Clusters 2.0

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D1.1

Market & Business Ecosystem Analysis

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Abbreviations and Acronyms

Acronym	Definition
CluCS	Cluster Community System
CPG	Consumer Packaged Goods
EC	European Commission
FMCG	Fast Moving Consumer Goods
FF	Freight Forwarders or Forwarders. They organise the entire transport chain integrating services of different LSPs; their business is not based on physical assets but rather on information, knowledge and partners network. Sometimes include specific LSP own-offer
GA	Grant Agreement
LL1	Living Lab 1. Refers to the Living Lab focused on the Cluster Community System, initially focused at Bologna and Trieste places
LL2	Living Lab 2. Refers to the Living Lab focused on the Clusters Network Integration Platform, focused on the CargoStream platform
LL3	Living Lab 3. Refers to the Living Lab focused on the NMLU and handling technologies
LSP	Logistic Service Providers. LSPs are intended as focused on asset-bound services providers: carriers for the various modes, handlers, warehouses, …
NMLU	New Modular Logistics Units
PO	Project officer
PTN	Proximity Terminal Network
VAS	Value Added Service providers
WP	Work Package

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Executive Summary

Logistics clusters become value creators for the regions where they are formed, where a mix of good intermodal connections, logistics platforms and large freight volumes are in place. Well-established logistics clusters still do not leverage their full potential in terms of competitiveness and sustainability for the European industry and society, due to several reasons:

- Not enough coordination between the local actors in the cluster,

- Not enough connectivity and coordination between European logistics clusters to maximise the full network potential of the clusters and related hubs.

Moreover, logistics clusters also need to deal and minimise negative impacts such as congestion, noise, land use and local pollution.

Following the main project objective that is to enhance the competitiveness and sustainability of the Clusters, a lot of effort is needed to make them aware of new possibilities and concepts, including enabling them to take part in Clusters networks and corridors' flows. Below figure shows the different outcomes expected from the project.

The present version of deliverable D1.1 introduces a first analysis and preliminary insights into the Market and Business Ecosystem for the project's exploitable foreground. Therefore, the document first collects and assesses market situation, problems faced, capturing trends in the marketplace, potential competitors, detected preliminary barriers and introduces a set of scenarios as part of the market analysis, and potential sociotechnical and economic opportunities as well as other business topics, focusing on the main project results:

- Clusters Community System (CluCS)

- CargoStream

- New Modular Logistics Units

1. Introduction

1.1 Purpose of Document

This document provides the initial Market & Business Ecosystem Analysis of Clusters 2.0 project. Its aim is to provide an analysis of current approaches and solutions addressing Clusters 2.0 challenges and estimation of the potential market for Clusters 2.0 technologies and services. It includes an analysis of the current stakeholders' business models, their relationships, their roles and their evolution in the "to be" Clusters 2.0 ecosystem.

The document is based on the status of the project and vision of the outcomes during the first year of Clusters 2.0. As the developments and vision of the outcomes evolves acording the living labs adopts and evaluates it, as well as the business context (including barriers, competing business, legal aspects and so on), the document will evolve accordingly. *D1.1 Market & Business Ecosystem Analysis* will be revised, extended and completed by the D1.2 Business Models Innovation (M24) and D1.3 Business Models Innovation at the end of the project (M36). The Clusters 2.0 project exploitation strategy is explained in D1.4 Exploitation Handbook (M12) and D1.5 Final Exploitation plans (M36), including exploitation different strategies for different Clusters 2.0 partners: industrial, academic and stakeholder.

The document is structured in 3 sections (section 2, 3 and 4) corresponding to each of the main outcomes of the project. For each outcome the below analysis structure has been followed:

- Business Cases Overview
- Business Ecosystem Analysis
- Market segmentation
- Target market
- Competitive analysis
- SWOT analysis

An additional section for conclusions (section 5) follows the analysis sections.

1.2 Methodology

Market Opportunity Analysis (MOA) is a step-wise method to assess the market potential of a product or service and to provide scenarios that can lead to market strategies. It consists of four steps: value chain/value network analysis, competitive analysis, market segmentation, and scenario development. It is a methodology designed to be a guide in a mostly qualitative research into the market potential(s) of a product or service. It describes the markets or ecosystem(s) in which the product or service can be placed, while providing insight into strategic choices that need to be made.

Regarding Business ecosystem the analysis is based on "The Business Model Canvas"[1]. The Clusters 2.0 consortium has agreed to use the "Business Model Canvas", a template that

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helps to clearly and simply define and develop the business model in all its categories. According to the most common definition, a business model is the first step that has to be undertaken in order to be able to create a business able to create value, and, therefore, produce monetary revenue to its owners. In fact, the economists sustain that the success of an innovative product in the service market strictly depends on the quality of its Business Model (BM).

The Business Model Canvas, Alex Osterwalder & Yves Pigneur.
https://strategyzer.com/books/business-model-generation

2. Cluster Community System (CluCS)

This chapter provides an initial analysis of the business ecosystem and market targeted by the Cluster Community System (CluCS) developed in WP2 and piloted in LL1. The background for the analysis is constituted by the initial concepts provided in Deliverables D2.1 and D2.2 and by the LL1 scoping document (Deliverable D5.2.1).

2.1 Business Cases Overview

The following Table 1 provides an overview of the Business Case, i.e., the rationale for developing CluCS from a business point of view. This Table constitutes the starting point for business ecosystem analysis and market analysis.

Table 1 Cluster Community System (CluCS) - Business Case summary

Target Market Sector and Client profile
Market sector: *Logistic services demand and offer in the Cluster area.* CluCS potential customers are all companies moving goods through the cluster's network of ports and terminals (Proximity Terminal Network). The market is not characterised by the type of cargo: potentially all goods moving through the Clusters are target of the CluCS services. The market characterisation is geographical: customers are to be found among companies moving cargo in the Cluster area. CluCS can be defined as a "physical platform", as it offers services strictly related to physical facilities (PTN) and within defined geographical boundaries. This is an innovative approach compared to existing platforms to match logistics services demand and offer. These are "virtual platforms" as they normally operate on global level regardless of where terminals and facilities are located. In the LL1 the interested geographical area is between Bologna and Trieste, with the related PTN infrastructures and facilities.
Market size: Following the definition of CluCS as a "physical platform" focused on geographical proximity, any kind of port (sea, inland, airport) are potential part of the market
Client profile: *Shippers, Logistic Services Providers and Freight Forwarders active in the Cluster* The targeted clients are LSPs and shippers of various sizes: - For SMEs, mostly having none or very limited ICT systems, CluCS provides an opportunity to digitise their transport chain making them more competitive.   - For large companies, that mostly have their own transportation management systems, CluCS will have to be integrated with such systems. Therefore the cost of integration will have to be minimised and clearly outweighed by CluCS tangible benefits.   Inside each company, the target users to be addressed are the individuals who have decision-making power on planning and acquiring logistic services for goods moved in the cluster.
Problem to solve and business opportunity
Problem to solve: *Lack of coordination among logistic services providers operating in the Cluster network of hubs, terminals and infrastructures,* leading to the following problems: - underutilised terminal capacity by shippers, both handling and storage areas;   - lack of synergies among terminals and hubs in the network to develop common value-added services,   - limited volumes to implement fully efficient intermodal transport connections from Cluster's hubs to key external destinations;   - lack of synchronised operation of transport and logistics services at Cluster level, limiting responsiveness and increasing delays and waiting times at nodes;

- higher costs due to missing consolidation of shipments and under-optimised load factors.

Business opportunity: Based on the analysis carried out in WP2, it can be observed that there are currently in Europe favourable political and socio-economic conditions to the creation of logistic Clusters, opening up opportunities for CluCS application:

- Aggregation of terminal networks, on regional basis or cantered on key hubs, to better organize intermodal flows (e.g., RailPort in the Gothenburg area, Brabant Intermodal, HIL Proximity Terminal Network between Bologna and Parma).
- Initiatives aiming at Europe-wide coordination of terminals, such as the Inland Links platform promoted by the Port of Rotterdam to increase intermodal connections between inland terminals and contained ports.
- National policies to strengthen the role of ports as central hubs for the aggregation and coordination of terminal networks in the port hinterland, as implemented by the Italian Government with the recent Decree no. 169/2016 which creates "Port Network Authorities".

Value Proposition / Solution

Value Proposition: *Better co-ordination and optimisation of logistic resources and infrastructures in the Cluster.* CluCS enables collaborative booking and planning of transport, handling and value-added services in the Cluster. For the target customers, this produces the following benefits:

- Reduced logistics costs, due to consolidation of shipments on Cluster or Terminal Network level allowing a better use of available capacity;
- Shorter lead times, due to synchronised multimodal solutions with a comprehensive transport lead-time up to a of 20% less than the all-road option;
- Increased volumes, as terminals, warehouses and related services will be immediately accessible to shippers allowing them to increase usage of these logistic resources;
- Increased reliability, due to visibility and monitoring functions on Cluster level that will allow to pre-emptively handle any delay or problems.

Solution: *The Cluster Community System (CluCS) is an IT platform enabling integrated management of the Cluster available resources and the synchronisation of operations in the Cluster network of hubs, terminals and warehouses.*

CluCS provides functions on three main levels:

- *Planning.* Shippers can search for, visualise and book transport and logistic services for their needs, while logistic services providers (including carriers, terminal and warehouse managers, etc.) can publish and make their services available to the widest potential audience, receiving bookings from customers. Planning is integrated vertically and horizontally, to maximise load factors and to coordinate bookings with under/above-standing transport chain sections (e.g., intermodal connections entering or leaving the Cluster).
- *Execution.* Logistic services providers can perform planned operations through real time adaption to supply chain conditions. Furthermore, CluCS enables cargo bundling at cluster level, integrating transport services with terminal operations and value-added logistics services.
- *Monitoring*. Monitoring functions support dynamic planning and execution, by: (i) providing a constantly updated picture of the status of services and resources within the Cluster, and (ii) notifying promptly unexpected events to allow real-time adaptation of booked services to avoid delays, disruptions and unplanned costs.

Needs vs. Solution

Target User needs	Solution's benefits
Access logistic services in the Cluster (Shippers, Forwarders) - Faster, cheaper and more reliable; - Increase load factors and warehouse capacity utilisation.	- CluCS provides companies with a single-entry point to book and plan services and infrastructures in the Cluster, integrating and synchronising transport, handling and related value-added services in a seamless way.
Provide services to Cluster users (LSPs, Forwarders) - Optimising capacity utilisation; - Including new value-added services.	- Consolidation of shipment on Cluster level allows a better use of available capacity; - Value added services are integrated with transport (e.g. co-packing and shipment consolidation, late product differentiation, assembling and testing, logistics process tracking, vehicle load factor optimisation, last mile

		optimisation and connections with cities, single booking window).
Increase intermodal transport share (LSPs, Forwarders) - Shift cargo from road to other transport modes inside the Cluster. - Bundle cargo to enable long-distance rail connections from and to the Cluster's hubs.	-	CluCS enables planning, execution and monitoring of integrated intermodal transport services with enhanced performances, competitive with all-road solutions.

Solution cost effectiveness

This part will be completed in next iterations based on impact assessment results.

Positioning on the market

Competitor 1: *Booking platforms and transport marketplaces*

- There are various booking platforms for truck services, but they do not exist for rail <to be verified with some more details>.

- Marketplaces (e.g., Transporeon).

- Extended Port Community Systems. There are various large ports and terminals with installed "Community System" platforms. Some of them have been (or can be) extended to offer services on cluster level (e.g., large ports in Spain and the Netherlands).

Competitor 2: *Large logistic services providers own booking platforms*
e.g., DHL

Competitive advantage

Relevant features	Booking platforms and transport marketplaces	Large LSPs own booking platforms	CluCS
Cost	Low (but on individual services only) Single services can be booked at lower prices due to competition inside the marketplace.	Higher In general no competing services are offered, which rises the price. Few large LSPs offer integrated end-to-end services (to be verified).	Lower Being optimised on PTN level, by those owning the facilities, the services are integrated and cheaper.
Booking of integrated services on cluster level	No Only individual services can be booked.	No Integrated booking is possible only for the part of the transport chain directly controlled by the LSP.	Yes The Cluster different services, including value-added ones, can be integrated and booked simultaneously.
Monitoring of services execution on cluster level	No Only individual services can be monitored.	No Monitoring is possible only for the part of the transport chain directly controlled by the LSP.	Yes Services can be monitored and tracked on cluster level.

Technology readiness requirements

Goal is TRL 7 - System prototype demonstration in an operational environment. As part of the technology developments are based on CargoStream outcomes, the expected level is related to the CargoStream one.

Other requirements

There are governance being currently considered. For instance: who sells the services? On account of whom?

2.2 Business Ecosystem Analysis

2.2.1 Key stakeholders in the business ecosystem

The following Table 2 lists the key stakeholders in the symbiotic network of logistics clusters business case. These are the organisations playing a key role in the application of the new solution to achieve the benefits described above in Business Cases Overview. For each stakeholder the Table highlights its role in the solution's value chain, i.e., which of the stakeholder's activities are essential for the solution to deliver value according to its expected benefits. Other activities, not related to the solution's application, are excluded from our analysis.

Table 2 Key stakeholders in the Cluster Community System business ecosystem

Symbiotic Network of Logistics Clusters		
Stakeholder type	**Role in the value chain**	**Partners / External stakeholders**
Shippers	Move and store goods using the Clusters logistic resources and services. Responsible for: - Providing shipment demand data to the platform. - Planning and booking shipments using services available through the platform.	Procter & Gamble
Logistic services providers	Organise and execute transport and logistic services for the shippers. Responsible for: - Providing services data to the platform. - Performing transport and logistic services, including different modes of transport, unloading, unloading, transshipment, cross-docking, reverse logistics and new value-added services.	Trieste Inland Terminal, Captrain, Interporto Servizi Cargo
Forwarders	Plan and integrate services to provide complete logistic solutions to shippers. Responsible for: - Matching services demand and offer on the platform. - Planning and managing intermodal services for bundled flows from different shippers.	ASPT-ASTRA, Parisi

2.2.2 Stakeholders business models and their potential evolution

The current business models of the above-identified stakeholders are presented in the following using the business model canvas. To simplify the presentation:

- the business model elements shown in the canvas are only those that are relevant to the Cluster Community System solution;
- a colour code has been used to highlight the kind of impact the new solution has on each business model element:

o gray elements are not substantially affected by the solution;
o blue elements are those that the can be changed if the solution is implemented (direct impact);
o green elements are those that require further strategic decisions to be changed, in addition to implementing the solution (complementary impact).

Shippers

The current business model of Manufacturers is represented in Figure 1 canvas, showing only the elements that are relevant to the Cluster Community System business case.
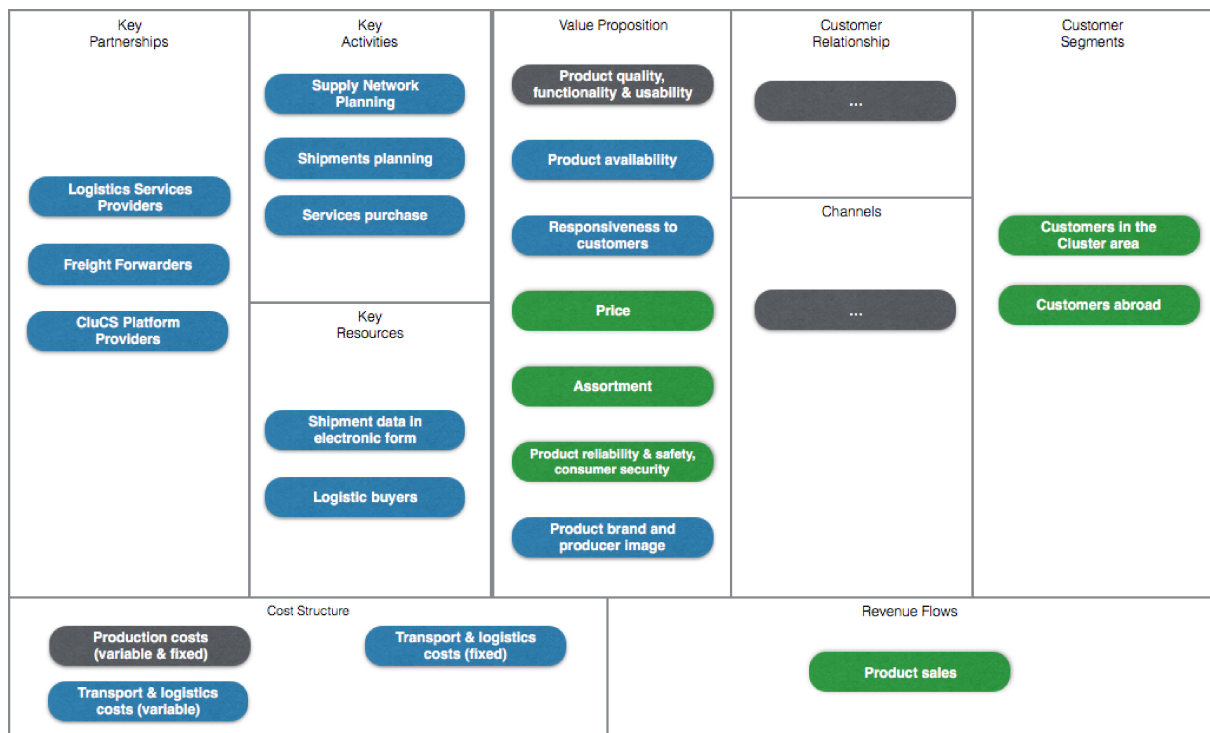

Figure 1 Shippers current business model

Unaffected elements

The following business model elements are not substantially affected by CluCS adoption.

Category	Unaffected Elements	Motivation
Value proposition	Product quality, functionality & usability	These aspects concern R&D and product development activities.
Customer Relationship	All	The potential logistics improvement through the solution does not change or create new types of customer relationship.
Channels	All	The potential logistics improvement through the solution does not change or create new channels for customer engagement.
Cost structure	Production costs (variable & fixed)	The potential logistics improvement through the solution does not impact on the cost for supply, manufacturing and production infrastructure.

Direct impact

The following business model elements are directly affected by CluCS adoption.

Category	Directly impacted Elements	Motivation
Value proposition	Product availability Responsiveness to consumers Product brand and producer image	The solution has the potential to improve customer service level, increasing product availability and responsiveness to demand changes. Also, the product brand and producer image can be improved and promoted by adoption of more environment-friendly transport solutions.
Key activities	Supply Network Planning Shipments planning Services purchase	The solution impacts on: - strategic planning level, where the network can be redesigned and new terminals and services involved; - operational planning, where shipments and loads have to be planned through CluCS; - purchasing of logistic services, that will be transferred on the CluCS platform.
Key resources	Shipment data in electronic form Logistic buyers	The company has to invest in: - Making available shipment request and order data in electronic form, where possible through automated exchanges with CluCS. - Training logistic buyers that will have to request, purchase and monitor services through CluCS.
Key partnerships	Logistics Services Providers Freight Forwarders CluCS Platform Providers	- The adoption of CluCS by Shippers requires LSPs and Forwarders to be present on the platform, adopting the same system. - At least one third-party service provider is required to run and manage the CluCS platform for all users in the Cluster.
Cost structure	Transport & logistics costs (variable) Transport & logistics costs (fixed)	Giving access to more services options, including cargo bundling and integration of different providers, the transport direct costs should be lowered. The fixed logistics costs can also be affected (e.g., warehouse facilities rental and management costs).

