MARKET-READY PILOT APPLICATIONS OF E-FREIGHT IN EUROPE

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Abstract - This paper illustrates business cases of market ready applications of e-freight in Europe coming from the development of a project named E-IMPACT, and aiming at fostering the implementation of e-Freight through a series of studies including the development and the founded in the framework of the Connecting Europe Facility (CEF) adoption of an e-Freight Toolkit. Main concepts of e-freight initiative and framework are introduced in the paper as well as socio economic effects and policy issues related to the use of a Common Framework for Information and Communication Systems in Transport and Logistics in Europe. Business cases about Multimodal freight journey planning and booking, multimodal operations planning and execution management over Maritime, Road, Rail and Inland Waterway Transport and Collaborative e-cargo ecosystem are described and first achievements of the project are described.

Keywords - E-Freight, TEN-T, transport, digital services, Maritime, Road, Rail and Inland Waterway Transport.

I. THE E-FREIGHT INITIATIVE

A significant share of the companies that deal with transport and supply chain management in Europe recognize interoperability and information exchange as a relevant challenge. Interoperability is expensive and complex. Information exchange implementations in this respect have so far mostly taken place at an individual mode level, often triggered by traffic management needs (e.g., TAF/TSI for railways and e-Maritime for ship-to-shore communications) and public reporting requirements (e.g., reporting standards set by the national custom agencies). To achieve higher efficiency levels, large companies have significant costs in making sure that their transport / supply chains are connected. Many Small and Medium Enterprises (SMEs) lack the capability and resources to interoperate and collaborate with other companies. In response to these needs, the European Commission has launched the e-Freight initiative as part of the ITS Action Plan (Action Plan for the Deployment of Intelligent Transport Systems in Europe COM(2008) 886 final) and the recent e-Freight consultation report (concluded that logistics Services Clients (manufacturers, SMEs in general, wholesale and retailers) see a large need for information exchange and collaboration amongst themselves and with the entire logistics chain. These stakeholders also mentioned the importance of increasing the efficiency of information exchange and the need to develop improved interoperability between freight transport systems. Moreover the maritime sector urges as a priority for 'the one single message to report everything in one go', the air transport sector is open to an e-Freight approach that simplifies interoperability and the rail sector supports in particular the development of a Single Transport Document, Single Windows, and tracking/tracing tools. Logistic Service Providers, especially Freight forwarders support the use of electronic transport documents and the development of a paperless business environment in general, and would therefore welcome the creation of an appropriate legislative framework for the deployment of tracking and tracing technologies and other technological components contributing to the e-Freight concept. e-Documents would be highly welcome by freight forwarders on the condition that they can be used throughout the EU without any discrimination or hindrance and that data security is ensured. e-Freight aims at making easier information exchange between the different actors in the transport logistics chain, by supporting industry through the necessary standards, administrative, governance and legal provisions. This will simplify and reduce the cost of exchanging information between different actors and transport modes along the chain, leading to a more efficient, less polluting freight transport, and facilitating the use of multimodal freight transport solutions.

II. THE E-FREIGHT FRAMEWORK

The e-Freight framework ((now converted to ISO IEC 19845 logistic interoperability standards) is a standard for information exchange covering the entire transport logistics domain with the objective of fostering interoperability between businesses and systems. The e-Freight framework offers a level of standardisation that is different from the type of standardisation currently offered such that it will be possible for small, medium and large sized enterprises to implement it and connect to and/or be part of efficient multimodal logistics networks. It offers framework for interoperability which currently deals with the following areas:

- Information exchange between stakeholders in efficient supply (and transport) chains;
- Reporting to authorities for clearance and compliance;

- Interaction between traffic management systems (also called cooperative systems when including communication between vehicles and the transportation infrastructure) and systems for freight transport management;
- Facilitation of emerging technologies, particularly in the area known as "intelligent cargo";
- Communication of security information to public and private stakeholders and supply chain visibility.

