaining valuable market information about intermodal solutions. We have to realize that stakeholders of the road transport sector have for many years access to very efficient electronic tools of transport exchange type as meeting point of customers' transport needs and carriers' transport possibilities resulting in immediate spot transport contracts. Thus market acceptance of the proposed tool is one of the main challenges.

Low deployment ratio of the ICT tools being developed within research projects is another negative effect. Strategic decisions on continuation of the most promising implementations are required.

3.3. Integration architecture

In this chapter we would like to present a vision of integrated, interoperable logistics solutions with lower environmental impact and competitive performance. This can be achieved through an open architecture allowing integration of existing ICT Tools where door-to-door logistic services are planned and executed cooperatively by the involved business actors. This includes the logistic service clients (shippers or manufacturers) and the logistic service providers covering the different modes of transport as well as handling, forwarding, planning, integration activities, warehousing, and value adding services. The integrated infrastructure will support the use of current and emerging technologies. This is an attempt to combine the few of the ICT tools developed in Baltic Sea region in one working interoperable model.

The idea of interoperability has to be considered at two levels:

- Interoperability between actors cooperating within supply chain.
- Interoperability between different ICT systems.

3.3.1. Interoperability between actors cooperating within supply chain

In the processes of delivery planning, preparation of transport contract and it's execution several interactions happen between the following actors:

- Logistics service provider.
- Logistics service client
- Transport coordinator
- Logistics platform manager

While a role of the two first target groups are clear. the difference between transport coordinator and logistics platform manager has to be explained.

Transport coordinator is using the logistics platform for building supply chains and plan deliveries for transport users in direct contact with carriers being chosen for providing their services on agreed sections of a route. In the complex freight transport market, the transport coordinator may be freight forwarder or 4thPL transport integrator organizing services for their customers as well as shipper directly managing his deliveries by himself. This is how the dedicated and customizes versions of application may be used by the concrete companies in their supply chain management.
Logistics platform manager – managing logistic platform being contact place for transport service users and providers. He is neutral businesswise, focusing on platform maintenance, building and updating data bases, providing information of services, networks, time schedules, KPI and rankings.
The figure below shows data exchange between actors involved in transport process.

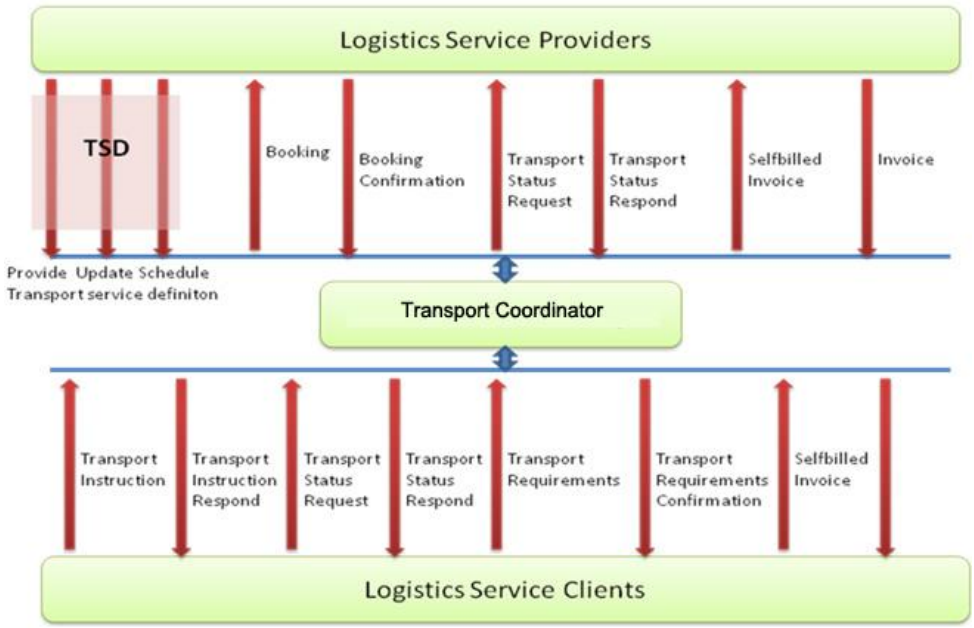


Figure 16 Data Exchange between Logistics Service providers, logistics Service Clients and Transport Chain Manager
(Source: ILiM own study)

The status messages might be received from onboard devices on trucks, trains or containers with information from sensors about position, temperature, seal conditions and many other factors important in particular case. The other example might be the custom documents or other which are accompanying goods during transportation like e-waybill. Besides the electronic messages itself it is also important to apply the same standards of identifiers. Identifiers for location, goods, loading units, consignments, transport equipments. GS1 organization has such standards and they are widely used like: GTIN – for goods identification, SSCC – for loading units, GRAI and GIAI for transport equipment and GSIN, GINC for shipments and consignments.

