

NexTrust



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Optimizing existing and new intermodal rail services (WP3. D.3.3)

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(Project Deliverable Report D.3.3)



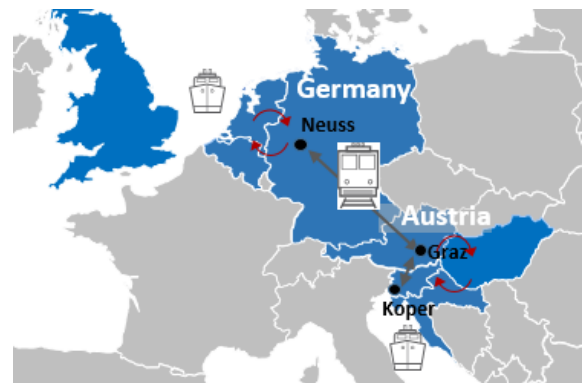
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Executive Summary

The research activities of the intermodal supply chain sector of NexTrust were looking from the *supply side* into the vertical cooperation in order to understand whether the horizontal collaboration model with a trustee function can also be applied successfully on the vertical intermodal supply chain. These research perspective was so far not really tackled and the trusted function business model was only seen as key success factor to establish cooperation horizontally between shippers.

The NexTrust intermodal demonstrator was realized together with the Austrian logistic service provider (LSP) Wenzel Logistics.

Since 2004, the carrier and LSP Wenzel is taking the full risk to operate a train service. This so called ‘company train’ is connecting the South of Austria, Slovenia, Croatia, and Hungary with the area of Western Germany, Netherlands, Belgium and United Kingdom. The current hubs to consolidate the continental Full-Truck-Load (FTLs) to a rail connection are the Cargo Centre Graz CCG (Styria, Austria) and Intermodal terminal Neuss (Ruhr region, Germany) with a potential intermediate stop in Frankfurt/Main. There is a second train service in cooperation with the CCG, which is bundling the maritime flows between Graz and the maritime Port of Koper (Slovenia).



Wenzel Intermodal Train Connection

In order to be competitive with road transportation, one of the cornerstone is, that the train frequency must be *regular* to offer the necessarily *daily* flexibility to use the train service and consequently be in the operational position to shift more traffic off the road. The utilization of train capacity is one of the major challenge over the last decade in particular for the Wenzel train between Graz and Neuss. In the research analysis and discussions it emerged that for the improvement of the above described inefficiency situation, Wenzel shall try to collaborate directly with the shippers.

The research activities looked into the appropriate business model of NexTrust to understand how with this new and innovative way of trusted collaboration, an existing intermodal railway service can be optimized and shift more traffic off the road. The research activities were following the 3-step methodology unique to the project. This 3-step-approach has following phases:

Step 1) Identification ➡ Step 2) Preparation ➡ Step 3) Operation

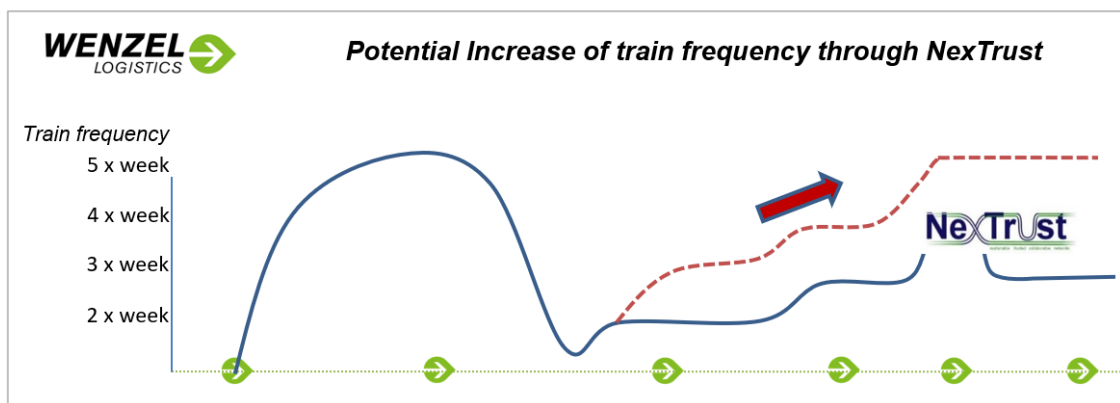
Within this management process, the collaboration between carrier (door-to-door) and the shipper (producer) is facilitated by the neutral service provider with trustee function. With the

innovative NexTrust business model, the new player, the trustee is installed as neutral, independent supporting entity between the shippers, which acts under strict confidentiality and EU competition law compliance. This collaboration approach is extended to the collaboration between carrier and intermodal operator or, if the carrier itself is an operator, between carrier and railway undertaking. Therefore, the trusted collaborative intermodal networks are built up in the first place *vertically* between shippers and logistics service providers, who are committed to cooperate in a fair and trusted environment as equal partners.

The NexTrust project focused in the first phase of its research activities to expose collaboration opportunities, using Giventis' ELG-Web™ platform to enable *smart visibility* across the shippers thus building a more intelligent and sustainable supply chain. In this way, the FTL project team addressed the currently fragmented logistics “silos” from individual shippers and actually succeeded to replace these “silos” with a “cross-shipper” more efficiently connected trusted transport network.

Overall, around 5 shippers could be identified with 5,033 FTL shipments on the corridor for the FTL demonstrator by Wenzel. There were even more FTL flows by other shippers, however, these flows were not necessarily to the Styria area of Austria, or Slovenia and Croatia. Due to the large catchment area, other potential freight flows were in consequence not selected for the pilot cases.

The results are showing that enough critical mass could be bundled in order to optimize the Wenzel company train. At least around 1,500 FTL shipments per year were converted from the road to the Wenzel company train in several pilot cases and phases. Once these pilot cases will turn to daily business, then the train frequency with the identified and bundled road FTLs could lead at least to one more train departure per week.



The Demonstrator shows that the NexTrust business model brings significant added value to supply sided stakeholders who have invested in the intermodal train business. The innovative NexTrust business model can be seen as a complementary approach to increase the overall usage of intermodal freight services.

With the mode conversion in place, the shippers are not only benefiting from a sustainable transport mode, but also can reduced its carbon footprint significantly. The GHG calculation emerged that the intermodal pilot cases have achieved a GHG reduction of 30% to 60%.

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1. Introduction, Goal and Objective

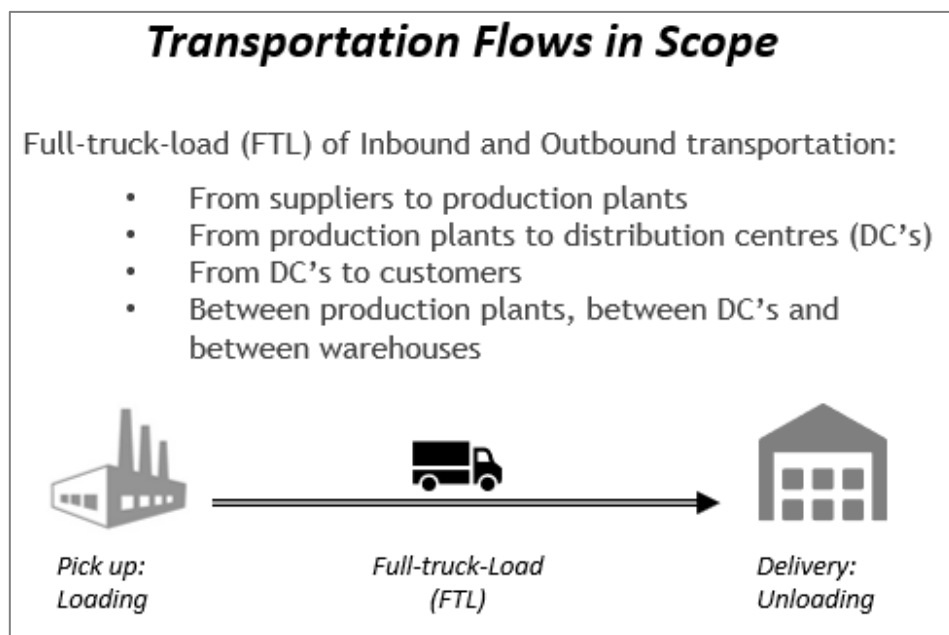
The overall freight share of total GHG emissions is around 8% and the future scenarios foresee an further growth in the coming years. In the same time, freight transportation is one of the 'most challenging sectors' in which to achieve emission reductions. There are lot of initiatives and way to look into reducing the greenhouse gas (GHG) emissions impact of freight transportation.

The NexTrust project is tackling the negative GHG emissions impact of freight transportation with an innovative business model which facilitates trusted collaboration in transportation to increase efficiency and sustainability in European logistics. NexTrust is hereby looking into the *entire* transport supply chain and the here presented reports is focussing on the multimodal or in the context of the project referring to "intermodal" supply transport network.

1.1. The Business Model and Transportation Flows in Scope

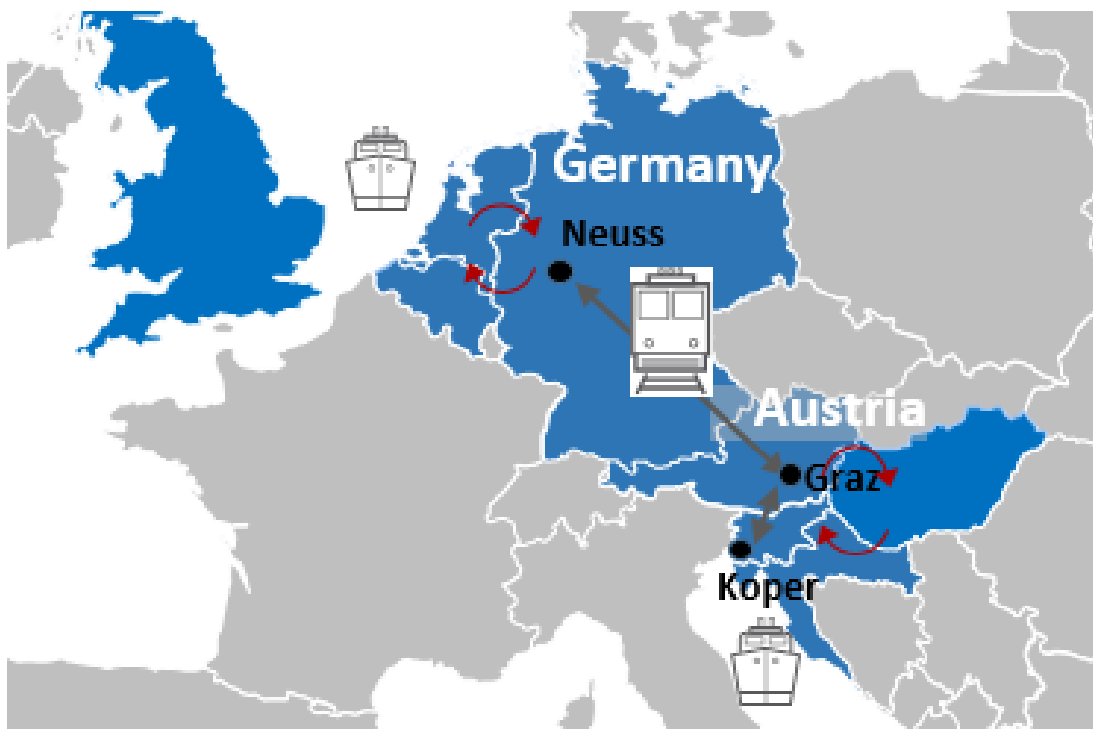
The research activities of the intermodal supply chain sector of NexTrust were looking from the *supply side* and were focussing on the vertical cooperation in order to understand whether the horizontal collaboration model with a trustee function can also be applied successfully on the vertical intermodal supply chain. These research perspective was so far not really tackled and the trusted function business model was only seen as key success factor to establish cooperation horizontally between shippers. However, in order to achieve a high level of sustainability, the concept of the trustee could also be applied and tested in the vertical approach to verify whether significant GHG emission reduction can be achieved.

The here presented demonstrator is looking into the inbound and outbound full-truck-loads (FTL) across Europe, as summarized in the picture below.



1.2. The key player of the intermodal demonstrator: Wenzel Logistics

The NexTrust intermodal demonstrator was realized together with the Austrian logistic service provider (LSP) Wenzel Logistics. Since 2004, the carrier and LSP Wenzel is taking the full risk to operate a train service. This so called 'company train' is connecting the South of Austria, Slovenia, Croatia, and Hungary with the area of Western Germany, Netherlands, Belgium and United Kingdom. The current hubs to consolidate the continental Full-Truck-Load (FTLs) to a rail connection are the Cargo Centre Graz CCG (Styria, Austria) and Intermodal terminal Neuss (Ruhr region, Germany) with a potential intermediate stop in Frankfurt/Main. There is a second train service in cooperation with the CCG, which is bundling the maritime flows between Graz and the maritime Port of Koper (Slovenia).

