Living Lab 6: Enhanced Marine Shipping Arrival Information

1 Background and introduction

1.1 Background

Europe is considered as one of the global leaders in the logistics sector. Eight EU Member States are ranked among the top 10 countries in terms of logistics performance for the year 2018[i], while the market size of the logistics sector in Europe was estimated as being equal to €878bn in 2012[ii].

However, in various sectors, logistics costs remain a significant part of total supply chain costs. These logistics costs represent 12% of total cost in the manufacturing sector and more than 20% in the retail sector[iii]. Moreover, logistics efficiency could be improved. Statistics have shown that 24% of all vehicle movements per kilometre in the EU are not carrying goods, while the average load factor for vehicles is estimated as being 57%[iv].

To enhance efficiency in the EU logistics sector, increased collaboration could improve the current situation. More efficient synchronized networks and a decrease in operational costs are the main benefits for the companies involved in cooperation schemes[v], as it has been estimated that cost savings and efficiency gains of 6-10%, according to Transport Intelligence[vi], or a reduction of 9-30% in distribution costs, could be expected[vii].

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1.2 SELIS

However, a key barrier to collaboration is secure data exchange, and this is the barrier that SELIS aims to remove. The Shared European Logistics Intelligent Information Space (SELIS) project is a €17 million European Union Horizon 2020 Research and Innovation Programme, running from September 2016 to August 2019. The project has built a scalable and replicable platform for pan-European logistics applications, at every level allowing a standardized exchange of core data between any number of registered users.

The SELIS project combined strategies for innovative, efficient and green logistics with leading edge open source information technology techniques that support collaborative logistics, through building applications and testing them in real world use cases.

1.3 Living labs

Living Labs have been used by SELIS as the testing and proving environment by using current commercial and operational scenarios to test and refine the SELIS developed technical solutions. Some solutions incorporated opensource systems integrated into the overall platform.

The SELIS Living Lab activities have included the stress-testing of the solutions developed for building the basis for a safe, secure, reliable and robust data-sharing platform.

- Each living lab involved business partners willing to support the development and piloting of these applications.
- Each of these living labs tested one or more applications, with each pilot containing one or more trials, or use cases, which allowed the testing of developed solutions in a number of different scenarios, with different groups of collaboration partners, each effectively conducting a stand-alone experiment which generated a set of real-world results which can then be compared with the expected and anticipated benefits.
- Each real-world pilot and use case trial created insight on implementation, and the enablers and barriers to success.

1.4 The Concept of SELIS Community Nodes

SELIS has developed the concept of a network of logistic communities, each created as localized shared intelligent logistics information spaces, each adaptive, configurable and providing the privacy that collaboration requires. These communities are termed as SELIS Community Nodes (SCNs). The aim is to stimulate the growth of a network of these SCN, that will create a distributed common communication and navigation platform for transport and logistics, a platform that through multiplication can be extended and expanded to support Pan-European logistics applications, adaption and collaboration.

Each SCN is a secure domain where supply chain partners share data (e.g. raw data, analytics predictions, inventory, routing decisions etc.) in a secure and governed manner that, in turn, enables the implementation of a specific collaborative logistics model.

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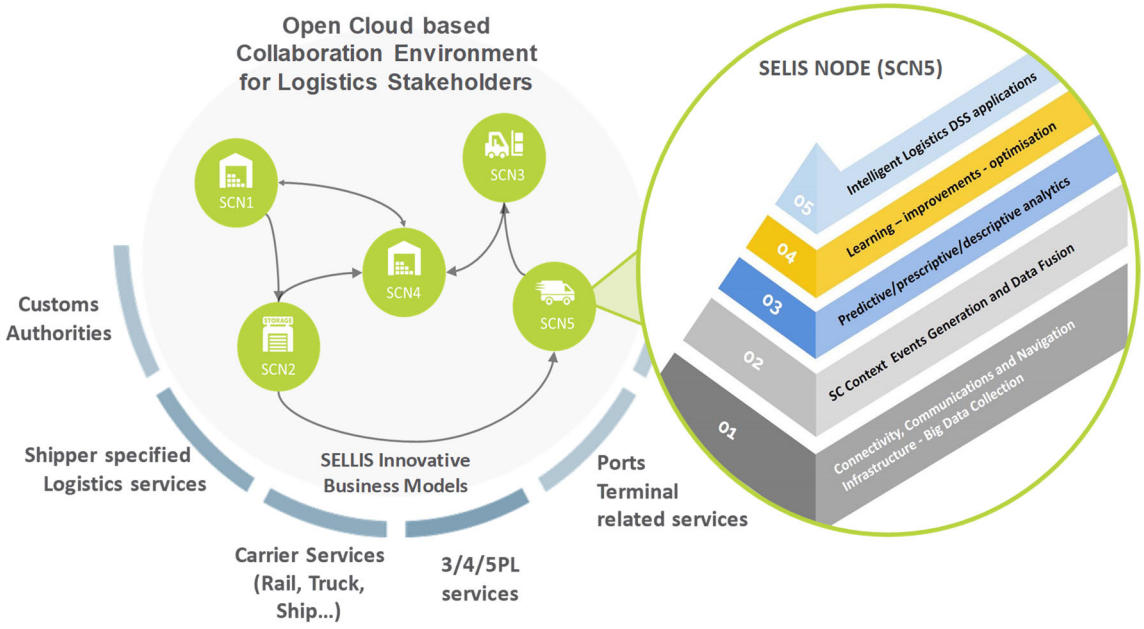

