

The Role of Standardisation and Collaboration in Supply Chain

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1. Introduction

The NexTrust project objective is to increase efficiency and sustainability in logistics by developing interconnected trusted collaborative networks along the entire supply chain. These horizontally and vertically built trusted networks will integrate shippers, Logistic Service Providers (LSP) and intermodal operators as equal partners. To reach a high level of sustainability, the project will not only bundle freight volumes, but shift them off the road to intermodal rail and waterway.

NexTrust will build these trusted networks ideally bottom-up, with like-minded partners, adding multiple layers of transport flows that have been de-coupled and then re-connected more effectively along the supply chain. It will develop C-ITS cloud based smart visibility software to support the re-engineering of the networks, improving real-time utilization of transport assets.

NexTrust will focus on research activities that enhance collaboration in the market, validated through pilot cases in live conditions. The project engages major shippers as partners (Beiersdorf, Borealis, Colruyt, Delhaize, KC, Mondelez, Panasonic, Philips, Unilever) owning freight volumes well over 1.000.000 annual truck movements across Europe, as well as SME shippers and LSPs with a track record in ICT innovation.

The pilot cases cover a broad cross-section of the entire supply chain (from raw material to end-consumers) for multiple industries. The creation and validation of trusted collaborative networks will be market-oriented and implemented at an accelerated rate for high impact. The project's pilot cases are expected to reduce deliveries by 20-40 % and Green House Gases emissions by 40-70 %. Load factors will increase by 50-60 % following the emphasis on back-load/modal shift initiatives.

NexTrust will achieve a high impact with improved asset utilization and logistics cost efficiency, creating a sustainable, competitive arena for European logistics that will be an inspirational example for the market.

This deliverable (6.10) serves as a description and guidance to describe the role of standardisation in supply chain. Detailed information is given how the consortium is structured and managed, internal communication measures are setup and how deliverables are created, checked and approved. Focus is laid on the project management tool team GANTT allowing the consortium to schedule and track progress of all tasks within NexTrust.

About Horizon 2020:

Horizon 2020 is the biggest EU Research and Innovation programme ever with nearly 80 billion Euro of funding available over seven years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market.

Horizon 2020 is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness.

Seen as a means to drive economic growth and create jobs, Horizon 2020 has the political backing of Europe's leaders and the Members of the European Parliament. They agreed that research is an investment in our future and so put it at the heart of the EU's blueprint for smart, sustainable and inclusive growth and jobs.

By coupling research and innovation, Horizon 2020 is helping to achieve this with its emphasis on excellent science, industrial leadership and tackling societal challenges. The goal is to ensure Europe produces world-class science, removes barriers to innovation and makes it easier for the public and private sectors to work together in delivering innovation.

Horizon 2020 is open to everyone, with a simple structure that reduces red tape and time so participants can focus on what is important. This approach makes sure new projects get off the ground quickly – and achieve results faster.

The EU Framework Programme for Research and Innovation will be complemented by further measures to complete and further develop the European Research Area. These measures will aim at breaking down barriers to create a genuine single market for knowledge, research and innovation.

2. Project Overview

NexTrust is an EU-funded project which brings together 31 partners to drive collaboration in the logistics industry. Its objective is to increase efficiency and sustainability in European logistics.

It will create interconnected, trusted networks that collaborate along the entire supply chain.

NexTrust is developing a new way of working. Its innovative business model aims to create long-term solutions that solve real problems in the logistics sector.

NexTrust aims to build trusted networks that will fully integrate shippers, logistics service providers, and intermodal operators as equal partners. The project will be coordinating 20 different pilots that address problems across the length and breadth of European logistics. These pilots will aim to:

- Remove 40 % of lorries
- Remove 15 % of delivery vehicles
- Reduce greenhouse gas emissions by 70 %
- Increase load factors by 50 %.

In each pilot area, NexTrust is driving efficiency to lower congestion, uncertainty and fuel use. It will help logistics providers to cut costs and remain sustainable in the long-term.

The action engages major shippers as partners owning freight volumes of well over 1.000.000 annual truck movements across Europe, plus SME shippers and LSPs with a track record in ICT innovation.

In each area, NexTrust is driving efficiency to lower congestion, uncertainty and fuel use. It will help logistics providers to cut costs and remain sustainable in the long-term.

NexTrust is coordinating 33 different pilots that address problems across the length and breadth of the logistics industry. These include:

- Bundling freight volumes to reduce the number of vehicles running empty, or at less than full capacity
- Shifting freight from the road onto rail and waterways which are more carbon-efficient
- Creating and refining technologies designed to optimise efficiency in logistics, including re-engineering networks and improving real-time utilisation of transport assets.

3. Definitions

3.1. Standardisation

Standards give a common language to identify, capture and share supply chain data– ensuring important information is accessible, accurate and easy to understand.

The GSMP (Global Standards Management Process) is a community-based forum for businesses facing similar problems to work together and develop standards-based solutions. Standards created by industry, for industry.

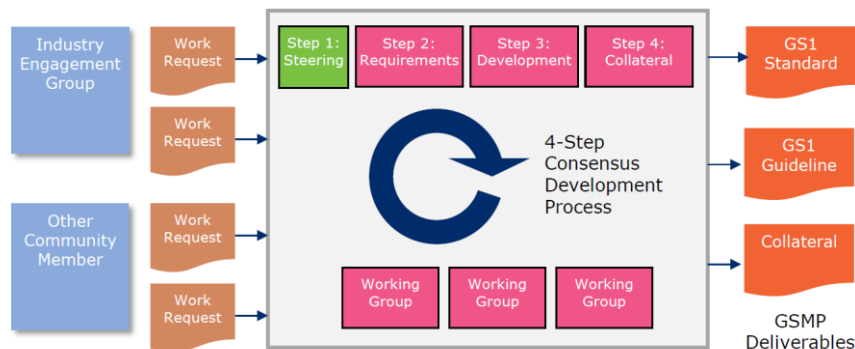


Figure 1: Global Standard Management Process GS1

The trusted neutral participant GS1 facilitates dialogue and the development of standards-based solutions between business and technical people from nearly sixty countries. Industries represented include retail and consumer goods, fresh foods, healthcare, transport and logistics, governments and many more.

3.2. Collaboration

A supply chain is the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services delivered to the ultimate consumer (Christopher 1992). In other words, a supply chain consists of multiple firms, both upstream (i.e., supply) and downstream (i.e., distribution), and the ultimate consumer.

Several different definitions of supply chain management exist. Cooper defines it as "... an integrative philosophy to manage the total flow of a distribution channel from supplier to the ultimate user". "Supply Chain integration is the streamlining of all activities from manufacturer to retailer through combined effort by the trading partners." (The Transport Optimization report, ECR Europe 2000, p. 61)¹. We are talking about an integration from farm to fork.

Collaboration comes up if two or more independent companies are working jointly to plan and execute supply chain operations. Collaborations take place in horizontal as well as vertical directions.

3.3. Horizontal Supply Chain Collaboration

Horizontal collaboration appears between different supply chains of competitors or non-competitors on the same supply chain level cooperate. At the minimum two companies of the same industry and the same stage of production work together. These companies belong to the same supply chain stage and often produce or trade the same products. Companies add their strength to gain benefits. Collaboration affects the processes and structure design of distribution networks. Cooperation create a change of existing hubs and requires trusted coordination.

¹ (ECR Europe, 2000)



Figure 2: Horizontal Collaboration

3.4. Vertical Supply Chain Collaboration

Vertical collaboration occurs when collaborating with customers, internally (cross-functional), service providers, suppliers or commodity/packaging producers. In practice, two types of cooperation are distinguished. Upstream cooperation with commodity or packaging producers' or downstream with retailers.

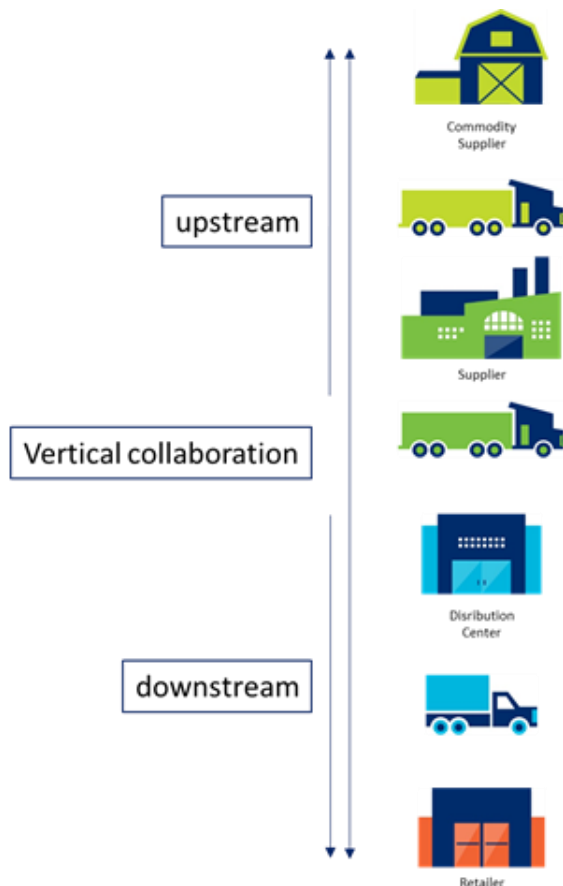


Figure 3: Vertical Collaboration

Vertical collaboration processes between producers, suppliers and customers in the early 1990s i.e. in the ECR Initiatives. processes are:

- VMI: Vendor Managed Inventory
- BMI: Buyer Managed Inventory
- CMI: Co-Managed Inventory
- CPFR: Collaborative Planning Forecasting and Replenishment

All processes based on the communication and identification standards of GS1.

Supply Chain Management itself describes a vertical collaboration. Supply Chain integration captures the all of the approaches captured by the different suppliers, manufacturers, and customers to successfully integrate their operations and create an efficient supply chain. (Simchi-Levi et.al. 2000).

4. Role of Standardisation (as a Specific Form of Collaboration)

4.1. Function of Standardisation

Standardisation contributes to efficient interaction between parties by agreeing complying with arrangements constituting the standard. Standardisation therefore grounds on common sense. The more agreeing the higher the likelihood for high adoption of a standard the more it merits to be called a standard.

Standardisation thus could serve as a trigger for technological change. As standards are a willful limitation of options, they allow new standard-based technological products an easier market entry due to their interoperability with other complying products and features. In comparison, non-standardised products would usually face higher costs or limiting field of application.

However, as innovation relies on variety it is important that standardisation takes place with the right timing and intense to support and not to prevent innovation.

Besides allowing and encouraging innovation, standardisation leads to (Source: The Economic Benefits of Standards to New Zealand Standards Council of New Zealand and BRANZ August 2011, p. 8ff.)

- preventing information asymmetry (as access to standards provides transparency),
- creating economies of scale (as the number of standard complying products increase which can lower the costs associated with the production of one unit),
- allowing for network externalities (as it may be a reason for joining a network if already many others are part of that network) and
- reduction of transaction costs (e.g. for searching or understanding what would be the right product for the demands).

In a nutshell, the function of standardisation contributes preventing market failures.

4.2. Kinds of Standards and Collaboration for/in Standardisation

Different kind of standards exist. One of the common differentiation is via reach of a standard:

- **Company standards** are primarily to facilitate commoditization within one company or enterprise. They might have some reach beyond the companies' boundaries.
- **Industry standards** are developed and recommended by interested parties of that industry. They also could have some reach into industries beyond the industry providing it.

Another shape of scope is using geographical terms. It can be differentiated between:

- **national standards**, (e.g. DIN A4 paper format).
- **regional standards** (e.g. standards for German speaking countries, EU standards, European standards) and
- **global standards** (e.g. GS1 Standards).

It could be that over time, successful national standards become regional or global standards (see DIN A4 paper format) as well as successful regional standards being adopted in other regions or become global standards.

As an encapsulated, especially national, sight contradicts global world trade many new standards nowadays are developed directly on a global scale with triggering impulses out of nations or regions.

A third kind of differentiation of standards (source: FISpace D500.4.1, p. 13) orientate upon the level of their binding character:

- **De-jure standards**, are formal standards used as normative documents from official standardisation bodies. There is strong pressure to apply them as they are legal basis and can be made mandatory.
- **Technical or industry specifications** are based on consensus among members of standards bodies, consortia or trade organisations and do not have a formal character or legal basis; they are recommendations but when widely accepted and used in practice by relevant market players they can become de facto standards.
- **Workshop Agreements** are industry recommendations developed by interested stakeholders through a short-track process often facilitated by several formal standards bodies; workshop agreements serve as industrial consensus documents between participating individuals and organisations, and can be revised relatively easily.
- **Conformance test applications**, reference implementations and guidelines aim to support interoperability between and easy rollout by market players of products and services based on formal standards or industry specifications. They have an informative character.
- **Technical reports** are informative documents supporting further standardisation work, e.g. by identifying the need for additional technical clarifications in – or between – existing specifications, standards, or guideline documents.

4.3. How to Apply Standards to Gain the Benefits Expected

In this section, the benefits laid out in chapter 5.1 are further looked into more deeply to derive how to gain these benefits best. They base upon best practice recommendations from the user community of GS1 Standards (GS1 Architecture Principles, 2016, www.gs1.org, are referred/quoted in excerpts).

4.3.1 Business Value

Standards should support business processes, be tied to trading partner needs and demonstrate its business value. In order to provide this value, standards should be created pragmatically, only in response to business requirements coming from trading partners, where there is a genuine intention to implement. The definition of the standards is driven by the business needs of trading partners.

The overall cost of implementation of standards needs to be considered aiming to achieve the best overall value for the total supply chain. Savings in one part of the supply chain could result in larger efforts and/or costs elsewhere in the same supply chain. Impacts for implementing and maintaining standards need to be taken into account. Costs and benefits should be spread fairly across participants.

4.3.2 Conformance

Standards and solutions should be defined in a way that makes it possible to assess, practically and without ambiguity, whether or not an implementation is conformant as claimed. It will often, but not always, be desirable to include criteria for assessing conformance as part of the standard.

4.3.3 Consistency

In order for the full choreography of business processes to operate unhindered, standards have to be consistent across all the processes. Standard development processes should make provision that new standards are consistent with overall system requirements.

4.3.4 Extensibility

The standards development process should ensure extensibility of the standards, of the tools for implementations, and of the implementations themselves. Extensibility is a necessity for all system components in order to cater for new and/or more efficient business processes and for the expanding user community.

4.3.5 Interoperability

Interoperability is the capability of different systems to exchange data based on a shared understanding of business processes.

Interoperability can be achieved in four ways: Through product engineering, industry/community partnership, access to technology and intellectual property and implementation of standards.

4.3.6 Motor of Technological Developments (Forward Looking)

Standards need to anticipate change so that proper planning can take place. This will minimise the extra cost of implementing changes. In this respect it is important to provide for migration strategies and backward compatibility.

4.3.7 Open Supply Chains Compatibility

An open supply chain is one in which the complete set of trading partners (including service providers) is not known in advance and changes continually. This is because:

Trading partnerships change so that new relationships have to be accommodated.

Open supply chain compatibility provides interoperability without the need for organisations on each side of the interface to negotiate individually in advance.

4.3.8 Simplicity

In the development of standards, simple or less complex solutions achieving the same results should be favoured because simplicity results in easier implementations. Complexity increases potential failure points, introduces unreliability into the supply chain, and can undermine trust between trading partners.

4.4. Drawbacks of Standardisation

Besides the benefits generated by standardisation there are things on the other side to put up with, especially:

- **Costs for standardisation process**
The process of standardisation require time and resources in order to develop, administer and publish the standards.
- **Time to market**
To reach consensus could be a lengthy process, the more the higher the number of parties involved and the more controversial potentially is. Therefore, compared to non-standardised products which do not rely on consensus this could result into a longer time to market.
- **Risk for abuse of market power**
In case one or only a few parties dominate a market risk exists that this/these parties use its/their market power do dominate the standardisation process as well. In order to avoid abuse of market power, it is up to the organisations administering and chairing the process to moderate it concerted and well-balanced.

- Risk of negative impact due to limitation
As mentioned, limitation is immanent to standardisation. It needs to be safeguarded that the reduction of variety does not harm innovation but foster it. This is dependent upon the question of right timing and intensity of standardisation.
That is why in cases where such risk exists often development accompanying standardisation helps coping. Thus, standardisation could take place at an early stage and relatively fast due to limited consensus requirements but with an eased importance than full consensus based standards.
- Age of standards
The longer a standard exists the more this could lead into widely adoption. However, as a standard age, this could also have the impact of a decline in economic benefit. In the end, this could result into market failure. In order to avoid this standardisation bodies usually have fixed revision cycles so safeguard every standard is examined within this period at least once. Such revisions should lead into taking decisions whether a standard is still up-to-date, needs to be adjusted or amended or whether it can be deprecated or replaced.

4.5. Experiences in Applying Standards in a Research Environment

This chapter explains the handling of standardisation within the NexTrust Project.

4.5.1. Role of GS1 Organisations within NexTrust (WP6)

GS1 is a neutral, not-for-profit standards organisation that helps companies to do business across the world. Standards developed and maintained are used by over one million companies worldwide within 25 industries across 150 countries. GS1 Germany is one out of more than 100 GS1 Member Organisations serving the user community worldwide.