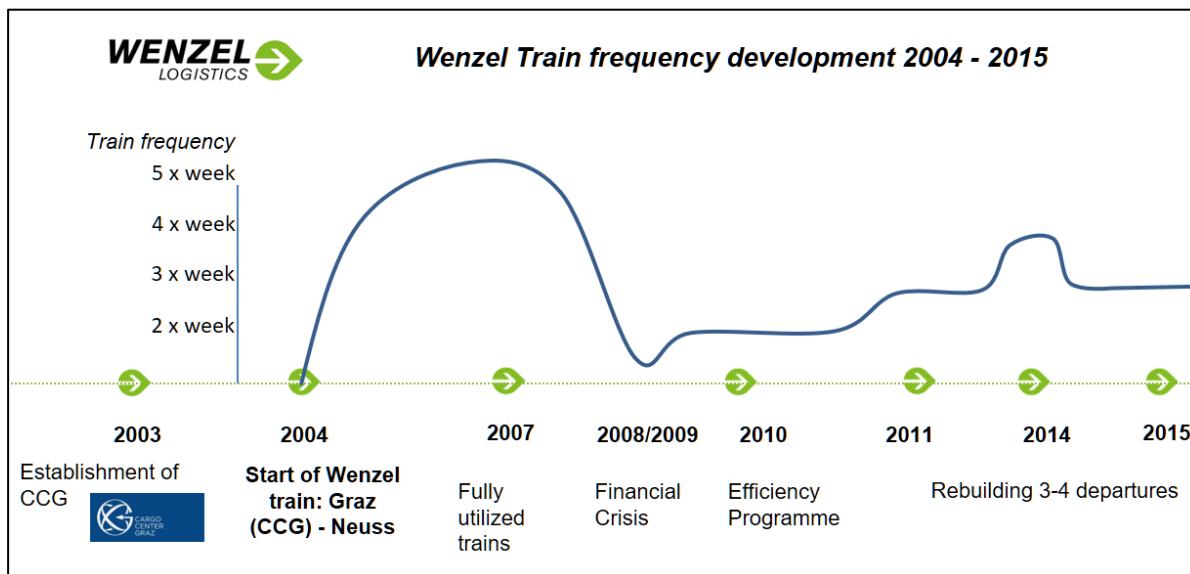


Wenzel Intermodal Train Connection

1.3. Intermodal capacity fluctuant and not constantly utilized

In order to be competitive with road transportation, one of the cornerstone is that the train frequency must be *regular* to offer the necessarily *daily* flexibility to use the train service and consequently be in the operational position to shift more traffic off the road.

The utilization of train capacity is one of the major challenge over the last decade in particular for the Wenzel train between Graz and Neuss. In the graphic below we visualise how fluctuant the train frequency was over the last decade.



The Wenzel train started in 2004 and could establish in few years daily fully utilized train departures. In 2008/2009 the train stopped almost with the financial crisis its service and could only after an internal efficiency programme be rebuilt to 2-4 train departures per week.

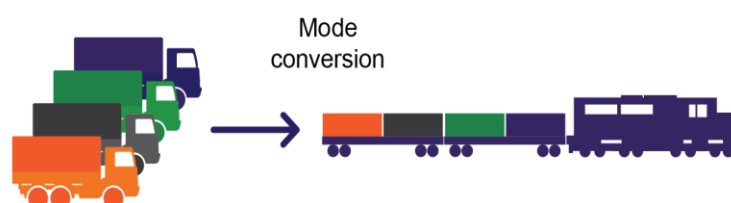
The additional problem with the underutilized train frequency is, that the train production costs are with fewer trains higher than with daily train departures. In consequence the intermodal train solution cannot be cost competitive with only few train services a week.

1.4. Main objective and goal of the Demonstrator

The focus of the research activities was now to find the appropriate collaboration business model for *vertical collaboration* among a carrier who is a small and medium-sized enterprises (SME) and its customer, the shippers, who are the producer of goods. The NexTrust intermodal demonstrator is defined with the internal pilot case number 3.2 of the project.

The goals of the NexTrust Intermodal Demonstrator:

- (1) *Optimizing intermodal rail services through trusted collaboration among SME sized carrier and shippers*
- (2) *Applying the trusted business model for the intermodal supply sector.*
- (3) *Increasing the quantity of freight flows for an existing train connection, where the SME sized LSP is taking today the full risk of utilization.*



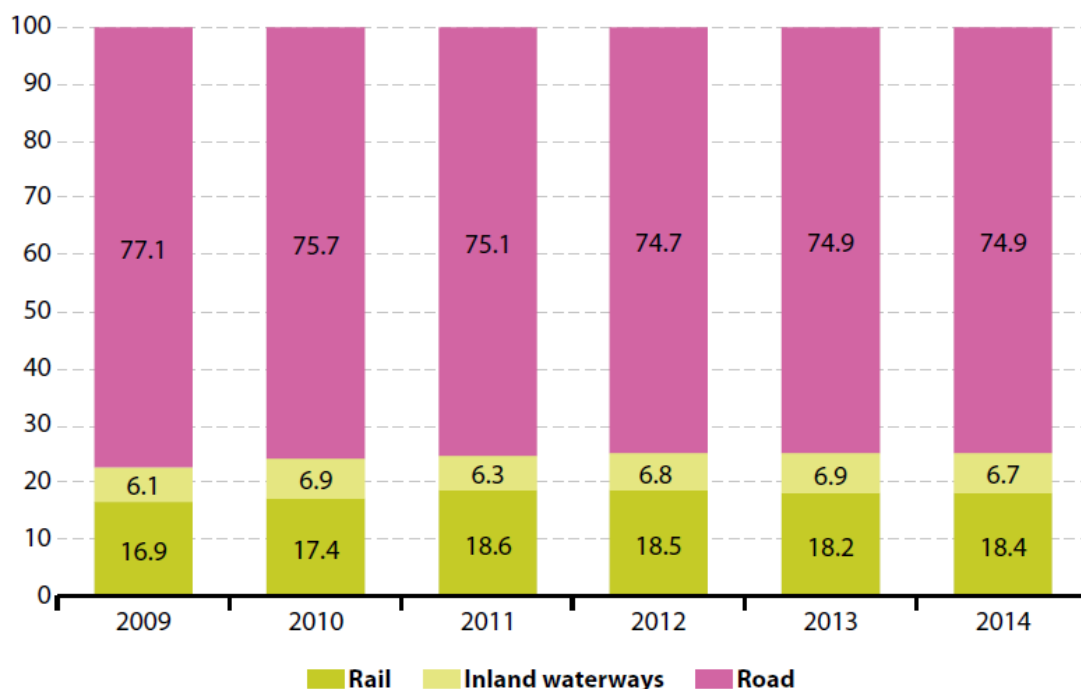
2. General Description, including Need and Problems

The here presented results of the intermodal demonstrator use cases focusses on the transportation of FTL shipments, which are transporting freight from production plants to warehouses or shipping raw material to production plants across Europe.

2.1. General Overview about Intermodal Rail Services in Europe

The situation today in Europe is that the FTLs are transported mainly via road causing high levels of GHG. Latest transportation statistic by EUROSTAT shows the huge potential of shifting freight off the road. Among the land transport modes in Europe for freight, road transportation continues to account for the biggest share with about 75% causing 411 Billion Tonne-Kilometers (TKM) in the EU. This share has remained almost unchanged since 2009 (!). Railway's share of the freight transport market is steady and low with around 18%.

Figure 3.2.1: Modal split of inland freight transport, EU-28, 2009–14 (!)
(% of total inland tkm)



Source: Eurostat: "Energy, transport and environment indicators", 2016 edition, ISBN 978-92-79-60137-8, page 101

While freight will probably continue to be transported by truck when it comes to short distances, freight transportation over medium and long distances can be shifted to the rail mode to increase the environmental sustainability of the European Transport System. Shifting the road freight to the environmental railway transportation mode could cut GHG emissions by 30% to 70% for individual FTL shipments.

There are a lot of reasons why the freight share of road for EU inland transportation is high and the railway mode share is steadily low. The key basic challenge is that supply chain

management (SCM) logistics focuses on the planning, organisation, management, control and execution of freight transport operations. Hereby the SCM must meet quality requirements of the customers and shippers.

The inefficient market conditions for the SCM to choose and opt for intermodal transport solutions are many fold. Below we highlight some examples (*not an exhausted list*):

- SCM and freight transportation is cost-driven, road transportation is the dominant and generally cheapest mode when oil price is low.
- Intermodal transportation must compensate extra loading/unloading costs at the terminals.
- Intermodal transportation is less flexible organized and physical structured than road. If the freight is transported in one direction it must need also backloads for a similar direction back.
- Intermodal business involves much more stakeholders and is much more complex in the technical set up than a pure road transport execution. Intermodal freight transportation needs several carriers for the first and last mile delivery from origin/destination to the rail terminals. Intermodal rail transportation needs an railway undertaking to set up the train across different national rail systems from terminal to terminal with locomotives, wagons, loco drivers, track charges.
- Intermodal “production” costs, such as rail track charges, infrastructure and energy costs are increasing more than road.
- Insufficient infrastructure capacities make it partially operationally impossible to shift traffic off the road. Rail terminals are often full and have not enough capacity to handle additional flows.

2.1.1. The modal shift objective

The European Commission formulated, in its 2011 White Paper on transport, several goals to tackle these issues. (Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system). The White Paper refers to ten goals to achieve a competitive and resource efficient transport system, which together will serve as benchmarks for achieving a 60% greenhouse gas (GHG) emissions’ reduction target. Goal number three envisages concretely that 30% of road freight services over 300 km by 2030 should be shifted to other environmental friendly modes such as rail or waterborne transport, and more than 50% by 2050, facilitated by efficient and green freight corridor infrastructure.

This political objective received confirmation with the United Nation Paris agreement 2015, which is a global agreement on the reduction of climate change and sets a goal of limiting global warming to less than 2 degrees Celsius (°C) compared to pre-industrial levels. The agreement calls for zero net anthropogenic greenhouse gas emissions to be reached during the second half of the 21st century. This global sustainable agreement calls on further measures and action on the European transportation sector, to improve its sustainability. Transportation accounts for around 20% of the global greenhouse gas emissions.

2.1.2. Combined Transport the dominant role of Intermodal Transport for European transport flows

The European Union as well as the European Conference of Ministers of Transport (ECMT) and the United Nations Economic Commission for Europe (UN/ECE) have accepted the following definition of Combined transport (CT):

“Intermodal transport where the major part of the journey, in Europe, is by rail, inland waterways or sea, and any initial and/or final legs carried out by road are as short as possible.”

There are two forms of combined transportation in Europe. The first one is classified as “unaccompanied intermodal transport (CT), where the goods travel in swap bodies, standardised containers or semi-trailers. These are efficiently transferred at transshipment sites, also called terminals, which are conceived to act as the link between these methods of transport. The second way is defined as “accompanied intermodal (CT), where the whole road vehicle is involved, i.e. the traction cabin too, which is driven onto a special wagon, and the driver accompanies it in a specially fitted couchette wagon. The latter version is not dominant in Europe, where else unaccompanied intermodal (CT) transport is growing.

In the intermodal chain, there are different actors relevant and it is already a result of collaboration between different partners, essentially:

- the infrastructure managers (IMs), who put the railway network at the operators' disposal for a fee;
- the railway undertakings (RUs), which operate rail traction services;
- the CT operators, who buy transport capacity from the RUs going from the equivalent of one isolated loading unit (distribution traffic) to the whole train; they provide about half the required wagons, the other half coming from the RUs;
- the terminal managers, who are, according to the circumstances, CT operators, RUs or local operators.
- the clients – road haulage companies, freight forwarders, logistics companies – who deliver the loading units to the departure terminal and collect them at the destination terminal*.

Source = International Union for Road-Rail Combined Transport (UIRR), Brussels

According to these various contributions, intermodal operators work out their basic programme, with annual or long-term validity, being the subject of a timetable and price catalogue, but also individual tenders in order to meet specific requirements. They market either terminal-to-terminal transports for logistics companies, freight forwarders and ship-owners, the initial and/or final legs by road being carried out by the clients, or the whole transport chain from the loader to the addressee.

CT is recognised as being the most dynamic market for the transport of goods in Europe, which will most surely enable the RUs to participate in the growth of transport requirements essentially resulting from growing economic welfare and EU enlargement. Moreover, in comparison to road and maritime routings, road-rail CT makes it possible to limit the emission of pollutants and energy consumption.