Recently and as a result of the intense efforts at European level to turn it into a global standard, the e-Freight framework has been adopted as part of the ISO/IEC DIS 19845 Standard. Logistic and port communities, freight forwarders, multimodal operators, among other stakeholders in Europe have recognized these needs and the potential benefits that the adoption of the e-Freight framework may bring.

III. THE E-IMPACT PROJECT

A consortium of 10 partners coming from different EU countries and coordinated by the Port of Lisbon in Portugal, has joined forces to develop the e-Impact project. The project's overall objective is to foster the implementation of e-Freight so as to simplify and reduce the cost of exchanging information between different actors and transport modes along the chain, leading to a more efficient, less polluting freight transport, and facilitating the use of multimodal freight transport solutions. Achieving paperless and seamless information flows along the whole transport logistics chain (involving shippers, freight forwarders, transport carriers, network managers as well as authorities) is a key objective for both the freight transport sector and the EU. The Action, including studies and real-life pilot deployments, is implemented in core ports (in Italy, Poland and Portugal along three core network corridors (Atlantic, Mediterranean and Baltic – Adriatic). The primary specific objective of the project is to reinforce the message delivered to the stakeholders about e-Freight benefits. This objective will be met through a series of studies including an e-Freight Adoption Toolkit and an assessment of the e-Freight PPP feasibility, estimating technical, financial and legal requirements on individual stakeholders, at corridor level, and across different corridors of the core network. The studies will also document business case implementation, clear migration paths for industrial users to evolve to e-Freight standards and data interchange infrastructures, based upon e-Freight initiatives carried out on European level. The second specific objective is to develop concrete business cases where logistics stakeholders (shippers, logistic services providers and authorities) will benefit from the e-Freight policy, in terms of improved efficiency, reduced costs and enhanced business potential. This objective will be met by deploying and operating four real-life trials in the core ports of Trieste in Italy, Gdansk, Gdynia, Szczecin and Świnoujście in Poland, and Leixões and Lisbon in Portugal (see Fig.1).

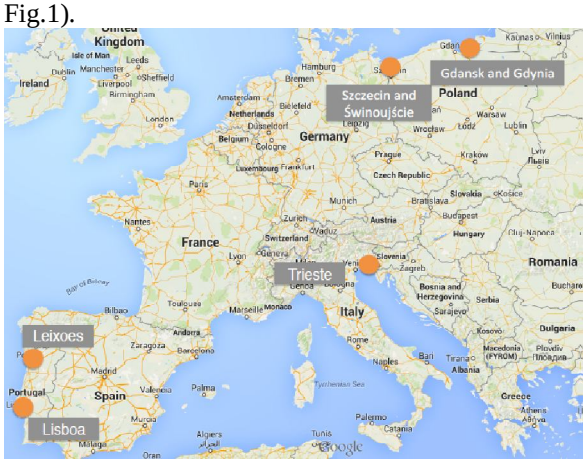


Figure 1: Ports involved in the e-Impact project.

The purpose of the e-Impact project is to implement the e-Freight standards and e-Delivery infrastructure in real market-ready pilot operations along the 3 corridors. These pilot applications include various types of solutions, namely:

- Information systems to enable/enhance Europe-wide and multimodal freight transport and logistics planning and management integration with traffic management systems;
- Multimodal journey planners for freight;
- Tracking and tracing tools;
- Intelligent cargo applications;
- Tools for the implementation of single transport documents;
- IT infrastructures supporting information exchange and user authorisation / authentication: e-Freight connectivity infrastructure;
- Support for interoperability between different standards.