The GS1 System is the collection of standards, guidelines, solutions, and services created by the GS1 community through GS1's community development processes, and is the most widely used supply chain standards system in the world. GS1 Standards support the information needs of end users interacting with each other in supply chains, specifically the information required to support the business processes through which supply chain participants interact. The subjects of such information are the real-world entities that are part of those business processes. Real-world entities include things traded between companies, such as products, parts, raw materials or packaging. Other real-world entities of relevance include the equipment and material needed to carry out the business processes such as containers, transport machinery or entities corresponding to physical locations in which the business processes are carried out.

4.5.2. Requirements for Integration of GS1 Standards to NT IT Platform

The GS1 Standard GLN (Global Location Number) within the ELG analysis tool of Giventis should be used to identify logistics locations, like pick-up points, delivery locations and cross-docking or transshipment points to optimise the intermodal transportation flows within the simulation and planning phase. Therefore, it is important for the pilot partners involved to exchange their relevant GLN master data with the trustee via the platform, in order for him to generate correct routing and optimisation recommendations.

Via the ELG optimisation platform collaborative opportunities will be identified using cross network smart visibility. The intent is to create a complete, interconnected picture of the transport flows, enabling to then segment them into business cases that support connecting them together in a more efficient manner.

The ELG-WebTM tool is a secure, cloud based platform that optimizes transport flows across internal transport networks, and externally, across multiple shippers and carriers. ELG-Web enables a paradigm shift in transport purchasing strategy. It exposes and enables companies to leverage the synergies hidden in their transport data, supporting innovative, collaborative long term purchasing strategies. The tool gives visibility to potential FTL (full truck load) reloads, continuous movements, intermodal FTL bundling and LTL (less than truck load) co-loading opportunities. ELG-Web identifies unload and reload points in companies'

networks where carriers currently unload and then depart empty. Leveraging this visibility at the purchasing level offers opportunities to increase asset and driver utilisation, reducing costs by reducing empty running.

For optimisation of transport flows the unique identification of locations is the key, i.e. GLN. Within the GS1 System the GLN provides this functionality. In order to combine the tool functionalities with the advantages of GS1 standards it is necessary to have a mandatory field for the GLN in the tool.

For more details see "Proposal: Requirements for integration of GS1 Standards to the NexTrust IT platform" (D6.9, chapter 5).

4.5.3. User Guide on Standards Compliance Criteria

GS1 Standards can be divided into the following categories according to their role in supporting information needs:

- **Identify:** There are standards to identify real-world entities by means of GS1 identification keys. They may be used in an information system and are subject to electronic information sharing.
- **Capture:** These standards provide the capability to automatically capture information carried directly on physical objects in the shape of standardised GS1 barcode symbols or RFID transponders (RFID tags). They build the bridge between the world of physical objects and electronic information.
- **Share:** GS1 Standards for information sharing include data standards for master data, business transaction data, and physical event data, as well as communication standards for sharing this data between applications and trading partners. They build the foundation for electronic business transactions.
- **Use:** These recommendations describe how the three categories mentioned above are combined to efficiently meet business requirements in application environments (e.g. cross-company traceability).

In terms of transport and logistics, GS1 supports the following five business processes to increase their efficiency, speed and accuracy:

- Delivery management
- Transport management
- Warehouse management
- Asset management as well as
- Border procedure management

The logistics industry involves a wide variety of parties such as consignor and consignee, freight forwarders and carriers as well as official bodies like customs and port authorities. The combination of logistics channels and parties implies an opportunity to simplify asset and shipment identification using GS1 identification keys and sharing this information between carriers and other service providers.

For more details see "User Guide on Standards Compliance Criteria" (T6.2.2.2).

4.6. Handling of Standardisation within Project Synchro-Net

Synchro-NET will provide tools to plan and control intermodal freight transport chains. For this purpose different modules will be developed to support planning on tactical, strategic and operational level. In a simulation mode customers and service providers can model and validate transport routes using different modes. Here, also new links and nodes can be integrated into the logistics network to simulate its impact on the transportation schedule. This simulation mode will be used for tactical and strategic planning. In contrast to the simulation mode, in the booking mode also detailed timing constraints along the routes are considered. The tracking, control and adaption of the execution of a route is realized within the real-time mode.

Though the project is demonstrated oriented Synchro-NET main modules (addressing five important areas of functionality) will be commercialised by the partners involved in their development either as standalone modules or as an integrated solutions. The demonstrators will be used to guarantee the applicability of the Synchro-NET solutions to large-scale operations of many different stakeholders.

The true success of Synchro-NET will be assessed by the ongoing impact after the project to ensure that slow steaming and synchro-modality become widely used as strategies for de-stressing the supply chain. The exploitation, communication and dissemination activities that will be carried out from the start of the Synchro-NET project will not only lay firm foundations for this success but will generate the “critical mass” required for the Synchro-NET concept to be self-perpetuating. The presence of high-profile shippers and logistics providers in the consortium will aid this process by adding credibility.

From a structural point of view, unlike projects like NexTrust, Synchro-Net project covers standardisation topics not within an own standardisation work package. This might arise out of standardisation to play rather a secondary role. However, still a potential standardisation topic in developing the Synchro-NET tool referring to the capacity/freight flow calculation algorithm exists. This result could therefore become valuable input for further standardisation processes beyond Synchro-Net.

4.7. Handling of Standardisation within FIspace Project

The EU funded research project FIspace (www.fispace.eu) developed a multi-domain business collaboration space (short: FIspace) that employs Future Internet (FI) technologies for enabling seamless collaboration in open, cross-organisational business networks. It was pioneered – similar to NexTrust but in a different field of business – towards fundamental changes on how collaborative business networks will work in future. Working experimentation sites were established where pilot applications were tested in early trials for agro-food as well as for transport and logistics. Moreover, the project FIspace prepared for industrial uptake by engaging with players and associations from relevant industry sectors and IT industry.

The dimension of standardisation covered the investigation on technology standards for cross-sectorial system and data integration. It contains on the one hand a compilation of standards relevant to the agro-food and logistics sector and enriches this on the other hand with relevant standards for building electronic platforms to apply business applications onto. Documentation had been prepared to guide use case trials concerning the use of standards and related technology to ensure standards being used throughout the FIspace project wherever possible. For the detailed results referenced/quoted in the summary below, FIspace deliverables D500.4.1-4.3 are recommended for reading.

A continuous dialogue between standardisation experts and the trials was undertaken to monitor closely how and where standards are relevant to those activities. Out of this dialogue, work on the trials had been encouraged to use standards where appropriate, and identify adaptations to existing standards where needed or additional standards where appropriate. It was not the remit of FIspace to develop or establish new standards but identifying requirements for standards where appropriate.

The use of standards in each trial had been evaluated with a focus on how products, business partners and locations are identified. Based on the gap analysis, recommendations for future work were made.

For safeguarding, the use of data standards in the trials and their needs for formats and protocols to exchange data input from the trails and their experience was gathered via a questionnaire. As a result of the feedback received, in general, the trial partners had little or no issues regarding access to information on standards. Software developers seem to be familiar with the standards relevant to their field.

As a conclusion, open standards (such as GS1 Standards), a focus of interoperability and the implementation of linked open data were recommended.

The support for standards by the FIspace platform and the requirements for standardisation from an open call, application developers had been evaluating the validation of the FIspace platform to support standards from external organisations and relevant networks. Based on these evaluations for future revisions of the FIspace platform as it transitions towards commercial deployment primarily in some specific fields additional guiding documents for application developers have been considered helpful.

Forward looking towards deployment of the FIspace platform it was noted that typically the higher the number of overlapping standards that are supported, the higher the effort required maintaining interoperability of systems. It was therefore recommended that consideration to be given as to whether measures should be taken to guide application developers towards a more focused and lower number of overlapping standards, which would likely reduce the support costs of maintaining the FIspace platform when commercially deployed.

4.8. Handling of Standardisation within Project MyEcoCost

The integration of environmental criteria in decision-making on production and consumption at all levels has been seen as a cornerstone of a move towards sustainability for a long time. This includes the establishment of an international database and accounting system of the resource intensity of products and services. Such a database and system is urgently needed in order to monitor the success of strategies and measures to increase efficiency of resource usage on all levels: from the macro-economic level and the level of value chains, to the level of companies and even individual unit of any product and processes. Based on recent developments in information and communication technology, the development of a cost-effective accounting system for natural resources with widespread application in the global economy has become feasible. Digitization has enabled the facilitation of a global network formed by collaborative resource-accounting nodes that collect relevant environmental data at each stage of a production chain or at stages in the provision of a service, which represents the core function of the myEcoCost project. This data can be passed from suppliers to customers similar to invoices or integrated into them; it can be aggregated along the chains down to the sales counter, and thus specific information not only for a product group or brand, but even for an individual unit of any product can be communicated to the final consumer. This information can help consumers to optimise the environmental impact of their consumption routines.

12 O'Connor, M. (1997): The internalisation of environmental costs: implementing the polluter pays principle in the European Union. *International Journal of Environment and Pollution* 7(4), p. 450–482. | Cerin, P. (2006): Bringing economic opportunity into line with environmental influence: A discussion on the Coase theorem and the Porter and van der Linde hypothesis.

A global network of resource accounting nodes can provide specific data for processes and tiers in supply chains based on common system boundaries. The broader vision of myEcoCost is the global spread of interlinked eco-accounting modules only using primary data generated by companies, households and their suppliers. The system runs in parallel to existing financial accounting systems. The ecoCost flows and aggregates in the same way that financial value does through a supply chain. It can provide environmental information to all economic actors and deliver high-quality datasets contributing to improved life cycle inventory data; it can also generate accurate national and international statistics in a harmonised way. Thanks to high levels of automation, its calculation is (almost) in real-time. With ecoCost values widely available, our view on products and services could change! We could track our purchases and their environmental effects over time, assess if our lifestyles are within ecological limits, and learn how to reduce our personal or corporate environmental impact. In this way, we envisage a new era of eco-awareness in everyday life with myEcoCost providing a vital infrastructure prompting designer, producer and consumer decisions toward more sustainable lifestyles and an ecologically based economy. The ecoCost of a product could be displayed on the price tag on a retailer's shelf and/or through scanning a product barcode via a smartphone app at the shop or at home. Consumers will be able to make informed decisions about the environmental impact of any purchased product or service. In the same way that a generation of people became aware of their personal calorie intake and changed their consumption patterns accordingly, we may soon be making decisions guided by a recommended personal eco-impact level. If this consumer behaviour were to become statistically significant in the eyes of producers, ecological costs for products could be lowered already in the medium term through changes in supply driven by user demand. Consumer data collected by the myEcoCost IT infrastructure could be used in an anonymous, confidential and secure way, deriving statistics on resource consumption or environmental performance at local, regional or national level.

We believe myEcoCost is the resource accounting system that society needs today: it supports the transition towards a resource-efficient economy, and to more sustainable lifestyles. Reliable eco-resource efficiency information helps not only consumers to make environmentally friendly decisions, but it is also

necessary for business decision-making, for design choice, or for procurement, e.g. when selecting their suppliers according to green procurement strategies, either voluntarily or to meet legal obligations. To do so without being overwhelmed by extra costs requires the more efficient collection and use of internal and external data on resource use. The myEcoCost business software computes ecoCosts from ecoCost values provided by suppliers (or possibly secondary data where supplier data is not yet made accessible) and from internal processes defined by the company. The company would then pass the aggregate figures per unit of production to the next actor in the supply chain. In this process, only data released by a participating company will be transmitted within the myEcoCost system, while all other data would only be stored on internal servers of the respective company. Combined with current and future improved data security standards, this assures participating businesses that their privacy is maintained. In short, the vision of the project is to promote a new social era of environmentally sustainable production and consumption, and support that process by establishing the myEcoCost system, which uses the latest technology.

4.9. Experiences in Applying Standards in an SME Environment

4.9.1. Experiences from PROZEUS Project

GS1 Germany GmbH and Institut der deutschen Wirtschaft Köln Consult GmbH (IW Consult) have jointly carried out the PROZEUS project between 2002 and 2012. PROZEUS was supported by the Federal Ministry of Economics and Technology (BMWi) and stands for the "promotion of the eBusiness competence of small and medium-sized enterprises (SMEs) to participate in global procurement and sales markets through integrated processes and standards".

Based on e-business sample solutions from the medium-sized practice of both corporate target groups, it will be demonstrated how the effectiveness of business processes across the entire value chain can be increased and which sources of error should be avoided. In the recent past, however, the once-isolated value-added chains are growing together. This is also a series of standards.

PROZEUS has the overall aim of promoting the eBusiness competence of SMEs to participate in global procurement and sales markets through integrated processes and standards.

There are still challenges for SMEs. Existing deficits such as lack of knowledge about the functionality, economic benefits and possible applications of eBusiness standards and related electronic business processes are to be further reduced. This lack of information is limited not only to small and medium-sized enterprises in the consumer goods industry, as well as to the industrial and service sectors. Deficits are still to be found in important multipliers such as business and trade associations as well as IT service providers.

Thus, for GS1 Germany and IW Consult, the common goal remains to create transparency for standards and processes in e-business, in addition to raising awareness among the companies on the topic. This is achieved through the development of know-how and the demand-oriented provision of high-quality information. Information from practice for practice continues to be highly credible in the medium-sized economy and represents an important transfer instrument for PROZEUS. Under the term "Standards.Praxis.Mittelstand.", practice-tested solutions from pilot projects are transferred to other SMEs. In these pilot projects, the feasibility of such concepts has to be demonstrated and the permanently achievable potential benefits are disclosed. The active transfer of results into the economy and cooperation with experts ensures the rapid implementation of e-business activities for SMEs. This enables small and medium-sized enterprises to maintain their position on the market with the aid of new technologies.

4.9.2. Experiences from eStep Project

A self-assessment tool (SAT) was developed as part of the research project eStep Mittelstand (www.estep-mittelstand.de).

The SAT served as a first step in the self-analysis of the company, in order to recognize its own potential and thus to determine the individual eBusiness maturity level. To ensure that the tool can be further developed in an appealing and logical way, the DIN SPEC 91334 includes the precise assignment of

individual question weights to one of the four determinants: enterprise, organization, cooperation and data management results.

The classification into the five-stage degree of maturity was carried out by specific questions, which are recorded by the company and the specialist departments. The five levels of the degree of maturity were explained in detail by DIN SPEC. The standardization ensured in this way ensured that further future developments of the tool could also take place within the developed regulatory framework.

On the basis of the different stages, specific action recommendations were derived, which specify further important steps. Another target was the integrated benchmarking, which compares its own performance with the indexed performance of the average of its own industry. The evaluation of the questionnaires, which lead to specific recommendations for action, were also described in the DIN SPEC. These include, in particular, the weighting of the various questions as well as the point values assigned to the individual questions. An explanation of the assignment of the points ensures, however, that future branch-expanding questions can also be integrated into the standardized evaluation. The acceptance of SAT was quite positive.

4.10. Experiences in Applying Standards within Business Initiatives

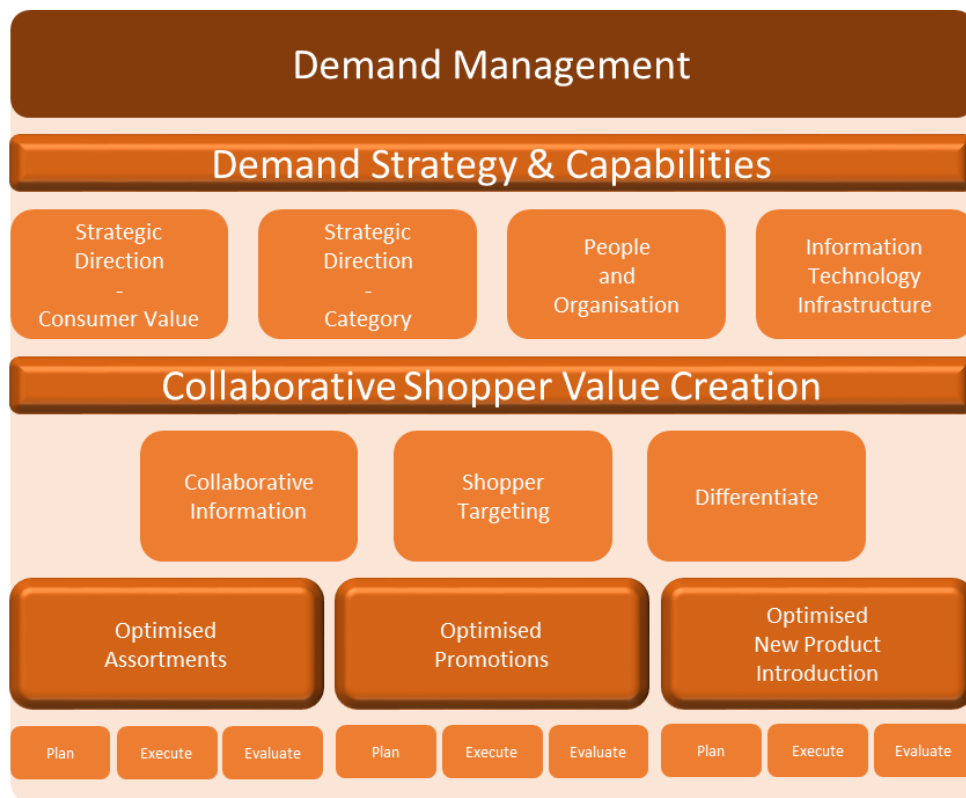
4.10.1. Experiences from Efficient Consumer Response (ECR) Initiative

ECR is defined as a "comprehensive management concept based on vertical collaboration in manufacturing and retailing with the objective of an efficient satisfaction of consumer needs. The main components of ECR are supply chain management and category management."