From the point of view of transport and environmental policy, the development of CT represents one of the main thrusts of the EU's and its Member States' strategy. Indeed, this transport system benefits from strong and deserved support at European level which consists of various promotional measures such as the elaboration and preservation of framework conditions to ensure it fair access to the transport market.

2.1.3. Road equipment for use with semi-trailers is increasing

However, the pure road freight mode remains the most dominant transportation mode. This dominance of road transportation results in freight forwarders focussing on optimising their freight-related road equipment first before they consider shifting traffic to a multimodal transport solution. This is particularly important for continental freight flows, which connect production plants in Europe with the distribution centres close to the European regional customer areas.

A trend in recent years has been the increasing use of semi-trailers for road freight services. The semi-trailers are 13.60 meters long and provide an internal space that is up to 2.7 to 3 metres high, as visualised below. The semi-trailers are setting the road equipment standard and the road freight forwarders use a variety of trailer equipment for continental freight flows.

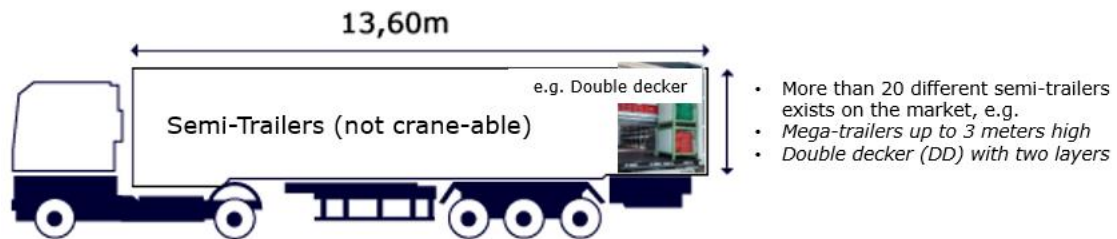
The equipment producers offer all kinds of trailer options to better address the customer supply chain needs. The requirements are in terms of optimising the loading space of the "full truck load" (FTL), but in the same time takes into consideration product specific requirements and inventory constraints in the production plant and warehousing. For example, out of the 20 different semi-trailers, the double decker (DD) trailer has two layers, subdividing the superstructure into fields and offers then additional pallet storage place on the second loading level and can adopt the inside loading space.

In addition, some customers have temperature-controlled requirements, where the semi-trailers must ensure a certain temperature level, starting from frozen (-16 to -30 Celsius), to Pharmaceutical temperature (2 to 8 and 15 to 25 Celsius) or Ambient temperature (between 6 to 15 degrees). In consequences, the road freight forwarder needs a refrigeration system and telematic temperature recorders to be able to cool the semi-trailers to a certain temperature and control the customer agreed temperature level.

Below we are visualising a standard semi-trailer and showing an excerpt of a product catalogue of one leading European equipment producer to highlight the existing variety of equipment products.

The product catalogue is available online for the public and serves only as example to demonstrate the existing market situation, without further notion.

Semi-trailers dominating road equipment



2.1.3. Technical Barriers: Only 5% of semi-trailers can be used for rail freight service

The challenge is that the vast majority of the semi-trailer equipment cannot be used for multimodal freight transportation as it is technically not robust enough to be lifted. Only 5% of the two million existing semi-trailers can be used with cranes and can be shifted onto intermodal rail freight services.

The reason is, that road equipment must be modified and strong curtain edges and double thickness panel guards must be fitted to protect against potential damage caused during the crane and fork lift loading process. The road trailers need these gripper edges, which are additionally marked in yellow colour, so that during the lifting process the equipment can better see where to move up the trailer.

However, these modified road trailers are unpopular among trucking companies because they cost and weigh more than standard semi-trailers. A semi-trailer that can be used with a crane has a roughly 2% higher price tag and about a 500 kg greater tare weight than a standard trailer. This reduces the trailer's maximum payload and increases fuel consumption on the road by some 0.5 litres per 100 km or about 1.5%. Furthermore, not every type of semi-trailers can be modified and will be never able to be craned to the railway.

Hence, the road freight forwarders are technically not in a position to contribute to the EU's modal shift target. European producers who are willing to shift traffic off the road do not find the appropriate freight forwarders capable to make the mode conversion happening. In the same time, the road freight forwarders are looking into greening their supply chain and understand that multimodal transportation is a strategic global decision to take.

2.2. The current business model for intermodal rail freight transport

Before applying the NexTrust business model at the intermodal pilot case categories, it must be explained and described what are the current intermodal business models in Europe commonly in place. The railway transportation sector actually has established over the last decades different successful business models for the intermodal transport with the focus to be able to bundle cargo flows and shift road traffic off the road.

Often this transport set up is also defined or expressed as “combined transport” (CT), where the major part of the journey in Europe is by rail and any initial and/or final legs carried out by road are as short as possible. This combination rail-road shall bring together the advantages to carry large quantities of freight over long distances on the rail, and providing with road vehicles the flexibility needed for regional distribution.

The demonstrator report will not further specify the different terminologies and regulations and refers to the appropriate European transport associations for further background reading and understanding.

2.2.1. The intermodal operator model

The main business model currently in place in Europe is the so called “**intermodal operator**” (or **combined transport operator**), who acts as independent intermediary or kind of broker between intermodal companies and potential customer groups. The operator is a legal entity and service provider who purchases transport capacity from railway undertakings and sells the rail capacity then as intermediary to several partially competing carriers.

The operator model is a *vertical business model*, which focus is to make the use of railway services easier and more cost efficient for the carriers, while the carriers are keeping their legal and commercial

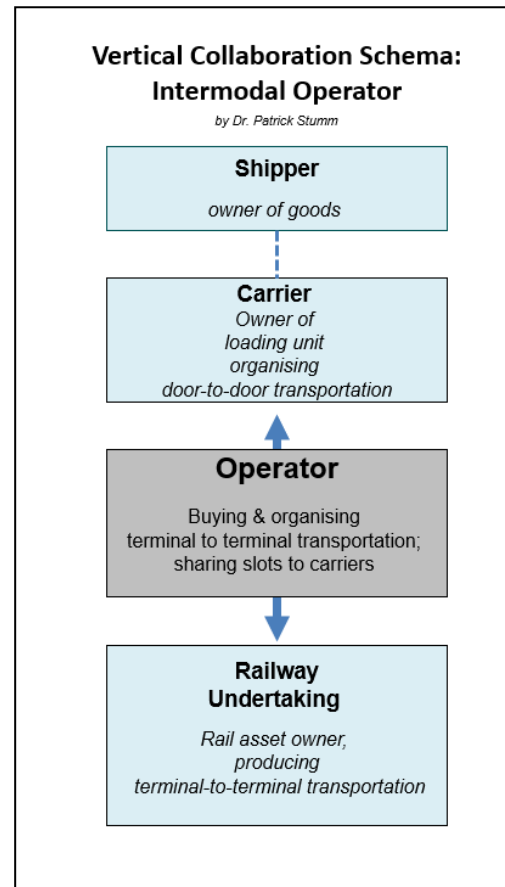
relationship with their own customers, the shippers.

Shippers represent the owner of goods, whether consignors (the traditional meaning of shipper) or consignee (to whom cargo is shipped).

In Europe, one of the first intermodal operator on the market was the Swiss company *Hupac*, founded in 1967. The entity is today owned by transport and logistics companies (2/3) and rail companies (1/3). *Kombiverkehr*, founded in 1969 is another intermodal (CT) operator and a legal entity which brings together around 230 freight forwarders in form of a membership relation.

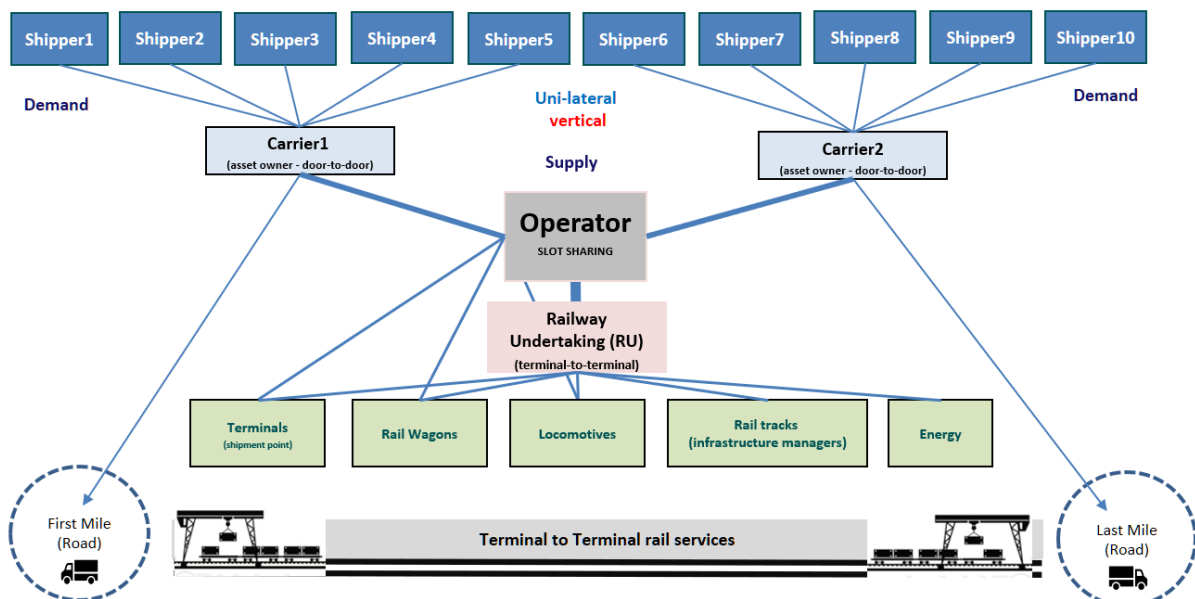
The so called “Kommandists” are using the operator role of *Kombiverkehr* to share rail capacity and bundle freight to shift off the road. Over the last decade, other intermodal operator were established in the European market, such as, Inter Ferry Boat (IFB), today changed to *LINEAS Intermodal* (1998) or the railway operator *TX Logistik* (1999).

While the key characteristics of each business model of the intermodal railway operator is slightly different, we can determine that the current intermodal business model in market place is focussing on the essential role of *bundling cargo* to achieve a price competitive critical mass of FTLs, selling capacity as intermediary to the carriers and freight forwarders. This common model is here below generally visualised.



‘As-is’ Situation: Intermodal Operator Business Model

by Dr. Patrick Stumm



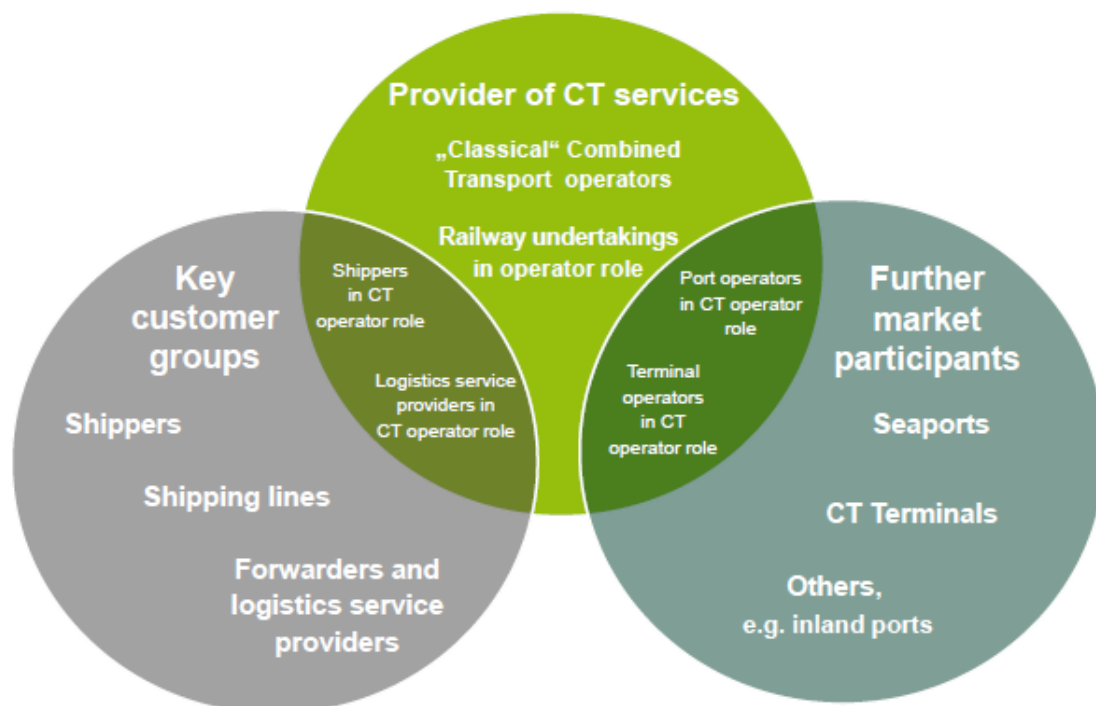
2.2.2. The evolvement of the intermodal operator model

However, the Intermodal Transport Operator model has evolved over the last years. Predominantly the focus of the operator was purely on buying terminal to terminal railway services. Today, the intermodal operators are also owner of terminal infrastructure, owner of rail wagons or locomotives. Depending on the situation, the operator must then for example buy railway services only for rail track infrastructure usage and energy.