3.3.2. Interoperability between different ICT systems

The ICT systems and tools under investigation will exchange a lot of real time data about statuses, weather forecasts, parking opportunities e.t.c. That means that all the cooperating systems, platforms needs to have an open architecture for integration with other systems.
Figure below shows the possible integration between recognized ICT tools around the Batltic Sea region.

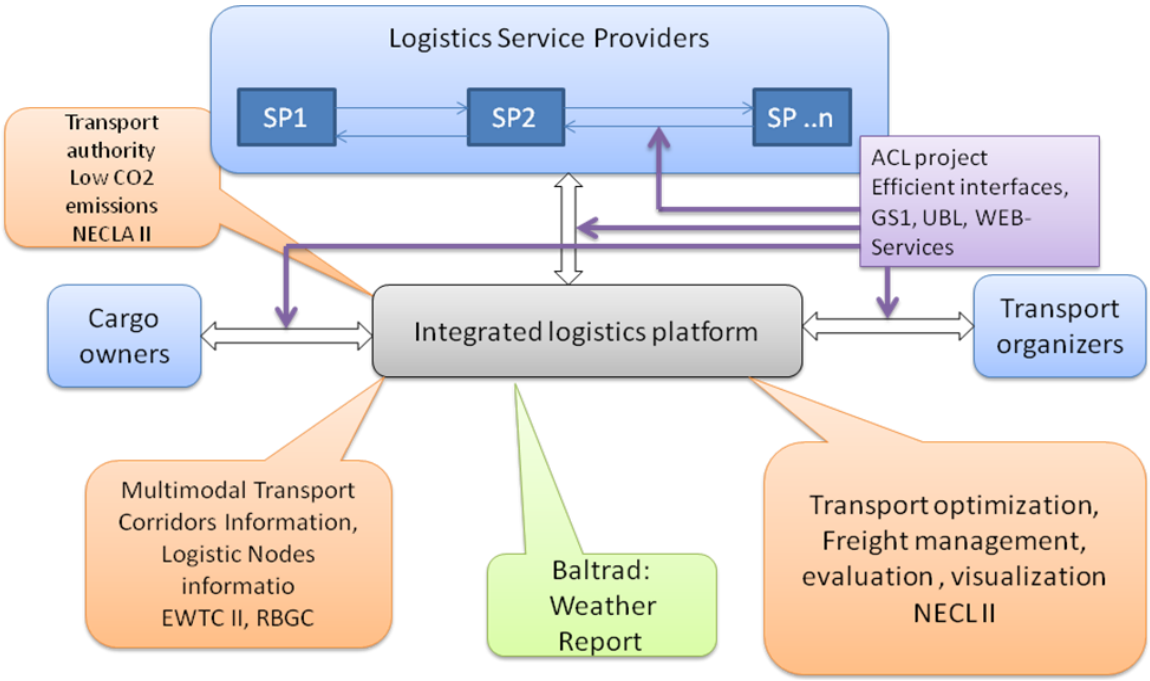


Figure 17 ICT tools Interoperability model.
(Source: ILIM own study)

- Interaction between shippers / cargo owners and Intermodal Logistics Platform

  Logistics service providers as it was shown on the figure 17. send the transport instruction message1 to the transport coordinator the it gets the response weather it has been approved or not. It may receive also the status messages on whenever stage of transport chain. There also can be obtained such messages like these regarding long term planning for future transport instructions, agreement of basic data like locations, routes and logistics units, and messages from financial settlements process.

- Interaction between Logistics Service Provider and Intermodal Logistics Platform

  In this case LSP registers their service description on the platform, the electronic messages can be use for it. The most important messages for LSP is then booking which he receives from transport coordinator and then booking confirmation which is send back by LSP. LSP what is very important in intermodal transport chain and from transport monitoring point of view, sends the statuses of the service they perform on his chain part. The Transport statuses 2 might be send whenever during transport chain execution. LSP might be asked for it with status demand message. Besides these messages LSP might exchange messages regarding long term planning for future transport instructions, agreement of basic data like locations, routes and logistics units, and messages from financial settlements process.

- Interaction between EWTC II Parking Information System and Intermodal Logistics Platform .