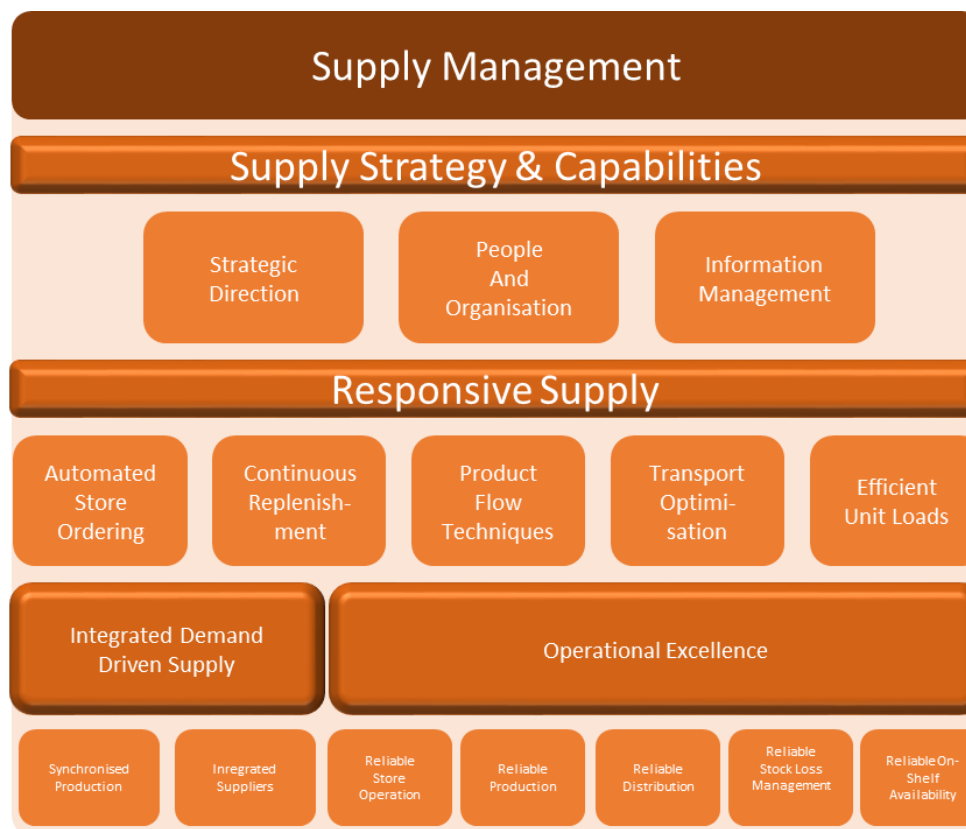
ECR started in the early 90th last century in the USA. The initiative was triggered by the situation that the increase of productivity of the internal supply chain was exhausted, revenues stagnated and costs were raising at the same time. Retail and manufacturer realized that profit could increase by cooperation between the participants of the supply chain. Supply Chain participants seek for open cooperative partnerships.

With a slight delay, ECR came to Europe in the mid-90s Leading European FMCG companies (manufacturer and retailer) founded the ECR Europe Initiative in 1995. They gave the initiative the following ECR-Mission: "Working together to fulfil consumer wishes better, faster and at less cost".

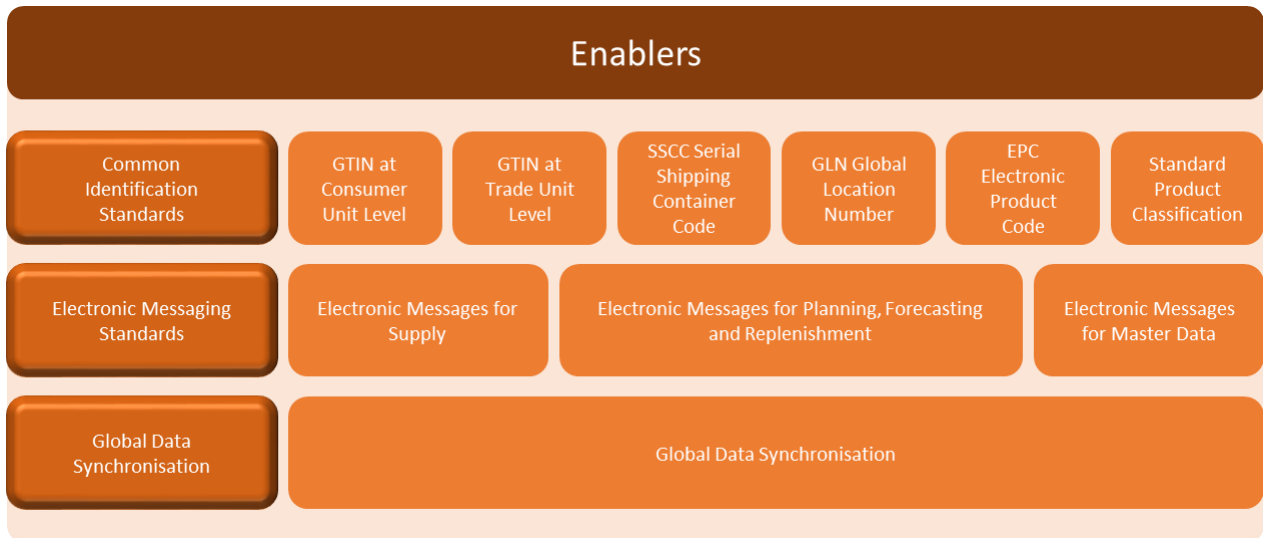
Working together leads to a collaborative set up of supply and demand processes, enablers and the elimination of in-efficient uncoordinated processes. They are described in the following graphics.



Source: ECR Europe



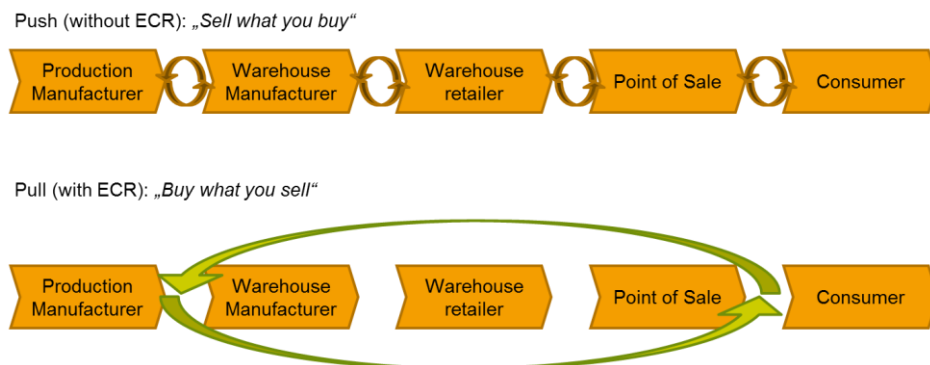
Source: ECR Europe



Source: ECR Europe

Figure 4: Collaborative Set Up

A further main result was the reversal of the push principle to the pull principle with a high effect on supply planning.



Source: Karrer 2004

Figure 5: Push and Pull Principle

The early monetary expectations based on a Coopers & Lybrand´s Value Chain Analysis in 1995 regarding the results of cooperation in ECR processes summarized in the following diagram:

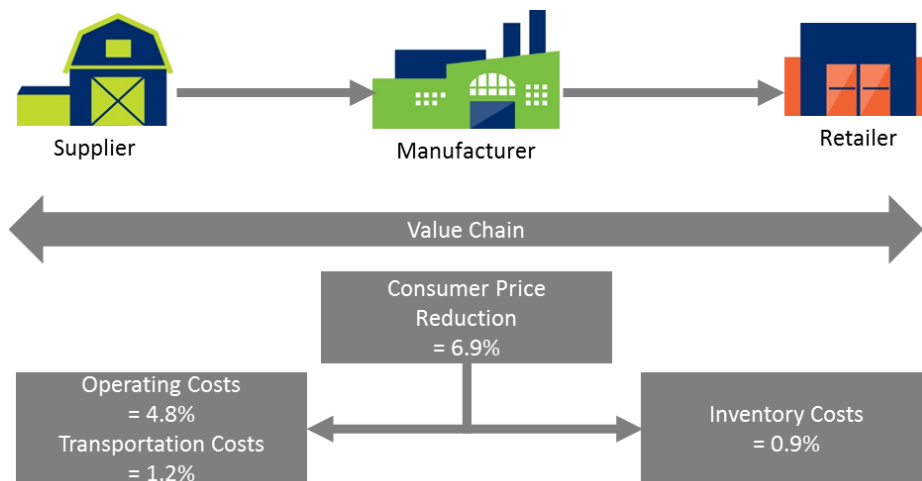


Figure 6: ECR – early expectations of cost savings

In 2005 ECR Europe on occasion to their 10th anniversary carried out a study to get a “holistic impression on the status of ECR implementation. The study contained five different subprojects:

- Analysis of the ECR adoption level and its impact on performance based on the Global Scorecard database
- Analysis of the ECR adoption and its impact on performance based on case studies
- Analysis of ECR adoption’s impact on companies’ cost structure based on case studies
- Analysis of the macro-economic environment of ECR adoption
- Drawing the overall conclusions from and reporting the study

In general, the study shows that there is a tremendous difference between high ECR adopters and low or non-adopters. The overall results for main aspects of the supply chain are:

- on average 5,7 percentage points higher service levels
- on average 10 days less finished goods cover
- on average 4,9 percentage points higher shelf availability

Additional effects are:

- reduction in delivery time by 48 h
- improved on-time delivery to a level above 98 %

These results lead to a cost reduction of 3,3 % compared to 5,7 %. The industry realized slightly more than half of the in 1995 expected benefits. The study showed that still an additional 28 billion Euro optimisation potential not carried out at that time.

In addition to the quantitative results, the quality of the relationship between partners in the supply chain was improved. ECR adopting suppliers became retailers’ preferred collaboration partners, they have progressed and extended their capabilities, helped suppliers to improve their supply chain and to improve their image and drive sales. ECR adopting retailers improved their supply chain as well, as their sales and image. They improved also their knowledge about the shopper insights.

To have a look at the change of relationship between all participants of the supply chain including the shopper and consumer a tremendous development shown.

- To share the overall shopper and consumer knowledge enables all parties of the supply chain to create a higher consumer value
- Cooperative relationships become more responsive and flexible

- Cooperative relationships become more trustful and fair
- A higher commitment to joint problem solving is shown

Most of the ECR relationships started with a small pilot in one country, supported by the national ECR Initiative, a consultant or academic institution. The right selection of the project partners is a success factor. ECR needs a strategic plan and a multifunctional team to get successfully started. The main final step is the transfer from project to daily process.

The study also mentioned the barriers to successful ECR adoption. The main barriers are:

- Substantial differences in the understanding of the ECR idea
- Concepts are too complex
- A lack of management commitment to collaborative business practices
- No link between management commitment and staff
- The level of trust between potential partners in ECR processes is insufficient
- No active management of ECR adoption and its quantitative and qualitative success
- Companies are not willing to invest into the ECR requirements, if they are not available yet
- Technological requirements to automate ECR processes are not matched
- Integration of ECR mind set into the business strategy
- Retailers and suppliers' traditional approaches are deep rooted in employees' mind set

Regarding the success measurement, the consumer goods forum developed the global scorecard.

"Much of this is about change management. Change has to improve hard business results and the scorecard tool has been designed for all to 'manage what we measure'". (Jim Flannery, former Managing Director, Customer Development, Procter & Gamble (P&G) Global Operations).

The implementation of ECR started all over Europe, with differences in the adoption level. Countries with a high level of inter-industry cooperation and a high willingness of companies to invest into ECR triggered change processes show a higher adoption level compared to other countries. Germany and the UK show a higher adoption level because the market participants were organized long before ECR started in organisations like the CCG (change of name to GS1-Germany in 2005) or the Institute for Grocery Distribution (IGD) in the UK. The coordination by well-known and accepted organisations was seen as a success factor in those countries.

Business standards had also an impact to ECR adoption.

"The increasing definition and adoption of global standards has enabled efficient data and information exchange. The use of global identification and communication standards is an important requirement to efficiently run collaborative business processes."

The standards used in ECR processes are mainly the same recommended in NexTrust:

- Identification
 - Global Trade Identification Number (GTIN)
 - GS1-128 based serial shipping container code (SSCC)
 - Radio frequency identification technology (RFID)
 - Electronic product code (EPC)
 - Global product classification (GPC)
- Communication
 - EANCOM® standard for electronic data interchange
 - Web-based solutions based on the EANCOM® content

ECR invented also the implementation pyramid as a tool to support the implementation of ECR processes and standards for the individual company.



Figure 7: ECR Implementation Pyramid

Evaluate: How far is a company already progressed in adopting ECR.

Plan: Plan to incorporate proven ECR improvement concepts into your business strategy.

Cultural Intervention: the three drivers are willingness to innovate and change, creation of shopper value and, collaborative understanding of partner's business and sharing of information.

Align Goals & Objectives: eliminate inner company silos between departments and align the overall strategic cross-functional process mind set.

Align Measures and Incentives: people's measures and incentives are designed to encourage certain behaviour and should be in line with the ECR strategy.

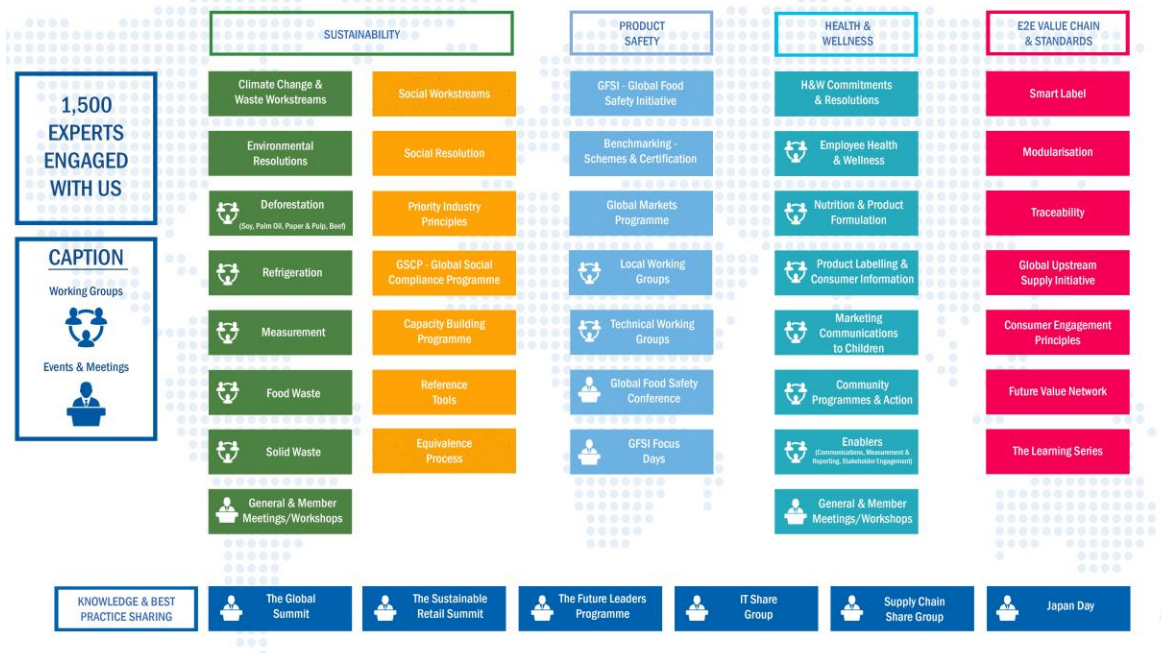
4.10.2. Experiences from The Consumer Goods Forum (TCGF)

The Consumer Goods Forum is working together with the global players in industry and trade. The working fields are structured as follows:

- Sustainability
- Food safety
- Health care
- E2E value chain (end to end value chain)

WORKING TOGETHER EFFICIENTLY FOR POSITIVE CHANGE

Here's an overview of our activities in five focus areas and where our members can get involved and engage with us. Our working groups and events develop toolkits, guidelines and reports, and offer opportunities to share best practices. All of which helps support our members while they implement our resolutions and commitments in a collective bid to drive positive change globally.