Complementary impact

The following business model elements are affected by CluCS implementation, but the solution is not sufficient by itself to change them. Other investments have to be implemented to actually change those elements. Therefore, the solution is judged complementary to other strategic decisions.

Category	Impacted Elements	Motivation
Value proposition	Price Assortment Product reliability & safety, consumer security	The solution has the potential to impact on prices, reducing costs, to increase the range of products offered, and to reduce risks to safety and security. But these elements depend on strategic decisions taken by marketing and product management, primarily. CluCS can complement these wider strategies but they are not a primary motivator for such decisions.
Customer segments	Customers in the Cluster area Customers abroad	The solution can help redesigning the supply network to acquire new customers that previously where harder to reach. These new customers can be in the Cluster area or abroad, as CluCS makes available new connections to potential markets. But the choice to enter new market segments depends on strategic planning and supply network investments, CluCS by

		itself having only a complementary impact on such decisions.
Revenue flows	Product sales	Being able to ship more efficiently, CluCS can support increase in sales. However, to significantly grow revenues requires further investments in production and marketing, NMLUs by themselves having only a complementary impact on such decisions.

Logistic Services Providers

The current business model of Logistic Services Providers is represented in Figure 2 canvas, showing only the elements that are relevant to the Cluster Community System business case.
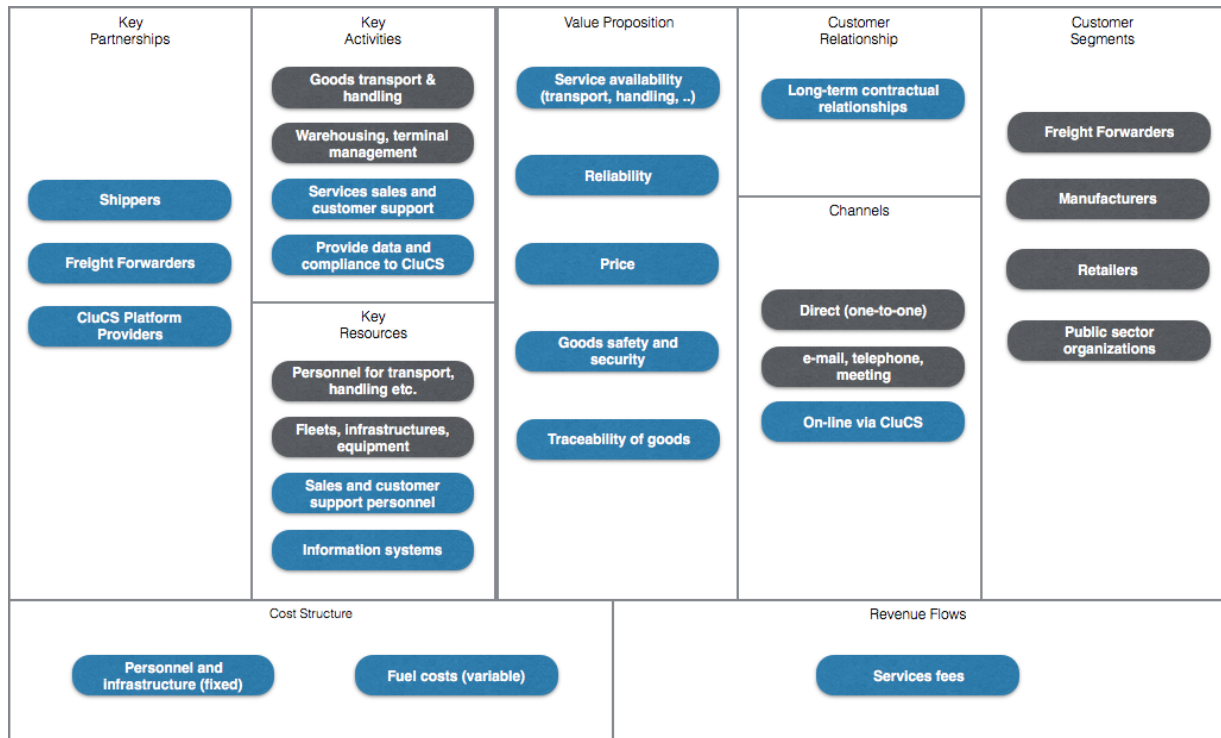

Figure 2 Logistic Services Providers current business model

Unaffected elements

The following business model elements are not substantially affected by CluCS implementation.

Category	Unaffected Elements	Motivation
Key activities	Goods transport & handling Warehousing, terminal management and other services (e.g., cross-docking, packaging, postponed assembly...)	CluCS does not directly impact on physical operations.
Key resources	Personnel for transport, handling and warehousing operations Fleets, infrastructures, equipment.	CluCS does not directly impact on physical assets.
Channels	Direct one-to-one e-mail, telephone, meeting	The potential logistics improvement through the solution does not affect the traditional commercial channels.
Customer segments	Freight Forwarders Manufacturers Retailers Public sector organisations	The potential logistics improvement through the solution does not change the LSP's target segments.

Direct impact

The following business model elements are directly affected by NMLU and cluster handling technology implementation.

Category	Directly impacted Elements	Motivation
Value proposition	Service availability (transport, handling, warehousing etc.) Reliability Price Goods safety and security Traceability of goods	CluCS will make the LSP services more visible and accessible to shippers in the CluCS. Monitoring and dynamic planning functions will improve reliability, safety and security, and will enable traceability. Bundling and efficiency recovery can reduce the overall cost of services, opening up opportunities for price-based competition.
Customer Relationship	Long-term contractual relationships	There may be potential changes on customer relationships, that are traditionally based on long-term contractual agreements. CluCS might favour shorter term contracts.
Channels	On-line via CluCS	CluCS is a new on-line channel for customer acquisition.
Key activities	Services sales and customer support Provide data and compliance to CluCS	The solution impacts on: - Sales and customer relationships activities, that are in part performed via CluCS; - Information provision and data management activities, which have to be compliant to CluCS.
Key resources	Sales and customer support personnel Information systems	The company has to invest in: - Making available services data and manage orders via CluCS, where possible through automated exchanges with own systems; - Training sales and customer support personnel on CluCS.
Key partnerships	Shippers Freight Forwarders CluCS Platform Providers	- Shippers and Forwarders are key partners of LSPs and they should be present on the platform, adopting the CluCS system. - At least one third-party service provider is required to run and manage the CluCS platform for all users in the Cluster.
Cost structure	Fuel costs (variable) Personnel and infrastructure (fixed)	Through bundling and increased handling efficiency, the solution should reduce the direct variable costs of services, in particular fuel costs. Personnel and ICT infrastructure costs can also be impacted (impact to be evaluated).
Revenue flows	Services fees	CluCS has the potential to increase sales.

Freight Forwarders

The current business model of Freight Forwarders is represented in Figure 2 canvas, showing only the elements that are relevant to the Cluster Community System business case.
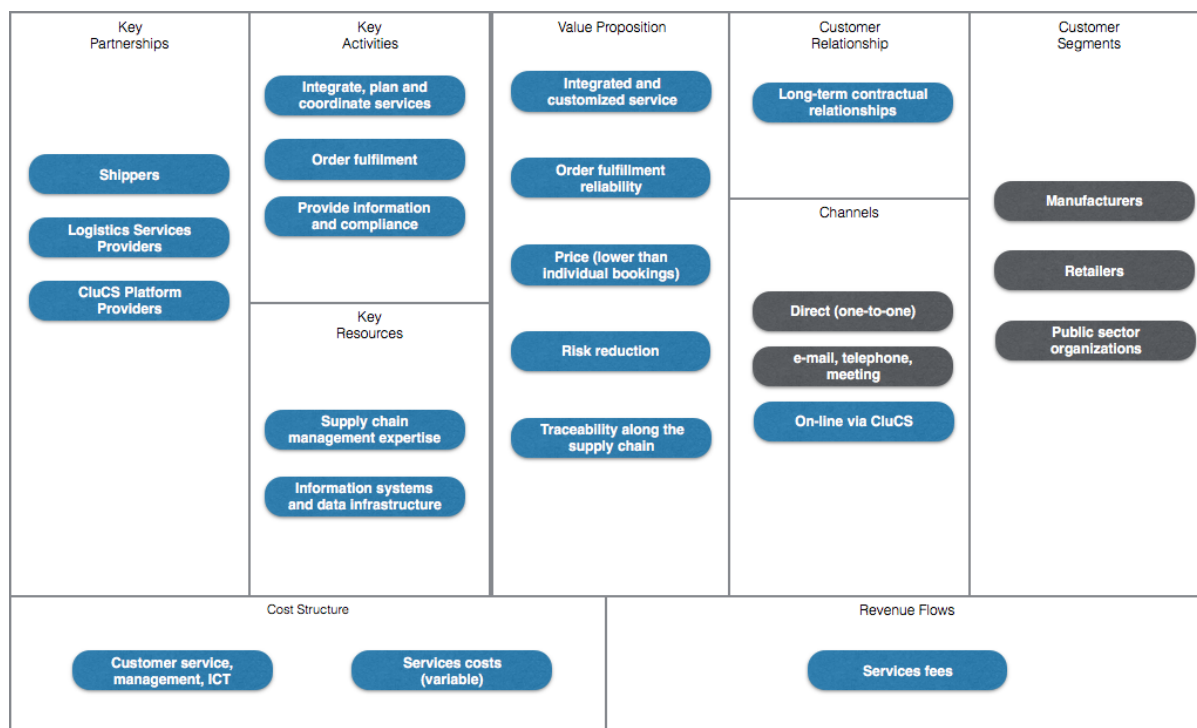

Figure 3 Freight Forwarders current business model

Unaffected elements

The following business model elements are not substantially affected by CluCS implementation.

Category	Unaffected Elements	Motivation
Channels	Direct one-to-one e-mail, telephone, meeting	The potential logistics improvement through the solution does not affect the traditional commercial channels.
Customer segments	Manufacturers Retailers Public sector organisations	The potential logistics improvement through the solution does not change the Forwarder's target segments.

Direct impact

The following business model elements are directly affected by CluCS implementation.

Category	Directly impacted Elements	Motivation
Value proposition	Integrated and customised service Order fulfilment reliability Price Risk reduction Traceability along the supply chain	CluCS will open up new opportunities to integrate logistic services. Forwarders can exploit the system to offer better and more customised solutions to their customers. Monitoring and dynamic planning functions will improve reliability, safety and security, and will enable traceability. Bundling and efficiency recovery can reduce the overall cost of services, opening up opportunities for price-based competition.

Customer Relationship	Long-term contractual relationships	There may be potential changes on customer relationships, that are traditionally based on long-term contractual agreements. CluCS might favour shorter-term contracts.
Channels	On-line via CluCS	CluCS is a new on-line channel for customer acquisition.
Key activities	Integrate, plan and coordinate services Order fulfilment Provide information and compliance	The solution impacts on: - Selection and coordination of logistic services providers, that can be searched and planned via CluCS. - Operational planning, where CluCS provides data and functionalities. - Information provision and data management activities, which have to be compliant to CluCS.
Key resources	Supply chain management expertise Information systems and data infrastructure	The Forwarder has to invest in training key personnel on the CluCS planning and monitoring functions, to take advantage of the innovation. The information systems also should be adapted and integrated with CluCS.
Key partnerships	Shippers Logistics Services Providers CluCS Platform Providers	- Shippers and LSPs are key partners of Forwarders and they should be present on the platform, adopting the CluCS system. - At least one third-party service provider is required to run and manage the CluCS platform for all users in the Cluster.
Cost structure	Service costs (variable) Fixed costs for customer service, management, ICT, administration and immaterial infrastructures in general.	Through bundling and increased efficiency, CluCS should reduce the direct cost of services spent for any individual customer. Customer services, management and ICT infrastructure costs can also be impacted (impact to be evaluated).
Revenue flows	Services fees	CluCS has the potential to increase sales.

2.2.3 Hypotheses on business ecosystem evolution

Based on the above-indicated impact on current stakeholders Business Models, the following Table lists the main hypotheses on the business ecosystem evolution. These hypotheses have to be validated in the next project iterations, by answering the relevant business questions as listed in the table.

Hypothesis	Description	Business questions
CluCS must be operated by a neutral third-party implementing a new ad-hoc business model.	For building a synergy of transport and logistics activities at the Cluster level a collaborative business model is needed. This should be based on the two-levels Proximity Terminal Network (PTN) concept defined in WP2 (D2.2). These potential new business models are described in Annex 7.1, but in general they require a coalition between terminals currently competing to each other. The coalition is coordinated by a neutral party equipped with CluCS, e.g., a 4PL	- Who will act as neutral third-party operating the CluCS for the stakeholders in the cluster? - A 3PL/4PL already operating in the area? - A new organisation? - A public-private partnership? - Some other entity? - If a new organisation is foreseen, either a private player or public-private partnership, which revenue flows will sustain it, and how will these impact on the existing stakeholders cost structure? - Will this new organisation compete with the existing forwarders/3PL services?

	having the expertise and skills for building and maintaining this collaborative network.	
Acceptance by shippers.	Shippers will adopt CluCS to publish their logistic services request, to find and purchase integrated solutions and to plan and monitor services execution.	- Which tangible and quantifiable advantages are there for shippers in terms of: customer service, brand image, costs reduction? - Which is the total cost of ownership for shippers in terms of: data integration, operations adaptation, operating costs to work on CluCS?
Logistics Services Providers acceptance.	LSPs will adopt CluCS to publish their services availability, to receive orders and to provide monitoring data.	- Which tangible and quantifiable advantages are there for LSPs in terms of: customer service, revenue increase? - Which is the total cost of ownership for LSPs in terms of: data integration, operations adaptation, operating costs to work on CluCS?
Freight Forwarders acceptance.	Forwarders will adopt CluCS to organise intermodal transport for their clients, to deal with LSPs, to plan and monitor activities along the chain.	- Will forwarders active in the cluster accept the CluCS (and the neutral party operating it) or will they perceive it as unfair competition? - Which tangible and quantifiable advantages are there for forwarders in terms of customer service and revenue increase? - Which is the total cost of ownership for forwarders in terms of: data integration, systems and operations adaptation, operating costs to work on CluCS?

2.3 Market segmentation

In general, the process of market segmentation involves segmentation of the market into typologies, i.e. traffic that behaves in similar patterns. Then, it is needed to analyse these typologies and find the most suitable freight segments from perspective of transport density. Thirdly, the highest density segments are analysed to find the types of freight with highest shifting potential.

Specifically, to have a strong interlinking between Clusters (from the aspect of freight flow intensity) we need to have an efficient collection and distribution between Clusters at both ends of long-distance corridors. One important component is building an intra-cluster collaborative PTN concept which is elaborated in the previous section. This concept should provide flow density on corridors interlinking Clusters. However, besides inter cluster corridor density, additional economic principle which will justify the general Clusters 2.0 idea is freight uniformity. This principle highlights the need for uniformity of shipments or some form of standardisation (palletised, containerised or placed in NMLUs). From this assumption we may assess target market segments.

2.4 Target market

Proposed cooperative business models represent potential cooperation forms which can fulfil the task defined on the beginning of the work: Collaboration and synergy within the cluster to generate enough for freight flow forwarding to railway transport mode between the clusters.

Full functionality of the proposed solutions depends on specific Cluster's market characteristics. As it is mentioned in previous chapter, it is needed to assess the targeted goods categories, its origins and destinations and its potential to be shifted to intermodal rail. Therefore, it is needed to assess relevant industry sectors in the Cluster's specific areas. Then it is needed to identify the commodity categories with the highest potential for new rail intermodal service based on suitability of specific goods for rail intermodal transport.

In general, every full truck load carried between locations within the market areas of PTN can be considered as a potential market segment for a new PTN concept design and rail intermodal mode out of the Cluster. Of course, this depends on the total logistical costs of rail intermodal versus uni-modal road taking also into account the value of time and other relevant criteria.

Containerised hinterland transport represents also a target market segment of proposed solution. Goods packaged in overseas (ISO) containers have a high potential for modal shift. Competitiveness lies in the fact that no additional transhipment is necessary compared to road haulage in the seaport. The hinterland transport of ISO containers is less time-sensitive than continental intermodal transport due to the total length of the maritime transport chain. Of course, this is true as long as containers are on the maritime link. However, as soon as they are transhipped on land the urgency suddenly becomes high. A solution to change the perception could be to include rail as part of the maritime/port handling to transport to an inland (port) terminal as extended gateway.

Another market segment with high shifting potential concerns the heavy goods - solid or liquid. This class includes typical containerised bulk such as chemicals in tanks, paper, metal or other containerised bulk goods. In the case of chemicals in tank containers it is important to minimise empty return trips. Round trips of intermodal transport units represent essential prerequisite for establishment of new intermodal service. Intermediate solution could be based on a system optimisation where the return trips of the empty units could be the market for rail and the loaded and more time sensitive units could be a dedicated road market.

Another market segment that should become reachable includes those goods with high logistics requirements in terms of organisation, reliability and punctuality. Seamless, robust PTN orchestrated by a 4PL empowered by CluCs should satisfy these requirements. Examples of these goods are time sensitive supply chains in the automotive industry parcel service or groupage consignments.

Temperature-controlled goods represent a market segment which also has a potential for modal shift. However, besides an efficient transport chain in organisational aspect, a necessary requirement is the appearance of feasible rail options for temperature-controlled cargo as well as appropriate equipment in terminals. Again, the problem may exist in return flows.

In case of international intermodal transport conditions in each country need to be evaluated in order to assess the potential for proposed collaborative concept and for the proposed measures to promote establishment of proposed collaborative relationships.

2.4.1 Market Characteristics

When we assess market characteristics within and between Clusters in general we have to emphasise main requirements from shipper's point of view: low cost, high reliability, flexibility, low lead time and full visibility of shipments during their flow from point of origin (within Cluster of origin) to the point of destination (within the Cluster of destination).

In general, the developed system must produce better cost-quality ratio. In other words, we do not seek higher quality and lower costs (improvement in quality may sometimes lead to higher costs) but, rather, to achieve a substantially better cost-quality ratio. Within the Cluster, this ratio should be improved by efficient handling strategy (this depends on the mode options used in PTN) with the aim to minimise shipment handlings and connection times.

The quality considers the following criteria:

1. Lead time decreased. The shipper needs products at his disposal as soon as possible. Faster circulation time also implies less transport equipment and load units. Shorter terminal times influence on increased transport radius and therefore on market area expansion.

2. Higher transport frequencies imply reducing waiting times for freight, required stack facilities at terminals as well as rental cost savings of shippers.

3. Higher reliability is vital for reduction of buffers and it is therefore directly related to costs.

4. Increased flexibility is needed, especially for capacity adjustments in time and space.

5. Suitable operation times between the actors within Cluster reduce interconnections between subsequent links and optimise terminal efficiency.

6. Visibility - end to end visibility enables proactive redesign of freight itinerary, synchromodality concept and shipper's satisfaction.

For this to be realised we need a synergy between 'orgware' (business and governance models), software (ICT infrastructure) and hardware (NMLUs) solutions supported by a stimulative legislative framework which will be fully followed by national authorities. Regarding the situation within the Cluster, proposed business models based on a innovative freight flow bundling strategy supported by PTN design should satisfy main shipper's requirements.