  The Parking Information System may supply ILP with information about free parking places for the road transport, We can imagine also the further information like reservations parking places for planning routes and perhaps other services offered on Parkings.

- Interaction between EWTC II Broker Information System and Intermodal Logistics Platform

  The Infor 24 Information Broker System might be a network for delivering a real-time business critical data for ILP during transport planning and execution. For example this can be status information, tracking and tracing , temperature monitoring, traffic information, accidents or acts of robbery.

- Interaction between RBGC Intermodal Node Information System and Intermodal Logistics Platform

  Thanks to the Intermodal Node Information System the logistics nodes might receive advice of coming deliveries for better preparation of a node's services. INIS may also give information to which unloading gate might be used. It can support the planning with information about infrastructure of the nodes that could result with adequate transport means selection during planning.

[1] Transport Instruction message – definition of GS1

[2] Transport status message – definition of GS1

- Interaction between BALTRAD Baltic Weather Radar and. Intermodal Logistics Platform
  The infrastructure will allow to pass real-time data about weather conditions to planning system or during transport execution it might be use with alarm messages to maritime or inland water transport operators

- Interaction between NECL II Fully operating transport matching system and Intermodal Logistics Platform
  This system could offer the transport optimisation methods to ILP in the Multi-attribute decision evaluation module.

- ACL projects and their ICT tools could ensure the efficient interfaces between actors and systems in above interoperability model.

3.4. Integrated solutions

The integrated logistics solution objective will be obtaining a coherent ICT system supporting all phases of transport services (planning, negotiating and concluding contracts, service performance)
Integration process efficiency will rely on the key capabilities :

- Logistics Objects - Integrated solutions are based on the use of logistics objects. They are: physical objects like locations, logistics nods, trade units (cartons), load units (containers) and transport means. However, there are also logical objects, like logistics services descriptions, route plans, electronic transport documents. Each logistics object will have functions associated with it that are being performed when required. Logistics objects should have standardized identifiers and descriptions to be well recognizes in all integrated systems anchored on the Logistics Integrated Platform. Logistics objects defined in this way allow the users immediate identification of logistics objects.

- Interoperability with the other systems and platforms. The integrated logistics solutions will have the possibility to connect with existing and new platforms and systems thanks to standards used for logistics objects end electronic messages. Technology communication standards might be different as the technology is always changing but most important is the scope of data, common identifiers and messaged format.

- Environment friendly integrated ICT solution should provide methods to plan and manage door-to-door logistics services, matching demand from single or multiple shippers with available capacity from different modes and service providers. The optimal choice of logistics service shall be based besides time and costs also on environmental performance including CO_2 emissions calculator like we have NECL2 project. Real-time status reporting and event notifications from relevant logistics objects will impact dynamic re-planning also taking into account information about short- and long term capacity information in the transportation infrastructure.

3.5. Requirements

General level requirements of Integrated Logistics Platform system:

Functionalities:

- Solutions for whole process of serving intermodal door-to-door transport, transport chain planning.
- Transport chain visualization.
- Measurements of energy consumption and CO_2 emissions during transport execution process.
- Rank of services and service providers.
- Incorporate status information from existing systems of logistics service providers.
- Electronic Data interchange solutions being able to integrate corporate systems using different communication standards. Simplified version for the SME shall be elaborated.
- Information about logistics nodes, available services and service booking.
- Parking information and booking parking places.
- Incorporate information about weather conditions and traffic to the onboard computers and smart phones.

Modules:

- Database of logistics services.
- Services set-up.
- Multi-criteria Transport optimization tool.
- Supply chain strategic planning.
- Multimodal delivery planning.
- Negotiation and booking system.
- Transport execution control.
- Financial settlements.

Features:

- Open architecture.
- Keep up with standards.
- Integration with existing system enabling interchange important transport planning and executing data.
- Be future-oriented (independent of current solutions).
- Provide a total picture (supporting transparency, management, and security).
- Provide friendly solutions for the system users.
- Focus on interoperability (not on inner parts of systems).
- Provide interoperability without constraining business process development and improvements.
- Independent of technology.
- Facilitating interaction with existing standards (to help protect investments already made in legacy and other systems).

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Baltic Sea Region Programme 2007–2013

- Validation of developments with freight market stakeholders.
- Enable market leaders and SMEs to interact at a low cost, and this should emerge as a standard. endorsed and adopted by major freight ICT systems providers and logistics operators.
- Support co-modality.
- Assist in making the European transport and logistics system more efficient and environmentally friendly.