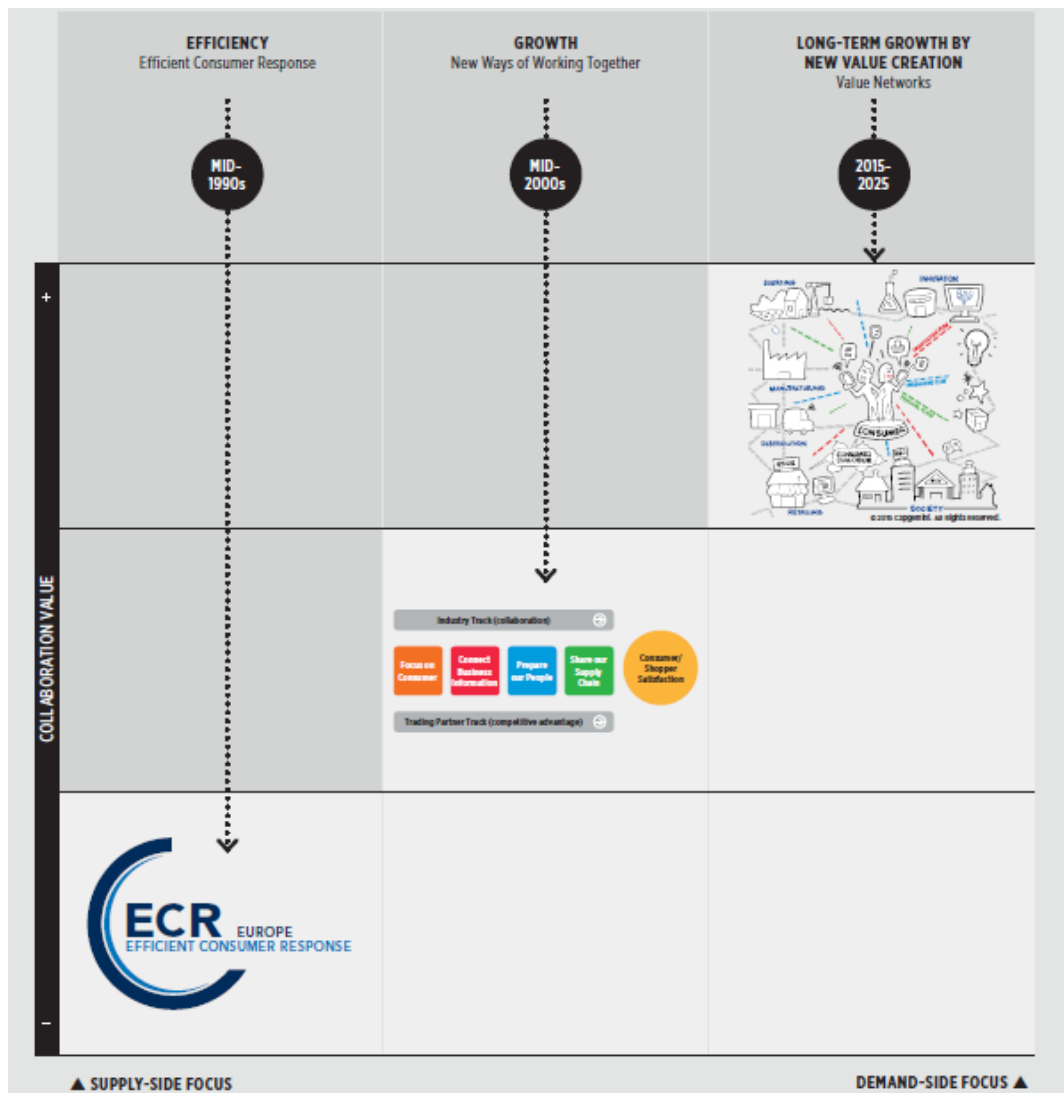
Source: <http://www.theconsumergoodsforum.com/networking/our-projects-and-working-groups>

Figure 8: Working Together Efficiently for Positive Change

The latest report of the consumer Goods Forum, published in 2016 focused on collaborations. “The consequences of the digital revolution for physical flows have perhaps not had as much attention as those for data flows but they could be equally far reaching. Supply and delivery networks are likely to become both denser and more varied. What particularly interested us in the Consumer Goods Forum (CGF) was the scope for new forms of collaboration that this disruption in physical flows unlocks” Rüdiger Hagedorn said in the foreword of the publication.²

TCGF mentioned that cooperation is nothing new, it started in the early 90s with ECR and is continuing in creating value networks for the future.

² (Burton, 2016)



Source: <http://www.theconsumergoodsforum.com/files/Publications/2015-CGF-Capgemini-Rethinking-the-Value-Chain-Report.pdf>: p.16

Figure 9: Experiences of TCGF

However, cooperation is not as successful as it could be. The main barriers are:

- Competition rules
- Definition of the right business model

Collaboration is shown as a main success factor for physical logistics and digital transformation

Five key trends are defined by EY and TCGF:

- Urbanization will exacerbate traffic congestion, making deliveries more challenging and costly
- Environmental regulation will get tougher and more expensive
- Transport will become even more inefficient

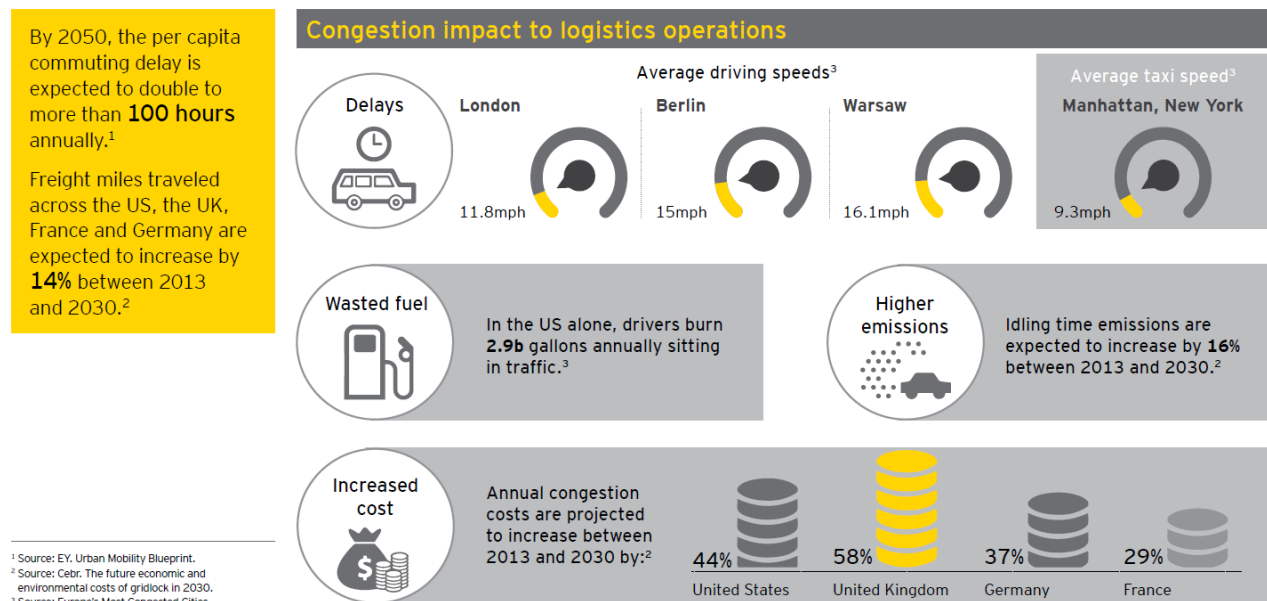
- Transport costs will continue to increase
- Omni-channel consumers have growing expectations

Why could collaboration be a success factor and how could the business models look like?

These questions are answered by the following recommendations in the report:

- City/market retail and logistics consolidation centres
- Manufacturer logistics hubs
- Improved data quality/visibility

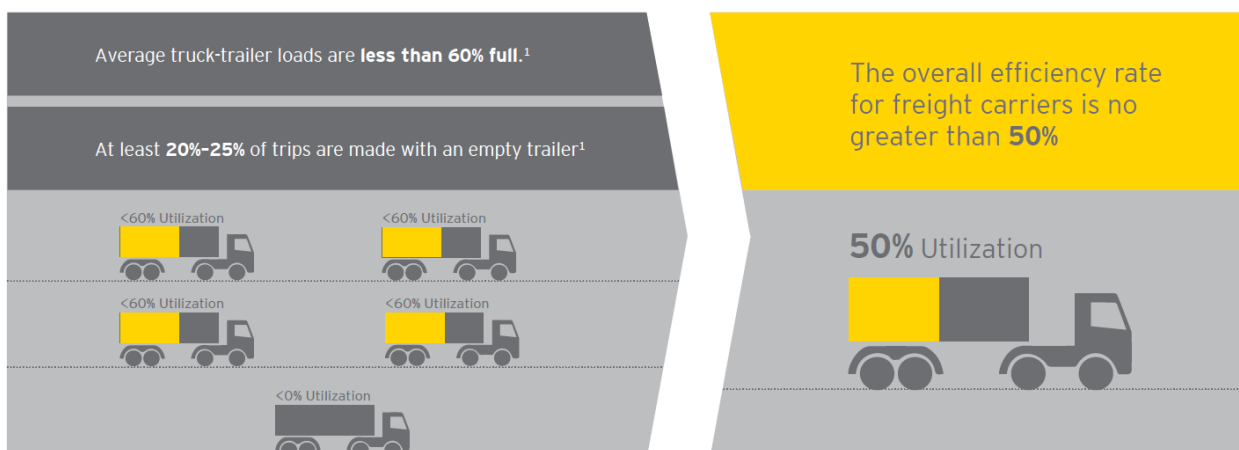
The congestion impact to logistic operations give a clear picture of the future regarding the necessity of horizontal and vertical collaboration for future value networks.



Source: (Burton, 2016), p. 8

Figure 10: Congestion Impact to Logistics Operations

The actual development would end in an inefficient physical logistic flow. Truck fill rates decrease. The overall efficiency rate for freight carriers is under 50 %. In parallel to that, transportation cost will rise due to prognostic rising fuel prices, shortage of drivers all over Europe, and other costs i.e. toll.

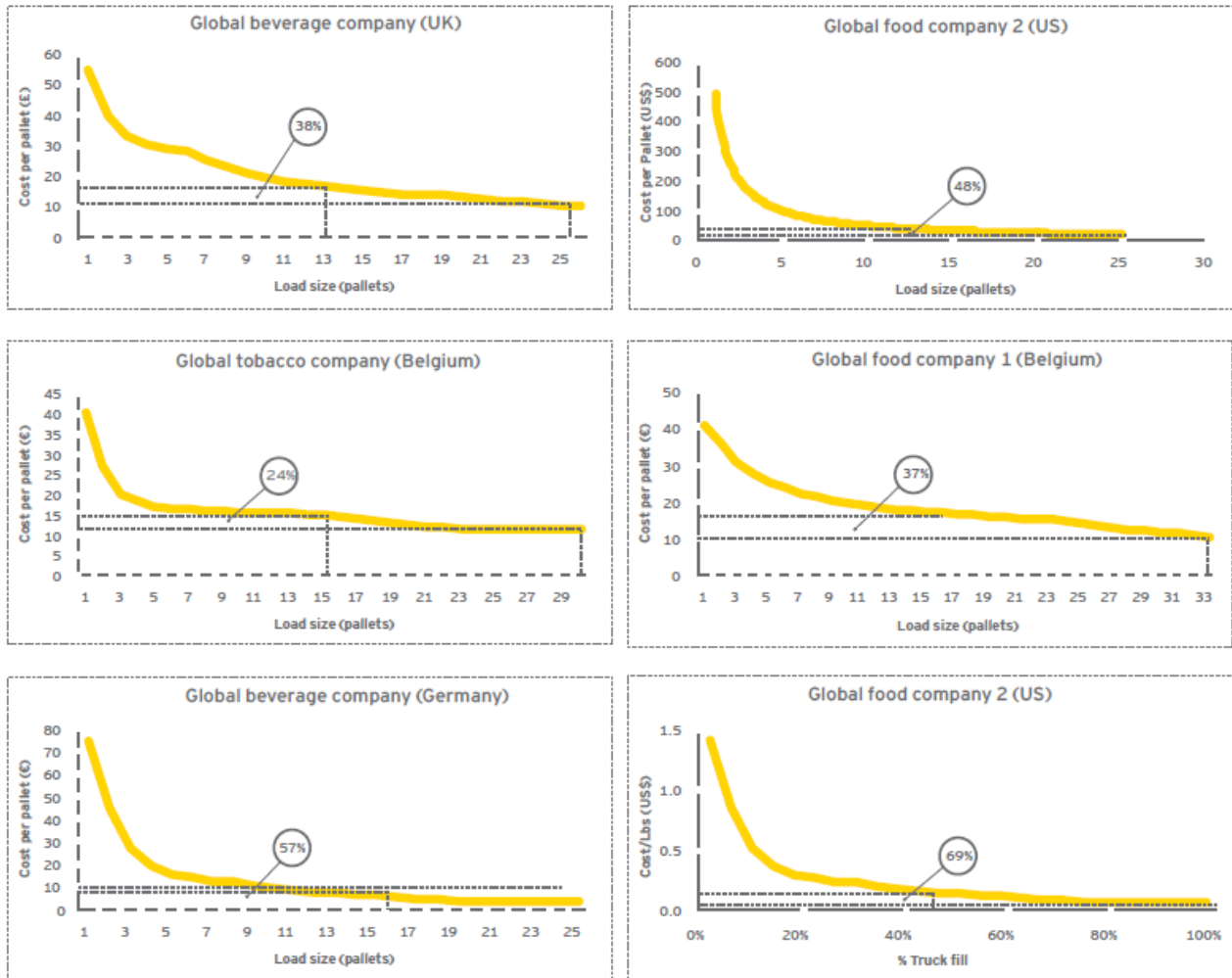


¹ Source: ScienceDaily, "Physical Internet": Shared Transportation System Would Increase Profits, Reduce Carbon Emissions.

Source: (Burton, 2016), p. 14

Figure 11: Efficiency Rate for Freight Carriers

In general, there is a huge room for improvement in vehicle fill. In cooperation business models companies can maximize or doubles the vehicle load. Savings between 20-50 % could be realized. This is the result of the EY survey.



○ Shows indicative cost per pallet saving percentage from half truck to full truck load

Source: (Burton, 2016), p. 23

Figure 12: Truck Load Savings

The cost decrease per pallet in relation to truck fill rate shows especially high saving potentials in the break bulk area (1-6 pallets).

Different scenarios for vertical and horizontal collaboration were drawn and the potential challenges were analysed.

Collaboration scenario benefits vs. challenges summary

Collaboration scenarios	Expected benefits*	Additional benefits	Challenges
1 Manufacturer-to-retailer DC delivery through manufacturer logistics hub 	c. 30% cost reduction c. 56% Vehicle fill rate increase - Low CO₂ emissions	- Manufacturer logistics hub and market retail consolidation center OPEX, CAPEX, fleet and gain share - High delivery frequency and effective inventory management	- Strategic partnership based on shared values - Some competitive intelligence sharing
2 Manufacturer-to-store delivery through manufacturer logistics hub 	c. 23% cost reduction c. 50% Vehicle fill rate increase - Low CO₂ emissions	High ability to meet mixed, variable and short lead time demand, and environmental and regulatory changes	- Location optimization and warehouse management. - Loading and delivery prioritization - who gets what, where, when and how
3 Manufacturer-to-store delivery through manufacturer logistics hub, and market retail consolidation center 	c. 39% cost reduction c. 61% Vehicle fill rate increase - Low CO₂ emissions	- Focused people, process and technology capability building - High load mix - High transparency - Consumer comfort and satisfaction	- Transport routing and scheduling - Non-branded trucks - Congestion (in case of urban center or city)
4 Market retail consolidation center to store delivery 	c. 54% cost reduction c. 72% Vehicle fill rate increase - Low CO₂ emissions	- High flexibility - Shared assets or asset free based delivery - Synergies for the return process	- High risk exposure to any disaster, require robust contingency and continuity planning - Payment criteria and customer security (i.e., cash payments in emerging markets)
5 Manufacturer-to-consumer delivery through manufacturer logistics hub, market retail consolidation center and collection point 	c. 40% cost reduction c. 49% Vehicle fill rate increase - Low CO₂ emissions	- Collaborative warehouse model could be applied just for slow movers in a low-cost location - Collaboration models could be applied to rural areas as well as highly populated inter-city areas	- Reliant on asset share or outsourcing - Loss of consumer intimacy and differentiation

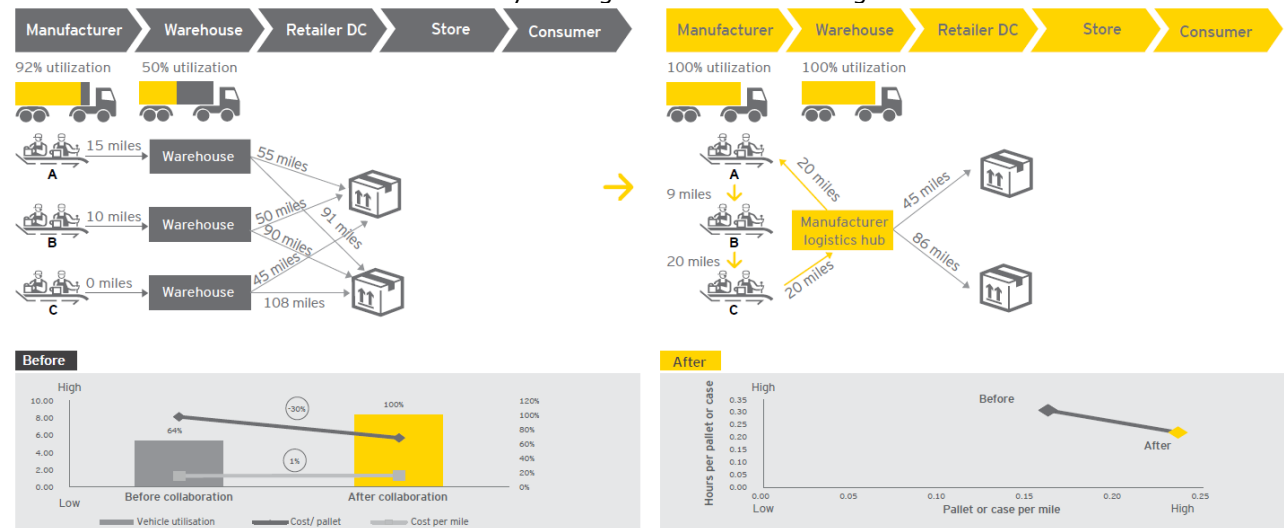
* All benefits are indicated based on hypothesis-led scenarios. Cost per pallet is used as standard to demonstrate reductions. However, for consumer delivery, please read this as cost per case or box.