2.4.2 Market Size

Logistics clusters represent an area of economic market opportunity where business is increasingly expanding in a variety of industry segments - from finance to manufacturing to

distribution[2] (Kosk, 2013). Transport, logistics and distributive activities in Clusters are performed by various actors. Market size of logistics cluster is represented by all the actors of transport because of the variety of services that could be provided in terms of infrastructures, superstructures and related services.

If we focus on intermodal terminal network in proximity of clusters, considering that they play fundamental role in routing goods we may list following factors influencing the potential market coverage of PTN:

- Economic potential of the region and its area of influence;
- Class of terminals in PTN (main port, international, national, local) influences on geographical coverage, volume, and capacity;
- Characteristics of freight flows and types of bundling networks in PTN - bulk terminals, transfer, distribution or hinterland terminals;
- The price/quality ratio provided by terminal;
- Terminal accessibility - regional connectivity (transport infrastructure) of terminals;
- Environmental issues - external effects which are better incorporated into prices will relatively decrease the competitiveness of unimodal road transport.
- Regulation - over regulation restricts transport network integration;
- Location of terminal within the cluster - For example, in port regionalisation, satellite terminals have lower market coverage 10-20 km, whereas inland terminal cover 50-60 km.

2.4.3 Market growth and trends

Market growth and trends is significantly influenced by socio-economic trends. The economic development in next period will influence on re-chartering of transport chains and shifting trade volumes toward emerging markets. Regarding the modes of transportation, it is impossible to reduce the share of road transport in the short term because it is responsible for approximately 80% of inland transport. Currently, there are capacity challenges, especially in rail transportation which will become even stronger in future, having in mind permanent growth of freight flows expected. Regarding the rail intermodal the trend for increasing demand is evident (Figure 4).

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[2]

Logistics Clusters: The Next Hub of Environmental Innovation. Natalia Kosk, 2013. Available at: https://www.sdcexec.com/warehousing/article/10851246/logistics-clusters-the-next-hub-of-environmental-innovation
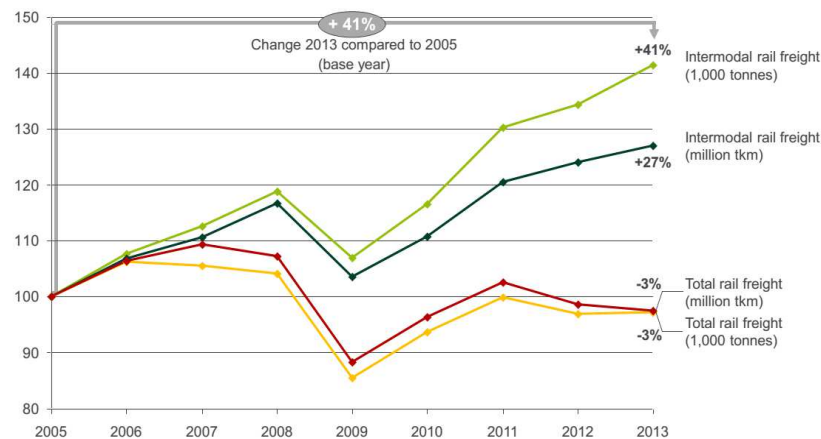
Figure 4. Rail market development[3]

Maritime intermodal transport represents an important generator of flows on future clusters network. Regarding containerised hinterland transport, its development is closely related to the development of container throughput at major seaports. Sufficient capacity of hinterland corridors and reliable services are extremely important for establishing strong links between logistics clusters in EU. The medium trend growth perspectives for container handling in EU seaports will remain positive. Next figure highlights the main needs of hinterland transportation.
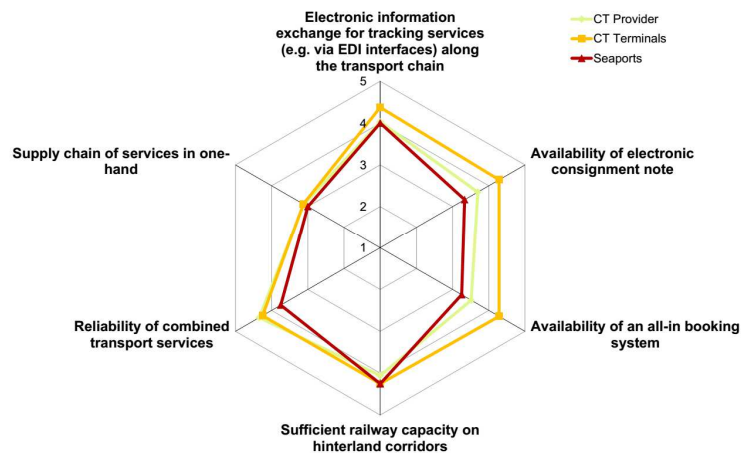
Figure 5. Assessment of main operational needs of hinterland transportation[3].

In general, transported good in future will become lighter and of higher quality, while their lot sizes will become smaller. This will call for customised transport as well as individualised and flexible production process. Logistics and transport operators can tackle these challenges with greater flexibility and it is likely that logistics clusters will be designated to operate for much shorter time frame. In that respect, regarding the FMCG and automotive

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3

UIC, 2014. 2014 Report on Combined Transport in Europe, ISBILLION 978-27461-2378-6. Available at: https://uic.org/IMG/pdf/2014_report_on_combined-transport_overview.pdf

industries the same trend exists and comes from initiatives for development of green transport options reflected in improved transit times and infrastructure developments. It is expected that the market for rail intermodal will continue to gain around, also in industries other than FMCG and automotive.

Also, regarding break bulk cargo, it is expected that 90% of this cargo will be transported in containers. Increasing of fuel prices (among the other factors) could speed up the markets transition from break bulk to container shipping.

2.5 SWOT analysis

Following tables present SWOT analysis for collaborative models presented in Section Stakeholders business models and their potential evolution.

Table 1. SWOT analysis about horizontal cooperation form

Strengths	Weaknesses
Cost efficient consolidation of freight flows in PTN. Higher utilisation of available transport and storage capacities.	Increased cost due to freight consolidation. Capacity problems can happen.
Opportunities	**Threats**
Access to new cargo volumes.	Misalignment of interests of collaborating parties.

Table 2. SWOT analysis about vertical collaboration model

Strengths	Weaknesses
Cost efficient consolidation of freight flows in PTN. Higher utilisation of available transport and storage capacities. Sustainable business network	Increased cost due to freight consolidation. Capacity problems can happen. Increased cost of coordination due to increased number of partners. Limited applicability dependent on intensity of flows within PTN.
Opportunities	**Threats**
Access to new cargo volumes. Shifting traditional road-based market segments to rail intermodal transport. Increased market share of rail transport.	Number of actors in cooperative network. Higher risk of misalignment of interests of collaborating parties.

3. Clusters Network Integration platform (CargoStream)

This chapter provides an initial analysis of the business ecosystem and market targeted by the Clusters Network Integration platform (CargoStream) developed in WP3 and piloted in LL2. The background for the analysis is constituted by the initial specifications of the new technologies, as provided in Deliverables D3.1 and D3.2 and by LL2 scoping document (Deliverable D5.3.1).

3.1 Business Cases Overview

The following Table 3 provides an overview of the Business Case, i.e., the rationale for developing CargoStream from a business point of view. This Table constitutes the starting point for business ecosystem analysis and market analysis.

Table 3 Clusters Network Integration platform (CargoStream) - Business Case summary

Target Market Sector and Client profile
Market sector: Consumer goods, which are goods which are intended for everyday private consumption, mainly in Fast Moving Consumer Goods sector
Market size: Trade in goods between EU Member States (intra-EU trade) was valued — in terms of exports — at EUR 3347 billion in 2017. This was 78 % higher than the level recorded for exports leaving the EU-28 to non-member countries of EUR 1879 billion (extra-EU trade)[4].
Client profile: *Large shippers of CPGs*   The CargoStream users are innovative and entrepreneurial companies with an open mindset towards collaboration, sustainability and intermodality. They are large shippers, e.g., CPG manufacturers, who have transportation flows, which are above 600 kilometres in an open network.
Problem to solve and business opportunity
Problem to solve: *Enable horizontal supply chain collaboration*   Global supply chains face huge challenges in terms of environmental sustainability, reliability (e.g., congestion, truck driver shortages), service level, inventory and costs reduction. Horizontal collaboration between supply chain stakeholders answers these challenges, enabling: - Load optimisation and empty km reduction,   - Modal shift, moving transportation from road to rail or inland waterways.   Currently volumes are not large enough to scale up horizontal collaboration on industrial level. This is the challenge addressed by the CNI platform.   Business opportunity:

4

http://ec.europa.eu/eurostat/statistics-explained/index.php?title=International_trade_in_goods

Based on the analysis of the PESTEL framework and Porter's five forces, the CARGOSTREAM concept can be put in a matrix, which outlines the external forces impacting the industry and the level of competition which plays within the industry. The matrix, which is outlined below, shows that the CARGOSTREAM concept has a great potential to create sustainable value, while it is operating in a market which has the potential to be highly attractive.

MARKET ATTRACTIVENESS	LOW	MID	HIGH
HIGH	Yellow	Green	Green (CARGO STREAM)
MID	Red	Yellow	Green
LOW	Red	Red	Yellow
	LOW	MID	HIGH
	COMPETITIVE ADVANTAGE		

Value Proposition / Solution

Value Proposition: *Build scale for horizontal collaboration through the bundling of freight volumes.*

CargoStream enables shippers to bundle their transportation needs with other shippers, to:

- Eliminate inefficiencies in road transportation, e.g., increasing load factor, reducing empty km.

- Shift freight from road to rail and other modes.

- Lower freight transportation environmental and social impact (e.g., CO_2 emissions, congestion, safety risks).

Solution: *CargoStream is an independent Pan-European platform on which shippers, intermodal terminals, rail & barge operators, logistic service providers and value-added services providers collaborate by synchronising supply chain requirements with the right mix of transport services.*

The platform has the following key features:

- Access to aggregated transport demand data across the network of interconnected clusters. The CargoStream platform will provide an extensive database of historical cargo movements for the participating shippers. Such data will be normalised in order to be aggregated and compared, enabling discovery of collaboration opportunities.

- Multidimensional collaboration to ensure that benefits generated through cargo bundling and elimination of inefficiencies are shared among all supply chain stakeholders.

- Access to value-added services providers (VAS), e.g., trustees and optimizers, and apps providers who offer innovative services and functionalities based on the data made accessible through the platform.

Neutral and open platform, not owned by a single shipper or logistic services provider. This allows shippers to connect with different services providers via one single data integration effort and avoid a lock-in situation. For VAS and app providers, the platform offers the opportunity to leverage their knowledge without investment in time consuming one-on-one shipper contacts.

Needs vs. Solution

Target User needs

Discover bundling opportunities:

• Cargo pooling opportunities.
Backhaul trips opportunities.

Create new logistic services demand:

• New connections.

New modal-shift options.

Create new value-added services demand:

• Optimization of flows.
• Trustee service for collaborations orchestration.

This part will be completed in next iterations based on impact assessment results.

Competitor 1: *Logistics services providers*

The current solutions for CPG transport flows are offered by LSPs offering door-to-door services including intermodal options.

Competitor 2: *Trustees*

Bundling of cargo flows is currently supported by specialized consultants (e.g., Trivizor) acting as trustees, i.e., neutral third parties mediating between shippers and/or logistic services providers.

COLLABORATIVE

NETWORKED

SYNCHROMODAL

SCALABLE

PLATFORMED

Expected TRL is, at less, TRL 7 - System prototype demonstration in an operational environment, however some of the results are planned to be almost in TRL 9- actual system proven in operational environment.

Data input file standardization:

• Description minimal data set: .csv and .pdf, pre-tested on 10 shippers and ready for testing during iterations (examples on Basecamp);
• Iterations must clarify which extra data elements are needed to perform value added service insights (Apps).

API description and building for 3rd parties:

API will explain to 3th party app developers how to connect to the platform. First version description ready by end 10/2017.

CargoStream for end-users: Platform creation

- Member on-boarding: platform registration and CargoStream community access;
- Data upload: manual via upload App or integrated;
- App selection by individual members.

Other requirements
So far proven that we can get shippers on the platform (40 members, not active)
Not proven: network effect of members
High acquisition cost
Horizontal collaboration as first product

3.1.1 Key stakeholders in the business ecosystem

The following Table 4 lists the key stakeholders in the symbiotic network of logistics clusters business case. These are the organisations playing a key role in the application of the new solution to achieve the benefits described above in Business Cases Overview. For each stakeholder the Table highlights its role in the solution's value chain, i.e., which of the stakeholder's activities are essential for the solution to deliver value according to its expected benefits. Other activities, not related to the solution's application, are excluded from our analysis.

Table 4 Key stakeholders in the CargoStream business ecosystem

Symbiotic Network of Logistics Clusters		
Stakeholder type	**Role in the value chain**	**Partners / External stakeholders**
Shippers	Ensure product delivery at retailer's shop, DC or city hub at the planned time in the expected quality, quantity and conditions. Responsible for: - Providing shipment data to find bundling opportunities. - Planning shipments taking into account bundling and cross-docking options.	Procter & Gamble, Bridgestone, Chemours, ETEX, Duracell
Logistic services providers	Organize and/or execute transport and logistic services for the shippers. Responsible for: - Planning and managing intermodal services for bundled flows from different shippers. - Planning of transport - Performing transport and logistic services, including loading, unloading, transhipment, cross-docking, reverse logistics etc.	DHL, European Container Services, CLDN, Lineas, DB Cargo, Ahlers, Jan de Rijk, Air Cargo Belgium, Seability, WFS Belgium

Terminals	Ensure that logistics operations are performed as planned and with the expected quality of service. Responsible for: - Performing requested services, including loading, unloading, transhipment, etc.	Duisport, Heathrow, InterPorto Bologna, Piraeus Container Terminal, Port of Trelleborg
Value added service providers	Provide value added service tools and analyses for groups of shippers. Responsible for: - Indicating collaboration potential and the related costs and benefits.	ArgusI, Mines Paris Tech, TriVizor, EuraLogistic, University of Antwerp, Zaragoza Logistics Centre
Technology providers	Provide CargoStream platform technology to shippers, logistic services providers and value added service providers Responsible for: - Ensuring platform functionality according to the expectations. - Growing a substantial community base to enable bundling and collaboration among shippers.	Nallian

3.1.2 Stakeholders business models and their potential evolution

The current business models of the above-identified stakeholders are presented in the following using the business model canvas. To simplify the presentation:

- the business model elements shown in the canvas are only those that are relevant to the CaergoStream solution;
- a colour code has been used to highlight the kind of impact the new solution has on each business model element:
    o gray elements are not substantially affected by the solution;
    o blue elements are those that the can be changed if the solution is implemented (direct impact);
    o green elements are those that require further strategic decisions to be changed, in addition to implementing the solution (complementary impact).

Shippers

The current business model of Shippers is represented in Figure 6Figure 1 canvas, showing only the elements that are relevant to the CargoStream business case.
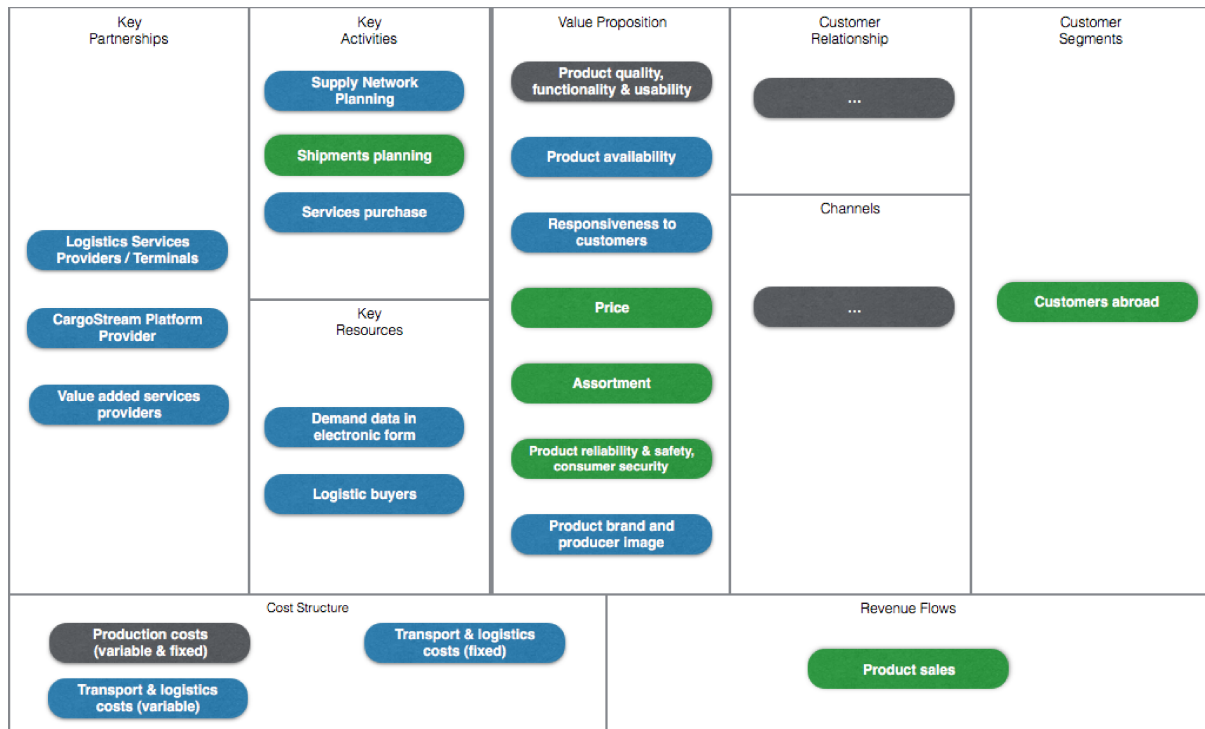
Figure 6 Shippers current business model

Unaffected elements

The following business model elements are not substantially affected by CargoStream adoption.

Category	Unaffected Elements	Motivation
Value proposition	Product quality, functionality & usability	These aspects concern R&D and product development activities.
Customer Relationship	All	The solution does not change or create new types of customer relationship.
Channels	All	The solution does not change or create new channels for customer engagement.
Cost structure	Production costs (variable)	The potential logistics improvement through the solution does not impact on the cost for supply, manufacturing and production infrastructure.

Direct impact

The following business model elements are directly affected by CargoStream adoption.

Category	Directly impacted Elements	Motivation
Value proposition	Product availability Responsiveness to consumers Product brand and producer image	The solution has the potential to improve customer service level, increasing product availability and responsiveness to demand changes. Also, the product brand and producer image can be improved and promoted by adoption of more environment-friendly transport solutions.
Key activities	Supply Network Planning Services purchase	The solution impacts on: - strategic planning level, where the network can be redesigned by new options for bundling and intermodal connections; - logistics services purchase will be strongly affected,

Key resources	Demand data in electronic form Logistic buyers	The company has to invest in: - Making available historical and actual demand data on shipments in electronic form via CargoStream. - Training logistic buyers that will have to analyse and make use of CargoStream data to identify new intermodal options and collaborations.
Key partnerships	Logistics Services Providers Terminals, Hubs CargoStream Platform Provider Value added services providers	- For the platform The adoption of CluCS by Shippers requires LSPs, Terminal and Hub operators and to be present on the platform, adopting the same system to allow the match between demand and potential connections data. - At least one third-party service provider is required to run and manage the CargoStream platform for all users. - Value added services providers must be on the platform to support match-making and collaboration.
Cost structure	Transport & logistics costs (variable) Transport & logistics costs (fixed)	Giving access to more services options, including cargo bundling and optimised intermodal connections, the transport direct costs should be lowered. The fixed logistics costs can also be affected as hub and terminal facilities can be shared as well, by effect of collaboration.