The e-Freight pilot applications are associated to Core Network Ports, their respective port and logistic communities and also the multimodal links to the 3 Core Network Corridors involved. The essence of e-Impact is to test and validating the viability of innovative solutions, supported in common e-Freight language and standards, thus interoperable to enhance multimodal freight transport along corridors. This will further achieved with a feasibility study to evaluate the future scale up and roll out. It is recognised that strong simplification of reporting operations, reduction of lag times and inland shipping are crucial factors for the EU competitiveness and to enhance the role of ports as gateways in a world-wide scenario and to contribute to reach the objectives of the internal market at the EU level. Modal changes are natural bottlenecks to a door-to-door chain. By acting on the logistic information exchange and integration, the e-Impact action is providing a positive contribution towards multimodal transport,

notably on acting on maritime hinterland connections that will be favouring the shift of long distance freight transport from roads to other friendly modes as set in the ambitious white paper targets. Equally, e-Impact advocates a solution supported on common standards, technological neutrality and interoperable systems. Furthermore, it is worth to mention that e-Impact looks to deploy a connectivity infrastructure, which supports low-cost /easy to use interoperability with a set of simple and economical solutions for SMEs. Low cost applications with embedded interoperability capabilities for LSPs and related companies for:

- Transport planning
- Electronic Booking and issuing of appropriate transport documents
- Execution monitoring (e.g tracking and tracing)

The project will contribute to more efficient transport chains, notably by reducing the information and administrative bottlenecks along the logistic chain. This is expected to contribute to attraction of economic and business activities along the network nodes, contributing to enhance the economic growth and cohesion within those regional areas All these aspects fully embedded in the e-Impact development logic are natural contributors for the EU 2020, Cohesion Policy and internal market. To allow a smooth transition from current practices to new e-Freight solutions, the project assembled a toolkit based on e-Freight developments on European level. The toolkit includes guidelines and templates on how to exchange information exchange across modes, by studying standards and systems in use by the various stakeholders, namely:

- Transport Management Systems, Terminal Management Systems, Port Community Systems and e- Custom systems;
- Modal standards, such as Blue Belt, eMaritime, RIS and TAF-TSI and electronic document interchange standards like EDIFACT, UN and GS1.

As unifying standard across modes, the e-Freight / Common Framework has been adopted. To reduce the effort and cost for implementing e-Freight solutions, the toolkit supported the deployment of advanced IT infrastructures. These infrastructures are based on access points, allowing each stakeholder's system to connect once and be able to exchange data with potentially every other system similarly connected. The following fig.2 illustrates the utilisation of the Access Points connectivity infrastructure to support message interoperability between different stakeholders and transport modes:

The toolkit has been defined coherently with e-Freight developments across Europe and it has been fully described in a previous paper..

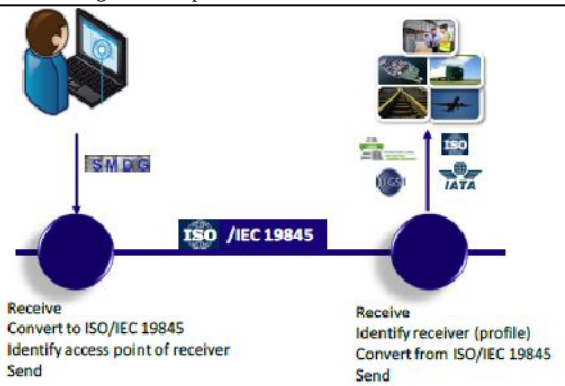


Figure 2: Utilisation of the Access Points connectivity infrastructure.

IV. THE BUSINESS CASES

4.1 Business Case 1: Multimodal freight journey planning and booking

The Business Case 1 is developed in the Port of Trieste area, in the Friuli Venezia Giulia region, in Italy (Fig.3). It is a peculiar region from the logistic point of view for its gateway position towards East Europe and the Balkans.

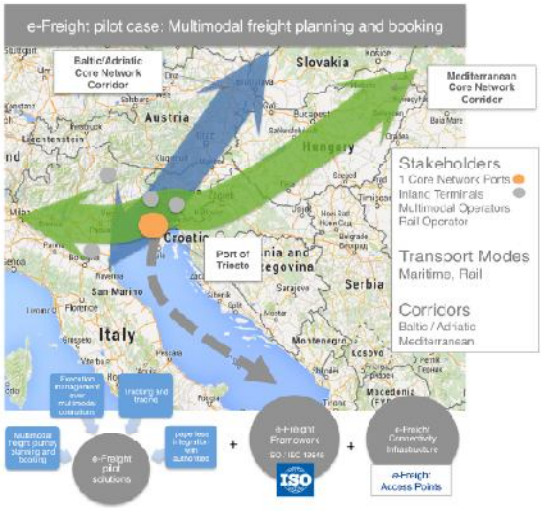


Figure 3: Business case 1 in the port of Trieste.