Furthermore, today there are different actors in the operator role. Was it before only neutral operators which then evolved over the time to become infrastructure and asset owner as well, the customers, end-customers and other market players of the operators themselves became an intermodal operator.

To illustrate these evolutions, the International Union of Railways (UIC) has summarised the development of the so called CT (combined transportation) intermodal operator business model. The graphic below shows that nowadays, shipper, carrier and railway undertaking became intermodal operator. But also infrastructure providers, such as terminal and ports enter the market of intermodal operators.

The market is therefore very fragmented. This is also caused by the liberalisation of the European railway market since the 1990's and the increase of competition.



Source:

UIC (International Union of Railways) 2014 Report on Combined Transport in Europe

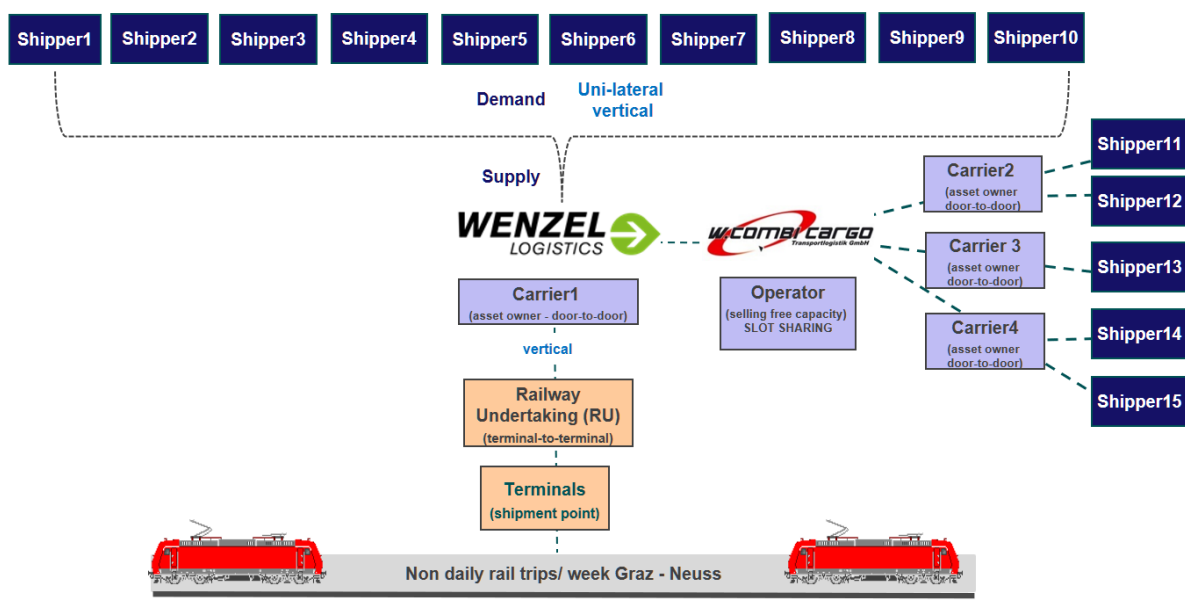
2.2.3. The Wenzel intermodal operator model

Since 2004, the carrier Wenzel is taking the full risk to operate the train service between the terminals Graz and Neuss. However, in achieving the necessary “critical” mass, Wenzel has set up a dedicated intermodal operator, called “*W-Combi cargo*”, which is selling free capacity to competing carriers. In this way, there is no direct interlinkage with competitors and not exchange of commercially sensitive information. In this way, Wenzel can fill up its train with other FTL shipments.

Analysis shows, that Wenzel can increase the train utilisation by working with the intermodal operator W-Combi Cargo . The train service has a fixed set of wagon and train meter length. On average, about 30% of this train capacity is sold by W-combi to other carriers. However, there is no fixed commitment with the competing carriers and they are booking slots on demand. Hence the risk can be compensated only partially and this is not sustainable in the long run.

The graph below visualises the current ‘as-is’ situation of the NexTrust intermodal demonstrator (Pilot case 3.2). For example, Wenzel itself has 10 different customer relations (shippers) to transport freight shipments by the intermodal rail freight services of the Wenzel company train. Through the operator W-Combi, other carriers can book available slots on the train, so that in consequence freight of other 5 additional shippers can be transported on the company train.

‘As-is’ Situation: Current Intermodal Business Model



2.4. The Constraints of the intermodal operator models

Without these business models for the intermodal rail transportation, the share of the railway services would be very low. However, in the same time it appears that these intermodal



operator could not boost the railway share overall. A particular challenge is the questions of who is taking the risk for the existing network, and how to ensure that the “critical” mass of freight flows can be achieved or maintained to operate in an efficient way. The market is fragmented and often the operators do not focus on the original role, which is acting as intermediary to take the risk in filling up the train. The main reason is clearly that the financial risk is too high and it must be shared in a different way.

Today, we can summarise that the intermodal railway operator is sharing the risk in three different scenarios:

- a) Carrier takes a fix commitment for rail slots. -> *Risk is with carrier.*
- b) Operator sells rail capacity on demand. -> *Risk is with operator.*
- c) Carriers takes partial commitment (e.g. 1/3 of the train), Operator sells free rail capacity on demand. -> *Risk is with carrier and operator*

If a transport actor takes the full risk to fill up the train capacity, then he designs a so called “*company train*”, because only one company is taking the risk. At the same time, company trains can have a combination with operator and slot sharing components, where the one risk-taking party tries to sell unused capacity on the market to third parties.

Some European intermodal operators have also established a legal entity where the shareholders are mainly the carriers, freight forwarders or other intermodal undertakings to be able to bundle cargo and share the general risk of the intermodal transport with a common joint-venture.

However, the major constraints of the intermodal operator model is, that it is organised between the door-to-door carrier and with the intermodal railway suppliers, and there is no direct involvement with the end-customers, i.e. the shippers.

With this role as intermediary at the supply level, there is no direct control about freight flows to be transported and with each procurement process and tender by the shippers a new carrier could be assigned, - who is often not using the intermodal service capacity from the previous carrier or is technically not able to continue to transport in an environment-friendly way.

This ‘as-is’ situation feature could explain one of the key elements to address with the NexTrust innovation to better understand how the current intermodal operator model could evolve further and engage also the real owner of goods, the shippers.

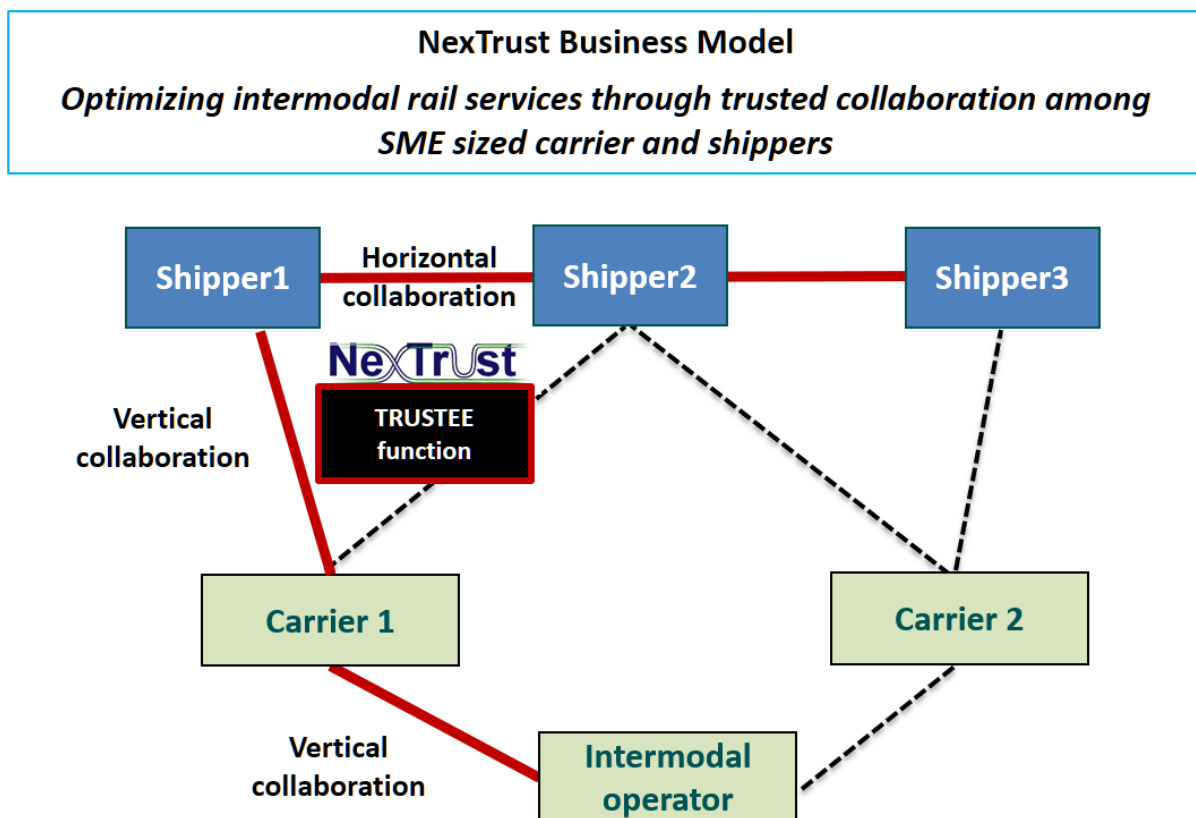
3. Application of NexTrust Business Model

3.1. The intermodal trusted collaboration business model

In the research analysis and discussions it emerged that for the improvement of the above described inefficiency situation, Wenzel shall try to collaborate directly with the owners of goods, the shippers and be open that shippers collaboratively want to request freight services of Wenzel.

The research activities looked into the appropriate business model of NexTrust to understand how with this new and innovative way of trusted collaboration, an existing intermodal railway service can be optimized and shift more traffic off the road.

Below we visualize the “Intermodal” NexTrust business model:



The collaboration between carrier (door-to-door) and the shipper (producer) shall be facilitated by the neutral service provider with trustee function. With the innovative NexTrust business model, the new player, the trustee is installed as neutral, independent supporting entity between the shippers, which acts under strict confidentiality and EU competition law compliance. This collaboration approach is extended to the collaboration between carrier and intermodal operator or, if the carrier itself is an operator, between carrier and railway undertaking.

Therefore, the trusted collaborative intermodal networks are built up in the first place *vertically* between shippers and logistics service providers, who are committed to cooperate in a fair and trusted environment as equal partners.

3.2. Legal aspects of trusted collaboration in the intermodal business model

There are important legal aspects to be considered when establishing business collaboration. Today in the transport market it can be observed that there is lack of knowledge as to how to comply with EU and national competition law. Legal aspects are sometimes overlooked and thus possibly managed in a grey area, hindering collaboration efforts. In other cases, collaboration initiatives do not consider the legal aspects and risk violating EU competition law.

In NexTrust, the legal compliance for collaboration initiatives is fundamental and is a cornerstone of the project. The NexTrust partner Kneppelhout supports the project with legal expertise for the pilot cases to ensure that a high level of legal compliance structure is in place. There are at least three legal compliance schemes, which shall be highlighted in the context of the NexTrust FTL and intermodal demonstrators:

- a) **Competitors:** Commercially sensitive information, such as confidential data, pricing etc. cannot be (in)directly shared with actual or potential competitors.
- b) **Anti-dumping price behavior:** Possible concerns with respect to abuse of purchasing power of competitors and non-competitors.
- c) **Costs behind the prices are confidential:** Shippers may receive information concerning another shipper's costs and/or price structures via the logistic service provider or carrier. Such information can be regarded as commercially sensitive information and the exchange thereof is prohibited under competition law.

In the context of the here presented NexTrust demonstrator, the role of the trustee in the collaboration is essential.