(The first row partially shown: "as it will rely on data shared and new collaboration options made available by CargoStream.")

Complementary impact

The following business model elements are affected by CargoStream implementation, but the solution is not sufficient by itself to change them. Other investments have to be implemented to actually change those elements. Therefore the solution is judged complementary to other strategic decisions.

Category	Impacted Elements	Motivation
Value proposition	Price Assortment Product reliability & safety, consumer security	The solution has the potential to impact on prices, reducing costs, to increase the range of products offered and of areas served. But these elements depend on strategic decisions taken by marketing and product management, primarily. CargoStream can complement these wider strategies but they are not a primary motivator for such decisions.
Customer segments	Customers abroad	The solution can help redesigning the supply network to acquire new customers that previously where harder to reach, as CargoStream can make available new connections to potential markets. But the choice to enter new market segments depends on strategic planning and supply network investments, CargoStream by itself having only a complementary impact on such decisions.
Key activities	Shipments planning	If cargo is bundled with other shippers and new intermodal connections are opened, operational planning activities will have to be adapted as well. But this change is not managed directly on CargoStream, but will involve other systems and other functions within the shipper's organisation.
Revenue flows	Product sales	Being able to ship more efficiently and to new potential customers, CargoStream can support increase in sales.

		However, to significantly grow revenues requires further investments in production and marketing, CluCS by itself having only a complementary impact on such decisions.

Platform Provider

The current business model of a typical Platform Provider (such as Nallian) is represented in **Figure** 7 canvas, showing only the elements that are relevant to the CargoStream business case.
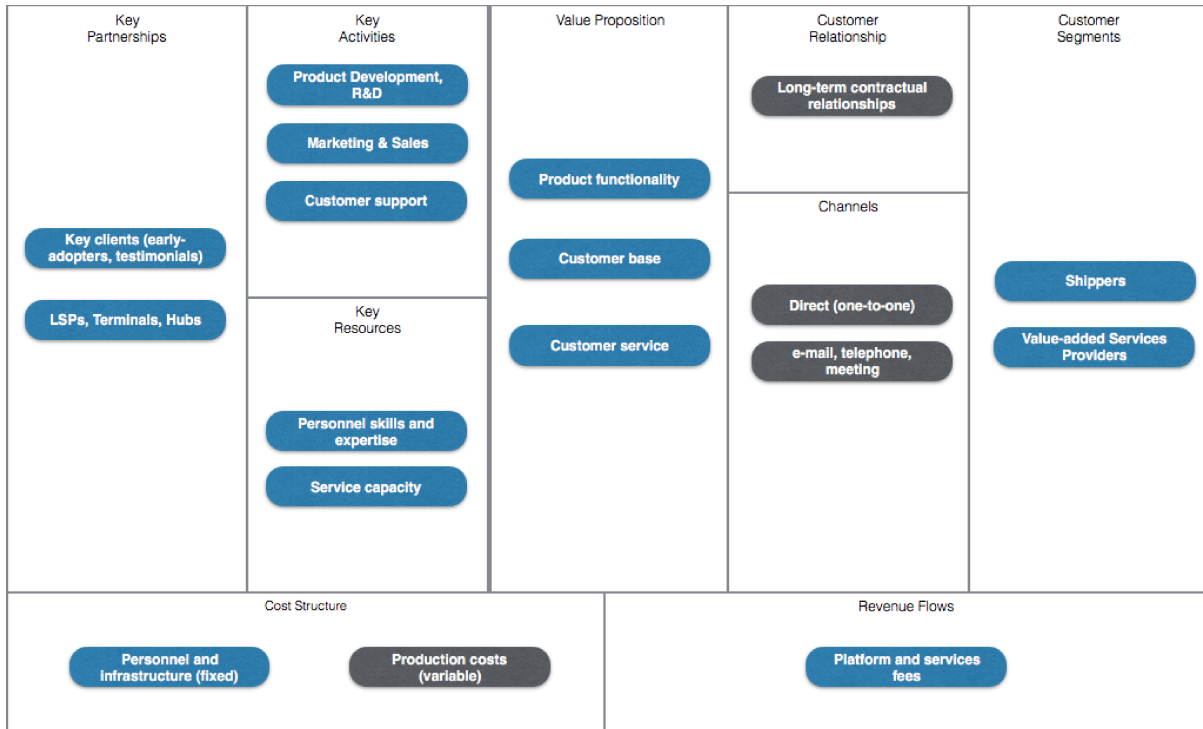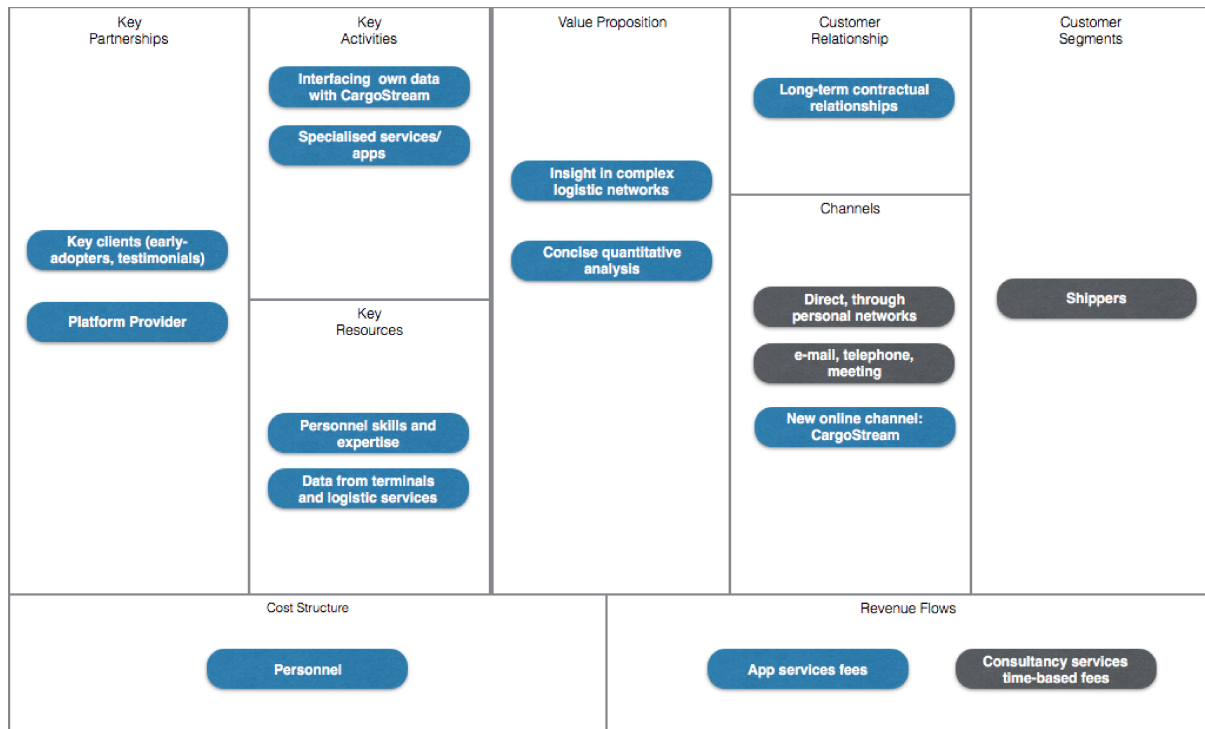

Figure 7 **Platform Providers current business model**

Unaffected elements

The following business model elements are not substantially affected by CargoStream.

Category	Unaffected Elements	Motivation
Customer Relationship	All	CargoStream does not require new types of customer relationship.
Channels	All	CargoStream does not require new channels for customer engagement.
Cost structure	Production costs (variable)	The business model is essentially based on fixed costs, for infrastructure, product development and customer service.

Direct impact

The following business model elements are directly affected by CargoStream.

Category	Directly impacted Elements	Motivation
Value proposition	Product functionality Customer base Customer service	CargoStream is a new product, addressing needs currently unfulfilled or fulfilled by completely different solutions (consultancy). Therefore, software functionality is an essential element of the value proposition.

		A significant customer base (shippers on the platform) is essential to ensure that CargoStream is of sufficient value to any new users wishing to adopt the solution.
		The platform provider has to ensure proper support services, similar to other SaaS services, e.g.: integration, hotline support, help desk, SLA on storage, security, performances and so on.
Key activities	Product Development, R&D Marketing & Sales Customer support	Product development is essential for such an innovative solution, to quickly adapt and scale-up functionality.
		Growing the customer base requires a properly dimensioned and focused sales force.
		Customer support is an essential element of the value proposition, demanding properly skilled personnel.
Key resources	Personnel skills and expertise Service capacity	Properly skilled personnel are needed to deal with high-level customers, both in sales and customers support.
		To ensure a proper service to a large community of shippers, an adequately sized workforce is required.
Key partnerships	Key clients (early-adopters, testimonials) LSPs, Terminals, Hubs	The adoption of the CargoStream requires collaboration with key clients, as early adopters and testimonials to improve the product and customer base.
		Very important is the availability of relevant LSPs, Terminals and Hubs to make available their transport capacity and schedules for matching with the shippers' transport demand.
Cost structure	Personnel and infrastructure costs (fixed)	The required key activities and resources will impact on the company fixed costs structure.
Revenue flows	Platform and services fees	Fees from the shippers, for platform and related services, constitute the main revenue flow.

Value Added Services Provider

The current business model of a typical Value-Added Services Provider (VAS provider, such as ArgusI) is represented in **Figure** 8 canvas, showing only the elements that are relevant to the CargoStream business case.

Figure 8 **Value Added Services Provider current business model**

Unaffected elements

The following business model elements are not substantially affected by CargoStream.

Category	Unaffected Elements	Motivation
Customer segments	All	The target customers are Shippers, and this is not affected by CargoStream.
Channels	Conventional channels (direct sales through personal network, B2B events...)	Current customer acquisition channels remain active. CargoStream may constitute an additional channel to acquire new customers.
Revenue flows	Consultancy services time-based fees	The existing time-based fees model does not change for consultancy services offered to customers, including shippers acquired through CargoStream. For example, ArgusI plans to offer dedicated analytics services on-demand if a company wants a more detailed analysis to come one step closer to actual implementation of the bundling or optimisation opportunity. This includes a standardised day rate for CargoStream-originating work. Due to its company-specific nature, this work will be done offline (not via the CargoStream platform).

Direct impact

The following business model elements are directly affected by CargoStream.

Category	Directly impacted Elements	Motivation
Customer Relationship	Long-term relationship with customers (shippers)	The CargoStream model has the potential to increase customer loyalty and capture. In 'normal' projects the VAS provider typically works in an offline way, gathering one-off datasets as a basis for analyses and advice. In principle, this creates a hurdle for customers and follow-up projects. A fully operational CargoStream service standardizes the data

|		through real-time connections with customers' IT systems. This makes it much easier for customers to do 'repeat purchases' with the VAS provider, as it will be a refresh of the analyses and insights, rather than a new project that has to be set up from the start.
Channels	CargoStream as new online channel	CargoStream provides a new channel to the market for VAS providers. The platform has intrinsic value for user companies, and the VAS providers that offer their services via the CargoStream platform benefit from the efforts the Platform provider and the other VAS providers do to connect companies. Current market channels are mostly personal networks and past performances; CargoStream can add to this by providing a set of potential customers that through the platform can easily benefit from value-added services.
Value proposition	Insight in complex logistic networks Concise quantitative analysis	The VAS provider value proposition is to provide insight in complex logistics networks of companies and groups of companies, through concise quantitative analysis. CargoStream can act as an accelerator for value-added services specifically developed for groups of companies at once, i.e. support of horizontal logistics collaboration. CargoStream will promote the topic and make logistics companies more aware of the possibilities of combining flows, either or not in combination with a modal shift from road to rail, barge or short-sea shipping services.
Key activities	Interfacing own data with CargoStream Specialised services/apps	The CargoStream platform will have to be integrated with the VAS provider own data structure. VAS providers usually develop their own tools and models. These can be developed on CargoStream, e.g., as apps for lane analysis, finding backload opportunities, trade flow analysis, collaboration and gain sharing.
Key resources	Personnel skills and expertise Data from terminals and logistic services	The VAS provider key resource use is time. The company collaboration, modelling and programming experts will spend time on optimising the CargoStream apps. Another critical resource is transport data from terminals and/or logistics companies. This task rests with the Platform Provider and the LSP/terminals, but in some cases the VAS provider can also help with relevant data sources.
Key partnerships	Key clients (early-adopters, testimonials) Platform Provider	The adoption of the CargoStream requires a small number of launching customers (e.g., P&G and other). Very important is the partnership with the Platform Provider, as owner of the main infrastructure in the VAS business model.
Cost structure	Personnel	Costs for the largest part depend on time spent on the analysis if a company requests optimisation/bundling advice from the VAS provider apps on the CargoStream platform.
Revenue flows	App services fees	Apps on CargoStream can complement the VAS main offer, offered for a small monthly fee. For example, via these apps the user can access an interactive dashboard consisting of tables, maps, and other figures depending on how complete the data is that is shared via CargoStream.

3.1.3 Hypotheses on business ecosystem evolution

Based on the above-indicated impact on current stakeholders Business Models, the following Table lists the main hypotheses on the business ecosystem evolution. These hypotheses have to be validated in the next project iterations, by answering the relevant business questions as listed in the table.

Hypothesis	Description	Business questions
The Platform Provider operating CargoStream must be perceived as a neutral third-party by all other stakeholders.	To support data sharing and collaboration between several stakeholders of different type, including competitors, the Platform Provider must be recognised by all participants as a neutral party, ensuring equal access and fair management of the platform to all participants.	- Is a Software as a Services provider business model sufficient to ensure neutral management of the platform? If not, which additional functions shall have to be performed by the Platform Provider? For example: - Governance of the network membership (rules on data provision and protection, data quality, SLA levels for VAS providers...)? - Enforcement of the governance (monitoring, penalties...)? - If another organisation should take care of governance, which type of organisation should it be? - Is there going to be only one Platform, or can there be different (possibly competing) Platform Providers?
Shippers acceptance.	Shippers will adopt CargoStream to publish their demand and shipment data, to find bundling and new intermodal lanes opportunities and to start collaboration even with the support of Value Added Services providers.	- Which tangible and quantifiable advantages are there for shippers in terms of: customer service, brand image, costs reduction? - Which is the total cost of ownership for shippers in terms of: data integration, operations adaptation, operating costs to work on CargoStream?
Value Added Services Providers acceptance.	VAS providers will adopt CargoStream to find new customers (shippers) and to improve the customer relationships with both new and existing customers, even through the provision of specialised apps.	- Which tangible and quantifiable advantages are there for VAS providers in terms of: increased number of customer, customer retention, customer lifetime value? - How is fair competition between VAS providers ensured through the platform governance?

3.1.4 Business ecosystem evolution through CLUSTERS 2.0 innovations

The aim of business framework on inter-Cluster level is to establish a "network of networks". Therefore, this requires an efficient and bi-directional link between local networks or logistics clusters and global network. This requires, in turn, an adequate governance model which defines the roles and responsibilities of all actors on intra-Cluster as well as on inter-Cluster level. Besides roles and responsibilities, the governance model must include data governance and a contractual governance framework. This idea is illustrated in the following figure. The orchestrator of intra-cluster network acts as a regional manager, managing the flows on one Cluster's level. On an inter-cluster level, cross chain integration is achieved by connecting individual intra cluster networks into a global inter cluster collaborating network. On this way a globally optimal transport chain optimal solution could be obtained.
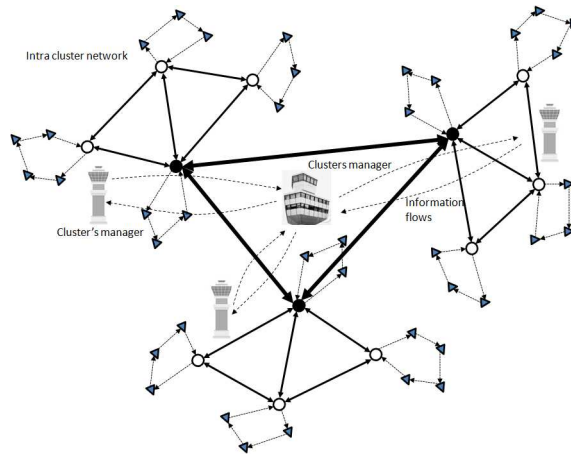
Figure 9. Hierarchical collaborative distributed network of hyper connected clusters

This "orgware" innovation must be followed by adequate "software" innovation. That means that the network of networks must be empowered by system of systems concept. In other words, CargoStream platform should act as a system of Cluster Community Systems (CluCs). Besides this, from a "software" innovation point of view it is needed for platform to be open/synchronised with existing systems of individual stakeholders (Port Community Systems, Control Towers of LSPs, transport management systems or terminal operation systems). Therefore, the need for CargoStream platform as a federative platform surely exists. Also, in order to satisfy the aim of shifting the flows to rail intermodal (and establishing strong railway links by using the existing TEN-T corridor network) this federative platform must include the links to rail related information systems - Raildata, Rail net Europe (RNE), and existing collaborative platforms like the platform of X-Rail alliance is for example. Also very important is that in order to enable a long term sustainability of the platform it also have to be open for actual disruptive innovations - blockchain, software as a service (SaaS) and other.

Regarding the inter-cluster collaborative business network design we need to evaluate all opportunities for formation an efficient and effective interface between the Clusters interlinked by the TEN-T network. According to the project aim, inter cluster network should be connected by strong and efficient rail links. That means establishing a hub and spoke structure where logistics clusters act as gateways for inter-cluster direct services. Liner trains can also be a feasible option where regional rail traffic volume along the corridor can be included. This depends on the impedance which could be generated by intermediate transport chain disruptions. In case that for some markets it is not feasible to establish a rail connection (or green transport corridor) this could be substituted by efficient long haul trucking links which will also provide some savings generated mainly by intra-cluster system.

Potential business model looks as on the following figure. The main actors out of the cluster are:

- Cluster manager - party responsible for establishing a network of logistics clusters, controlling and coordinating the flows - informational/physical between clusters. The most appropriate actor for this role is again 4PL. He will be empowered by Cargo Stream platform aimed to synchronise all operations between the clusters. Cargo

stream platform interacts with CluCs of all clusters in order to be equipped with real time information regarding the flows between the clusters.

- Transport operators (railway undertakings, railway operators, road carriers, barge operators) are charged for inter cluster transport service provision. Again, the most preferred option is to utilise rail then internal waterway mode, but road transport option for inter-cluster linking is also considered as an option if the specific market doesn't justify establishing a rail service.