This region is particularly significant both for its geographic location, at the meeting point of the Mediterranean and the Baltic/Adriatic Core Network Corridors, and for its concentration of ports and land, sea and railway transport networks. This business case is focused in establishing a pilot multimodal journey planning and booking solution associated to intermodal operations in Trieste (EMT multimodal operator), exploiting the e-Freight Framework. This operation involves Ro-Ro services operated from Turkey and Greece to Trieste and rail connections from Trieste to North Europe, daily linking Italy with Germany, Luxembourg and Switzerland. Kombiverkehr organizes the railway service in collaboration with the Parisi Group. The e-Freight pilot will contribute to the overall objectives of the project by:

- Deploying pilot e-Freight applications: for multimodal freight journey planning and booking, execution management over multimodal operations, tracking and tracing and paperless integration with authorities;
- Using the e-Freight Framework: The e-Freight Framework will be used as a fundamental tool for interoperability between different communication standards and communities (rail, road and maritime) as a neutral interoperability standard;
- Using the e-Freight connectivity infrastructure to support interoperability between the stakeholders involved.

4.2 Business case 2: e-Freight multimodal operations planning and execution management over Maritime, Road, Rail and Inland Waterway Transport.

This business case is focused in developing an e-Freight pilot application for synchromodal operations in the Atlantic corridor, exploring the extended gateway concept for the port of Lisbon connected to inland terminals in Portugal and Spain (see Fig. 4). This business case represents an important component of the Port of Lisbon's Multimodal Platform concept, which aims to develop the Port's role in the core network, eliminating bottlenecks and enhancing connectivity to the Atlantic Corridor and surrounding regions, while improving efficiency and sustainability. The port of Lisbon's multimodal platform concept, recently presented by the Portuguese Ministry of Economy, is focused in reorganising the port and logistic activities associated, as well as improving its global interoperability.

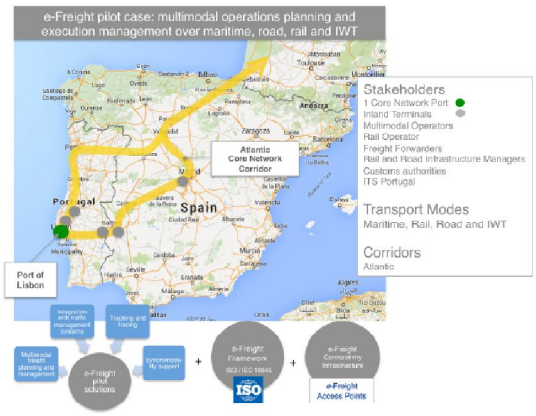


Figure 4: Business case 2 in the port of Lisbon.

The intermodal operations and flows associated to this business case mainly involve Lo-Lo containerized flows combined with rail and inland waterway operations. The business case aims to provide joint planning and execution management information between the port, inland terminals, inland waterway transport (in the Tagus estuary) and rail services. And it will contribute to the overall objectives of the action by:

• Deploying pilot e-Freight applications: This pilot includes Information systems to enable multimodal freight transport and logistics planning and management, including integration with traffic management systems and also tracking and tracing tools

• Using the e-Freight Framework: The e-Freight Framework will be used as a fundamental tool for interoperability between different communication standards and communities (rail, road, maritime, IWT) as a neutral interoperability standard, namely for:

- Transport planning
- Electronic Booking and issuing of appropriate transport documents
- Execution monitoring (e.g tracking and tracing)

• Using the e-Freight connectivity infrastructure to support interoperability between all stakeholders involved.