First, the trustee operates in a support and management function. It shall be neutral, independent and treat information confidentially.

- **Neutrality:** The trustee shall not enter into the collaboration itself and shall have no stake in any of the participants' organizations or directly benefit from the sale of logistics services.

- **Independence:** The trustee shall be a service provider for facilitating cooperation in a legally compliant way, and shall therefore be distinguished from the role of supply chain suppliers such as freight forwarders and carriers.

- **Confidentiality:** The shippers will provide their competition law sensitive information confidentially to the trustee only. They will not share sensitive information with other shippers.

Second, the trustee functions as "black-box" so as to avoid that commercially sensitive information will be shared between the collaborating partners. This is not only an important aspect to avoid anti-trust issues in horizontal cooperation level, but also in vertical cooperation.

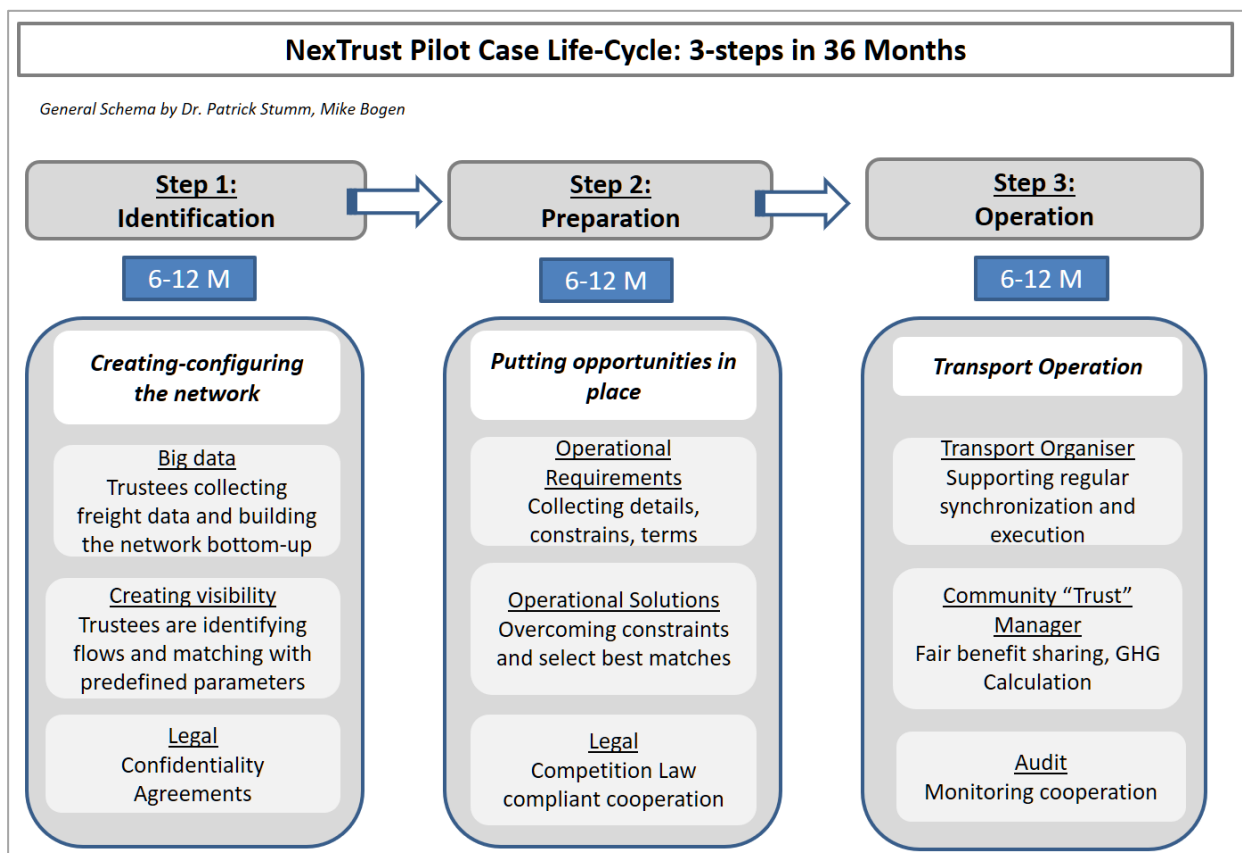
3.3 The 3-step-methodology for setting up trusted collaboration

The NexTrust demonstrator conducted its research activities following a 3-step methodology unique to the project. This 3-step-approach was first designed by the trustee partners Giventis, Kneppelhout, Pastu Consult and Tri-vizor in the previous EU research funded CO3 project (FP7, No 284926). Since the approach was already validated on smaller and limited scale conceptually, it could immediately be used for the research activities of the NexTrust FTL pilot cases.

The 3-step approach has following phases:

Step 1) Identification ➡ Step 2) Preparation ➡ Step 3) Operation

The time frame for each step in this research activity was approximately 6 to 12 months, summing up to a pilot case life cycle of up to 36 months. The methodology can be further developed, accelerated and validated for building effective, scalable collaborative FTL transport networks, which can then be deployed in the market, once the EU research activities are completed.



Step 1) Identification phase of the FTL demonstrator

In the identification phase, the trustee collects and analyses transport flow data of shippers who have expressed the interest to identify collaboration synergies between them. It is important that this process is managed in complete confidentiality - supported with agreement between partners - and that any information is shared only and exclusively through the trustee. The precondition is the design of an EU competition compliant legal framework that defines how to handle the collected data between the stakeholders. The role of the trustee in this framework has to be absolutely neutral and free of commercial conflict of interest. The “mapping & matching” analyses of transport data flows are executed with specialized, cloud-based “big data” ICT tools. This was done with the IT collaboration platform ELG-Web™ provided by the NexTrust partner Giventis.

The identification phase to identify synergies can be described as “bottom up”, organic approach for building sustainable collaborative networks. The trustee is using appropriate ICT tools, without the need to rely on a massive central database. The NexTrust FTL demonstrator very much follows the business philosophy of “think globally, act locally” with regards to building trusted collaborative networks.

The trustee will help the participants in a collaboration to identify, set up and organize the pilot cases by first collecting individually from the proposed participants some transport data for the express purpose of matching this data with the similar data of other collaboration candidates. The focus is on identifying if there are any potential ‘collaborative matches’ for freight flow bundling on identical or compatible lanes to develop more sustainable solutions. It is as if an impartial observer would take a helicopter view to look for bundling chances across the millions of structural freight flows and transport asset movements that exist everywhere in the European transport market. The first trust step is an important building block. The identification process is designed to identify potential partners and thus initiate first trusted relationships that can be scaled up to demonstration pilots.

Step 2) Preparation phase of the FTL demonstrator

In the preparation phase, it is the trustee’s responsibility to facilitate the development of business cases of several shippers to support specific collaboration scenarios and in this role act as an arbitrator to overcome any barriers or constraints to the collaboration. Just as in the identification step, this requires a “tool kit” of processes, methodologies and ICT tools covering all aspects of trusted collaboration, including but not limited to legal agreements providing for applicable rules of engagement that cover partner gain sharing, entry/exit terms, supplier selection and expected behavior between the partners. In many situations, the trustee may also facilitate market discovery in an anti-trust compliant environment through various means.

Step 3) Operation phase of the FTL demonstrator

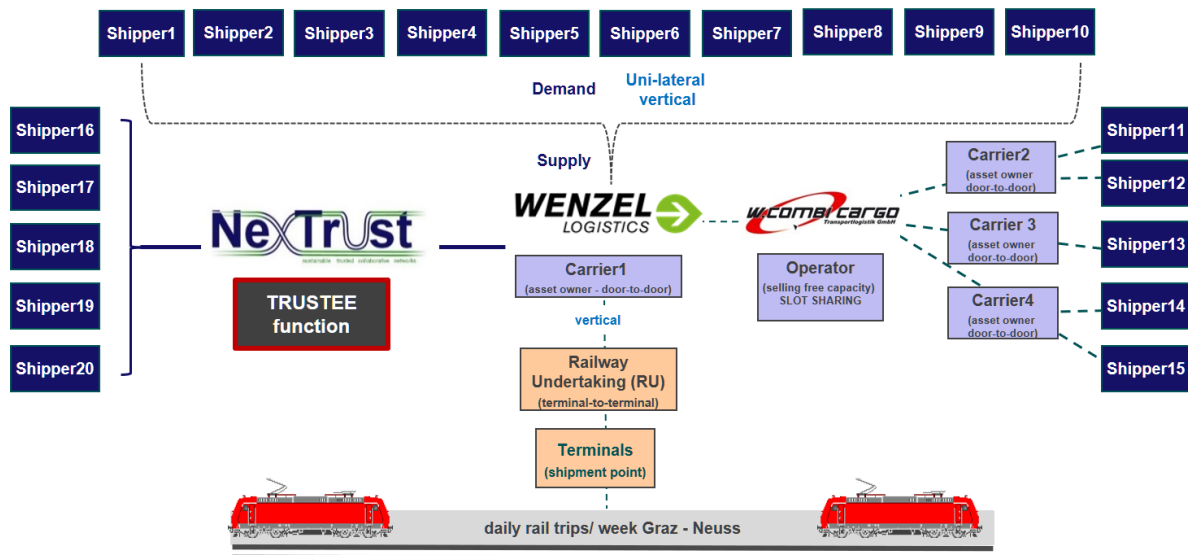
In the operation phase, the trustee implements the collaborative agreement (rules of engagement), and supports the actual operations of the collaboration scenario on an on-going basis. For this purpose appropriate ICT tools are needed for an efficient and streamlined management process. The trustee also audits the actual operations to ensure that the rules of engagement are followed and that gains delineated in the collaboration agreement are actually accrued.

3.4. The trusted collaboration business model of the Demonstrator

In the Intermodal demonstrator (pilot case category 3.2,) the Trustee model is now added on the carrier supply chain level and NexTrust is looking from the Wenzel perspective to optimise the current intermodal train connection.

Since 2004, Wenzel is purchasing the train connection from Graz to Neuss and has done this from different railway undertakings, which are providing the necessary rail equipment and organising the terminal to terminal operations. Wenzel is hereby taking the full risk to operate the train service and must pay the full train “production” with a long term contract and commitment. With the set-up of W-combi cargo, Wenzel can sell free capacity to competitors, but this is as described above not sufficient to achieve back daily train operations.

‘To-Be’ Situation: Trusted Intermodal Business Model



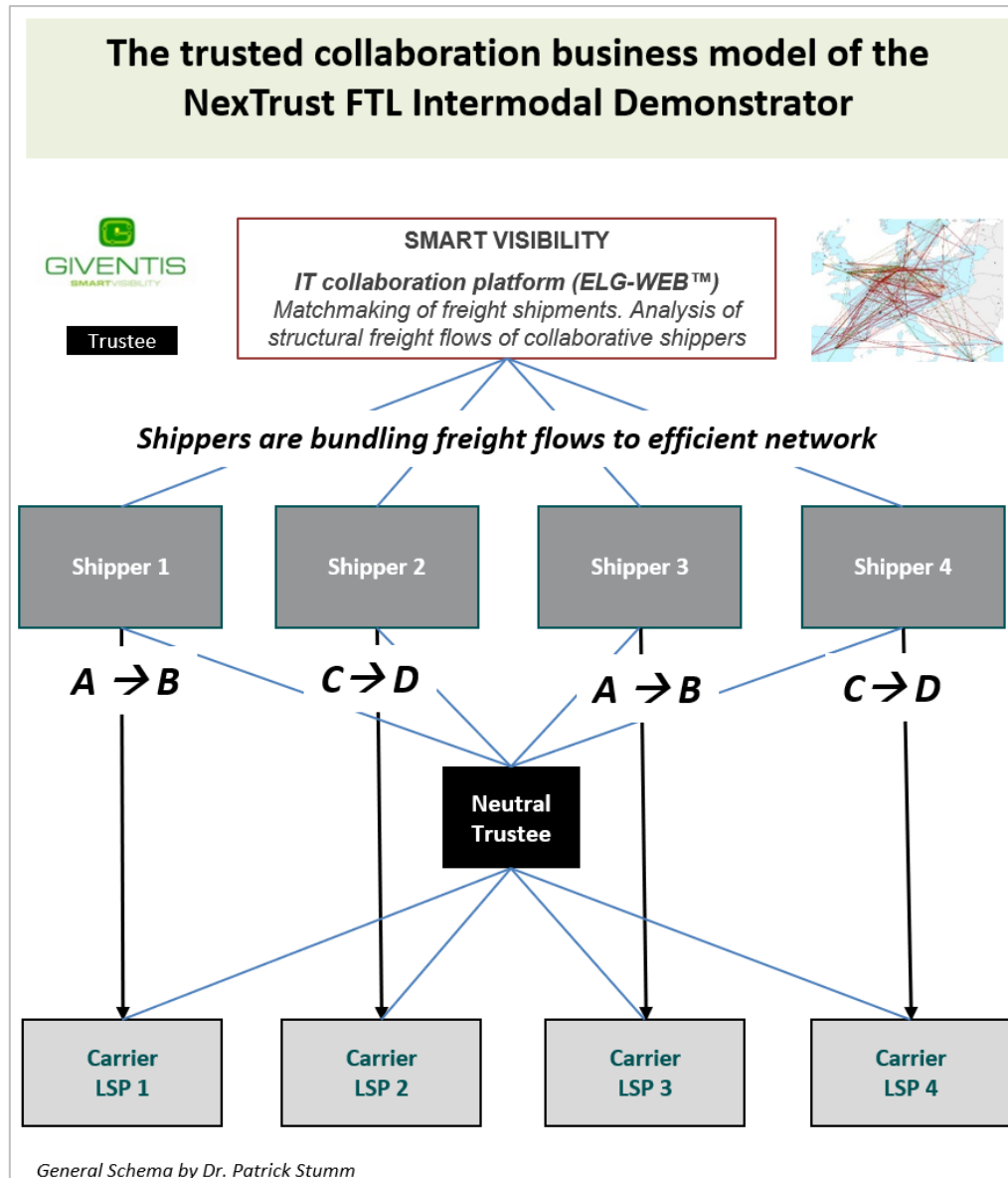
Now with NexTrust, Wenzel still keeps its existing business model. That means Wenzel itself has still different shippers client relations and freight shipments to be transported (shipper1-shipper10). Through the operator W-Combi, other carriers can book still available slots on the train, so that in consequence freight of other additional shippers can be transported on the company train (shipper11-shipper15).