Source: (Burton, 2016), p. 26

Figure 13: Benefits and Challenges

Concrete examples shown in the publication underline the hypothesis of the NexTrust project and show, that the adopted savings are realistic.

Case: Manufacturer-to-retailer DC delivery through a manufacturer logistics hub

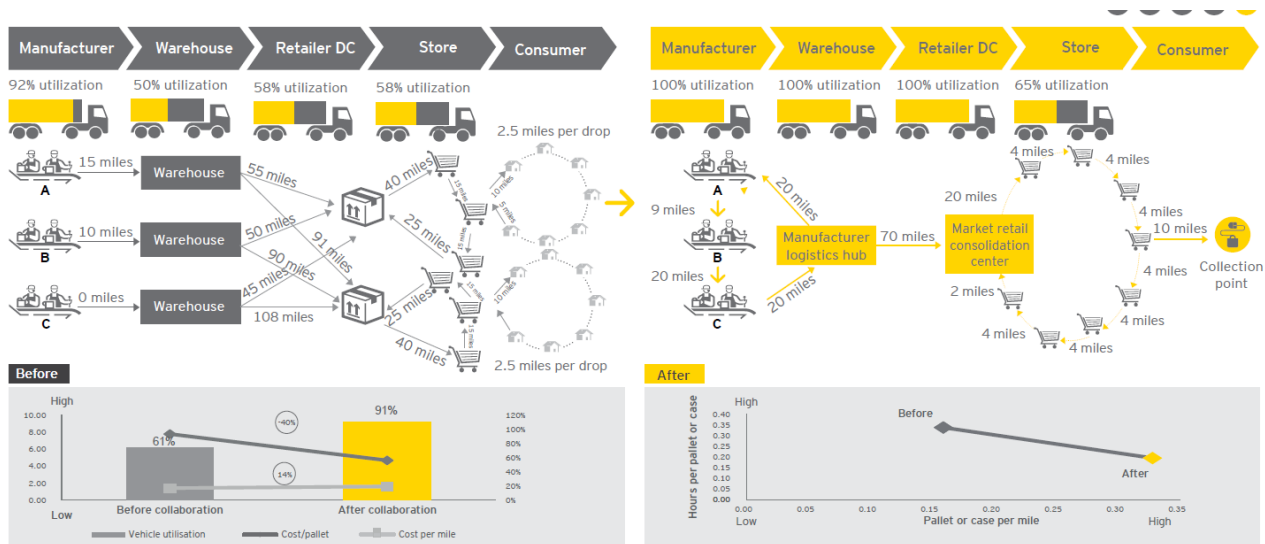


Source: (Burton, 2016), p. 27

Figure 14: Logistics Hub

The result is a possible saving about 30 % of cost per pallet.

The end-to-end-scenario shows, that saving could be even more than 30 % by adopting a collaborative business model. The scenario includes as well defined collection points. Potential saving are 40 %



Source: (Burton, 2016), p. 31

Figure 15: End-to-End-Scenario

4.10.3. Experiences from Lean & Green Initiative

Lean and Green is an international cross-industry initiative designed to help companies reduce their carbon footprint in logistics by 20 % within five years. GS1 Germany acts as the host of the initiative in Germany. The Lean and Green Initiative was established in the Netherlands in 2008 and is now active in Luxembourg, Belgium, Germany, Italy, Spain, the Czech Republic and Switzerland. A total of over 450 companies and 15 cities are present in the Lean and Green network. In Germany, more than 40 companies have already committed themselves to the initiative and show their sustainable commitment through CO₂ reduction projects.



Source: Lean and Green Germany

Figure 16: Set Up of the Initiative in Germany



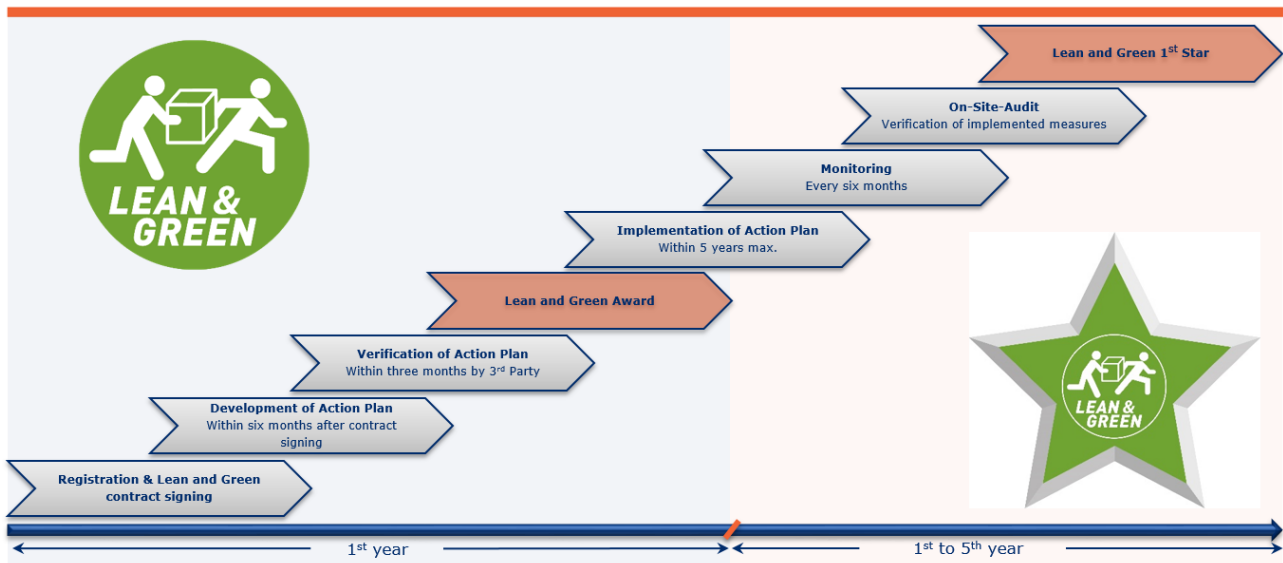
Source: Lean and Green Germany

Figure 17: Participant overview Germany

The Initiative is based on collaboration and strategic partnership, which enables significant effects. The first hurdle for all participants is the so called 1st Star Award, which companies receive by a proven greenhouse gas reduction of minimum 20 % in five years. The future scenario is a 5 star initiative which certifies climate neutral logistics and transportation processes without compensation of CO₂ emissions.

The process of the initiative to receive the Lean and Green 1st and 2nd Star Award follows 10 major steps:

1. The interested company sends a request to participate in the Lean and Green Initiative to GS1 Germany.
2. The company elaborates an action plan to reduce CO₂ emissions based on given criteria.
3. The action plan is audited by TÜV NORD CERT regarding feasibility. If necessary, a revision needs to be carried out by the company.
4. In case the audit is successful, the company receives the Lean and Green Award by GS1 Germany. Additionally the company receives the right to use the Lean and Green logos.
5. Regular monitoring of the emission values by GS1 Germany over the entire period of participation.
6. To proof the CO₂ reduction of minimum 20 % after five years the participating company is audited on site. In case the audit is successful the 1st star certification is awarded by GS1 Germany.
7. Within three years after the 1st Star certification the participating company is allowed to submit the concept for the 2nd Star program.
8. Verification of the concept by TÜV NORD CERT. From this point onwards the company has two years time to implement the concept.
9. Fulfillment of the 2nd Star criteria: Implementation of a cooperation or innovation project; carrying out a social project; expansion of the 1st Star Scope to at least 75 % or a further CO₂ reduction of 5 %.
10. Testing the implementation by the TÜV NORD CERT and certification with the Lean and Green 2nd Star by GS1 Germany.



Source: Lean and Green Germany

Figure 18: How to get the L&G 1st Star



Source: Lean and Green Germany

Figure 19: Possible ways to use the Lean and Green logo

It is the declared objective of the initiative to provide a platform in which the participating companies can share their activities, learn from each other and realize CO₂ savings together in the network. The exchange is promoted by regular events.

The Lean and Green Advisory Board is responsible for the content and orientation of the initiative. It has been recruited from the founding members of the initiative, who are pioneering for Lean and Green Germany. In addition, ambassadors carry the idea forward, for example to other potential participants. By hosting Lean and Green GS1 has experienced that a standardized project methodology, which is manageable for all companies independent of the size is a key element to establish a long-term collaboration initiative. Therefore all rules and regulations are valid for all members and every participant benefits from a standard set of documents guiding through the Lean and Green project.

For the calculation of the carbon footprint, internationally established standards are valid. This is particularly important when there are uncertainties regarding the calculation methods used. Examples are:

- Greenhouse Gas Protocol - A Corporate Accounting and Reporting Standard
- ISO 14064-1 - Specification with greenhouse gas emissions and removals
- DIN EN 16258 - Method for calculating and declaring energy consumption and greenhouse gas emissions for transport services (freight and passenger transport)
- DSLV Guideline - Calculation of greenhouse gas emissions in freight forwarding and logistics

Within the external audit, in addition to the feasibility of the planned measures, it is also checked whether the calculation method complies with the stated standards.

Measurement methods / Methods for obtaining the Lean and Green Award

The participating company must submit a carbon footprint (CO₂ calculation) for its logistics processes, including the planned measures to reduce greenhouse gas emissions, by at least 20 % within five years to obtain the Lean and Green Award. For the calculation of the carbon footprint, companies are free to decide which calculation method they use, if this is justified, comprehensible and documented. In this context, the application of established international standards, e.g. The Greenhouse Gas Protocol (A Corporate Accounting and Reporting Standard), ISO 14064-1 ("Specification with guideline at the company level for quantification and reporting of greenhouse gas emissions and removals") or the DIN EN 16258 (method for the calculation and declaration of energy consumption and greenhouse gas emissions for transport services) are recommended.

The examination of the documents required for obtaining the Lean and Green Award is carried out by the independent auditing institute TÜV NORD. Within the external audit, in addition to the feasibility of the planned measures, the conformity with the stated standards as well as the traceability of the selected calculation method are examined. The assessment sheet, which is used for the external audit, and other relevant documents of the Lean and Green process can be viewed under the following link: www.lean-and-green-germany.de

Room for interpretation within the major standards

EN 1628 is probably the most important method for calculating and declaring energy consumption and greenhouse gas emissions for transport services. The standard is well known and covers almost all aspects of emission calculation in transportation.

But there is room for interpretation because the standard allows three ways how to measure energy consumption. The following order of precedence shall prevail:

1. **Use of individual measured values for the actual transport:** In this case, the fuel consumption is determined exactly for the cycle in which the consignment was transported. To date, such a detailed analysis is rather unlikely in practice, since freight forwarders and logistics service providers can rarely collect separate energy data for all modes of transport used.
2. **Use of specific values of the transport service provider (characteristics typical for the vehicle or route):** In this case, the logistics company measures, for example on an annual basis, the diesel consumption of the vehicles, ships or aircraft it use, specifically for the route on which the consignment under consideration is transported, and then distributes these values to the individual item under consideration. Thus, an average energy consumption per ton-kilometer or per TEU kilometer is used. This approach is likely to become significant in the future, as it is

relatively easy to implement in practice. Instead of typical route averages, average vehicle values can also be used (e.g. the average of all 40-ton trucks or all B747-400F aircraft).

3. **Use of fleet values of the transport service provider:** This case is similar to the second case, but uses average values for a whole fleet of the logistics service provider and not specifically for a vehicle or route type. In order to apply these values for a single shipment, it must be ensured that the vehicles are typical for the transport in question. This procedure is common today in many forwarding agencies - however, this method provides the most inaccurate results, since it does not detect specifics of the individual transport.

The way of allocating emissions can influence the result per shipment significantly

The standard leaves even more room for interpretation when it comes to allocation of CO₂ emissions to a certain shipment, especially in complex logistic networks.

The EN 16258 standard specifies specific allocation recommendations for collection and distribution services. First of all, fuel consumption, TTW and WTW energy consumption or TTW and WTW greenhouse gas emissions must be determined for the entire tour in a first step and then split up into the individual emissions per shipment in a second step. If the distance is used for the allocation (e.g. for the calculation of ton-kilometers), the standard prescribes that not the actual transport distances of the individual goods are relevant, but the direct distances from the starting point or end point (e.g. terminal) to the loading and unloading points. With the help of this method, energy consumption and emissions can be more equitably divided among the individual shipments, regardless of when and in what order the individual shipments are loaded or unloaded during the tour.

The standard EN 16258 allows two options to determine the shortest distances: either the straight-line between the terminal and the loading / unloading point or the shortest realizable distance on the existing traffic routes between the terminal and the loading / unloading point. In practice, the differences between the two variants are small. Important: The shortest distances may only be used for the allocation; however, the fuel consumption must be determined along the real distance covered over the entire tour.

As with freight traffic in general, the product of distance and weight should also be used for allocation of collection and distribution services. According to the standard, other parameters (e.g. number of shipments, number of stops) in combination with the distance may be used for collective and distribution traffic instead of weight. In addition, these parameters can also be used alone or in combination (e.g. weight and number of stops). However, the allocation parameters used must always be specified in the declaration. As soon as the distances are used for the allocation of collection and distribution services, these must be the direct or the shortest distances. As a result, the CO₂ emissions per logistics unit can be influenced significantly by using different allocations methods. All methods comply with the standard and are therefore correct, although the individual result per shipment is completely different. The following table shall illustrate this.

						Allocation by ...				
Shipments	Stops		km	t	tkm	Shipment	Stop	Weight	50% Weight +	
						%	%	%	50% Stopp	tkm
1	1	Unloading	4,1	3,0	12,3	14,29%	16,67%	16,67%	16,67%	8,69%
2	2	Loading	7,9	1,5	11,9	14,29%	16,67%	8,33%	12,50%	8,37%
3	3	Unloading	10,3	2,0	20,6	14,29%	16,67%	11,11%	13,89%	14,55%
4		Loading	10,3	3,0	30,9	14,29%	8,33%	16,67%	12,50%	21,82%
5	4	Unloading	11,5	3,0	34,5	14,29%	8,33%	16,67%	12,50%	24,36%
6	5	Loading	8,2	2,0	16,4	14,29%	16,67%	11,11%	13,89%	11,58%
7	6	Loading	4,3	3,5	15,1	14,29%	16,67%	19,44%	18,06%	10,63%
			56,6	18,0	141,6	100,00%	100,00%	100,00%	100,00%	100,00%

Source: DSLV Leitfaden zur Berechnung von Treibhausgasemissionen in Transport und Logistik

Figure 20: Calculation of CO₂ Emissions

The example shows a distribution tour with different delivery and pick-up locations. The tour consists of seven shipments handled during six stops. The five columns on the right side of the table show the percentage of CO₂ emissions to be allocated depending on the different allocation methods. For shipment number four the emissions to be allocated differ between 8,33 % and 21,82 %. Important: all methods apply with EN 16258, which makes a benchmarking of CO₂ emissions per logistics unit senseless without fixing the same allocation rules.

Relative measurement of CO₂ reductions within Lean and Green

Within the Lean and Green initiative, the reduction of CO₂ emissions is measured relative to the logistics unit in percent. Therefore the absolute reduction either in total or allocated is of minor importance. The measurement relative to the logistics unit implicates the following advantages:

- Economic success of a company and ecological responsibility do not compete with each other. By relative measurement, ecological improvements per relevant unit can be reported, although the overall volume and therefore the overall CO₂ emissions in total are growing.
- On the other hand economically unsuccessful companies with decreasing volumes and therefore decreasing CO₂ emissions cannot claim ecological improvements if the percentage of CO₂ emissions per unit cannot be reduced consequently.

In case of relative measurement of CO₂ emissions it is extremely important that the compared points in time are calculated in the same way to secure that the comparison is like for like and the reduction in percent represents the relative optimization per chosen unit.

5. Role of Collaboration

5.1. Role/Functions of Collaboration (Why do Companies Collaborate?)

Horizontal as well as vertical collaboration follows the same goal from different perspectives. Supply chain efficiencies should be balanced by the need to minimize social impacts and the total costs, combined with a high consumer satisfaction.

Because trends in consumer behaviour could lead to new ways, satisfying the consumer, today's optimum could change by tomorrow. In the past, most collaboration has been bilateral agreements. Multi-horizontal and vertical collaboration seem to be more stable and flexible to meet the market expectations. The prerequisite for total supply network collaboration in vertical and horizontal dimension following compliance rules is a neutral trustee as an orchestrator of the network. Competition between trustees should be given.

5.2. How Collaboration Comes off

Most collaborations came up because of inefficiencies, corporate social responsibility, regulations, or changing of customer behaviour.

The roots lay either on individual initiatives or on organisations. The following list shows some examples for collaborative initiations.

ECR community (global): "ECR Community is a flagship for delivering consumer benefits through collaborative practices between trading partners along the consumer goods value chain. We provide a neutral platform on which to develop, disseminate and foster the implementation of these practices. We consist of a network of National ECR Initiatives each of which brings together manufacturers, retailers and in many cases, service providers within their country." (Source: <http://ecr-community.org/about-us/>)

Lean & Green (Europe): "Lean & Green Europe is an international community of organizations eager to build a better company and a more sustainable world. Lean & Green members include more than 500 shippers, carriers, logistics service providers, ports, terminals and retailers. We are an international non-profit working with business and government to solve complex sustainability challenges in logistics." (Source: <http://lean-green.eu/#mission>)

The Consumer Goods Forum (global):

The consumer goods forum is an organisation with 400 members across 70 countries retailers, manufacturers and service providers. CGF member companies have a combined sales of 3,5 trillion Euro and directly employ nearly 10 million people. 35 projects and working groups with 1500 experts working together to create new ways of global working together. The CGF is invented by the market itself.