In practical terms, this e-Freight pilot business case will provide:

– A pilot for synchromodality services applied to integration and capacity sharing between ports and the inland terminal network;
– An extension of the port of Lisbon's Gate Operational System Concept to support integration with Rail, Road and Inland Waterway Services;
– Setting up Truck, Train and IWT pilot appointment solutions for multimodal planning;
– The adoption of an e-freight extended gateway pilot, in collaboration with other Portuguese ports, taking into account:
– Intermodal terminals on the hinterland that extended the "traditional" borders of the port;
– Multimodal services that connect the port to the locations / terminals on the hinterland (road, rail andIWT);
– The involvement of authorities, which also adhere to this concept, accepting and embracing the newborders of the extended gateway, and supporting clearance procedures over this new reality.

4.3 Business case 3: Collaborative e-cargo ecosystem.

This business case is focused around the adoption of e-Freight principles on the Collaborative e-cargo ecosystem being developed by the port of Leixoes, in collaboration with the port of Lisbon (see Fig. 5).

This ecosystem integrates a set of services, solutions and applications for collaboration and multimodal chain sourcing, booking, planning and execution management over the Atlantic Corridor and also in articulation with other corridors. All types of stakeholders use it: shippers, freight forwarders, terminal operators, multimodal operators, road

transport, rail transport, and air transport ground handlers, among others. The e-Freight connectivity infrastructure to be developed on e-Impact will provide cheap and simple interoperability to this ecosystem, thus significantly increasing its added value to logistic chains.

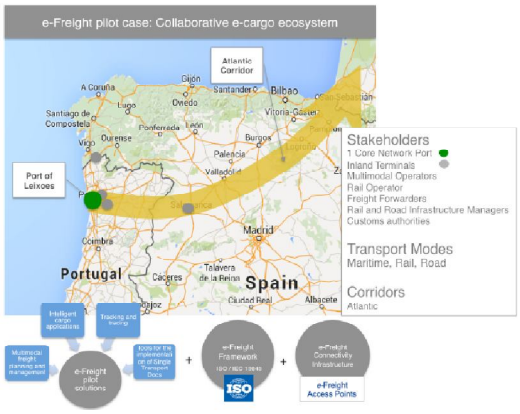


Figure 5: Business case 3 in the port of Leixoes, in collaboration with the port of Lisbon.

Considering the e-cargo ecosystem context, this e-Freight pilot will contribute to the overall objectives of the action by:

- Deploying a set of pilot intelligent cargo solutions: the pilot will aim to incorporate a set of pilot e-Freight based solutions to be included in the e-cargo ecosystem, namely:
- An e-booking (and publishing environment) for freight forwarders. This will take advantage of the service catalogue of multimodal services already set on the e-cargo ecosystem, to prepare a publishing and sourcing environment based on e-Freight standards.
- A set of door-to-door planning and execution management intelligent cargo services for Logistic Service Providers and Logistic Service Clients.
- A set of Low Cost applications for SMEs for smartphones with e-Freight connectivity embedded interoperability for:
- Transport planning;
- Electronic Booking and issuing of appropriate transport documents, including Single Transport Documents support;
- Execution monitoring (e.g tracking and tracing).
- Incorporate on the e-cargo ecosystem an e-Freight based solution for applying synchromodal practices. This concept should allow the logistic nodes around the port of Leixoes to share planning information and status events about containers, thus incrementing planning and execution management capabilities over the supply chain. It may also support authorities electronic clearance over the extended gateway network
- Using the e-Freight Framework (now adopted as ISO IEC 19845 logistic interoperability standards).
- Using the e-Freight connectivity infrastructure to support interoperability between all stakeholders involved.

The business scenario will be developed in 3 steps:

- Incorporation of the e-Freight adoption toolkit into the e-cargo ecosystem;
- Develop e-Freight based pilot intelligent cargo solutions to incorporate into the e-cargo ecosystem;
- Define and develop an e-freight pilot for the synchromodality integrated into the e-cargo ecosystem;

4.4 Business Case 4: Information system for synchromodal operations in ports

This business case tackles directly one of the missing links of the Baltic/Adriatic Corridor: the lack of traffic management systems being implemented along the corridor and supporting the multimodal connections with the ports. This missing link is partly reflected in the fact that currently there is no joint approach to management of operations in Polish Sea Ports and related multimodal services (see Fig.6).