Cooperative Systems

Cooperative systems are systems which will support the Integrated Logistics Platform with additional data. It can be data relating to the transport execution or planning phases.

One of the example can be traffic management systems dealing with interactions between vehicles and infrastructure. These systems are customized according to specificity of the mode of transport
Let's specify all the mode-orientated initiatives from the EU Commission :

- River Information Services (RIS) dealing with inland waterway transport.
- Intelligent Transport Systems (ITS) dealing with road transport and interfaces to other modes (which refers to e-Freight).
- TAF TSI (Telematic Applications for Freight – Technical Specification for Interoperability) Regulation focused on rail.
- e-Maritime dealing with business in the maritime sector with the support of advanced electronic capabilities.

The maturity in these areas is different. Standardisation has been developing within these domains with good effect. What is missing ? - standards securing interoperability between different modal infrastructures

Other systems which can deliver the additional data are related to the infrastructure within transport corridors. Good examples are the ICT tools mentioned in this document like parking information systems, logistics nodes information systems, weather radar and many others these system can deliver data which impact on better, optimised delivery planning.

3.6. Roadmap recommendations

The general Road Map approach for the integrated logistics solution should contain the following elements:

- Describe current situation of integration ICT tools with specific regard to logistics chains within and across different modes of transport .
- Carry out surveys and interviews with companies involved in logistics activity to integrate their needs , requirements and views into created ICT tools.
- Fit gathered requirements into transport and logistics processes being built in the developed software.
- Specification of implementation bottlenecks and risks.

- Specification of tasks with timeline.
- Describe the target group and find companies which will take a part in development of a pilot of integrated logistics solution.

3.7. Survey – discussion.

In this point we try to ask some questions regarding integrated solution which could start the discussion

- How to encourage service providers in promotion of "green corridors"?
- Which standards support essential information exchanges that will have to be included in the Integrated logistics platform to support it daily business processes?
- Which areas are still uncovered by current standards and what requirements does this impose on the integrated logistics platform?
- Which current and emerging ICT solutions on the market are available to support, in whole or in part, integrated solutions business processes?
- What other solutions not presented in this document would required for integrated logistics platform?

4. Conclusions

Analysis of the current market trends lead to conclusion that logistics is becoming more and more significant factor determining competitive advantages of enterprises. Customers require quicker but less expensive deliveries while fragmented demand makes logistics more complex. In parallel there are also noticeable stronger efforts towards rebuilding existing congested transport systems into more environmentally friendly. This is a background for initiatives in creating ICT tools supporting optimal modal choice.

The basic idea being exploited in construction of many tools of this type is to provide freight market decision makers with a tool similar to a Journey Planner enabling travellers searching for the best scenarios taking use of data bases of time schedules and tariffs published by passenger transport operators representing different modes (trains, buses, ferries, planes e.t.c.)

Supplying delivery planners with suitable market information referring to time schedules and tariffs of freight transport operators offering their services in different transport corridors, may contribute to change traditional attitude of majority of decision makers relying basically on road transport. Taking use of railway of vessel on longer distances is apparently cheaper due to scale of loading space. In case of the "not urgent" deliveries this may be reasonable option.

It should be considered however whether there is indeed an analogy between route planning process in case of an individual traveller and e.g. freight forwarder preparing the best transport scenario for his customer? It is not of course. It is relatively easy to build data base of locations, time-schedules and tariffs used in passenger traffic. In the road freight transport instead the number of locations potentially involved in transportation is unlimited what makes building data bases very challenging.

Much bigger problem is with creating data bases of freight charges offered by carriers and freight forwarders. Road freight transport is typical spot market depending on current demand-supply ratio.

Tariffs used in railway or maritime transport are subject to significant volume discounts. In result level of price indications may be much different from actual charges what makes planning process effects doubtful. That is why the further software developments has to integrate solutions for negotiating freight contract conditions to make data bases representative.

Some of planning tools heads towards offering platform for purchase of transport services and supply chain management system. In such a case a communication system between co-operating companies must be developed. It consists of agreed business models, standards of documents and messages being fully understandable for all participants. Diversity of standards being worked out within different initiatives is limiting development of applications for multi-partner co-operation.
The future depends on initiatives leading to successful unification of communication standards or converting them i.e. translating messages coming from one system to be understood by others.

Coming back to the set of tools being developed within the INTERREG transport projects – there is important question to be raised – do we foresee building regional integrated logistics platform offering to the freight market stakeholders variety of supportive tools optimizing their decisions? If yes, it is worth to elaborate common standards to facilitate communication between them.

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