- Infrastructure managers (rail infrastructure managers, road administrations). Infrastructure managers still do not have a holistic approach for the whole network and its alternate routes. They mostly focus on resolving incidents, while the communication of information on the available capacity and possible incidents to the users of the infrastructure remains limited. This is the especially the case with rail infrastructure managers and should include the network of rail infrastructure managers considering that the links between logistics clusters are international - traverse more than one rail network.
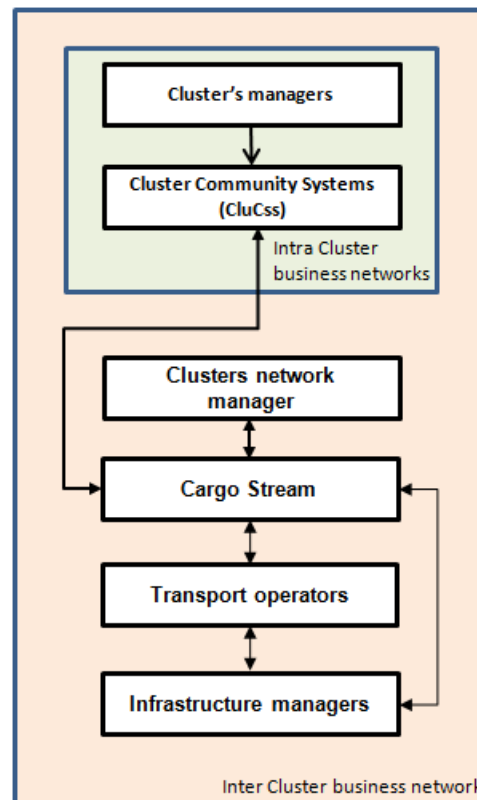
Figure 10. Inter cluster collaborative business network

Also, shippers, terminal operators and local rail operators could be local potential actors in the network in case of liner train services.

3.2 Market segmentation

Market segmentation for inter-cluster collaborative network is correlated with intra-cluster market strategy. Actually, cluster generates the flows on corridor between clusters. The exception exists in case of liner train service established between clusters. In that case it is needed to conduct a corridor-specific market analysis in order to assess different freight typologies and find the types of freight with highest shifting potential.

As CargoStream is a 4-sided platform for freight optimisation, there are 4 different player types to "buy" CargoStream

Shippers

Shippers – those companies having to send goods. These companies have to inject data about their transportation needs so that this data can be included in the pool of transportation needs, which will be used to look for global optimisation possibilities.
 	
• Their outcome is better transport within the same transportation requirements, where better is any combination of more cost effective, less CO_2, more predictable, higher frequency, … so less cost, less risk, and/or higher service level.
 	
• Can further segment by
 	
    o Size
 	
    o Transportation distance < or > 400km.
 	
    o Compatibility buckets
 	
    o Level of involvement in transportation choices. From fully outsourced over "monitoring/challenging" to fully in-sourced.

VAS - Value added service providers
VAS's (Value added service providers) - Those companies looking for optimisation opportunities based on combining transportation needs from multiple shippers. The initial target segment are the small consultancy clubs that have a passion for vertical and horizontal collaboration in logistics. These companies are already working on optimisation opportunities but typically based on data from a small number of shippers. Why small? Identifying which 2 shippers might have potential for freight consolidation is often determined by serendipity, i.e. 2 people talking to each other at a reception. Their outcome is • the ability to have a look at data from 1000's of shippers at the same time, effectively industrialising the process of identifying shippers with potential for freight consolidation. • The ability to reach a broad market cheaper, i.e. through the shippers on the platform.

LSP's - Logistic Service Providers
Those companies organising the transportation, with own assets or by orchestrating other companies. These LSP's can offer transportation plans based on combining some of the transportation plans. Some LSP's also take on the role of a VAS. Their outcome is • the ability to have a look at data from 1000's of shippers at the same time, effectively industrialising the process of identifying shippers with potential for freight consolidation. • The ability to reach a broad market cheaper, i.e. through the shippers on the platform. • Optimised flows as a means to replace incumbent providers and on the fly reduce

Infrastructure / Asset providers
Those companies owning/offering the actual transportation means. Think of railways, multimodal terminals, ... Some of these also act as a VAS, creating opportunities that make use of their own infrastructure/assets. Their outcome is: • An easier way to be found and to approach the market. • Access to a larger market, because they are connected to the platform.

3.3 Target market

The markets targeted by the inter cluster business model must be those currently performed mainly by road transport mode. In other words, besides the potential markets mentioned in Section 3.4 the most interesting for this concept are segments that have high logistics requirements in terms of lead time, cost, reliability, flexibility and visibility (for example, Fast Moving Consumer Goods - FMCG). Therefore, the problem at hand is the design of hyper-connected clusters network preferably by using green transport modes for the transportation of FMCG with the aim to establish economies of scale and scope through collaboration (exception exists only in case if for some specific service it is unfeasible to establish a rail transport service between clusters). So, in order to comprehend the potential of a collaborative cluster network, a comprehensive market analysis must be performed. This analysis should result in an estimate of the potential market, mapping the production and origin-destination matrices of flows broken down by product categories. Combined with information from shippers regarding the future expectations this analysis should give a relatively accurate estimate of the FMCG flows on network.

Main market segments and actors are:

- Shippers

- LSP's

- Optimisers

- Infrastructure Providers

- Logistic Hubs

3.3.1 Market Characteristics

Regarding the market characteristics, the main requirements defined for intra-cluster network hold also for inter-cluster network. The characteristics depends on the segment stablished above and analysed below:

Shippers	
Market Characteristics	Typically, these are large (global/regional) manufacturers with high frequency (several times a week for each origin) high distance transportation needs (> 400km), a big CSR component. Cross vertical can be general FMCG, Food & Bev, Chemicals, Raw Materials, … Typically, companies that have the feeling that internally they are already fully optimised, and that need to look across the walls of their own companies to tap into the next level of optimisation.
Market Size	This part will be completed in next iterations based on impact assessment results.
Market Growth	The segment as such is not growing significantly, but the share of shippers considering horizontal collaboration (i.e. with their peers) is increasing fast, triggered by the market trends.
Market trends	Increasing congestion Increasing driver shortage Increasing awareness of CO_2 Increasing importance of CSR Increasing popularity of "the sharing economy". All these trends have a favourable impact on demand for solutions such as CargoStream.
VAS	
Market Characteristics	Typically, these are small consultancies with a passion for vertical and horizontal collaboration
Market Size	A handful pure-play companies in each country.
Market Growth	The segment as such is not growing significantly.
Market trends	Increasing congestion Increasing driver shortage Increasing awareness of CO_2 Increasing importance of CSR Increasing popularity of "the sharing economy". All these trends have a favourable impact on demand for solutions such as CargoStream.
LSP's	
Market	Quite an old set of players with often old habits, thin margins, rather

Characteristics	conservative. Today, the all feel the threat of being disrupted, some are driven to act by FOMO (fear-of-missing-out), which is a strong enough driver to join platforms such as CargoStream. Overall a very fragmented market, with some very large players too. But stays fragmented as entry barriers are low.
Market Size	This part will be completed in next iterations based on impact assessment results.
Market Growth	The segment as such is not growing significantly.
Market trends	Increasing congestion Increasing driver shortage Increasing awareness of CO_2 Increasing importance of CSR Increasing popularity of "the sharing economy". Increasing need for differentiation vs other LSP's. All these trends have a favourable impact on demand for solutions such as CargoStream.

Infrastructure/Asset Providers	
Market Characteristics	Providers of multimodal terminals, railways, … High capex, with often 'chicken-and-egg' problem with regards to extras investments and new lines. Are looking to CargoStream for increased usage of their assets, and to make informed decisions to extend capacity.
Market Size	This part will be completed in next iterations based on impact assessment results.
Market trends	Increasing congestion Increasing driver shortage Increasing awareness of CO_2 Increasing importance of CSR Increasing popularity of "the sharing economy". Increasing societal and governmental push to multimodality. All these trends have a favourable impact on demand for solutions such as CargoStream.

3.3.2 Market Size

This part will be completed in next iterations based on impact assessment results.

3.3.3 Market growth and trends

At the moment, the trend for increasing demand for rail intermodal is evident, especially from FMCG and automotive industry. This comes from initiatives for development of green

transport options reflected in improved transit times and infrastructure developments. It is expected that the market for rail intermodal will continue to gain around, also in industries other than FMCG and automotive. However, one of the greatest challenges in a multi phased transport option is to offer reliable and flexible services. Another challenge is that customers are booking smaller volumes with shorter notice. This calls for increased demand for consolidated shipments and groupage consignments.

3.4 Competitive analysis

Switching costs from existing systems to CargoStream is rather high, from a "systems perspective". This is driven by:

- Perceived risk: are the other parts of the ecosystem in place and do they all have the right incentives to translate theoretical opportunities coming out of CargoStream into operationalised new flows.

- Existing contracts don't always allow the shipper to step out at any point in time, whilst to make horizontal collaboration work, multiple shippers should be able to switch at the same time, which would need "synchronised timing".

- LSP's and VAS's who already have their existing databases see this as a competitive advantage and are reluctant to share this with the CargoStream pool,

- LSP's, VAS's and Infrastructure providers would have an incentive to combine the inject CargoStream into their own data sets to find opportunities but without sharing their own data with the rest of the CargoStream community. So in a sense, CargoStream would be helping/feeding the competition.

CargoStream has several types of competitors:

- Doing Nothing, so business as is;

- Individual consultancies with an artisanal approach;

- Lots of start-ups tackling part of the problem

   o Platforms for strategic collaboration;

   o Platforms for spot collaboration;

3.5 SWOT analysis

Following tables present SWOT analysis for collaborative models presented in above.

Table 5. SWOT analysis for inter-cluster collaborative network

Strengths	Opportunities
- Open, any shipper, any actor - Strong brand - Recognised high societal relevance, tapping into key EU-wide challenges (CO$_2$, Congestion, Multimodality, …) - Fortune X companies among the believers - Some functionality available - 13 large companies on the platform - Reduction of total transport chain logistics costs - Higher utilisation of available transport and storage capacities. - Reduction of total transport chain logistics costs - Utilisation of green transport corridors - Higher utilisation of available transport and storage capacities.	- Problem is getting bigger - Driver shortage - Increasing congestion - Increasing driver shortage - Increasing awareness of CO$_2$ - Increasing importance of CSR - Increasing popularity of "the sharing economy". - Individual logistic hubs see value in a "private CargoStream", focussing on the flows to/from their hub.
Weaknesses	**Threats**
- Needs critical mass. Not getting to critical mass fast will undermine the initiative. - Not all parts of the "whole product" are in place, i.e. sufficient parties that work with the shared data and pull the data to operationalised optimised flows. - Product not yet fully self-service. - No business outcomes for users yet. - Still high expectations from direct stakeholders - Capacity problems on international rail	- Reducing momentum if no significant opportunities are operationalised on a regular basis. - Misalignment of interests of collaborating parties. - Enough volume to generate the direct service. - Interoperability problems in establishing of international rail services

4. New Modular Load Units and Cluster Handling Technology

This chapter provides an initial analysis of the business ecosystem and market targeted by the New Modular Load Units (NMLU) and Cluster Handling solutions developed in WP4 and piloted in LL3. The background for the analysis is constituted by the initial specifications of the new technologies, as provided in Deliverable D4.1 and by LL3 scoping document (Deliverable D5.4.1).

4.1   Business Cases Overview

The following Table 6 provides an overview of the Business Case, i.e., the rationale for developing NMLU and Cluster Handling Technologies from a business point of view. This Table constitutes the starting point for business ecosystem analysis and market analysis.

Table 6 NMLU and Cluster Handling Technologies - Business Case summary

Target Market Sector and Client profile
Market sector: *Fast-moving Consumer Goods (FMCG)*
Market size: Trade in goods between EU Member States (intra-EU trade) was valued — in terms of exports — at EUR 3 347 billion in 2017. This was 78 % higher than the level recorded for exports leaving the EU-28 to non-member countries of EUR 1 879 billion (extra-EU trade)[5].
Client profile: *Shippers, Retailers* The target customers are the individuals who, inside FMCG manufacturing and retail companies, have decision-making power on supply chain planning, on strategic, tactical and operational level. Decisional power on all levels is required because the decision to adopt new load units and handling solutions entails a significant redesign of supply chain processes, impacting on logistics equipment, infrastructure as well as execution and planning decisions on short-, medium- and long-term horizons.
Problem to solve and business opportunity
Problem to solve: *Global inefficiencies and limitations of current packaging solutions* - Poor fill levels of packing units and transportation means (42,6% average utilisation of trucks and containers at departure); - Poor utilisation of storage space in warehouses and terminals; - Handling inefficiencies (e.g., time spent to pack and repack of products to feed cargo into different partners' systems); - Security and safety risks due to discontinuities in the handling process (e.g., waiting periods or manual operations where cargo can be lost, stolen or damaged by weather). - Limitations to expand the range of products and destinations, due to difficult adaptation to different handling systems and storage formats along the chain; - Environmental impact due to inefficient resources utilisation, in terms of higher energy consumption and CO_2 emissions.
Value Proposition / Solution
Value Proposition: *Ship more efficiently, with more flexibility and better quality of service.*

5

http://ec.europa.eu/eurostat/statistics-explained/index.php?title=International_trade_in_goods

The NMLU solution enables shippers and logistic services providers to:
- Increase load factors of boxes, containers and vehicles. NMLUs allow better fill rates (less void space) and can be easily combined, loaded and unloaded to increase load factor.
- Bundle cargo of individual company or collaborating partners to enable intermodal transport. NMLUs allow bundling cargo without repacking and fast automated transhipment.
- Enable Less-than-truckload (LTL) shipments for both small and large companies. NMLUs can be filled by product and customer at the plant and then bundled for transport to the cross-docking centre.
- Increase handling efficiency. Modularisation reduces non-value-added handling activities, such as packing, re-packing and picking to feed into new systems along the supply chain.
- Increase first/last-mile delivery efficiency enabling innovative city logistics solutions.
- Improved quality, with reduced damage and reduced safety and security risks thanks to automated handling systems.

Solution: *New Modular Load Unit (NMLU) with innovative handling and transhipment technology*

The solution consists of a new Modular Load Unit (NMLU) at sub-container level, with the following key features:
- NMLU dimensions are in line with those of containers: 20 or 40 feet mainly used for deep-sea transport, and 45 feet mainly used hinterland/land or short-sea transport. Thus, no changes are required on current equipment used for loading/transport/unloading units.
- NMLUs enable standardisation and modularisation along the supply chain, allowing smaller and modular loading units to be combined together in a larger loading unit.
- NMLUs improve reverse logistics, facilitating collection and storage of empty units.
- NMLUs can be handled on the same level as pallets, allowing consumer goods to be packed on the production line without further handling until delivery to the end customer or hub.

Needs vs. Solution

Target User needs	Solution's benefits
Ship goods directly to final destination: - Reduce handling effort for intermodal shifts and cross-dock when shipping to a single destination (e.g., large store or hypermarket). - Increase load factors, even through collaboration with other manufacturers.	- Ship entire NMLUs by product and/or order instead of pallets. - Bundle cargo at cross-dock without opening NMLUs, optimising vehicle loads, if possible with cargo from different collaborating partners.
Ship goods through retailer distribution centre (DC): - Reduce handling effort for intermodal shifts and cross-dock. - Increase load factors, even through collaboration with other manufacturers. - Optimize distribution to retail stores, including reverse logistics.	- Ship entire NMLUs to retailer distribution centre instead of pallets. - Bundle cargo at cross-dock without opening NMLUs. - Prepare store-wise NMLUs at retail distribution centre, simplifying distribution to end destination stores. - Collect empty NMLUs at shops, which can be filled with reusable and disposal materials.
Ship goods in a city through 3rd party urban hub: - Reduce handling effort for intermodal shifts and cross-dock. - Collaborate efficiently with other manufacturers and retailers in the same urban hub, run by a 3rd party services provider. - Increase load factors, even through collaboration with other manufacturers. - Optimize distribution to shops in the city, including reverse logistics.	- Ship entire NMLUs to 3rd party urban hub instead of pallets. - Bundle cargo at cross-dock without opening NMLUs. - Prepare store-wise NMLUs at retail distribution centre, simplifying distribution to end destination stores. - Collect empty NMLUs at shops, which can be filled with reusable and disposal materials. - Use NMLUs as micro-hubs inside the city, to create smart loading/unloading zones server by light vehicles (e.g., electric vans, cargo bikes).

Solution cost effectiveness

Savings from handling, storage and less damages will outweigh the investment in equipment (Total Cost of Ownership).

This part will be completed in next iterations based on impact assessment results.

Positioning on the market

Competitor 1: *Traditional loading units: pallets and containers*
Competitor 2: *Other modular units*

Competitive advantage		
Relevant features	Traditional loading units (e.g., pallets, boxes, containers...)	CLUSTERS 2.0 NMLU
Handling effort for intermodal shifts and cross-docking	Low / Medium - Boxes/products are operated onto pallets which are the smallest operated unit within a container or trailer, being the biggest one. - For cross-docking this results in opening a container/trailer and moving each and every pallet into their designated containers/trailers. - In intermodal shifts containers (filled with goods for end destination or DC/CD) can easily be moved from vehicle to vehicle.	High - Compared to traditional loading units, NMLU-pallets are also (as for now) the smallest operated unit but by making use of multiple NMLUs in between NMLU-pallets and vehicles, there is more flexibility for shifting and cross-docking operations. - For cross-docking there is no need for opening containers or trailers as NMLUs can easily be shifted onto other vehicles. - During intermodal shift, NMLUs can be shifted alongside other NMLUs instead of only shifting rigid containers
Load factor	Low - Manufactures and retailers target FTLs which most of the time leads to full containers/trailers footprint-wise, resulting in inefficiencies at the same time, as they are not making use of the available height. - Also, this kind of loading comes with a loss of flexibility.	High - At first sight, making use of NMLUs leads to a loss of a number of pallets footprint-wise. Looking a little further will reveal the high potential of stacking NMLU-pallets onto each other as in practice even more NMLU-pallets can be moved compared to today's state of the art. - More flexibility in volume and weight on load transhipment, because of NMLU mix.

Efficiency in distribution to retail stores	Low
	
	- Products will be sent as FTLs from a plant.
	- Each and every pallet has to be moved into container/trailer individually.
	- In case of cross-dock (let it be internally or multi-user-transhipment) handling efforts are increased at the same time.
		High
		
		- If products from one manufacturer/ producer are sent directly to retail store, there are two beneficial cases.
		  o either products from one company are easily cross-docked (mix of NMLUs) and sent to retail stores,
		  o or NMLUs of various companies can easily be put together and sent to stores.
		- Additionally, there is the gain in load factor efficiencies.