The aim is:

- Foster debate across the Board and membership to identify areas which require collective, measurable action
- Develop, agree and encourage the targeted global adoption of practices and standards which do not impede competition
- Share solutions and best practice examples across and beyond the membership
- Engage with stakeholders and regional associations to speak for the industry with a common voice (Source: <http://www.theconsumergoodsforum.com>)

Sphinx (France): Seven pool manufacturing companies (potential competitors) with the involvement of a logistic service provider delivering together products in retail chains. They are engaged in a close collaboration not only harmonizing the physical product flow but also sharing information for collaborating forecasting, planning and replenishment (CPFR) based mainly on EDI standards. A neutral business partner is engaged to coordinate and control the transport plan on a daily basis. (Source: http://www.logforum.net/pdf/13_2_6_17.pdf)

Mars GmbH: Mars started in 2008 together with the independent consultant Cayla Consulting Group and the University of Regensburg a cooperation initiative. Retailers and manufacturers, i.e. Metro, Rewe, Edeka, Lekkerland, Globus, Tengelmann, Rossmann, Bartels-Langness, Fressnapf, Ferrero and Haribo were invited to discuss cooperation possibilities between industry and trade.

The first results for concrete cooperation:

- Shared warehouse
- Joint delivery
- Shared truck fleet

The realisation of the following projects was successful:

- Fleet sharing between Fressnapf and Mars
- Shared warehouse between Mars and Ferrero
- Joint delivery Mars and Ferrero to the retailers

Source: <http://www.lebensmittelzeitung.net/it-logistik/Mars-Neue-Wege-der-Logistik-Kooperation-68842>

Traceability: ECR Europe invented the "Integrated Supplier Concept" The main trigger was the traceability Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety.

"Integrated Suppliers is a concept for improving the part of the supply chain between manufacturers and their tiers of suppliers of ingredients, raw materials and packaging. By sharing information both parties are able to exercise judgement on costs, quantities and timing of deliveries and production in order to streamline the product flow and to move to a collaborative relationship." (Source: <http://ecr-community.org/wp-content/uploads/2016/11/ecr-europe-integrated-suppliers-ecr-is-also-for-suppliers-of-ingredients-raw-materials-amp-packaging.pdf>)

By following the requirements, the basis for implementation of traceability processes based on GS1 Standards with the suppliers was possible.

5.3. Requirements for Collaboration

5.3.1. Legal Framework/Conditions (Competition Law)

Pilots and recommendations in the NexTrust Project follow strictly the Article 101(1) of the Treaty on the Functioning of the European Union as follows:

"1. The following shall be prohibited as incompatible with the internal market: all agreements between undertakings, decisions by associations of undertakings and concerted practices which may affect trade between Member States and which have as their object or effect the prevention, restriction or distortion of competition within the internal market, and in particular those which:

- (a) directly or indirectly fix purchase or selling prices or any other trading conditions;
- (b) limit or control production, markets, technical development, or investment;

(c) share markets or sources of supply;

(d) apply dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage;

(e) make the conclusion of contracts subject to acceptance by the other parties of supplementary obligations which, by their nature or according to commercial usage, have no connection with the subject of such contracts.”

The completion law prohibits agreements between two or more independent market participants, which limit competition. It covers horizontal collaboration as well as vertical collaboration in a bilateral or multilateral way. (Source: http://ec.europa.eu/competition/antitrust/overview_en.html)

5.3.2. Trust

Trust is one of the main success factors of collaboration. A Trustee is in the role of a neutral third party a prerequisite especially for horizontal collaborative relationships.

The role of a trustee is described as follows: “In the context of horizontal collaboration in transport and logistics, the trustee function (usually executed by a specialized consultant, but this can also be a lawyer, an industry group or a trade association) is responsible for collecting and analysing data and for the management of the collaboration between a number of different shippers, logistic service providers and/or horizontal communities.”³

5.3.3. Availability of opportunities

All collaborations should either show qualitative or quantitative opportunities. Without any transparent and objective opportunities, collaborations will not be successful and last for longer than the project-duration. The way from project to process and daily business is blocked without the availability of opportunities.

Main qualitative opportunities in collaborations are:

- Reduction of GHG-emissions
- Improvement of customer relationship in vertical cooperation, i.e.
 - Increase of service level
 - Higher on shelf availability
 - Reduction of out of stocks and out of shelves
 - Improvement of demand planning
- Secure Traceability

Main quantitative opportunities are cost reduction in

- Transportation i.e.
 - better truck utilisation
 - round trips
 - transport bundling upstream or downstream
- warehousing
 - shared warehouses
 - consignment stock

³ (Burton, 2016), p. 3

Miebach Consulting did in 2015 a survey, which demonstrates, that tremendous savings could be realised in shared supply chains.

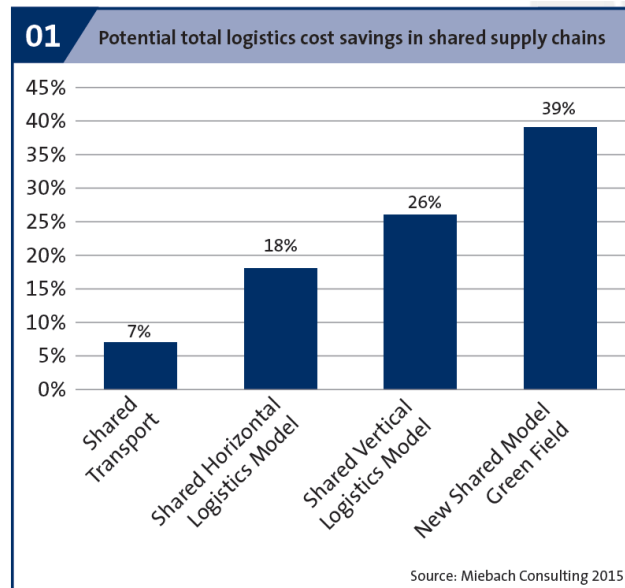


Figure 21: Savings in Shared Supply Chain

“Miebach has found collaborative opportunities to reduce costs across the entire supply chain. From simple shared transportation initiatives to more sophisticated projects that require a completely new logistics model where potential savings can be as high as 39 % of the combined total logistics costs of the collaborating partners”.

Five fundamental reasons to collaborate described in the survey:

- Environmental sustainability
- Big Data exploitation
- Technology developments
- SKU Proliferation
- The rise of the collaborative economy

5.4. Benefits of collaboration (What is it good for?)

Research results show, that distribution processes without any collaboration are not as successful as collaborative processes. Collaboration leads to ...

- Process improvement i.e. order fulfilment, lead times, reduction of inventory
- Significant reduction of interruptions
- Know how sharing and gaining
- New business opportunities

5.5. Drawbacks of Collaboration (Things to put up with)

In general, supply chain collaboration gives an opportunity for benefits, set up costs are dependent from the starting point. Companies who are experienced in collaborations like ECR and have implemented the recommended standards yet have lower implementation cost than companies who did not establish collaborations yet. By starting collaborations with competitors, the involvement of a neutral Trustee is a prerequisite. An agreement for cost sharing is part of the business model.

It is also recommended to involve an on competition law specialized lawyer to avoid legal disputes.

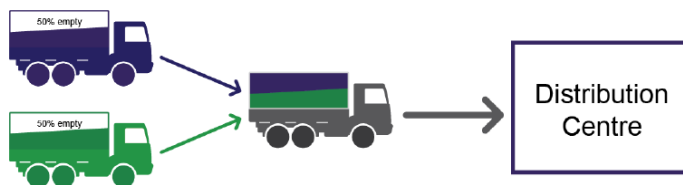
By analysing the collaboration, cost comparison calculation should show a better result in benefit. Supplementary the qualitative benefits should not be undervalued.

5.6. Experiences with Collaboration within a Research Environment

5.6.1. Collaboration via Pilot

Within NexTrust collaborative models can be clustered into for main sections.

- Consolidation of LTL (less-than-truck load) via transportation hub

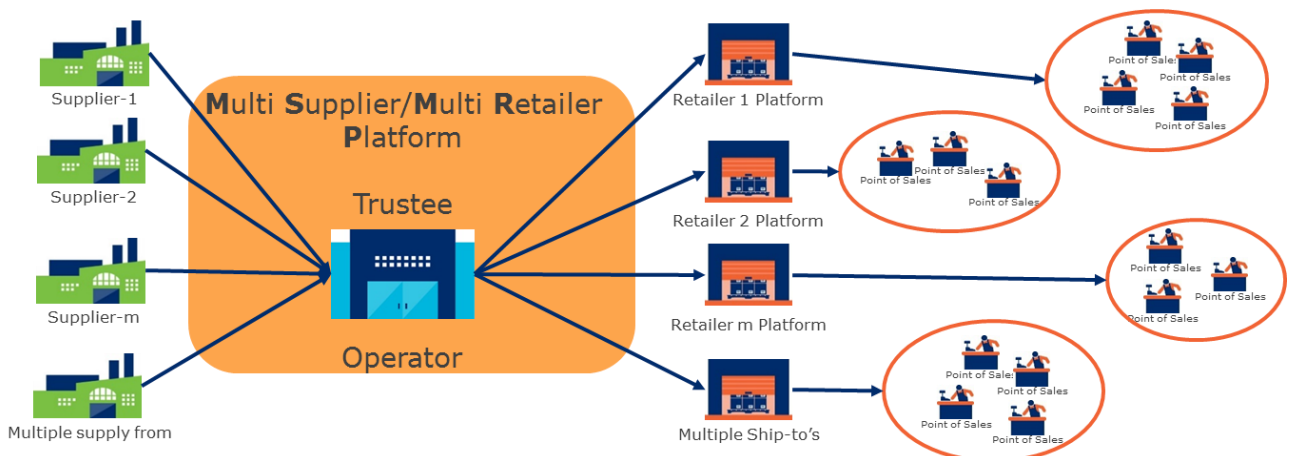


The main goal of WP1 is to reduce the road LTL impact on ecology and reduce the (semi-)empty mileage as much as possible. Reductions of more than 20 % vehicle movements and GHG emission reductions of 30 % are targeted. To reach these targets, overlapping structural vehicle movements are being identified across multiple industry sectors where collaborating shippers can share a vehicle to bundle.

Pilot example:

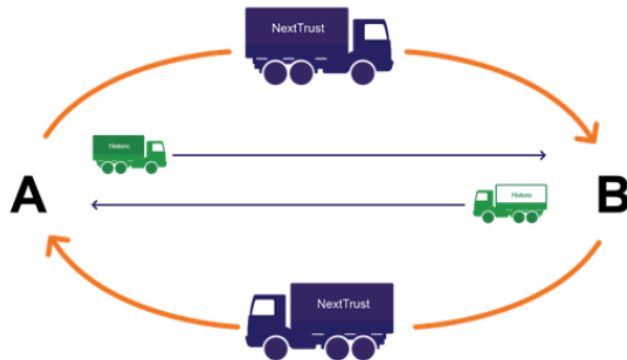
Multi Supplier-Multi Retailer platform: Biscuits suppliers and retailers are setting up a collaboration for sustainable logistics

- Four major Belgian biscuits suppliers consolidate their deliveries to four Belgian retail stores to reduce truck movements and to increase the truck's fill rate.
- Collaboration is guided by trustees and specialized lawyers to ensure that it complies with EU competition law.
- The more companies that bundle their freight volumes, the higher the gains in sustainability and in business.



- Optimization of FTL flows by generating round trips including road conversion to intermodal

Main goal of this process scenario is to identify overlapping transportation strings and to gain multiple deliveries. Avoidance of empty vehicle running is the main task.



Pilot example:

The most successful pilot category is currently the cross-shipper FTL collaboration for round trips, fresh-frozen food and continuous movement network design (2.1, 2.2, 2.3). These shippers have invited approximately 200 European road carriers for the nine pilot cases via a neutral procurement platform (June to August 2016) to support the NexTrust FTL pilot cases and to execute the new designed trusted networks in a market environment. (Source: Intermediary results from NexTrust pilot cases (D.7.3), version: 23/05/2017, p. 79)

Building collaborative trusted networks bottom-up:

Moving from independent supply networks ("silos") to trusted collaborative networks, anti-trust compliant

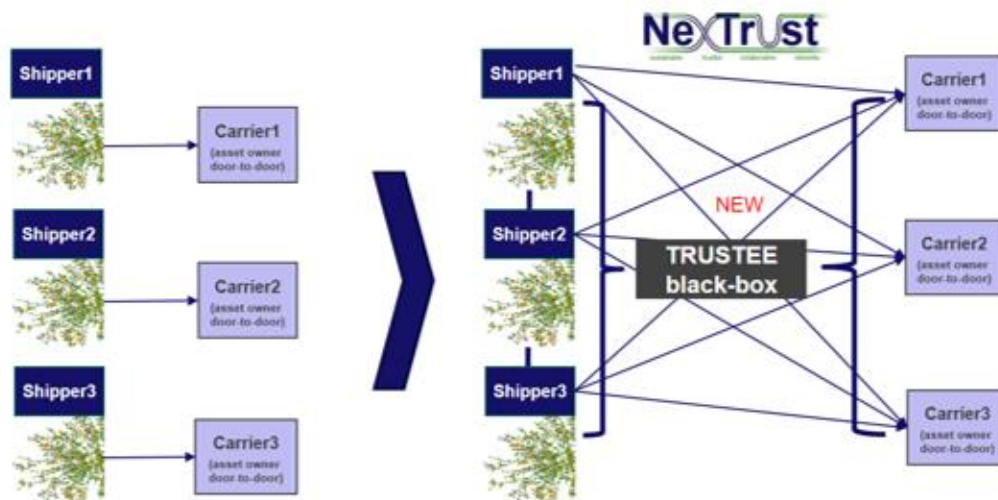
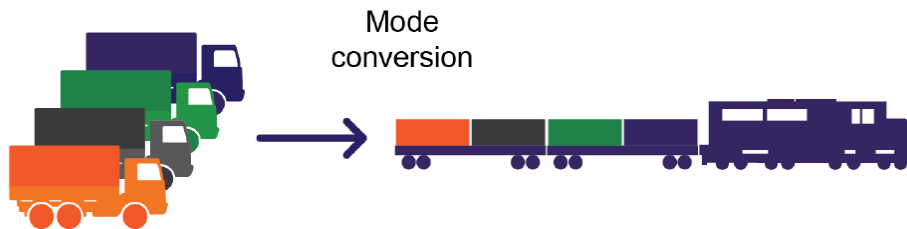


Figure 22: Building Collaborative Trusted Networks Bottom-Up

The Trustee is connecting the shippers into a transport community, addressing the lack of visibility and accessibility across the different industry players, crossing the silo to an accessible and easily interconnected network as visualised conceptually above. (Source: D.7.3, version: 23/05/2017, page 80)

- Optimising carriers network capacity (road and intermodal)

Until now, the Trustee business model was only seen as key success factor to establish cooperation between competing shippers. However, in order to achieve a high level of sustainability, this concept of trustee must also be applied and tested in the vertical intermodal perspective to verify whether reduction of GHG emissions between 30-70 % can be achieved.



Pilot example:

In the intermodal supply chain, management the trustee engages each shipper (shipper1, shipper2, shipper3, etc.) with the carriers and coordinates the entire collaboration process beyond the current supply chain practice. In fact it is a Supply Network collaboration in horizontal and vertical value chain direction. The optimization is based on the connection of suppliers and their LSP in horizontal as well as vertical direction. The fair risk sharing between them is an important task of the pilot. Confidentiality is guaranteed.

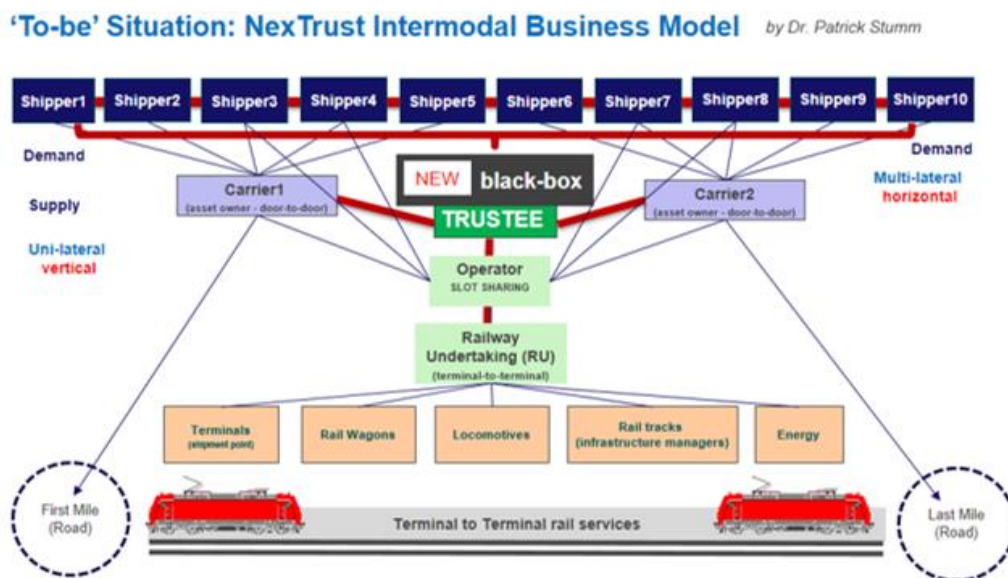
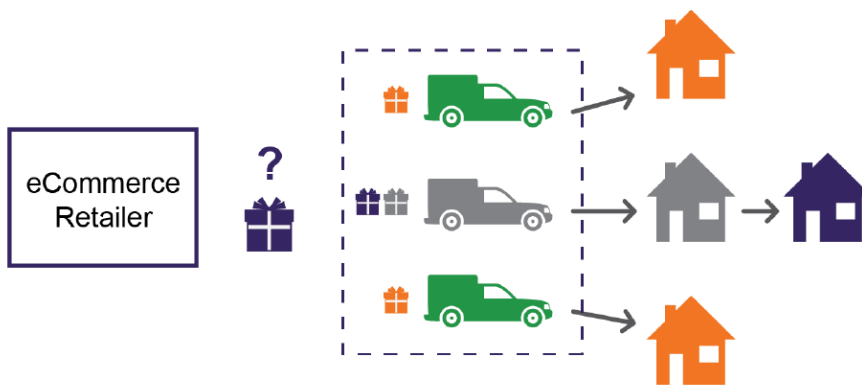


Figure 23: NexTrust Intermodal Business Model

- E-Commerce: multi-vehicle collaborative delivery network

Growing e-commerce and the change of customer behavior leads to the high increase of express and parcel services. Today's consumer expects that he /she receive via e-commerce ordered products immediately and at every place. However, today's parcel services are not connected. The equipment is not used in a 24/7 timeframe. The unproductive time of each vehicle is significant. The goal of this Scenario is, to avoid unproductive time by using the cars by different companies.