Figure 1: SELIS SCN concept

An SCN includes the necessary architecture to allows users (data publishers and/or subscribers) to:

1 - connect to multiple data sources;
2 - transform, reformat and normalize data;
3 - share data securely by means of user-defined access rights, thereby enabling collaboration;
4 - make use of machine learning that allows for self-learning and improving capabilities, such as continuous improvement in forecasting based on the ongoing and real-time use of accumulated data.
5 - adapt and deliver the capability as required by a specific industry or sector.

If appropriate, an SCN could communicate with other SCNs through an open and cloud-based architecture to create a network of SCNs; this would allow any operator to connect with another, such as a single port SCN, which could share appropriate data with an inland 3PL (Third party Logistics provider) or rail SCN.

2 Living lab 6 – Enhanced Marine shipping arrival information

2.1 Inaccurate inbound maritime shipping information leads to lack of synchromodal planning

For synchromodality to be more compelling and uptake increased, flexibility, punctuality and visibility of transport must be improved. Shared exchange of information will be required to allow partners to plan and optimize their routing and activity, and lack of visibility of connecting freight at a port hub hinders collaborative planning. The focus here is on the lack of data related to the maritime transport itself and the inaccuracies in the arrival times of ships. This lack of real time and accurate data restricts the synchronization of ship unlading, container processing at port, and the optimization of truck loading. The aims of the use case were to develop cargo visibility across hinterland networks, largely through better use of deep-sea vessel ETA (Estimated Time of Arrival) data. Building on this visibility, the aim was to create transparency for customers and supply chain

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partners within a hinterland network, and so facilitate greater collaborative planning and optimized use of port facilities, including better handling of traffic incorporating deep sea shipping. The data existed within current AIS capability (Shipping Automatic Identification System), but the challenge for the SELIS solution included making better use of this data through predictive modelling and allowing for better end to end supply chain ETA predictions.

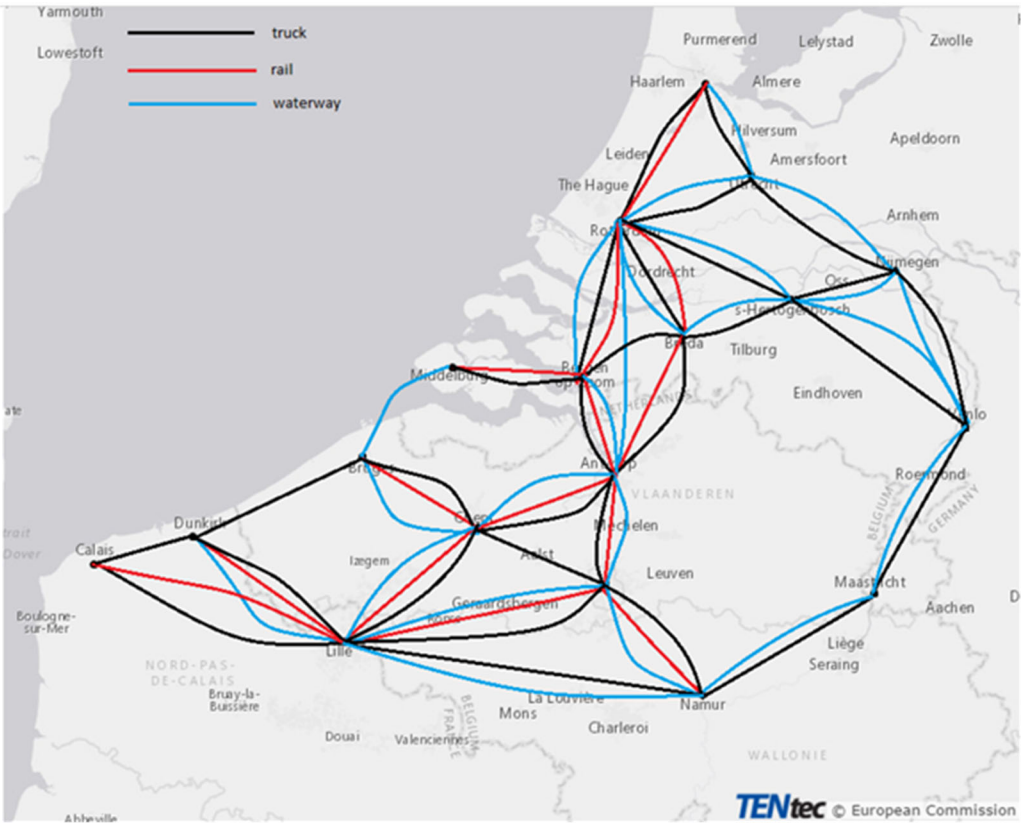

Figure 2: Graph representation the TEN-T multimodal Network hinterland[viii]