Simplified collaboration in 3rd party hubs	Low / Medium - Once FTLs of manufacturer/producer arrive at hub, goods are unloaded, scattered, and put onto load carriers for final destination.	Medium / High - In comparison to the state of the art, NMLUs can be shifted onto end destination vehicle without touching the products. - In case that products have to be cross-docked together onto new pallets or other load carriers, NMLUs and NMLU pallets can be opened and proceeded as usual.
Efficiency in city	Low - Analogous to the above, FTLs of	Medium (dependent on case) - Cross-docking and outbound processes stay the

distribution	manufacturer/producer arrive at hub, goods are unloaded, scattered, and put onto load carriers for city distribution. - In case that city distribution vehicles will be completely filled from one customer, pallets have to either be scattered or multiple pallets have to be moved one by one.	same as with state of the art. - However inbound and former transport processes benefit from the NMLU because there could potentially be a case where shared transports will be done, as NMLUs could have been mixed between various partners. - Also, ready-to-go-NMLUs for city distribution can be routed directly to city distribution vehicle which results in less handling effort.
Efficiency in return processes of load carriers	<u>Medium / High</u> - Pallets that will not be used for goods transport will be sent back to owner or will be picked up by service provider. - Exchange of pallets within pooling system regulates by its own.	<u>Low</u> - Additionally to NMLU-pallets, there are NMLUs and NMLU hoods to be handled and sent back or picked up. - This results in higher handling effort, larger storage areas, and possibly more transports.
Cost	<u>Average</u> - Cost drivers consist of transports, handling efforts during transhipment processes, and the use of load carriers. - Transport costs are not fully utilised, as the containers/trailers are sometimes only 60 percent utilised.	<u>Acquisition costs higher / Process costs not yet identified</u> - Additionally to the state of the art load carrier cost drivers, there is the need of using a NMLU subframe that has to be mounted onto vehicles that carry NMLUs - resulting in higher load carrier costs. - While handling and transport costs are foreseen to be beneficial by using NMLUs, use case cost calculations have to be applied in order to state the actual cost-benefit-ratio.

Technology readiness requirements

Expected to arrive to TRL 7 - System prototype demonstration in operational environment

This includes:

Box design to be standardised
Certifications, security requirements (if outside the truck/container)
Integrate sensor-ready technology

Other requirements

Value chain partners needed to deliver the complete solution.

4.2   Business Ecosystem Analysis

4.2.1 Key stakeholders in the business ecosystem

The following Table 7 lists the key stakeholders in the NMLU and cluster handling technology business case. These are the organisations playing a key role in the application of the new solution to achieve the benefits described above in Business Cases Overview. For each stakeholder the Table highlights its role in the solution's value chain, i.e., which of the stakeholder's activities are essential for the solution to deliver value according to its expected benefits. Other activities, not related to the solution's application, are excluded from our analysis.

Table 7 Key stakeholders in the NMLU and cluster handling technology business ecosystem

New Modular Load Units and Cluster Handling Technology		
Stakeholder type	**Role in the value chain**	**Partners / External stakeholders**
Manufacturers	Ensure product delivery at retailer's shop, DC or city hub at the planned time in the expected quality, quantity and conditions. Responsible for: - Adapting plant equipment and operations to NMLUs. - Planning shipments taking into account NMLU bundling and cross-docking options. - Loading NMLUs and ship them from manufacturing plant.	PGBS
Freight Forwarders	Organize transport and logistic services along the chain to meet the Manufacturers' delivery target, optimising costs and resources utilisation. Responsible for: - Planning and managing intermodal services by bundling NMLUs, even from different shippers. - Planning and managing LTL transport services by combining NMLUs, even from different shippers.	JDR
Logistic services providers	Ensure that transport and logistic operations involving NMLUs are performed as planned and with the expected quality of service. Responsible for: - Adapting vehicles and logistics equipment and operations to NMLUs. - Performing transport and logistic services on NMLUs, including loading, unloading, transshipment, cross-docking, reverse logistics etc.	WFS, DHL, JDR, CITYDEPOT
Retailers	Plan inventory and ensure stocks replenishment at DCs and shops to meet the expected demand. Responsible for: - Adapting DCs and, if needed, shops equipment and operations to NMLUs. - Planning replenishment taking into account NMLU bundling and cross-docking options. - Unloading and handling NMLUs at destination warehouse or shop.	tbd
3rd party hub	Ensure that logistic operations involving NMLUs are performed as planned and with the expected quality of service. Responsible for: - Adapting hub equipment and operations to NMLUs. - Performing requested services on NMLUs, including loading, unloading, transshipment, cross-docking, reverse logistics etc.	tbd
Technology providers	Provide NMLUs and handling technology to manufacturers, retailers and logistic services providers Responsible for: - Ensuring NMLU functionality according to the expectations.	VEG, INNOVA

	- Growing a substantial customer base to enable bundling and to justify investments to update equipment and processes.	

4.2.2 Stakeholders business models and their potential evolution

The current business models of the above-identified stakeholders are presented in the following using the business model canvas. To simplify the presentation:

- the business model elements shown in the canvas are only those that are relevant to the NMLUs and cluster handling technology solution;
- a colour code has been used to highlight the kind of impact the new solution has on each business model element:
    o gray elements are not substantially affected by the solution;
    o blue elements are those that the can be changed if the solution is implemented (direct impact);
    o green elements are those that require further strategic decisions to be changed, in addition to implementing the solution (complementary impact).

Manufacturers

The current business model of Manufacturers is represented in Figure 11 canvas, showing only the elements that are relevant to the NMLUs and cluster handling technology business case.
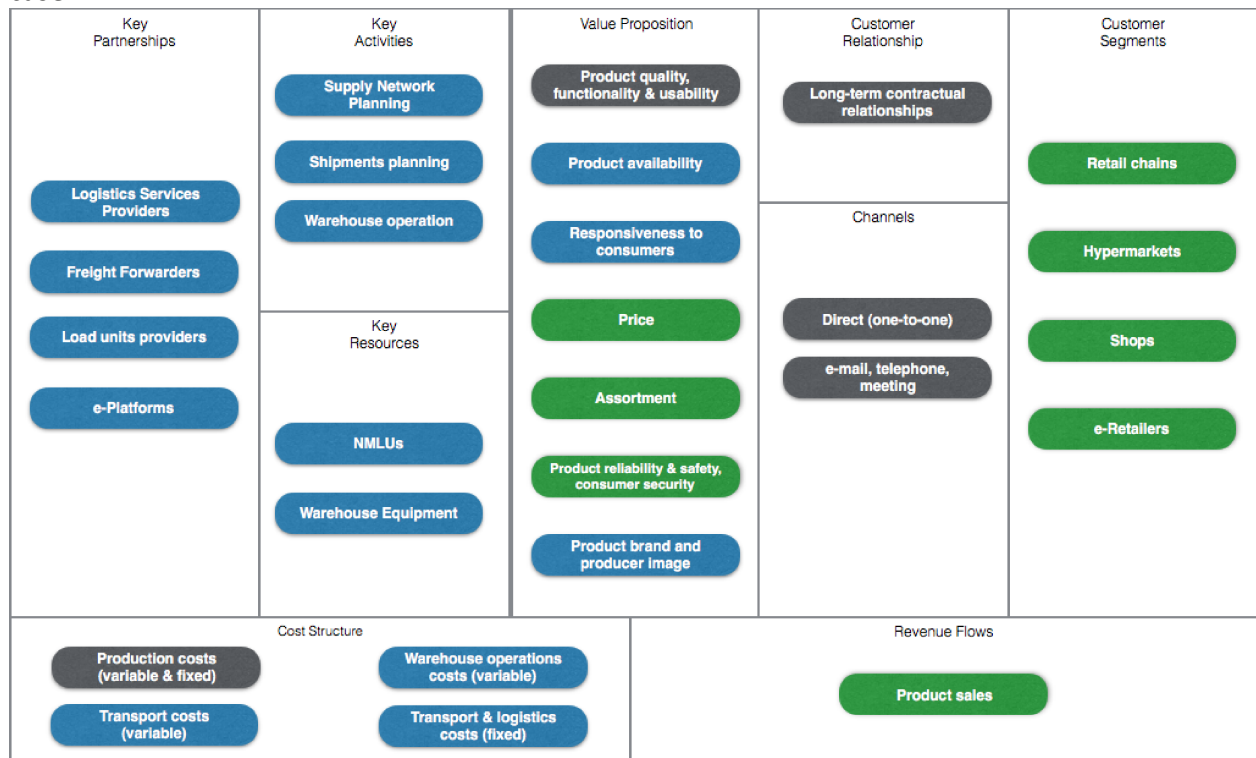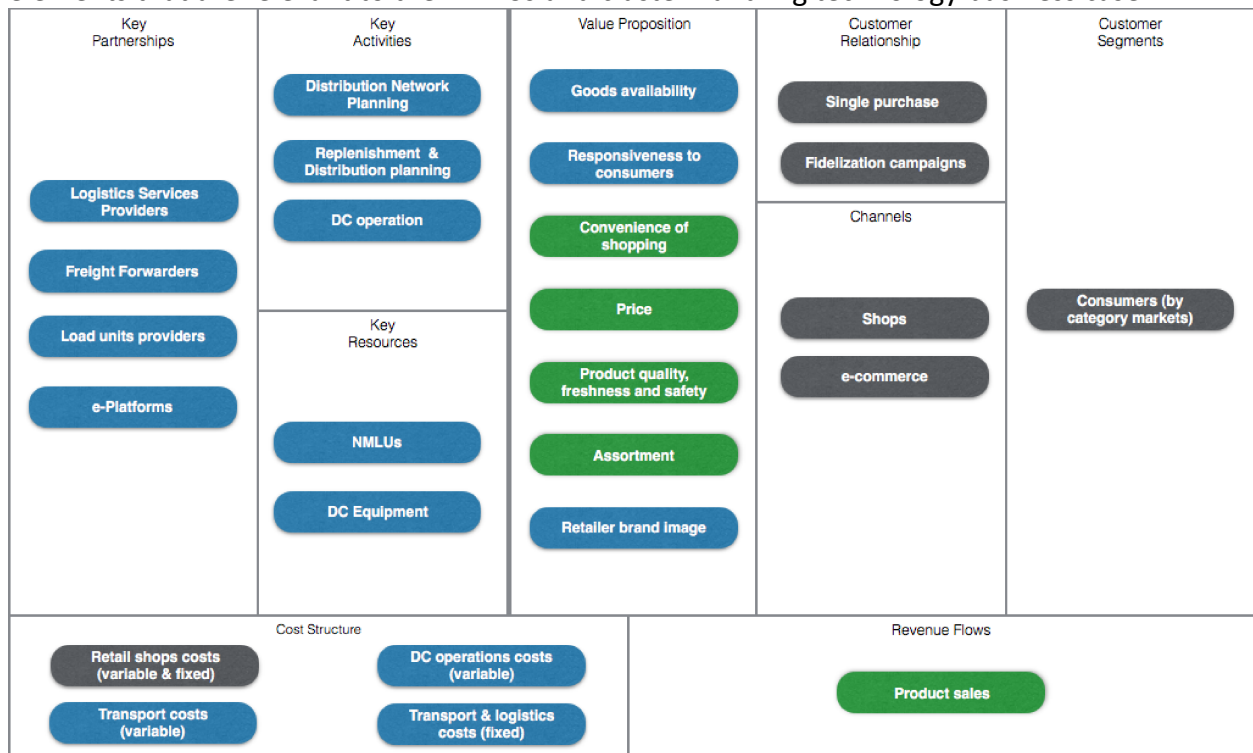

Figure 11 Manufacturers current business model

Unaffected elements

The following business model elements are not substantially affected by NMLU and cluster handling technology implementation.

Category	Unaffected Elements	Motivation
Value proposition	Product quality, functionality & usability	These aspects concern R&D and product development activities.
Customer Relationship	Long-term contractual relationships.	The potential logistics improvement through the solution does not change or create new types of customer relationship.
Channels	Direct one-to-one. e-mail, telephone, meeting.	The potential logistics improvement through the solution does not change or create new channels for customer engagement.
Cost structure	Production costs (variable & fixed).	The potential logistics improvement through the solution does not impact on the cost for supply, manufacturing and production infrastructure.

Direct impact

The following business model elements are directly affected by NMLU and cluster handling technology implementation.

Category	Directly impacted Elements	Motivation
Value proposition	Product availability Responsiveness to consumers Product brand and producer image	The solution has the potential to improve customer service level, increasing product availability and responsiveness to demand changes. Also, the product brand and producer image can be improved and promoted by adoption of an environment-friendly solution.
Key activities	Supply Network Planning Shipments planning Warehouse operation	The solution impacts on: - strategic planning level, where the network can be redesigned and new terminals and services involved; - operational planning, where shipments and loads have to be planned to exploit the NMLUs new features; - warehouse operations, that have to be adapted to the new processes and equipment.
Key resources	NMLUs Warehouse Equipment	The company has to invest in new equipment and warehouse infrastructure, partly or entirely replacing the old ones.
Key partnerships	Logistics Services Providers Freight Forwarders Load units providers e-Platforms	The adoption of the NMLUs requires collaboration with LSPs, forwarders and equipment suppliers who have themselves to invest in the new technology.
Cost structure	Transport costs (variable) Warehouse operations costs (variable) Transport & logistics costs (fixed)	Through bundling and increased handling efficiency, the solution reduces direct costs for transport and warehouse operations. The fixed costs for infrastructure, maintenance and support can also be affected.

Complementary impact

The following business model elements are affected by NMLU and cluster handling technology implementation, but the solution is not sufficient by itself to change them. Other investments have to be implemented to actually change those elements. Therefore the solution is judged complementary to other strategic decisions.

Category	Impacted Elements	Motivation
Value proposition	Price Assortment Product reliability & safety, consumer security	The solution has the potential to impact on prices, reducing costs, to increase the range of products offered, and to reduce risks to safety and security. But these elements depend on strategic decisions taken by marketing and product management, primarily. NMLUs can complement these wider strategies but they are not a primary motivator for such decisions.
Customer segments	Retail chains Hypermarkets Shops e-Retailers	The solution can help redesigning the supply network to acquire new customers that previously where harder to reach. But the choice to enter new market segments depends on strategic planning and supply network investments, NMLUs by themselves having only a complementary impact on such decisions.
Revenue flows	Product sales	Being able to ship more efficiently, NMLUs can support increase in sales. However, to significantly grow revenues requires further investments in production and marketing, NMLUs by themselves having only a complementary impact on such decisions.

Retailers

The current business model of Retailers is represented in Figure 12 canvas, showing only the elements that are relevant to the NMLUs and cluster handling technology business case.
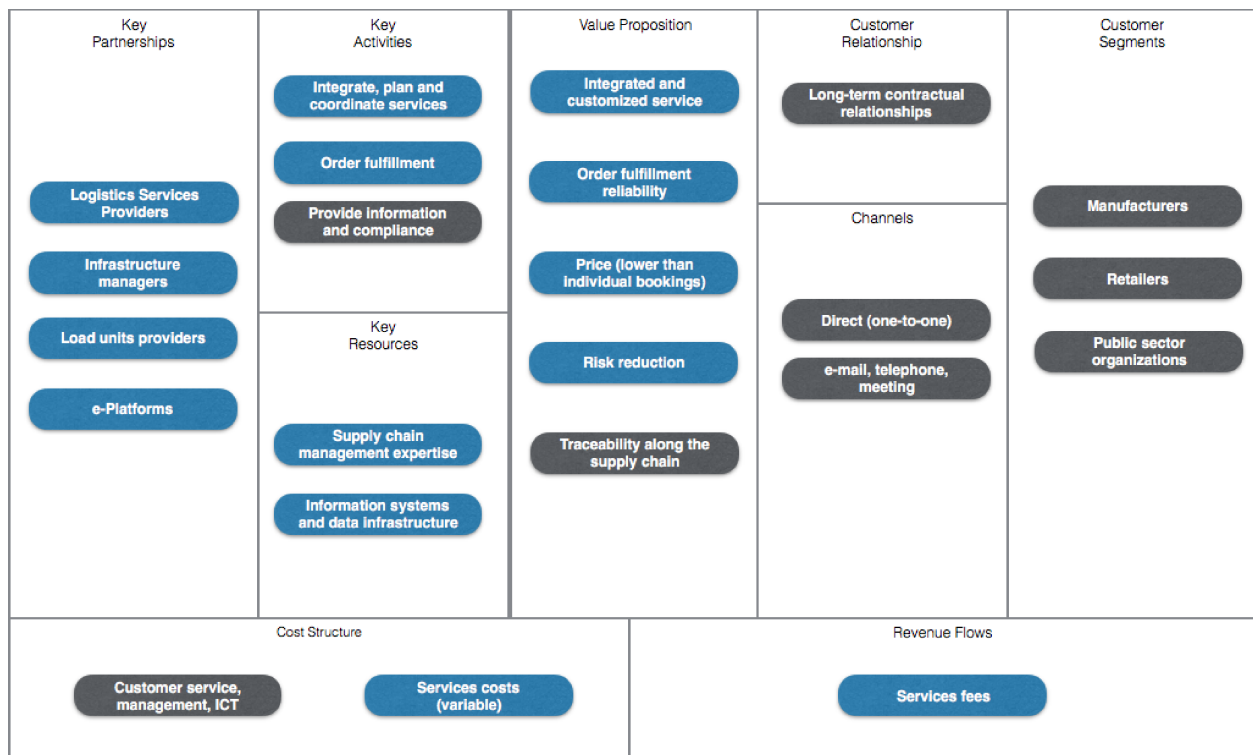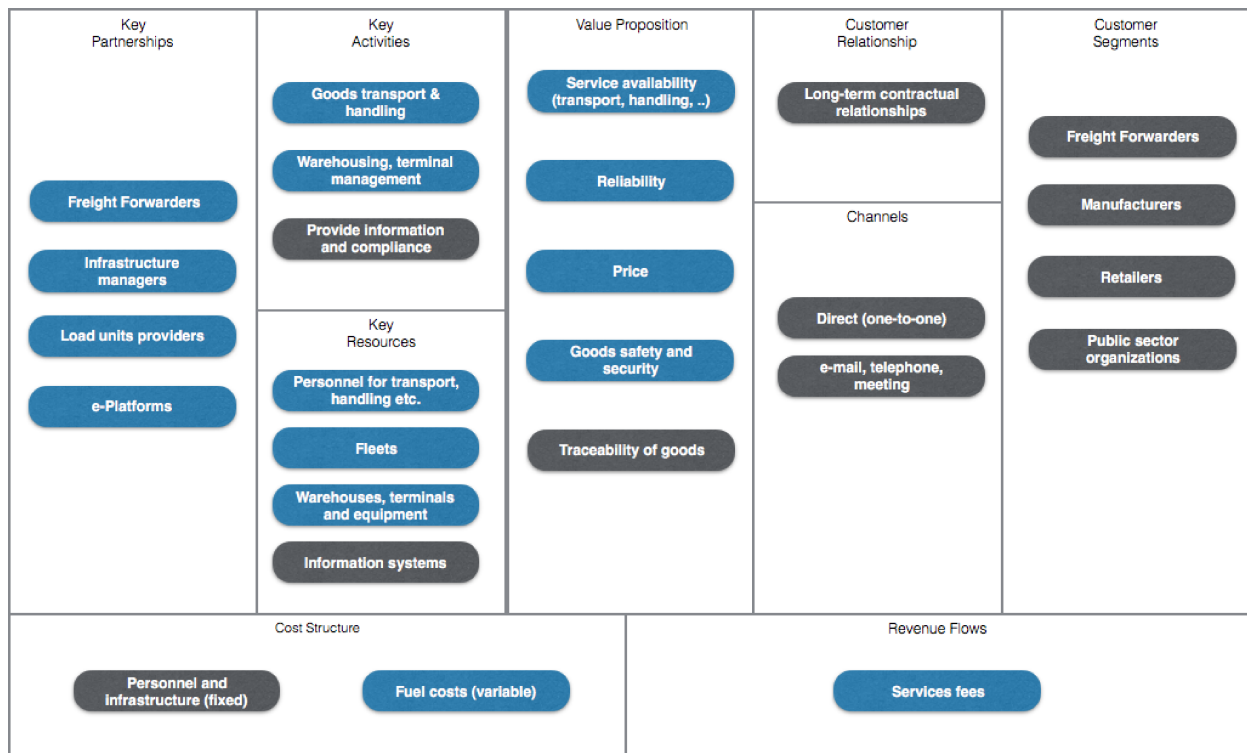

Figure 12 Retailers current business model

Unaffected elements

The following business model elements are not substantially affected by NMLU and cluster handling technology implementation.