Pilot example:

Building horizontal collaboration between delivery vehicle owners. One of the main focus points of the pilot case was to build up an IT-platform that enables collaborative approaches for collecting and fulfilling the shipment orders, a real-time visibility of vehicle locations “tracking & tracing” for routing the deliveries, as well as capacity sharing.

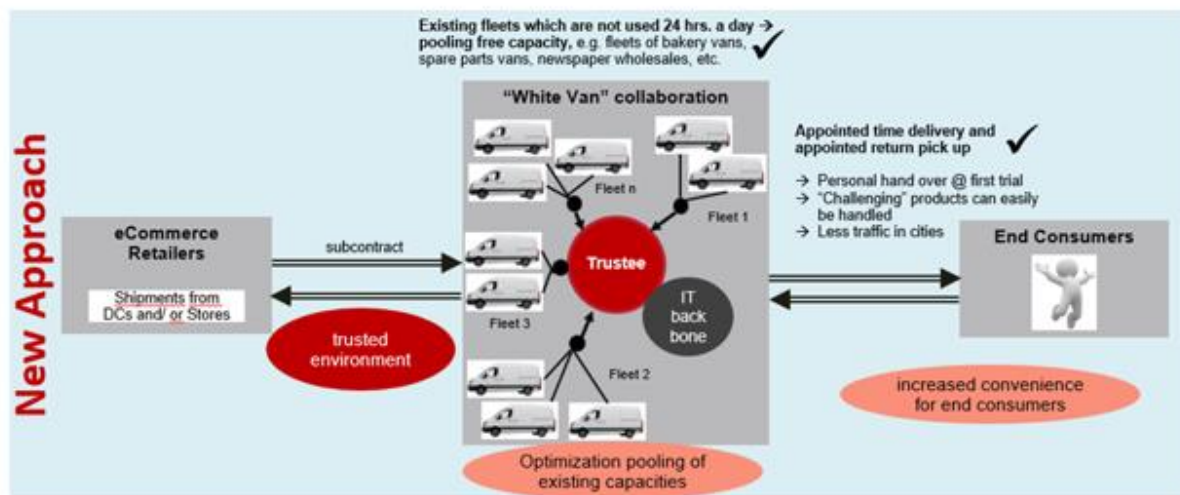


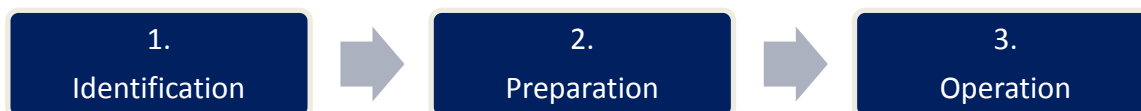
Figure 24: IT-Platform for Horizontal Collaboration

The IT platform allows retailers, vehicle owners and drivers to register for joining the collaborative network. The platform groups shipment orders from retailers and the end customer selects a timeslot for the delivery. With the timeslot arrangement function the unsuccessful delivery attempts will be reduced. Based on the shipment orders, the platform builds transport units and tours for sustainable delivery and books the corresponding vehicles. (Source: D7.3, version: 23/05/2017, p. 122)

5.6.1.1. 3-Step Methodology

See also technical report 31.10.2016

NexTrust is following a straightforward but effective 3-Step trusted network research methodology. This methodology looks at horizontal collaboration as a structured and controllable process. In summary, this process is broken down into three chronological steps, which in some cases can overlap, but is the logical collaboration process to follow. (KKL, 2016)



The *identification* phase is the stage of data collection and matchmaking. It precedes the (pre-contractual) phase in which a match is identified and the business case is developed. Collaboration in the supply chain comes with the setting up of a matchmaking service. Therefore individual shippers provide supply chain data to trustee companies that run a data platform in view of the comparison of this data with the data of other shippers which do the same in order to find bundling opportunities. In this stage a variety of legal issues comes up, such as confidentiality, data security, data ownership, prevention of misuse and the competition law risk of (in)direct information exchange. The identification phase is an individual stage; shippers interact with the trustee on a one-to-one basis. (KKL, 2016)

The *preparation* phase is the succeeding, collective pre-contractual stage which covers the period after a match is identified to the moment (operational) contracts have been entered into between the shippers and logistics service providers. In this stage the trustee has introduced the shippers involved and they will work out their business case together under the management of the trustee who does not only give direction to the business case development process but who can also assure that the shippers involved in the proposed collaboration, can avoid the exchange of commercial sensitive information. There is no need for that as the trustee can and will act as black box. Relevant legal issues are again confidentiality of data, competition law risks, the break-off of negotiations, mutual liability and the tender process to select a logistics service provider. In this deliverable a detailed analysis has made of the legal issues that come up for discussion in the preparation stage as well. (KKL, 2016)

The *operation* phase is the stage which transfers the tender results to operational actions. The collaboration is actively managed.

5.6.1.2. Gain Sharing Models under Collaboration Perspectives

One of the main success factors of collaboration is the fair gain sharing between the business partners in the collaboration process. What does fair mean?

- Transparent
- Easy to explain
- Stable in its results

Different models existing in theory and practice. The following table describes the main allocation rules:

	Allocation rule	Discussion of underlying incentive
Cost Allocation Rules	Equal Cost Method (ECM)	Total network cost: the lower the total network's cost, the lower the cost that will be allocated to your company. As each company bears the same costs, the incentive is to be as cost-efficient as possible. At the same time, it is better to use the network as much as possible, as the allocated costs can easily outweigh the usage otherwise.
	Proportional rule	Volume/trips/orders/... (depending on the criterion that is agreed on): Growth is often seen as an incentive. However, this rule does not incentivise efficiency or productivity
	Linear rule	Stand-alone cost efficiency: the lower the final stand-alone cost compared to As-Is, the more of the gains your company receive
Gain Sharing	Equal Profit Method (EPM)	Total network gain: the lower the total network's cost, the higher its gains. As each company receives the same gains, the incentive is to be as cost-efficient as possible. However, as each company receives the same chunk of the profit, there is no incentive to be more cost-focussed than other companies in the network.

	Shapely Method	Efficiency: the more marginal benefit your company adds to the network, the more gains your company will receive.
	Nucleolus	Stability: the goal is to arrive at the most optimal outcome with the lowest amount of "unhappiness" in the network

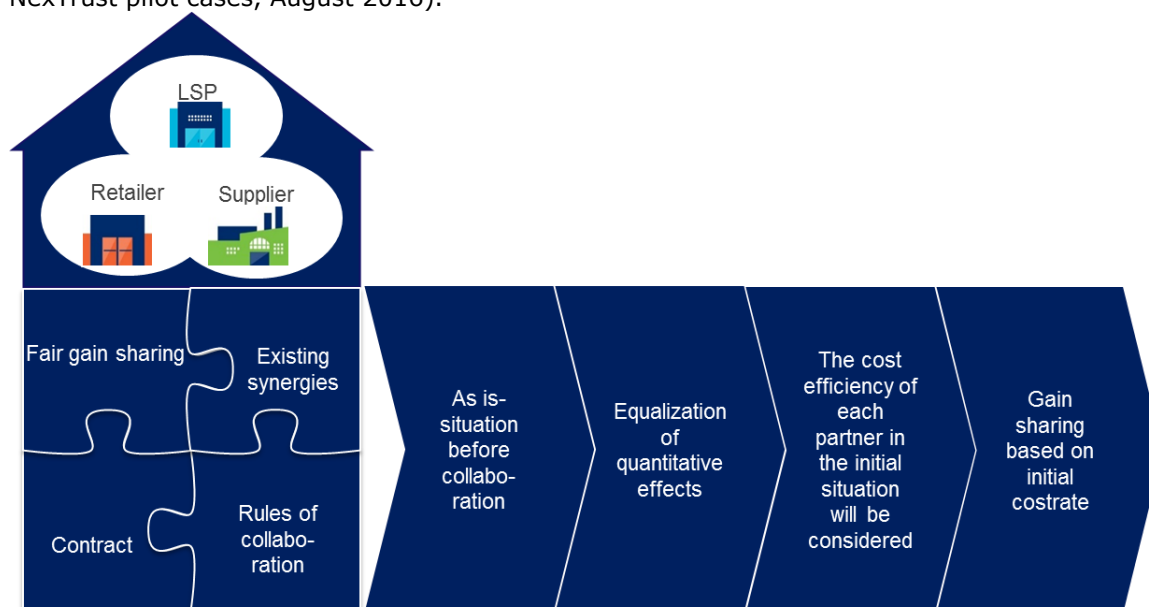
Source: Deliverable 7.1.

The different methodologies, which were analysed in the NexTrust-Project to come to a fair "win-win"-Situation would achieve this goal, but not all of those are easy to explain. And, what you can't explain you can't sell.

A team of Vlerick Business School and Vrije Universiteit Amsterdam (VU Amsterdam) as part of the NexTrust-Team analyzed the main existing allocation rules and came to the following recommendation.

"Concerning fair benefit sharing for building trusted collaborative networks, the academic partners and authors of this report advise to use a linear cost allocation rule, a tried-and-tested transparent rule in both literature and practice that puts emphasis on supply chain (cost) efficiency. Compared to other benefit sharing rules, the linear rule is easily adjustable to a specific pilot case setting and provides the necessary transparency to ensure fair benefit sharing as well as long-term trust. However, given the at times highly specific nature of pilot cases in different supply chain settings and scenarios, adaptations to this rule may be required."

(Source: Deliverable 7.1 First Pilot Peer Hub Contribution Report - Measuring the sustainable impact of NexTrust pilot cases, August 2016).



Source: GS1

Figure 25: Sustainable Impact Measurement

The following example shows, how the linear model works.

Company	Costs WITHOUT collaboration	% of the network costs WITHOUT	Cost WITH collaboration	% used to allocate = their part of costs before collaboration	Allocated part of the total network cost	Savings	% Savings	Volume	Old cost /volume	New Cost /volume	Volume %
A	550.000 €	46%	500.000 €	46%	464.135 €	85.865 €	15,6%	25.000	22,00 €	18,57 €	57%
B	385.000 €	32%	350.000 €	32%	324.895 €	60.105 €	15,6%	14.000	27,50 €	23,21 €	32%
C	250.000 €	21%	150.000 €	21%	210.970 €	39.030 €	15,6%	5.000	50,00 €	42,19 €	11%
Summe	1.185.000 €	100%	1.000.000 €	100%	1.000.000 €	185.000 €	15,6%	44.000	26,93 €	22,73 €	100%

5.7. Experiences with Collaboration in Business Initiatives and from Efficient Consumer Response

5.7.1. Process Recommendations and Enabling Technologies as a prerequisite for collaboration in ECR

National and international ECR Initiatives developed in the past 20 years several ECR recommendations. Project participants transferred successful pilots from project to process.

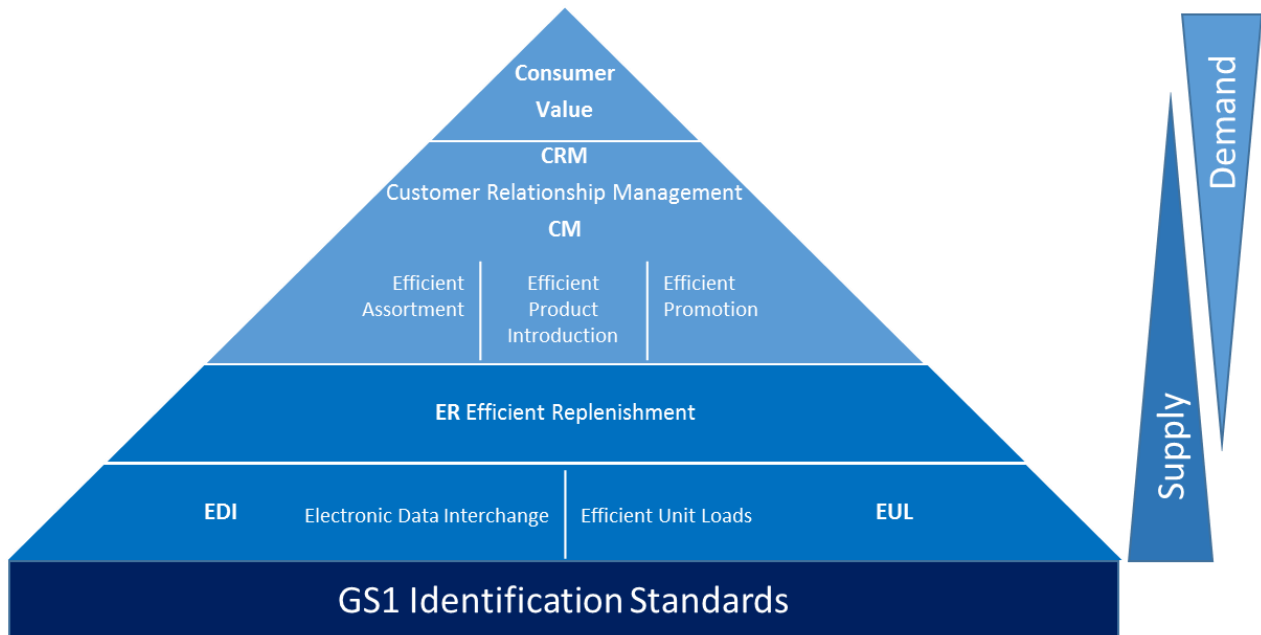


Figure 26: GS1 Identification Standards in Supply and Demand Side

GS1 Logistics Label

A logistic unit is an item of any composition established for transport and/or storage which needs to be managed throughout the supply chain. The GS1 Logistics Label allows users to uniquely identify logistic units so that they can be tracked and traced throughout the supply chain. The only mandatory requirement is that each logistic unit must be identified with a unique serial number, the Serial Shipping Container Code (SSCC).

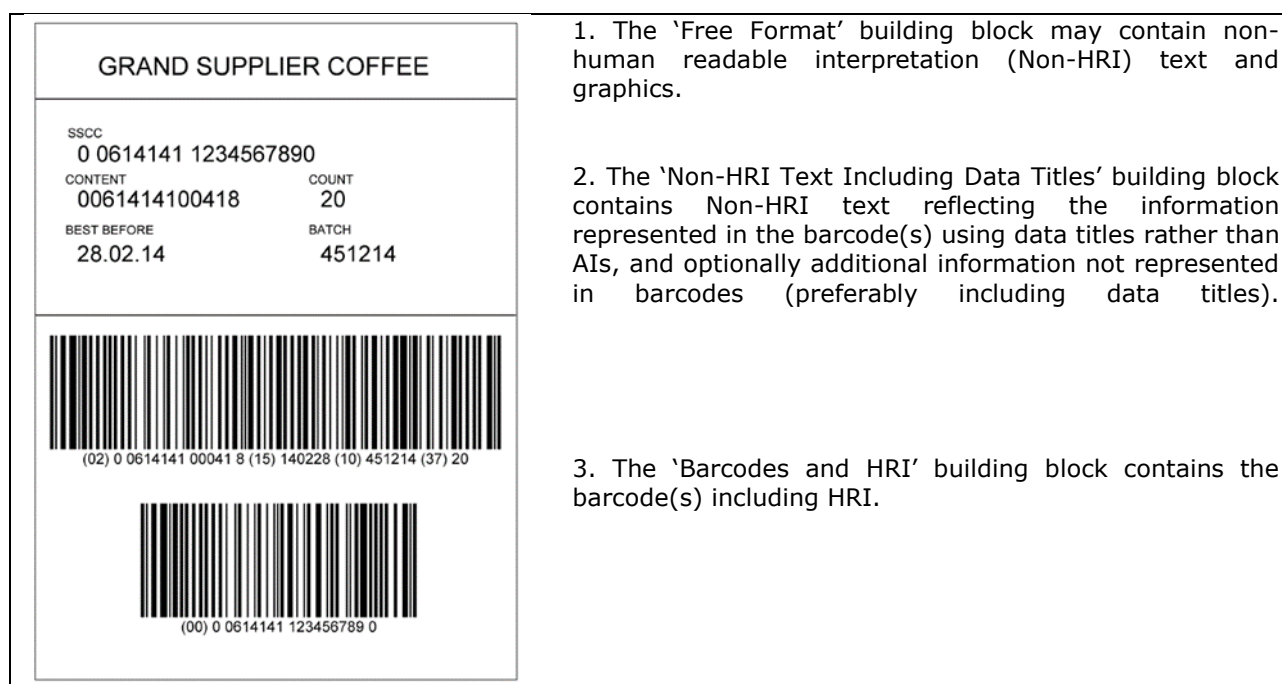


Figure 27: GS1 Logistics Label (example) (Source: GS1)

Scanning the SSCC barcoded on each logistic unit allows the physical movement of units to be matched with the electronic business messages (EDI messages) that refer to them. Using the SSCC to identify individual units opens up the opportunity to implement a wide range of applications such as cross docking, shipment routing, and automated receiving. Besides the SSCC other information can be included on the GS1 Logistics Label.