2.2 SELIS solution to support daily planning and scheduling

The SELIS solution aimed to use SELIS tools to develop a data platform and support Marine Traffic and all LSPs (Logistics Service Providers) operating in the hinterland routes that serve key ports, and in particular support their daily planning and scheduling activities, including the establishment of an analytical tool for stakeholders to perform corrective and preventive actions. However, the lack of accuracy of inbound shipping information was prioritised, and so the SELIS solution provided algorithms, implemented as SELIS community node standard modules, which calculating updated estimated time of arrival of maritime vessels based on real time ship-location data. The SELIS shipping service was built to support better planning by port and road transport, thereby enhancing the ability to deliver end to end synchronisation. The real network was transformed into a 'synchromodal network' as shown below. The synchronisation model was built using SELIS Knowledge Graphs, mapping the data within existing enterprise systems to the SELIS Common Information Exchange Model.

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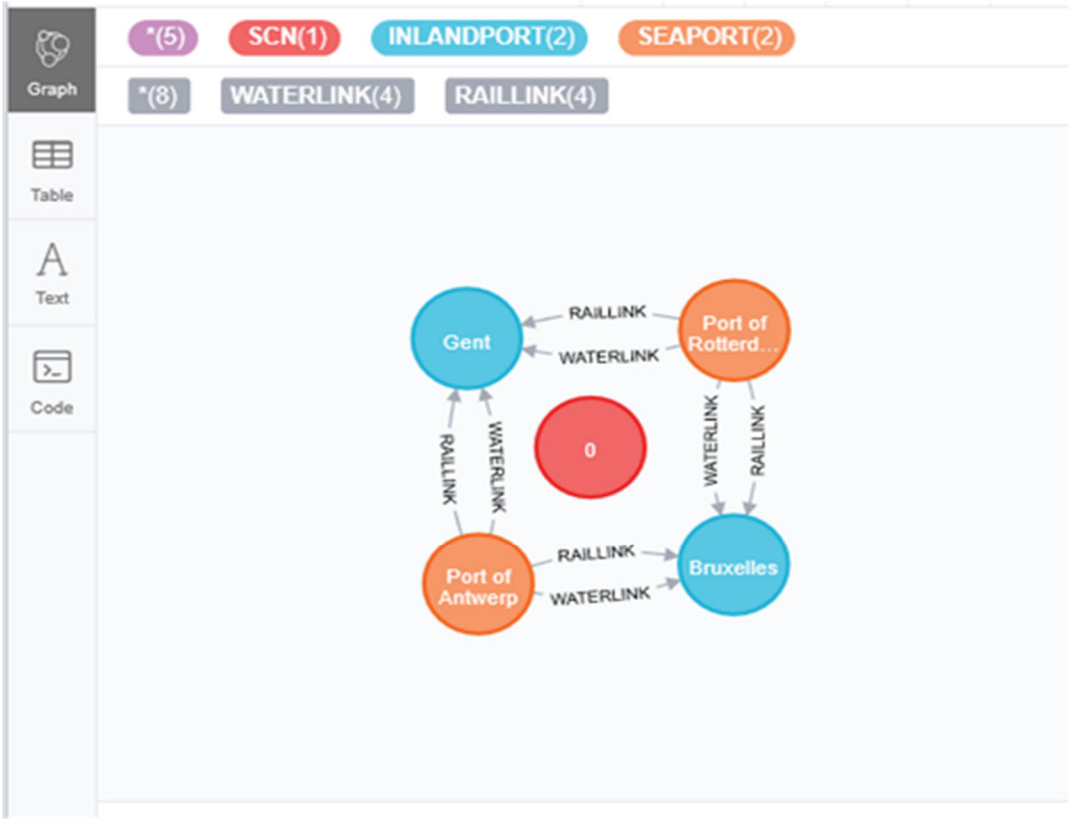

Figure 3: a synchromodal network coordinated by an SCN

2.3 Results of the Living Lab

The SELIS solution delivered accurate estimated time of arrival information for maritime ships arriving at ports, based on an algorithm that calculates a new arrival time using real time ship-location data available globally via AIS (Shipping Automatic Identification System).