Category	Unaffected Elements	Motivation
Customer segments	Consumers (in various mass market segments)	The potential logistics improvement through the solution does not change the retailer's target segments.
Customer Relationship	Single purchase Fidelisation campaigns	The potential logistics improvement through the solution does not change or create new types of customer relationship.
Channels	Shops. e-commerce.	The potential logistics improvement through the solution does not change or create new channels for customer engagement.
Cost structure	Retail shops costs (variable & fixed).	The potential logistics improvement through the solution does not impact significantly on the cost of shops infrastructure and operation.

Direct impact

The following business model elements are directly affected by NMLU and cluster handling technology implementation.

Category	Directly impacted Elements	Motivation
Value proposition	Goods availability Responsiveness to consumers Retailer brand image	The solution has the potential to improve customer service level, increasing goods availability and responsiveness to demand changes. Also, the brand image can be improved and promoted by adoption of an environment-friendly solution.
Key activities	Distribution Network Planning Replenishment & distribution planning DC operation	The solution impacts on: - strategic planning level, where the network can be redesigned and new terminals and services involved; - operational planning, where stock levels and replenishment runs have to be planned to exploit the NMLUs new features; - DC operations, that have to be adapted to the new processes and equipment.
Key resources	NMLUs DC Equipment	The company has to invest in new equipment and infrastructures, partly or entirely replacing the old ones.
Key partnerships	Logistics Services Providers Freight Forwarders Load units providers e-Platforms	The adoption of the NMLUs requires collaboration with LSPs, forwarders and equipment suppliers who have themselves to invest in the new technology.
Cost structure	Transport costs (variable) DC operations costs (variable) Transport & logistics costs (fixed)	Through bundling and increased handling efficiency, the solution reduces direct costs for transport and DC operations. The fixed costs for infrastructure, maintenance and support can also be affected.

Complementary impact

The following business model elements are affected by NMLU and cluster handling technology implementation, but the solution is not sufficient by itself to change them. Other investments have to be implemented to actually change those elements. Therefore the solution is judged complementary to other strategic decisions.

Category	Impacted Elements	Motivation
Value proposition	Convenience of shopping Price Product quality, freshness and safety Assortment	The solution has the potential to improve convenience of shopping, e.g., bringing goods closer to consumers, reducing prices by logistics costs reduction, increasing the range of products offered, improving quality and reducing risks to safety and security. But to invest on these elements further strategic decisions are needed on market positioning and consumer relationships. NMLUs can complement these wider strategies but they are not a primary motivator for such decisions.
Revenue flows	Product sales	NMLUs can help increasing products availability, thus indirectly supporting increases in sales. However, to significantly grow revenues requires further investments in purchases and marketing, NMLUs by themselves having only a complementary impact on such decisions.

Freight Forwarders

The current business model of Freight Forwarders is represented in Figure 13 canvas, showing only the elements that are relevant to the NMLUs and cluster handling technology business case.
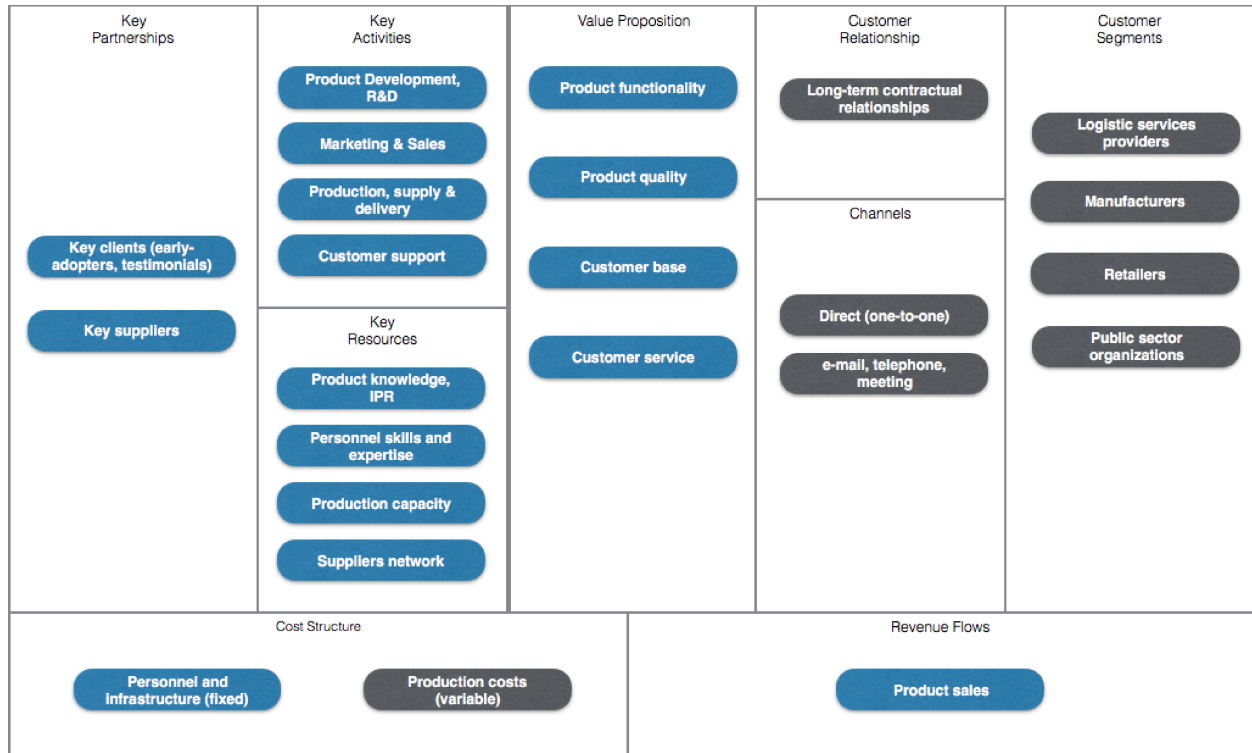

Figure 13 Freight Forwarders current business model

Unaffected elements

The following business model elements are not substantially affected by NMLU and cluster handling technology implementation.

Category	Unaffected Elements	Motivation
Value proposition	Traceability along the supply chain	NMLU and new handling technology do not directly affect traceability.
Key activities	Provide information and compliance	NMLU and new handling technology do not directly affect information provision and compliance.
Customer segments	Manufacturers Retailers Public sector organisations	The potential logistics improvement through the solution does not change the Forwarder's target segments.
Customer Relationship	Long-term contractual relationships	The potential logistics improvement through the solution does not change or create new types of customer relationship.
Channels	Direct one-to-one e-mail, telephone, meeting	The potential logistics improvement through the solution does not change or create new channels for customer engagement.
Cost structure	Fixed costs for customer service, management, ICT, administration and immaterial infrastructures in general	The potential logistics improvement through the solution does not impact significantly on Forwarder's fixed costs.

Direct impact

The following business model elements are directly affected by NMLU and cluster handling technology implementation.

Category	Directly impacted Elements	Motivation
Value proposition	Integrated and customised service Order fulfilment reliability Price Risk reduction	Implementing NMLU-based services, the Forwarder can better meet its customers' needs to improve their supply chain. NMLUs and new handling technology increase reliability and reduce risks. Bundling and efficiency recovery can reduce the overall cost of services, opening up opportunities for price-based competition.
Key activities	Integrate, plan and coordinate services Order fulfilment	The solution impacts on: - selection of services an providers, comply with NMLU carrying and handling requirements; - operational planning, where NMLUs introduce changes and new requirements on criteria an methods; - monitoring and reporting, that will also have to be adapted to the new load units and processes.
Key resources	Supply chain management expertise Information systems and data infrastructure	The Forwarder has to invest in training on the NMLUs and innovative handling methods, to take advantage of the innovation. The information systems also should be adapted to the new processes.
Key partnerships	Logistics Services Providers Infrastructure managers Load units providers e-Platforms	The adoption of the NMLUs requires collaboration with LSPs, hubs and terminals managers and equipment suppliers who have themselves to invest in the new technology.
Cost structure	Service costs (variable)	Through bundling and increased handling efficiency, the solution should reduce the direct cost of services

		spent for any individual customer.
Revenue flows	Services fees	NMLUs and new cluster handling technology can open up new business opportunities, as they virtually increase the transport and hubs capacity. This can be utilised to increase services sold to the same customer or to acquire new customers.

Logistic Services Providers

The current business model of Logistic Services Providers is represented in Figure 14 canvas, showing only the elements that are relevant to the NMLUs and cluster handling technology business case.

Figure 14 Logistic Services Providers current business model

Unaffected elements

The following business model elements are not substantially affected by NMLU and cluster handling technology implementation.

Category	Unaffected Elements	Motivation
Value proposition	Traceability of goods	NMLU and new handling technology do not directly affect traceability.
Key activities	Provide information and compliance	NMLU and new handling technology do not directly affect information provision and compliance.
Customer segments	Freight Forwarders Manufacturers Retailers Public sector organisations	The potential logistics improvement through the solution does not change the LSP's target segments.
Customer Relationship	Long-term contractual relationships	The potential logistics improvement through the solution does not change or create new types of customer relationship.

Channels	Direct one-to-one e-mail, telephone, meeting	The potential logistics improvement through the solution does not change or create new channels for customer engagement.
Cost structure	Fixed costs for personnel, fixed infrastructure (e.g., warehouses), vehicle fleets and related equipment	The potential logistics improvement through the solution does not impact significantly on the LSP's fixed costs.

Direct impact

The following business model elements are directly affected by NMLU and cluster handling technology implementation.

Category	Directly impacted Elements	Motivation
Value proposition	Service availability (transport, handling, warehousing etc.) Reliability Price Goods safety and security	Compliance with NMLUs transport and handling allows an LSP to meet demand from Forwarders, Manufacturers and Retailers requiring this new technology. NMLUs and new handling technology increase reliability and reduce safety and security risks. Bundling and efficiency recovery can reduce the overall cost of services, opening up opportunities for price-based competition.
Key activities	Goods transport & handling Warehousing, terminal management and other services (e.g., cross-docking, packaging, postponed assembly, ..)	The solution impacts on: - planning and execution of transport, handling and warehousing services, where NMLUs introduce changes on methods and criteria; - monitoring and reporting, that will also have to be adapted to the new load units and processes.
Key resources	Personnel for transport, handling and warehousing operations Vehicles fleets Warehouses and related equipment	The LSP personnel have to be trained on how to handle the NMLUs. Investments on fleets and equipment are required.
Key partnerships	Freight Forwarders Infrastructure managers Load units providers e-Platforms	The adoption of the NMLUs requires collaboration with Forwarders, hubs and terminals managers and equipment suppliers who have themselves to invest in the new technology.
Cost structure	Fuel costs (variable)	Through bundling and increased handling efficiency, the solution should reduce the direct variable costs of services, in particular fuel costs.
Revenue flows	Services fees	Being able to transport and handle NMLUs, the LSP should increase its revenues, attracting new customers that require this new technology.

3rd party hubs

This part will be completed in next iterations based on impact assessment results and concept evolution.

Technology Providers

The current business model of Technology Providers is represented in Figure 15 canvas, showing only the elements that are relevant to the NMLUs and cluster handling technology business case.

Figure 15 Technology Providers current business model

Unaffected elements

The following business model elements are not substantially affected by NMLU and cluster handling technology implementation.

Category	Unaffected Elements	Motivation
Customer segments	Logistic services providers Manufacturers Retailers Public sector organisations	The target customer segments do not change if the company is already operating on the market of logistic equipment and handling technologies. Similarly, customer relationships and channels do not change.
Customer Relationship	Long-term contractual relationships	
Channels	Direct one-to-one e-mail, telephone, meeting	
Cost structure	Variable direct production costs (e.g., materials, subcontracting)	The new product variable costs structure is not expected to be substantially different from the other company products.

Direct impact

The following business model elements are directly affected by NMLU and cluster handling technology implementation.

Category	Directly impacted Elements	Motivation
Value proposition	Product functionality	NMLUs and related technology are new products,

	Product quality (reliability, safety, durability, etc.) Customer base Customer service	adding a new set of functionalities to the current value proposition of technology providers. A large customer base is essential to ensure that NMLUs can be applied by different business partners along the supply chain. Providers of NMLU and new handling technology have to ensure the same level of quality and the same customer service standards as providers of traditional solutions on the market.
Key activities	Product Development, R&D Marketing & Sales Production, supply & delivery Customer support	To deliver the new technology on the market, the company has to put in place new activities in all key areas, from product development to customer support.
Key resources	Product knowledge, IPR Personnel skills and expertise Production capacity Suppliers network	New resources are needed to perform the new technology key activities, from product knowledge to be protected through a proper IPR strategy to a dedicated suppliers network.
Key partnerships	Key clients (early-adopters, testimonials) Key suppliers	The adoption of the NMLUs requires collaboration with key clients, as early adopters and testimonials to improve the product and customer base. Also key suppliers are needed, with proper knowledge and capacity to scale-up production.
Cost structure	Personnel and infrastructure costs (fixed)	The required new key activities and resources will impact on the company fixed costs structure.
Revenue flows	Product sales	Sales of the new product constitute an additional source of revenues for the company.

4.2.3 Hypotheses on business ecosystem evolution

Based on the above-indicated impact on current stakeholders Business Models, the following Table lists the main hypotheses on the business ecosystem evolution. These hypotheses have to be validated in the next project iterations, by answering the relevant business questions as listed in the table.

Hypothesis	Description	Business questions
Investment on NMLU assets.	The shift towards NMLU and associated handling technologies can only happen if one or more stakeholders invest to acquire the NMLUs as physical assets. This investment must be justified by a business plan fitting the investing stakeholder strategy and business model.	• Who will acquire NMLUs, aiming at substitution of traditional loading units along the chain? - An end-user, e.g., manufacturer or retailer? - A rental service like, e.g., container or pallet rental providers? - A forwarder or logistic services provider? - Other? ... • If the investment is made by end-users, which is the ROI for NMLU acquisition, maintenance and operation? • If a service provider is investing, which is the business model and plan for the new business generated through NMLUs?
Manufacturers and retailers acceptance.	Manufactures and Retailers will adopt NMLUs and the related technologies to move goods through the entire distribution chain.	• Which tangible and quantifiable gains are there for manufacturers and retailers in terms of: customer service, brand image, cost reductions?

		• Which of the above gains are shared and have to be split between manufacturers and retailers, e.g., cost savings resulting from bundling cargo with modular units? • Which are the set-up and operational costs for manufacturers and retailers to switch to NMLUs?
Logistics Services Providers compliance.	LSPs who are not themselves providing the NMLUs (see hypothesis 1) must anyway be free to operate in NMLU-based supply chains. They must be enabled to provide services compliant with NMLUs without investing too much. If too high investments were required, this would be a barrier for most LSPs, preventing large-scale adoption of NMLUs.	• Which are the investments required for LSPs to make their services compliant with NMLUs, in terms of: adaptation and acquisition of vehicles and equipment, personnel training, information systems and processes redesign? • Which tangible and quantifiable advantages are there for NMLU-compliant LSPs, in terms of competitive advantage, better customer service and increased efficiency?

4.3 Market segmentation

FMCG sector, retail industry is the target market for NMLU. This sector can be divided on a "behavioural, needs-based" segmentation base throughout the FCGM supply chain:

- Manufacturer: utilisation of production capacity; fast shipping of goods from plant

- Shipper: high transport or warehousing order situation; efficient transportation and logistics operations for moving of goods

- Retailer: Offer of product mix without out-of-stock situation; fast replenishment

Target group: Shipper, especially LSP and 3PL, who do logistics operations for Manufacturer and Retailers. Everyone in Retail SC, who is responsible for logistics operations to transport goods from plant over some consolidation points to end destination (e.g. store).

The NMLU as a new product of the pooling service provider. These offer their services to LSPs and 3PL, which have their interfaces in the retail SC. Effects for individual players in SC:

- LSP/3PL

    o more flexibility

    o volume and weight utilisation

- Manufacturer

    o Usability of transport platforms just like CargoStream for smaller players

- Retailers

o smaller shipments for retailers (order management optimisation)

4.3.1 Market Characteristics, size and trends

Segment: Manufacturer in FMCG	
Market Characteristics	For FMCG manufacturer is characteristic: − Concentration on one FMCG segment, e.g. personal care, household care, branded and packaged food and beverages, spirits and tobacco − High production volumes − Low contribution margins − High stock turnover
Market Size	European market is concentrating on 20 big manufacturers:

Top 20 Manufacturer of FMCG in Europe 2014

Top	Company	Country of origin	LEH-Umsatz (in Mio. USD)	%
1	Nestlé	CH	99.457	21,02
2	Unilever	UK/NL	66.135	13,98
3	AB-InBev	B	43.195	9,13
4	L'Oréal	F	30.515	6,45
5	Danone	F	28.286	5,98
6	Heineken	NL	25.504	5,39
7	British American Tobacco	UK	23.876	5,05
8	Diageo	UK	17.888	3,78
9	SABMiller	UK	17.458	3,69
10	Reckitt Benckiser	UK	14.498	3,06
11	Royal Friesland Campina	NL	12.191	2,58
12	Carlsberg	DK	11.853	2,51
13	Pernod Ricard	F	11.388	2,41
14	SCA	S	11.344	2,40
15	Imperial Tobacco	UK	11.265	2,38
16	Henkel	DK	10.744	2,27
17	LVMH	F	10.497	2,22
18	Arla Foods	DK	10.382	2,19
19	Danish Crown	DK	9.620	2,03
20	VION	NL	7.033	1,49
			473.129	**100**

Source: OC & C Strategy Consultants

Market Growth	Market is saturated, high entry barriers for a new manufacturer.
Market trends	− Growing popularity of autonomous vehicles − Rising popularity of IoT − Increasing popularity of sharing economy − Social responsibility

	− Logistics Technology as a Service − Virtual

Segment: Retailing

Market Characteristics	Retailers are referred to as middlemen or intermediaries. They occupy a middle position, receiving and gassing on products from manufacturer to customers. The characteristics of retailers are listed below: − Retailers act as a connecting link between the manufacturer and customers − Interfaces with the customer is service-based − Assets are local stores, Retailers provide convenience in terms of location of the shop − Sell small quantities of items on a frequent basis − Retailers offer is selection an assortment "product mix" of merchandise related to the target market in order to provide choice − Retailers normally charge higher unit prices than a manufacturer
Market Size	Expect online trade, the market is concentrating on 15 big players: **Top 15 Food Retailing Europe 2014** | Top	Retailer	Country of origin	Turnover in Mio. € (netto)	%
---	---	---	---	---
1	Schwarz-Gruppe	DE	79.300	10,82
2	Tesco	UK	76.490	10,44
3	Carrefour	F	74.706	10,19
4	Aldi-Gruppe	GER	65.100	8,88
5	Metro-Group	GER	63.035	8,60
6	Auchan	F	53.500	7,30
7	Rewe	GER	51.000	6,96
8	Casino	F	48.645	6,64
9	Edeka	GER	46.400	6,33
10	E. Leclerc	F	45.700	6,24
11	Sainsbury	UK	32.973	4,50
12	Asda	UK	31.584	4,31
13	Morrisons	UK	24.370	3,33
14	IMT	F	21.600	2,95
15	System U	F	18.510	2,53
			732.913	100	 *Source: MTV Study 2015*
Market Growth	Market is saturated, but retailing is a dynamic industry. It keeps growing by moving retail operations into new markets. Markets are ever changing and characterised by risk and threat.