However, with NexTrust and the service provider of the trustee function, additional shippers could be gained, who are transporting today the freight in target on the road with other carriers (shipper16-20).

The NexTrust intermodal FTL demonstrator has hereby two main service functions of the trustee, as also visualized in the figure below:

- First, the service is categorized as a “*Transport optimizer*”, which includes transport flow matchmaking to identify synergies between partners.
- Second, the service function is providing “*trust*”, where the trustee is acting as independent, neutral and confidential provider for several shippers. The trustee

enables the collaboration journey, from identification of freight flows through preparation of the collaboration, supporting the actual execution.



The trustee for the FTL demonstrator worked as a team, in particular the NexTrust partners, Giventis and Pastu. The role of Giventis was particularly important to identify and match transport flow data of shippers. Giventis has a dedicated IT collaboration platform 'ELG-Web' offering a unique on-demand web based service that helps clients to re-engineer and optimize their transport networks. The tool gives visibility to intermodal FTL bundling opportunities.

The legal support for the FTL demonstrator was provided by NexTrust partner Kneppelhout.

Overview of the neutral trustees for the FTL intermodal Demonstrator

Neutral Trustees	Short Description	3-step involvement
	<i>Pastu Green is the division responsible for innovative sustainable business solutions with special expertise in the transportation and logistics sector, such as, full-truck-loads and intermodal sector.</i>	<i>Involved in the entire life-cycle of setting up intermodal collaborative pilot cases</i>
	<i>Giventis is an information services company, offering a unique on-demand web based service that helps clients to re-engineer and optimize their transport networks by providing actionable business intelligence.</i>	<i>Involved in the entire life-cycle of setting up collaborative pilot cases IT optimization platform ELG</i>
	<i>Kneppelhout is a law firm with broad expertise in international business law, among others in corporate and commercial law, IP and privacy law, competition law and transport law.</i>	<i>Support for any legal questions which may arise.</i>

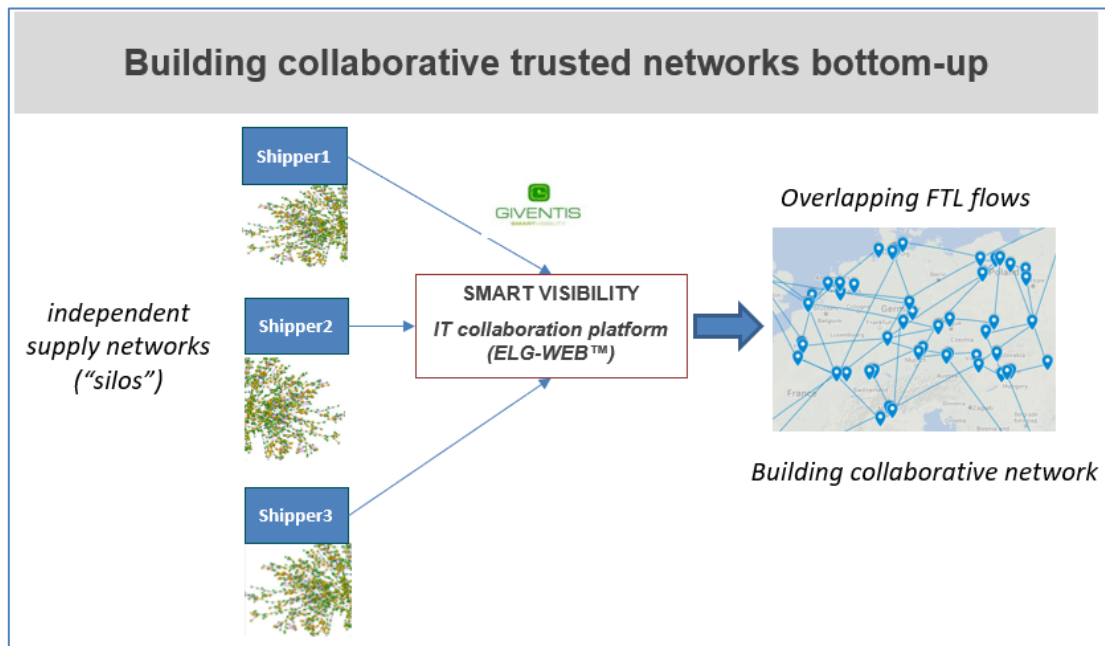
4. Results and Objectives demonstrated

4.1 Market Facing Full Truckload (FTL) Intermodal Demonstrator

The NexTrust project focused in the first phase of its research activities to expose collaboration opportunities, using Giventis' ELG-Web™ platform to enable *smart visibility* across the shippers thus building a more intelligent and sustainable supply chain. In this way, the FTL project team addressed the currently fragmented logistics “silos” from individual shippers and actually succeeded to replace these “silos” with a “cross-shipper” more efficiently connected trusted transport network.

An important requirement to enable this achievement was for the NexTrust team to first establish an operating “protocol” for the participating shippers and carriers, a conceptual collaboration framework to build these trusted FTL networks bottom up with like-minded partners (“communities”). Without first aligning the appropriate attitude and objectives towards horizontal collaboration between shippers, the research activities could not progress towards market direction. With this NexTrust protocol in place, the cross supply chain transport network analysis was implemented successfully.

The NexTrust FTL project team identified overlapping structural vehicle movements across multiple industry sectors where collaborating shippers and carriers can share the assets to round trips (backhauls) scenarios and convert them from road to the intermodal train connection by Wenzel.



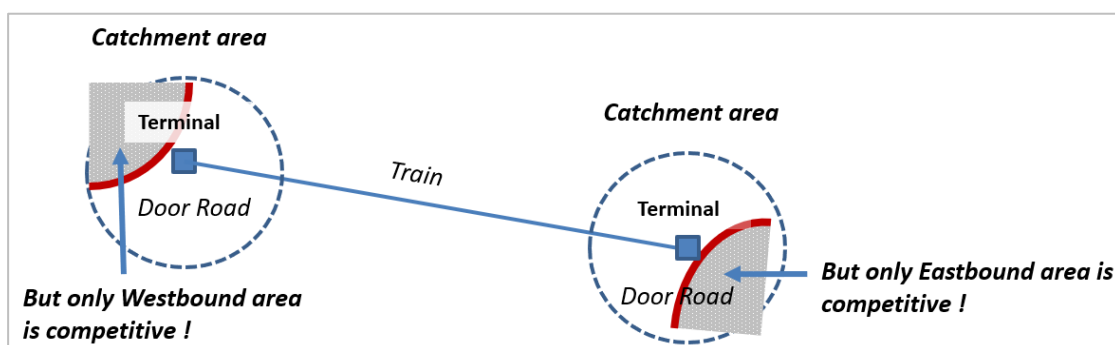
The NexTrust FTL Demonstrator, where pilot cases are tested in market conditions, is accomplished by NexTrust consortium members and external pilot participants. Overall ten shippers submitted FTL freight data with the purpose to shift off the road.

The type of cargo of these shippers is representing several industry sectors:

- Fast Moving Consumer Goods: food category + non-food category
- High tech products, including consumer electronics
- Industrial products, including raw materials

4.2 The Potential market benefit of FTL Intermodal Collaboration

Once the first research step of "Identification" of opportunities was completed, the project team entered into the preparation and operation phases, following the 3-step methodology as explained above. The objective was to select the best matches to create business cases from the huge freight flow data analysis. The main focus was to identify freight flows close to the terminal area and achieve the critical mass to bundle enough freight volumes, which can be then shifted off the road.



The results demonstrated, that the so called “catchment area” is an important cost driver for the intermodal freight services. Obviously, the shorter the catchment area distance is, the more competitive intermodal services can be offered. However, the research activities verified, that the even a wider catchment area can be considered, but backtracking must be avoided and only the onward shipment area can be considered, as visualised above.

Overall, around 5 shippers could be identified with 5,033 FTL shipments on the corridor for the FTL demonstrator by Wenzel. There were even more FTL flows by other shippers, however, these flows were not necessarily to the Styria area of Austria, or Slovenia and Croatia. Due to the large catchment area, other potential freight flows were in consequence not selected for the pilot cases.

In the table below we summarise the positive results with 5,033 FTL road freight flows to be shifted to the Wenzel train. In the Westbound direction, which means from Graz to Neuss, around 3,023 FTL road shipments were suitable for mode conversion. In the opposite Eastbound direction, Neuss to Graz, there were around 2,010 FTL road shipment fitting to the Wenzel intermodal network.

FTL road shipments	Westbound	Eastbound
<i>Shipper1</i>	101	88
<i>Shipper2</i>	476	654
<i>Shipper3</i>	160	80
<i>Shipper4</i>	1211	389
<i>Shipper5</i>	1075	798
Total	3023	2009

The market benefit shows that enough critical mass could be bundled in order to optimize the Wenzel company train. In the same time the intermodal transportation mode is less flexible organized and structured than road. If the freight is transported in one direction it must need also backloads for a similar direction back. Therefore the overall potential for the Wenzel FTL demonstrator considered around 2,000 FTL road flows, in both direction to shift to the Wenzel train.

Bearing in mind that one train departure equals to around 1,500 FTL shipments in both direction per year, the train frequency with the identified and bundled road FTLs could lead at least to one more train departure per week.

In the operation phase, the research activities managed to set up for a test period of 3 to 6 months several pilot case shipments. From the FTL road flows in scope, around 1,000 FTL shipments were shifted off the road in pilot cases. One example, of two shippers bundling the freight flows are Unilever and Mondelez, as visualised below.

The FMCG producer Unilever has freight flows from Neuss to Graz in the Eastbound direction and the other FMCG producer Mondelez has backload from Graz to Neuss in the Westbound direction.

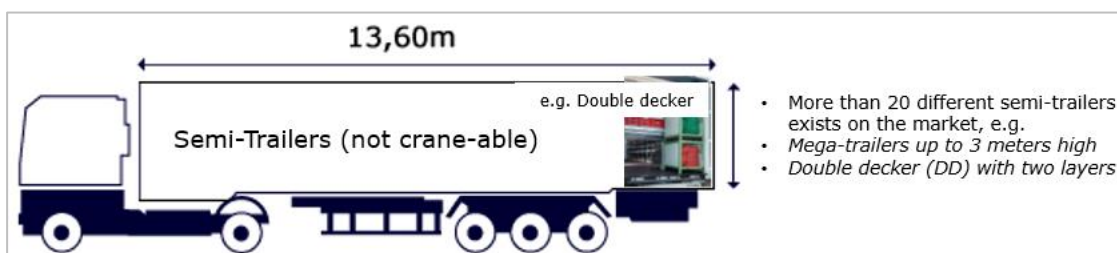


Wenzel technically bundled the freight flows as with the other shippers and as business as usual. However, critical success factor was the support of the neutral trustee, who coordinated the collaboration between the parties in a legally compliant and also efficient way.