This new arrival forecasting tool was linked to a shipping services SELIS platform (Community Node) that supported a standard process for ship-port-trucks planning and process synchronization.

The data on arrival and synchronised planning required the development of an interface with external data sources including the global ship positioning tracking system, and other third-party data providers.

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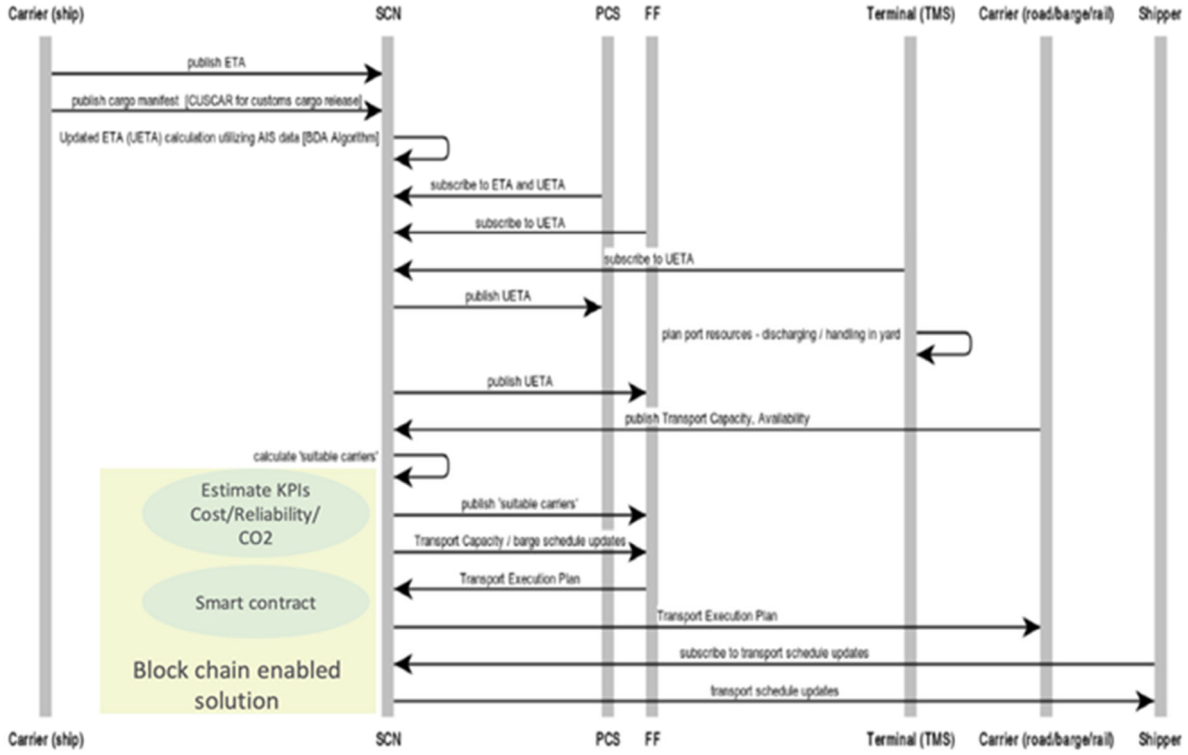

Figure 4: Coordination of Hinterland Synchromodal Operations

2.4 Business Impact

By delivery of a more accurate arrival time estimate for inbound maritime shipping, the solution increased the visibility of shipments to planners within port facilities and logistics service providers including road transport within the hinterland hub area. Such visibility helps to facilitate more collaborative planning, and subsequently through bringing together the information related to maritime and non-maritime legs of the total shipment journey, the new data enables end to end supply chain tracking from origin to destination. Creating this more complete end to end visibility should help logistics planners to optimise both their own operations and collaborate with others to generate improved end to end services for customers.

3 Conclusions

The synchromodal SCN solution was developed by Marine Traffic with the active participation of ILS, ICCS and CLMS, and centred on the use of ETA data of deep-sea vessels to support better coordination between ports and their hinterlands. The SELIS case study team suggested that the solutions could be replicated elsewhere, to support ports and national or regional agencies in improving the management of flows through their networks. The platform delivered demonstrates the possibilities offered by advanced functionality and value-adding services such as utilizing more accurate ETAs, which can generate new revenue streams also for the SCN operators that install and run the service, and for the specialized implementors and solutions integrators that can provide novel booking solutions based on big data and big data analytics. For example, the enhanced ETA estimates, using advanced prediction machine learning and historical data, can

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be applied to all legs within end to end supply chains, allowing more responsive and agile optimization of resources, and reduced environmental impacts.

4 Further questions

If you wish to ask further questions of the teams involved in this project, please contact Stephen Rinsler (steverinsler@elupeg.com), or Beatriz Royo (broyo@zlc.edu.es).

The SELIS website is https://www.selisproject.eu/

5 References

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