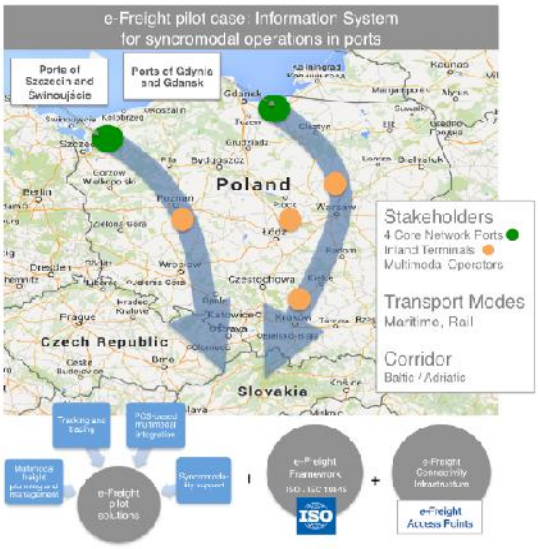


Figure 6: Business case 4 in the Polish sea ports.

Moreover, there is no capability to properly support electronic data exchange between business, customs and other administration bodies. Companies are either using their own, not-synchronised ICT solutions or they have no ICT tools in use. E-mail, fax, and telephone are the most popular means of data exchange. All of this results in significant inefficiencies in intermodal transport operations inthe Polish territory and also in the integration of Polish Ports into the Baltic/ Adriatic corridor.The core activities of Business Case 4 are focused in developing synchromodal operations in the Baltic/Adriatic Corridor, namely on the Polish Sea Ports: port of Gdansk, port of Gdynia, port of Szczecin and port of Świnoujście. The objective of the Business Case 4 is therefore to establish an e-Freight pilot that enables proper ICT integration at

port level and at multimodal service integration level, including the adoption of capacity publishing/sharing between inland terminals/terminal operations. The e-Freight pilot will also handle paperless reporting to authorities. With this system in place, all parties involved (logistics service providers, shippers, authorities, port administration) will use e- Freight Framework standards. The e-Freight pilot will aim to facilitate concurrent planning and execution management information between the ports, inland terminals, and rail services. This business case will contribute to the overall objectives of the project by:

- Deploying pilot e-Freight applications: This pilot will include Information systems to enable a port based pilot e-Freight initiative to manage freight transport utilising multimodal services. The business case will involve port authorities, container terminals, intermodal operators, rail services, road services, inland terminals, as well an information system provider and an independent notified body in the railway sector.
- Using the e-Freight Framework
- Using the e-Freight connectivity infrastructure to support interoperability between all stakeholders involved, namely the Polish ports.

CONCLUSIONS

e-Impact will help improving the efficiency of freight transport in the corridors involved and thus contribute to growthand competitiveness. By applying the e-Freight framework in all its development, the e-Impact project is supporting the overall goal to close the missing link between different information systems and facilitate the seamless flow of information along the transport logistics chain. By undertaking pilot cases in core ports along three core network corridors (and planning for the evaluation of its deployment in other ports during the feasibility study) the project is expected to provide a contribution to the single market and single transport area. The e-Impact project provides the necessary support to pilot ports for making easier information exchange between the different actors in the transport logistics chain (i.e. following administrative, governance standards). This will allow for a more efficient information exchange, and therefore a more efficient freight transport, and will simplify the use of multimodal and cross-countries freight transport. As previously referred the e-Impact project will undertake as one of its activities a feasibility study upon which the evaluation of the socio-economic benefits of the project at a macro level (here understood as at the EU level) will be observed. The outputs of the project, such as the PPP feasibility assessment study associated and the results of the pilot cases will all contribute to establish basis for policy-making at Corridor, Regional, National and Industry level. e-Freight initiative is central to the Commission's plans to develop a sustainable transport system that can meet the growing needs of the European public and economy without compromising mobility.

ACKNOWLEDGMENTS

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