	Online retailing sector is seeing double-digit percentage growth.
Market trends	− Automation − IoT/transparency − Last mile with online shopping − Consumer focus − Big data analysis − Virtual

Segment: Pooling	
Market Characteristics	For pooling service provider is characteristic: − Customers are manufacturer as well as shipper and retailer − High stock of carries (items and types) − High capital commitment caused by the stored carriers − High initial payment for establishment and operation of platform - Earnings by service carrier supplies and ad-on-services, e.g. repair and cleaning
Market Size	1.121 Mio. carrier (300 Mio. standard, 420 Mio. lugs, 400 Mio. reusable transport box for bread, 1. Mio. individual solutions) are in circulation on European level. *Source: MTV Study 2015*
Market Growth	Market is saturated
Market trends	− Shared transports − Bundling − Automation − Green Energy − Smaller Units − IoT − RFID

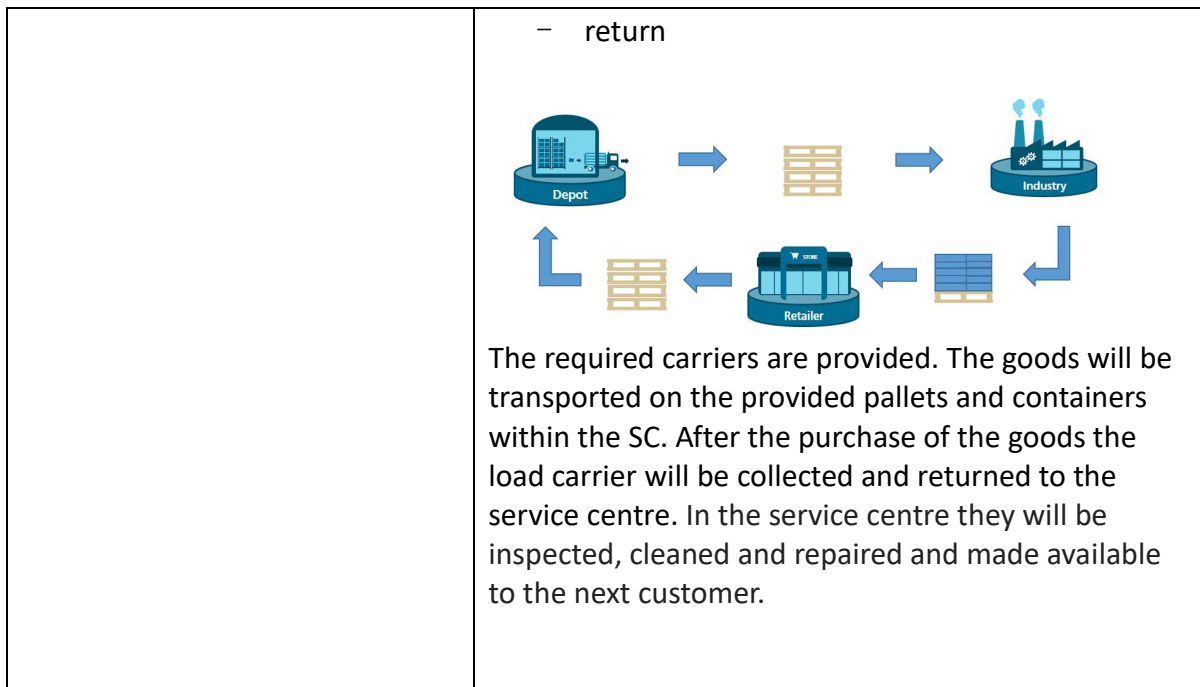## 4.4 Competitive analysis

The NMLU pooling provider has two types of competitors:

Closed Pooling System	
− Zentek Poolsystem − LPR Pool-System − LHM-Pooling − Deutsche Paletten Logistik (DPL) − CHEP − Greencycle	Only members of the closed Pooling can use the system. Regular services are: − purchase carrier − cleaning − repair − sorting − provision

	– return The required carriers are provided. The goods will be transported on the provided pallets and containers within the SC. After the purchase of the goods the load carrier will be collected and returned to the service centre. In the service centre they will be inspected, cleaned and repaired and made available to the next customer.
Open Pooling System	

– EPAL / GPAL
– Falkenhahn Worldpallet
– UIC
	Everyone (with a contract) can use the pool. There are contracts between the trading partners with different services:
	  – Purchase and sale
	  – Classical exchange
	  – Pledge and rent
	
	Pooling system:
	- Ideal exchange (Acceptance and delivery of the pallets are the same. 1:1)
	- Easy exchange (no exchange of the own carrier, only documentation return obligation)
	- Exchange with repatriation obligation (similar to a simple exchange with the obligation to transport the carrier to an agreed place)
	- Exchange with assumption of the exchange risk (The transport company is obliged to bring the carriers back)

4.4.1 Regulations and barriers affecting the competition

Specifics regulations are addressed to several sectors.

Transport of food:

-   Transport boxes have to be clean and in good condition

- Transport boxes have to be constructed that a good cleaning and disinfection is possible

- Best Case: Transport only for food

  o If the transport was mix with other product you have to split them in different boxes

  o After a food transport the boxes have to clean and disinfected

- At the transport of food, the transport boxes place to protect for the risk of contamination

- Monitoring of the suitable temperature of food

Packaging test:

- functional test at the packaging

- Peel-test

- Pressure test

- Attempts to pull (90°-/180°)

- Customised test device

- Open the cover

4.5 SWOT analysis

Strengths	Opportunities
• NMLU Components based on common standard in logistics sector • Optimal volume- and weight usage on transport • Additional transport possibility for LSP • Smaller shipments for retailer • Jump on cargo stream for smaller producers • Ready for intermodal shift • Ready for automated un- and loading systems • NMLU-Pallet fits to common standards, e.g. storage and transport	• New business field for pooling service provider (new service for LSP, Producer and Retailer) • Creation of a quasi-monopoly with the new system for the LSP • Cross company bundling possibilities • More flexibility for LSP in tour planning

Weaknesses	Threats
• Need for storage- and handling area for NMLU system components • High costs of process adaptation at each stage in SC	• No pleasing NMLU system design, not easy handling • Expectation of high maintenance effort and poor quality • No trust in system market entry • No trust in cross company bundling • Lightweight construction versus payload of load unit on NMLU-bottom • Smart Connection of NMLU components together and to interfaces • No equipment for handling of NMLU

5. Conclusions

Following the methodology of Market and Business Ecosystem Analysis, this report has provided a simple description of Clusters 2.0 main outcomes value chain, used mainly to identify market characteristics and potential competing offers, and position in comparison to them. The report has then identified the main types of actors being active in the industry, and provides structured, non-exhaustive lists of companies. Finally it has provided a general overview of market trends and raised important questions concerning how the sector could evolve in the coming years.

Regarding the market characteristics, the main requirements defined for intra-cluster network hold also for inter-cluster network. When we compare local (intra cluster) case and global (inter cluster case) from the aspect of expected level of fulfilment of stated criteria we may derive following conclusions:

- Intra cluster case - many to many distribution problems which need to be solved by an efficient bundling policy based on PTN design and with adequate business and governance model defined. So, the risk of satisfying the required criteria correlates to complex flows within the PTN.

- Inter cluster case - one to one distribution problem through corridor network (in case of direct connections) which is supported by bi-directional coordination between CluCs and CargoStream platform. Here, we do not have complex flows, however, especially in case of rail service established, rail infrastructure related problems may appear. This was the reason for including infrastructure managers in inter-cluster collaborative network.

In order to contribute to a greater shift to intermodality, Clusters 2.0 solution must address the current needs of shippers. Shippers have to make sure that their supply chain is equipped to offer maximum flexibility. Shippers request transport acceleration, transport postponement, effective and sufficient inventory levels. They also want final mile distribution and visibility along the whole transport chain. Or in other case, logistics and transport costs will eat up their profits.

Solution proposed by Clusters 2.0 pursue an increment of volume as well as integrated management by utilising the entire service portfolio of extensive origin value added services along with multi-vendor consolidation and multi-country consolidation. The most important is to offer a global transport solution (with focus on green transport modes and in accordance with specific needs) as well as final mile deliveries.

Further steps

This document is an initial version of the Market & Business Ecosystem Analysis, focused on the first year business vision. This should extended by further analysis of the market segmentation, competitive offer, barriers and further scenario development. For this reason, it will be revised, extended and completed by the following documents:

- D1.2 Business Models Innovation (M24)

- D1.3 Business Models Innovation at the end of the project (M36)

- D1.4 Exploitation Handbook (M12), explaining project exploitation strategy, and

- D1.5 Final Exploitation plans (M36), including different exploitation strategies for different Clusters 2.0 partners: industrial, academic and stakeholder.

6. Annexes

## 6.1 Potential new Business Models for the CluCS/PTN system

Based on existing business models of relevant stakeholders in the Cluster and CluCS concept design we may conclude that for building a synergy of transport and logistics activities at the Cluster level a collaborative business model is needed.

Collaborative business model should be based on designing a Proximity Terminal Network (PTN) that can efficiently address the need for logistics cost decreasing and improving logistics service level by shifting consolidated cargo to rail (or barge) so that economies of scale can be obtained. Depending on the available infrastructure (railway lines, road or inland waterway network) within the network of terminals in Cluster's proximity (PTN - Proximity Terminal Network) through collaboration the necessary synchronisation between road transport service (first/last mile transport) and more environmentally friendly transport services (rail or barge) can be combined in intermodal cluster network. In general, the focus of collaborative business network within the Cluster is a strong rationalisation of business processes that leads to economy of scale and scope and on that way to justifying rail intermodal flows from/to Cluster.

Collaborative cluster's network is in essence a two layered network composed from:
- Upper level sub-network that connects terminals;
- Lower level sub-network that includes first/last mile flows from/to terminals.

Local road carriers are subcontracted for this activity (in case of absence of rail industrial sidings). On the upper level consolidated shipments in terminals have been sent to the main terminal in PTN. In this terminal, which represents a Cluster's gateway, consolidation of freight will be performed in order to generate enough volumes for establishing a train service from Cluster. Freight bundling can be performed by long haul truck service or rail/barge service. This also depends on the market segment. Figure 16 compares flow pattern in existing situation and in case of collaborative network with consolidated flows via PTN.

Direct fragmented flows between origin and destination   Collaborative network with consolidated flows via cluster network
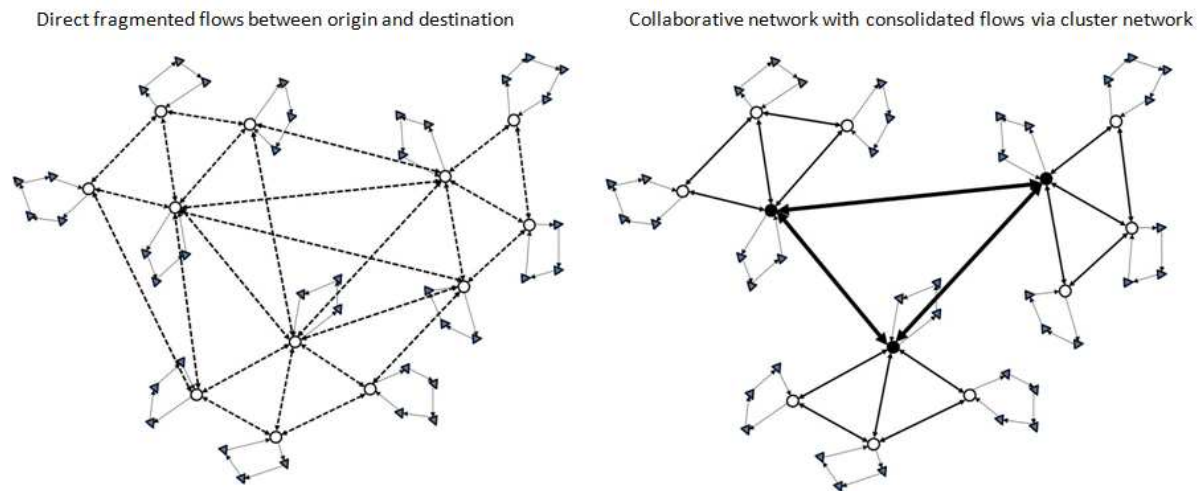
Figure 16: Fragmented and consolidated flows

In existing situation the flows are highly fragmented - shipments from different shippers are sent mostly by trucks without a system of flow consolidation. In this situation the cost efficiency is under pressure. In proposed business network freight flows of different shippers are consolidated and shipped through a PTN. The extra costs generated by freight flows bundling (extra handling, transportation) will be compensated by the economies of scale of the inter-cluster transportation.

Consolidation at Cluster level allows more efficient and more frequent transportation by concentrating large flows onto relatively few links between hubs.

PTN design problem in general form includes:
- Finding an optimal location for PTN terminal facilities and establishing a gateway terminal;
- Assigning origins/destinations to PTN terminals;
- Determining connections between PTN terminals;
- Routing flows through the network.

Based on established PTN design we can look for collaboration between stakeholders involved in PTN in order to achieve economies of scale and scope. Combination of activities of different stakeholders may lead to cost sharing, exchanging of relevant information leads to avoiding sub-optimisation (when stakeholders act independently) and acting as one organisation the stakeholders that collaborate can operate more efficiently and more effective.

Following collaboration forms are possible between stakeholders within the Cluster:
- Horizontal cooperation as cooperation between a number of shippers or a number of 3PLs may lead to cost reduction, strengthened market position, improved productivity, service quality, enhanced innovation and supply chain responsiveness and increased social relevance.

- Vertical cooperation as a cooperative relationship between shippers and 3PLs and/or rail operators and terminal operators can enhance synchronisation between supply and demand in the Cluster.

- Diagonal cooperation as a bi-dimensional cooperative strategy between a number of horizontally connected shippers or 3PLs, rail operators and terminal operators aims to additional enhancing of supply chain flexibility.

- Combining three basic forms of cooperation at various levels and in various modes simultaneously leads to creating interconnected logistics networks. Interconnected logistics network leads to improved efficiency of matching between shipment demand and available transport and logistics services as well as high level of synchronisation and dynamic update of logistics and transport plans across modes and actors.

For initialisation of collaboration based on designed PTN, two structures are suggested:

Coalition of terminals coordinated by a neutral trustee. This is in essence a horizontal collaborative PTN model with vertical character. This model establishes a synergy through forming a coalition between terminals currently competing to each other. Coalition is coordinated by a neutral party equipped with CluCs. Considering its expertise, 4PL represents the most competent party for building and maintaining this collaborative network. Formation of this collaborative network could yield to following advantages:

- Improved and optimised services;
- Better utilisation of transport capacities;
- Market power - with the formation of network, terminals will gain market power. Also, lower costs for terminal operators due to combined purchasing power;
- Shifting cargo from road transport for out of Cluster routes (also within the Cluster in case the rail infrastructure is available);
- Better utilisation of combined capacity - synergy between capacities of terminal will increase capacity compared to capacity of individual terminals. This will lead to improved reliability and flexibility within the Cluster.
- Utilisation of storage facilities: increasing of efficiency and reduction in total cost by sharing the storage facilities.

4PL will also combine the activities of 3PLs in order to reduce costs, optimise load factors and avoid empty running and coordinates transport requests in order to establish a PTN with improved service, better capacity utilisation and lower CO_2 emissions. So, the 3PLs are charged for last/first mile haulage. Between terminals, a number of options are available: long haul road option toward main terminal or in case of availability rail option (block/shuttle trains) or inland waterways operators can be subcontracted by 4PL. CluCs should enable joint operational planning. Cooperative structure with links within the coalition and with other actors looks like on Figure 2. RU/RO represents Railway Undertakings (RU) or Railway Operators (RO) subcontracted for PTN rail transport service

provision in case the network is available. LSPs are in essence 3PLs or road hauliers subcontracted for the first/last mile or long-haul transportation between terminals.
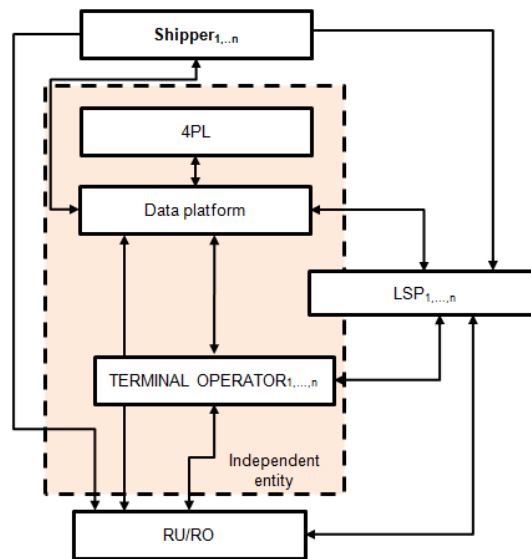

Figure 17. Horizontal inter-terminal network

Vertical collaborative PTN model. Previous collaborative PTN business model may evolve in a vertical business network by establishing a strong relationship with one or more shippers, 3PLs and rail operators (Figure 3). Again, the network is coordinated by 4PL empowered by CluCs. Having rail operator in strategic collaboration may enhance the coordination between terminal and transport operations within PTN in case the flows within PTN are performed by rail. Also, establishing a strategic relationship with rail transport provider will contribute to efficient interlinking between Clusters. This will be the subject of 4.2.3 section.
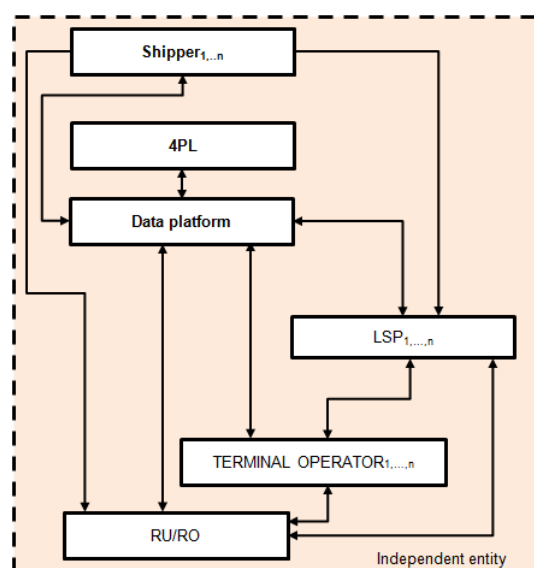

Figure 18. Vertical collaborative PTN model

Additional benefits comparing to previous business model are:

- Long term business network sustainability - one big or a number of shippers give sustaining capability to business network.
- Smooth visible, reliable and environmentally improved intermodal rail transport service. Efficient synchronisation of transport demand and transport supply through joint timetable planning, warehousing-derived terminalisation function.