4.2 The investment for intermodal temperature controlled FTL equipment

In addition to find critical mass to bundle FTL road flows and increase train frequencies, the intermodal demonstrator had to face also technical constraints in terms of the loading equipment. Today, the dominance of road transportation results in freight forwarders focussing on optimising their freight-related road equipment first before they consider shifting traffic to a multimodal transport solution. This is particularly important for continental freight flows, which connect production plants in Europe with the distribution centres close to the European regional customer areas and which are in focus of the NexTrust research project.

A trend in recent years has been the increasing use of semi-trailers for road freight services. The semi-trailers are 13.60 meters long and provide an internal space that is up to 2.7 to 3 metres high, as visualised below. The semi-trailers are setting the road equipment standard and the road freight forwarders use a variety of trailer equipment for continental freight flows.



The equipment producers offer all kinds of trailer options to better address the customer supply chain needs. The requirements are in terms of optimising the loading space of the “full truck load” (FTL), but in the same time takes into consideration product specific requirements and inventory constraints in the production plant and warehousing. For example, out of the 20 different semi-trailers, the double decker (DD) trailer has two layers, subdividing the superstructure into fields and offers then additional pallet storage place on the second loading level and can adopt the inside loading space. In addition, some customers have temperature-controlled requirements, where the semi-trailers must ensure a certain temperature level, starting from frozen (-16 to -30 Celsius), to Pharmaceutical temperature (2 to 8 and 15 to 25 Celsius) or Ambient temperature (between 6 to 15 degrees). In consequences, the road freight forwarder needs a refrigeration system and telematic temperature recorders to be able to cool the semi-trailers to a certain temperature and control the customer agreed temperature level.

The challenge is that the vast majority of the semi-trailer equipment cannot be used for multimodal freight transportation as it is technically not robust enough to be lifted. Only 5-10% of the two million existing semi-trailers can be used with cranes and can be shifted onto intermodal rail freight services.

The reason is, that road equipment must be modified and strong curtain edges and double thickness panel guards must be fitted to protect against potential damage caused during the crane and fork lift loading process. The road trailers need these gripper edges, which are additionally marked in yellow colour, so that during the lifting process the equipment can better see where to move up the trailer.

However, these modified road trailers are unpopular among trucking companies because they cost and weigh more than standard semi-trailers. A semi-trailer that can be used with a crane has a roughly 2% higher price tag and about a 500 kg greater tare weight than a standard trailer. This reduces the trailer's maximum payload and increases fuel consumption on the road by some 0.5 litres per 100 km or about 1.5%. Furthermore, not every type of semi-trailers can be modified and will be never able to be craned to the railway.

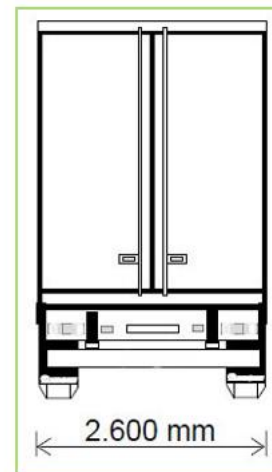
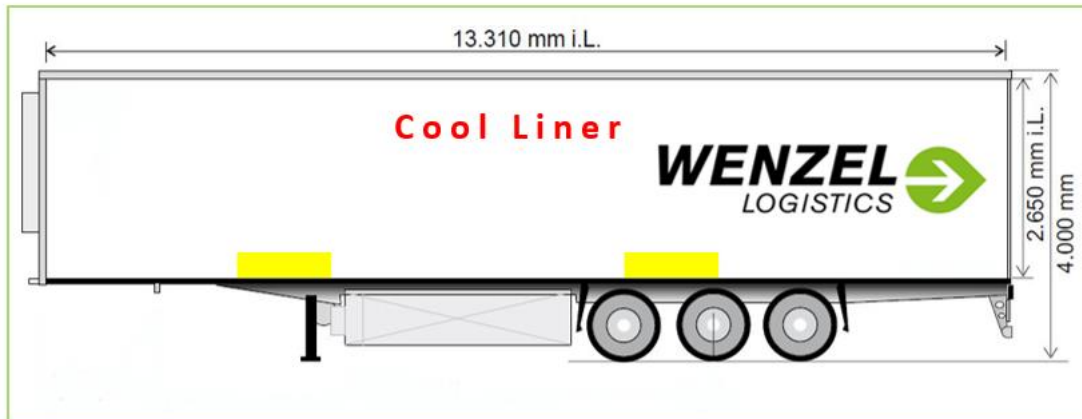
As Wenzel is investing in the intermodal train connection, it already invested in intermodal loading equipment. However it has done these only for so called “dry” or “ambient” industrial cargo, which does not require any temperature controlled transportation.

With regards to temperature controlled goods, the market availability and costs of intermodal reefer equipment is very high and only very few are available on the market.

Wenzel therefore needed to invest for the NexTrust Pilot Cases in the appropriate equipment types, such as “WECON WPR 45 SG” and KRONE Profi Liner SDP 27 eLHB3-CS.

Additionally, some FTL shipments which were firstly identified as “ambient” cargo, suddenly required during the course of the project also temperature controlled regime. The reason is that some shippers had recently some bad experiences with weather conditions which impacted the quality of goods. Hence, now they are requiring more and more a temperature range than at the beginning of the project.

Intermodal Reefer Equipment



With the investment in the intermodal reefer equipment the NexTrust intermodal demonstrator could perform technically the pilot cases and demonstrate that the business model can be successfully added to the vertical intermodal supply chain. This experience is fundamental before the carrier with the right risk/benefit sharing mechanism will be in the position to invest.

In the intermodal demonstrator, we see that once NexTrust is concluded, more intermodal reefer equipment would be needed, which could create an investment volume of 1 Million €. Hence Wenzel need the commitment of the shipper and then trustee's role to coordinate this risk/sharing model.

4.3 The impact calculation on carbon emissions

The neutral trustee is also responsible for the calculation of the Key Performance Indicators (KPI), which is for the FTL intermodal demonstrator mainly the reduction of carbon emissions.

The scientific partner of NexTrust, the VU Amsterdam, was analysing the GHG accounting in depth and published an internal deliverable report with a recommendation for the NexTrust partners to use a GHG calculation framework. Following VU Amsterdam, the challenge is that there no single globally recognized and accepted standard for calculating GHG (including CO₂) emissions along supply chains. Stakeholders agree, however, that a common global approach is necessary to improve transport and supply chain sustainability. Given the large number of players aiming for lower CO₂ emissions, many methods and tools have been developed over the last decade. A subset of these methodologies and tools are commonly used in the industry and, therefore, particularly useful for the NexTrust project. VU Amsterdam recommended that EN16258 and GLEC (Global Logistics Emissions Council) guidelines should be followed.

The actual GHG calculation was then done by the trustees, because for the calculation access to commercially sensitive information is required. For example, the fuel consumption is needed, but this information is considered to be very confidential, as from this parameter, the costs behind the price can be released. In the same way, the payload and number of vehicle movements from production plant (origin) to warehouse (destination) can lead to market share knowledge of shippers and production size.

The GHG emission calculation of the FTL collaboration pilot cases used following main data input as summarized in the table below.

GHG calculation: Data input			
1	Weight Vehicle	x	tonnes
2	Payload	x	tonnes
3	travel distance	x	km
4	travel time inclusive truck driver rest period EU directive	x	hours
5	fuel consumption vehicle	x	liter / 100 KM
6	refrigerated cargo: Fuel consumption	x	litre/hr
7	Emission factor (WTW)	x	kg CO ₂ e/kg fuel
8	Specific Weight diesel	x	kg/l

As some of the FTL shipments are temperature controlled and are in the need for refrigerated transport, the trustee needed to calculate the fuel consumption for refrigerating the goods multiplied with the travel time.

Additionally, the trustee based some calculations on industry defaults and average values as real time data was not always accessible. We received input data from carriers who are tracking in detail the fuel consumption, distance and travel time with onboard units at the vehicles. The consumption factor followed the GLEC framework and common scientific knowledge.

It was also agreed among the partners that for the purpose of demonstrating the sustainable impact, the approach to work with averages and industry default values is satisfactory, as the

deviation from default to actual values are minor. The objective of the NexTrust FTL demonstrator is to show the reduction potential and not the actual detailed accountable carbon emission, where there are many methods and tools available, but not one harmonized global set. The challenge for the shippers are also that, if they have once chosen one accountable GHG methodology, they need to understand in detail what has changed due to the change of methodology or due to the change of innovation activities.

The GHG calculation has also taken into account the backload travel distance and did not work with any industry default value as these would be not accurate and just a best guess.

Below we show the data calculation sheets for the “as-is” situation and “to-be” situation as example.

AS - IS Situation					
Transportation by road					
Data given					
type of truck			Fuel consumption	Fuel consumption l/hour	
Gross Weight Vehicle (truck + trailer)	tonnes		Fuel consumption (litre/hr)	-20 degrees	0 degrees
Payload	tonnes		6,2m /33,42 m3 /Rigid lorry		
travel distance	km		10,4 m/61,15 m3 / Rigid lorry		
travel time	hours		14,3 /78,79 m3 / Semi Trailer		
average speed of the truck	km/h				
Is an empty return trip foreseen?			! 2% extra fuel consumption per tonne		
cooling/heating applicable					
fuel consumption for the empty truck	liter / 100 KM				
Emission factor	kg CO2e/kg fuel				
Specific weight diesel	kg/l				

TO BE (Intermodal)					
Travel distance		km	Main run (Graz - Neuss)		
Return trip					
empty return trips					
type of truck					
Which train is used?					
Gross Weight Vehicle		tonnes			
Payload (in tonnes)		tonnes			
cooling/heating applicable					
fuel consumption for the empty truck		liter/100 km			
travel time		hours			
average speed of the truck		km/h			
Are goods stored in the transshipment before they are put on the train?					
Are goods refrigerated ? At which temperature ?					
Is refrigerating applicable in the return trips ?					
Emission factor					
Mass diesel					

The emission calculation resulted in a reduction in GHG emissions of around 30% to 60%.

The reduction was depending on the overall travel time and distance. When the catchment area on the road was large, the reduction of GHG emissions was less. Additionally, the reduction of GHG emission is also depending on the fuel consumption to refrigerate the freight. If the intermodal travel time is increasing compared to the pure road freight transportation, then the GHG emissions are not that much decreasing, because the cooling of good is consuming fuel independently from the transport mode.

5. Lessons Learnt and Outlook

The NexTrust FTL demonstrator fulfilled the main goals of the research activities. It was demonstrated through supply sided vertical collaboration that there is a high potential to increase efficiency and sustainability in the European logistics market. NexTrust can support the optimization of intermodal rail freight services and contribute to an increase of sustainability.

There are five key lessons learned, which are important to acknowledge when exploiting the FTL intermodal collaboration beyond NexTrust:

<i>NexTrust FTL Intermodal Demonstrator: The 5 top lessons learned</i>	
Top 1)	Collaboration protocol must be followed
Top 2)	Demonstration and validation is needed
Top 3)	Management and support functions of neutral trustee are crucial
Top 4)	ICT tools are an important enabler
Top 5)	Impact of market conditions

5.1. Top1) Collaboration protocol must be followed

Successful collaboration is not a matter of luck. It is the result of a *structured process* from the very beginning following the 3-step methodology.

However, the important basic requirement the FTL team learned is, that there was a need to establish an operating “*collaboration protocol*” for the participating shippers, a conceptual collaboration framework to build these trusted FTL networks bottom up with like-minded partners. The right collaboration behaviour is crucial and the protocol could filter very efficiently, if the collaboration can lead to success or not. The participants must be willing to de-couple from their own network to be able to re-connect more effectively along the supply chain. If the potential collaboration partners are not ready to follow this collaboration protocol, then the likelihood that the NexTrust way of collaboration will fail is very high. Without having aligned the appropriate attitude towards collaboration between shippers and carriers, the research activities could not progress towards market stickiness. The majority of shipper participants have accepted the concepts delineated in the FTL collaboration business model, and more just as importantly, the *trusted network protocols*. This acceptance and success of the current pilot cases has provided the momentum to expand pilot cases to additional shippers.

Furthermore, the FTL team learned that to this collaboration protocol it is also important to address internal-external company alignment. The organizations have to be in synchronization internally and externally with their partners and carriers, speaking the same language in terms

of buy-in, commitment and execution. There is a need to align internal shipper functions and corporate objectives, especially between departments representing sustainability, logistics procurement and logistics operations.

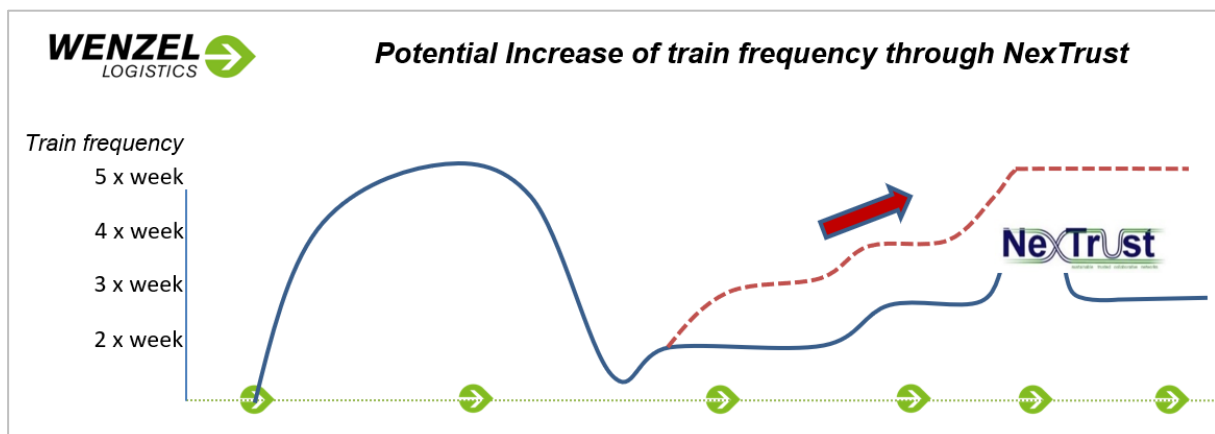
5.2. Top2) Demonstration and validation is needed

There have been numerous collaboration initiatives put in place over the last decade and new business models have emerged or the intermodal business model evolved. However, none of these have tackled the inefficiency in the transport logistic market with a solid legally compliant business model, where shippers are pro-actively collaborating. The innovative nature of the NexTrust business model faced a lot of questions and scrutiny at the outset, with time and patience needed to explain the concept accordingly.

The lesson learned shows, that for such a disruptive and innovative business model, which is new to the transport logistic market, companies need examples of successful collaboration validated on large scale under market conditions to persuade themselves and others that such working methods will be beneficial for them. There were still a number of shippers and carriers who were taking a wait and see attitude vs. that of an early adopter.

The identification Phase is crucial to gain smart visibility in the supply chain. Previous SCM practice had difficulties to convert FTL road flows to intermodal. The trustee has a valuable role to moderate and mediate vertical cooperation between intermodal carrier and shippers. The trustee can guarantee protection of commercial sensitive information and focus the pro-active cooperation on non-sensitive matters and build trust.

The NexTrust intermodal pilot case, demonstrated that around 1,500 FTL shipments per year could be converted from the road to the Wenzel company train. That means the train frequency with the identified and bundled road FTLs could lead at least to one more train departure per week.



The NexTrust Business Model brings added value to supply sided stakeholders who have invested in the intermodal train business. The innovative NexTrust business model can be seen as a complementary approach to increase the overall usage of intermodal freight services.

5.3. Top3) New support and management functions of trustee is crucial

For decades, carriers have been trying to optimize, consolidate and bundle freight via various business models and ICT systems. However, these solutions have achieved a portion of what is expected, but having been unable to sufficiently increase the efficiency and transparency in the highly fragmented LSP/carrier market. The main reason is a lack of success in creating the trusted environment necessary to enable horizontal and vertical collaboration, where shippers pro-actively share transport demand visibility. These core components are not in evidence today in the European logistics market, and explain in part the current market's failure to achieve efficiencies along the supply chain.

NexTrust, with its disruptive business model, is introducing a new innovative component into supply chain market to change the collaboration approach. *The neutral trustee* has a critical role in supporting the entire collaboration process, from managing benefit sharing (price fixing avoidance) to KPI calculation (as data is confidential for this as well), to execution support.

The FTL research activities demonstrated the trustee is an essential and required component in the trusted network business model. The Trustees function as a neutral, independent entity, who treat information confidentially. The trustee is a kind of neutral coordinator for the horizontal collaboration between shippers, which is absolutely required to guarantee anti-trust compliance with EU law, and insures that companies' own legal compliance rules are respected. The trustee has no role or financial stake as an actual transport provider, and is therefore also not a 3PL or 4PL nor it is substituting any other known collaborative initiatives e.g. control tower or alliances. The trustee helps to distinguish what can be communicated among partners and what information cannot be exchanged, in particular, commercially sensitive information.

The first research results emerged that the intermodal operator model in the 'as-is' situation is a very important business model in place, but has already further evolved from its original concept. At the same time, the current more advanced intermodal operator model demonstrates that it has its limitations for further intermodal growth. If the EU and its main stakeholders really want to shift traffic off the road by 30% by 2030, a new breakthrough approach in the supply chain management must be put in place, which addresses the imbalance of risk sharing and which engages the shipper (end-customers) in the complex multi-actor intermodal supply chain. The overall challenge in the current "as-is" business model structure is that carriers are not controlling the flows. Only if they are of certain large size, they can counter-balance some freight volumes of other shippers, but carriers who are losing one shipper as customer can bring the entire intermodal service in risk quickly, as the level of critical mass is reduced. Without engaging the shippers and "responsible" actors in the collaboration, it will be very difficult to reach sustainability targets and to make intermodal business as attractive and competitive alternative to pure road transportation.

Additionally, the pilot cases validated the added-value of a trustee who supports the mode conversion and sets up the vertical collaboration of trusted networks. The trustee can extend the vertical collaboration to the supplier of the carrier and can bring together the shipper with the main rail "producer" (railway undertaking and operator). This is a very important step forward in order to address better intermodal operational requirements and somehow a "must", if actors want to increase mode conversion on accelerated speed. The trustee is a real mediator and moderator which can bridge the "frustrations" of the complexity of intermodal

services and with the black-box enable to set up a fair baseline and discussion about target price versus intermodal price.

5.4. Top4) ICT tools are an important enabler

The NexTrust business model is a solid foundation that can bring new benefits to the logistic sector as the business model goes beyond pure optimization IT platforms.

At the same time, the FTL project team identified ICT tools as critical supportive enablers for trusted collaborative networks. The digital enabling function is the key component to identify accurate, appropriate and efficient collaboration opportunities. These tools support and enable the entire collaboration process in an efficient and structured way.

In the identification phase, the trustee collects and analyses transport flow data of shippers. The “mapping & matching” analyses of transport data flows are executed with specialized, cloud-based “big data” ICT tools. This was done with the IT optimization platform ELG-Web™ provided by the NexTrust partner Giventis. With this ICT tools, the identification of synergies can be described as “bottom up”, organic approach for building sustainable collaborative networks. The trustee is using appropriate ICT tools, without the need to rely on a massive central database. The NexTrust FTL demonstrator learned that it is important to follow the business philosophy of “think globally, act locally” with regards to building trusted collaborative networks. For the market discovery and engagement of European carriers into the FTL collaboration cases, the FTL demonstrator used dedicated ICT tender tools. In the actual execution of the FTL collaboration cases, the parties are using several ICT solutions of the involved carriers and shippers. With the emerging internet and ICT solutions carriers can use today, “Transport Management Systems” (TMS) offer a wide range of added value functions. These ICT tools today are important enablers for the execution of the FTL collaboration pilot cases and its involved partners.

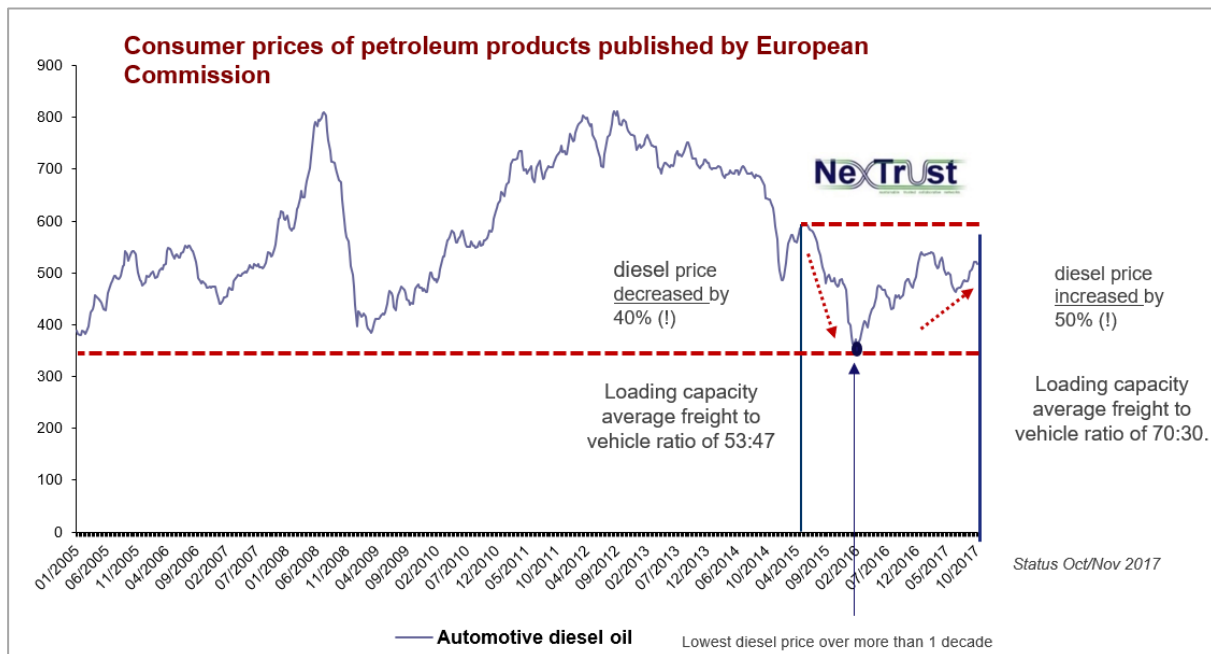
Overall, we expect with the continued development and deployment of ICT and digitizing tools, that more enabling support can be used to manage the collaboration in an efficient way.

5.5. Top5) Impact of market conditions

Current low diesel price is making road transportation cheap and it is challenging for intermodal services to meet the resulting target price.

Freight transportation is still too much depending on the overall market conditions, either to diesel price or capacity level.

To demonstrate the exceptional market conditions which NexTrust had to face, we visualise below the automotive diesel oil price development since 01/2005 to 10/2017, issued by DG Energy, European Commission on a weekly basis.



In the first quarter of 2016, the automotive diesel price was on the lowest level then over more than one decade. Even in the economic crisis time of the year 2008/2009, the diesel oil price was not that low. This hindered the establishment of more intermodal pilot cases, as the target rate of road for intermodal conversion was not achievable, even when bundling freight volumes to a critical mass. Then, in the third and fourth quarter of 2017, the diesel price increased by 50%. The fluctuation of the diesel price in such a short time during the NexTrust project period is exceptional when compared to the preceding ten years.

In addition to find critical mass to bundle FTL road flows and increase train frequencies, the intermodal demonstrator had to face also technical constraints in terms of the loading equipment. Today, the dominance of road transportation results in freight forwarders focussing on optimising their freight-related road equipment first before they consider shifting traffic to a multimodal transport solution. This is particularly important for continental freight flows, which connect production plants in Europe with the distribution centres close to the European regional customer areas and which are in focus of the NexTrust research project.

A trend in recent years has been the increasing use of semi-trailers for road freight services. The semi-trailers are 13.60 meters long and provide an internal space that is up to 2.7 to 3 metres high, as visualised below. The semi-trailers are setting the road equipment standard and the road freight forwarders use a variety of trailer equipment for continental freight flows.

The equipment producers offer all kinds of trailer options to better address the customer supply chain needs. The requirements are in terms of optimising the loading space of the “full truck load” (FTL), but in the same time takes into consideration product specific requirements and inventory constraints in the production plant and warehousing. The challenge is that the vast majority of the semi-trailer equipment cannot be used for multimodal freight transportation as it is technically not robust enough to be lifted. Only 5-10% of the two million existing semi-trailers can be used with cranes and can be shifted onto intermodal rail freight services. The reason is, that road equipment must be modified and strong curtain edges and double

thickness panel guards must be fitted to protect against potential damage caused during the crane and fork lift loading process. The road trailers need these gripper edges, which are additionally marked in yellow colour, so that during the lifting process the equipment can better see where to move up the trailer.

The mode conversion in the European freight transport market therefore need also the appropriate infrastructure and in particular for carriers, also the suitable technical intermodal equipment or alternative solutions. With the NexTrust business model in place, carriers and shippers can address the appropriate risk/benefit sharing mechanism before investing in the intermodal assets.

6. References

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