Cross Docking⁴

"Cross Docking is a distribution system, in which merchandise received at a warehouse or distribution centre is not put away into stock, but is immediately prepared for onward despatch to the next distribution level. Three cross docking types can be distinguished:

- CD of full pallets: one SKU per pallet, pallets moving from truck to truck.
- CD of cases: Break down of pallets at the TSP with no leftover.
- CD of pre commissioned pallets: Mixed pallets moving from truck to truck.

During the preparation of CD operations, additional work, such as special packing or synchronisation with other product flows can occur." (ECR Europe, 2000)

⁴ (ECR Europe, 2000), p. 59

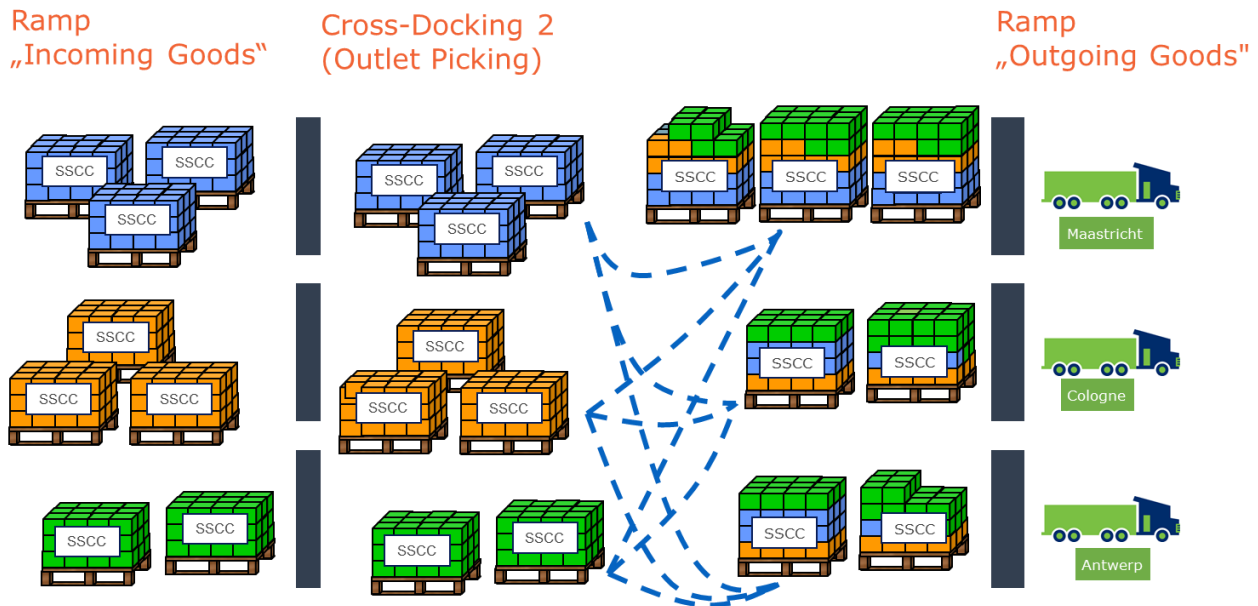


Figure 28: Cross-Docking Process (Source: GS1)

Vendor Managed Inventory⁵

"VMI is an alternative to the traditional order-based replenishment practice, being a more efficient supply chain integration strategy and collaboration concept. In a VMI relationship, the vendor is empowered to manage a customer's inventory and replenish the goods at the customer's site automatically under agreed conditions and rules.



Figure 29: VMI Process - Inventory Responsibility (Source: GS1)

Instead of sending purchase orders, buyers send inventory and sales information electronically to the vendor. Based on this demand data, the vendor makes periodic resupply decisions regarding order quantities, shipping and timing. The information about real demand will be transparent to the vendor, reducing uncertainty for its production and operational planning. VMI gives the vendor both responsibility and authority to manage the entire replenishment process. The change is fundamental by making the availability and inventory turnover the new primary measures of the vendor's performance instead of delivery time and preciseness.

Collaboration is core to the success of VMI. Buyers and vendors must enter VMI with the objective of multi-disciplinary teams working together to discover the "win-win" solution to VMI. The individuals involved

⁵ (Hammer & Bernasconi, 2016), p. 5

should be collaborators and understand the needs and requirements of their trading partners.” (Hammer & Bernasconi, 2016)



Figure 30: EDI Communication Process (Source: GS1)

5.7.2. Successful Pilots

Best practices in Supply and Demand Side project are appreciated by the ECR-DACH-Community during the annual ECR Conference. In the year 2003, the ECR award was found and given to successful ECR adopters in the categories Demand Side, Supply Side, Company and personality. The following Supply Side awardees show, that the implementation of ECR process recommendations in combination with GS1 standards give huge opportunities for successful supply chain optimisation.

GS1 Logistics Label

ECR Awardee 2005	Aeraxon – Retailer
Project:	Implementation Enabling Technologies with a medium sized supplier
Target:	Implementation of transport label with SSCC and the EDI message DESADV
Result:	Implementation with three retailers • EDEKA • dm • Globus

Cross Docking⁶

ECR Awardee 2012	Mondelez - Lekkerland
Project:	Win-for-Four transport optimisation with cross docking
Target:	Implementation of cross-docking processes with fixed delivery days
Result:	• Reduction of ramp contacts – 90 % • Unmixed full pallets + 23 % • Truck loading efficiency + 18 %

⁶ (ECR Europe, 2000), p. 59

ECR Awardee 2006 L'OREAL – Douglas – Thiel Fashion Logistic	
Project:	international implementation of integrated cross docking with KPI oriented payment and implementation of Enabling Technology Electronic Data Interchange (ORDERS, DESADV, INVOIC, REMADV) and standardized Identification transport label with SSCC
Target:	Reduction of inefficiencies in sales processes and decrease of logistic costs
Result:	• EDI implementation based on GS1-Standards with main customers • Reduction of logistic costs compare to central warehouse -50 % • Ready for global roll out

Source: Verkehrsrundschau 28.09.2006/Lebensmittelzeitung 27.9.2006

Vendor Managed Inventoryⁱ⁷

ECR Awardee 2007 DANONE - Globus	
Project:	Continuous replenishment program/vendor managed inventory (VMI)
Target:	increase of service level, product freshness, full pallet rate, decrease obsoletes
Result:	• Increase Service level • Increase Product freshness • Increase Full pallet rate • Decrease Obsoletes

ECR Awardee 2011 Triumph – Sauer	
Project:	Efficient sales area management with VMI
Target:	Implementation of VMI in 150 outlets
Result:	• Sales increase over 4 years +100 % • Out of Stocks < 5 %

5.7.3. Experiences from The Consumer Goods Forum

The consumer goods Forum works in a more strategical way and does not host operational pilots i.e. for transport optimization. The in 5.11.2. mentioned research study done with the support of EY shows the high impact the CGF anticipates to collaborative business models.

⁷ (Hammer & Bernasconi, 2016), p. 5

5.8. Experiences with Collaboration within a Research Environment

5.8.1. Collaboration with Synchro-NET Project

From a theoretical perspective the cooperation between both projects could consist in the following possible activities:

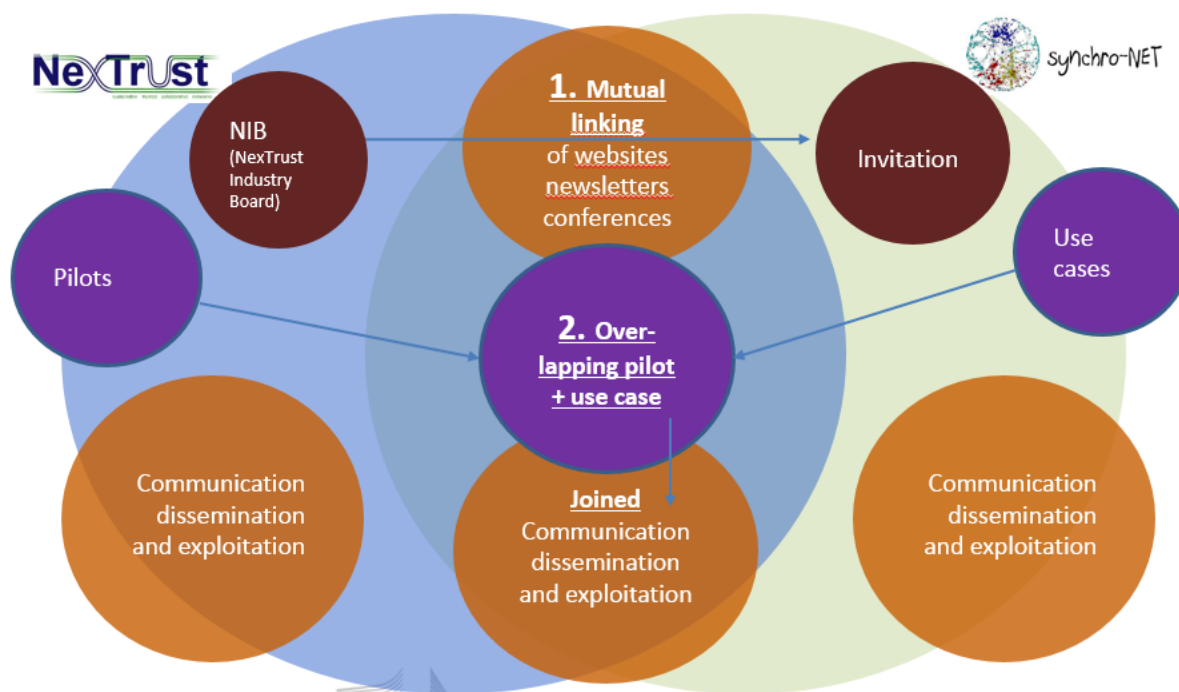


Figure 31: Possible Activities

Breaking down the theory in concrete steps for communication and dissemination both projects committed to the following joint actions:

- Mutual linking of the websites with logos, i.e. the logo of Synchro-NET should be placed on the NexTrust website with a link to the Synchro-NET website and vice versa.
- Same procedure should work for adding mutual logos with links in the periodical newsletters. Likewise it would help to share and like in social networks (LinkedIn and Twitter).
- Synchro-NET informs NexTrust about the events in which it will attend and vice versa.
- Synchro-NET invites NexTrust at the Stakeholders roundtable on May as stakeholder; NexTrust invites Synchro-NET to join the NexTrust Industry Board NIB.

Most of these actions are already done resp. implemented.

6. Validation of results via market interviews

6.1. Market Interviews

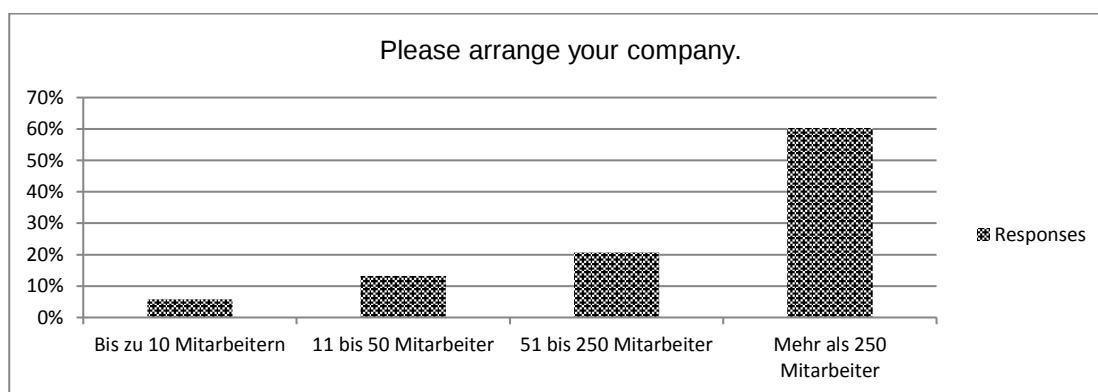
The "Cooperations in Supply Chain Networks" survey was conducted in September 2017. The questionnaire was compiled on Survey Monkey (www.surveymonkey.com). - ECR tag (physical) - BVL Newsletter (Mailing) - GS1 Germany Kundendatenbank (Mailing) Target group: Raw material / packaging supplier, manufacturer, retailer, logistics service provider, pooling service provider of returnable load carriers, recycling and disposal companies Not in scope: IT service providers and consulting companies Target industry: Focus on FMCG - but other industries are also interesting

The survey can be divided into three subsections. Please note, that D.6.10. is only focussing on the role of standards within cooperation (fat marked sections – table 1). The other sections will be analysed within D.8.5 to define the market potential for the trustee business model.

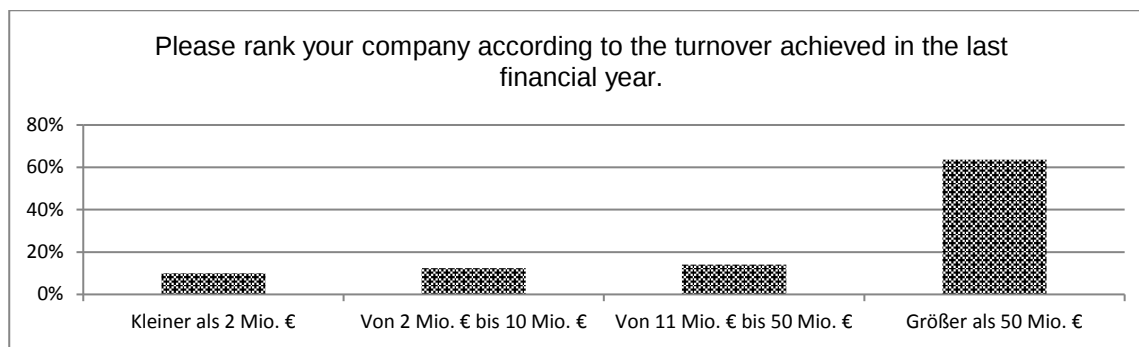
Question 1-4	General questions about company size and industry Question
Question 5-15	Questions regarding experiences with cooperation project
Question 16-21	Future handling of cooperation projects
Question 22-25	Questions regarding the potential of cooperation
Question 26-27	Role of Standards in Collaborations
Question 28-31	Other

A total of 121 people took part in the survey and completed the questionnaire.

In question 1, the respondents were asked to indicate the number of employees of their company (see Figure 1). 6% of respondents work in companies employing 10 or fewer people. 13% of survey respondents work for a company that employs 11 to 50 people. 21% of respondents are employed in a company that has 51 to 250 employees. 60% of survey respondents work in companies employing more than 250 people.



In question 2, the respondents ranked their company or the company they are working for based on their sales in the last fiscal year (see Figure 2). 10% of the respondents are working in a company that has a turnover of less than 2 million euros in the last financial year. 12% of respondents work for a company that generated sales of between € 2 million and € 10 million in the last fiscal year. 14% of the respondents are employed in a company that has achieved a turnover between 11 million Euro and 50 million Euro in the last financial year.



EU Recommendation 2003/361 / EC allows the classification of companies into categories (micro, small, medium and large enterprises) based on number of employees and turnover (see Table 1). According to the EU Recommendation, companies with fewer than 10 employees or annual sales of less than € 2 million are considered to be micro-enterprises. Companies with fewer than 50 employees or annual sales of less than 10 million euros are considered small companies. Medium-sized companies are organizations with fewer than 250 employees or annual sales of less than or equal to 50 million euros. Companies with more than 250 employees or annual sales in excess of 50 million euros are considered large companies.

Type	Number of employees		Sales in Mio. €
Kleinstunternehmen	< 10	and	≤ 2
Kleine Unternehmen	< 50	and	≤ 10
Mittlere Unternehmen	< 250	and	≤ 50
Großunternehmen	> 250	and	> 50

The merger of the results of question 1 and question 2 makes it possible to classify companies in accordance with EU Recommendation 2003/361 / EC of the European Union (see Table 2). 5% of survey respondents work for micro-enterprises. 13% of respondents work for small businesses. 14% work for medium-sized enterprises, while 68% work for large companies. The evaluation shows that large companies in particular have participated in the survey.

In question 3, respondents indicated what level of supply chain the business you work for is located. Only 1% of respondents work for raw material / packaging suppliers. 46% of respondents are employed in industry or by manufacturers. 17% of the respondents are active in the trade, whereas 9% are employed by logistics service providers, 3% by pooling service providers of returnable load carriers and 1% recycling and disposal companies. In addition, 12% of respondents work for IT service providers and 4% for consulting firms. 7% of respondents used the text box feature to indicate "Other":

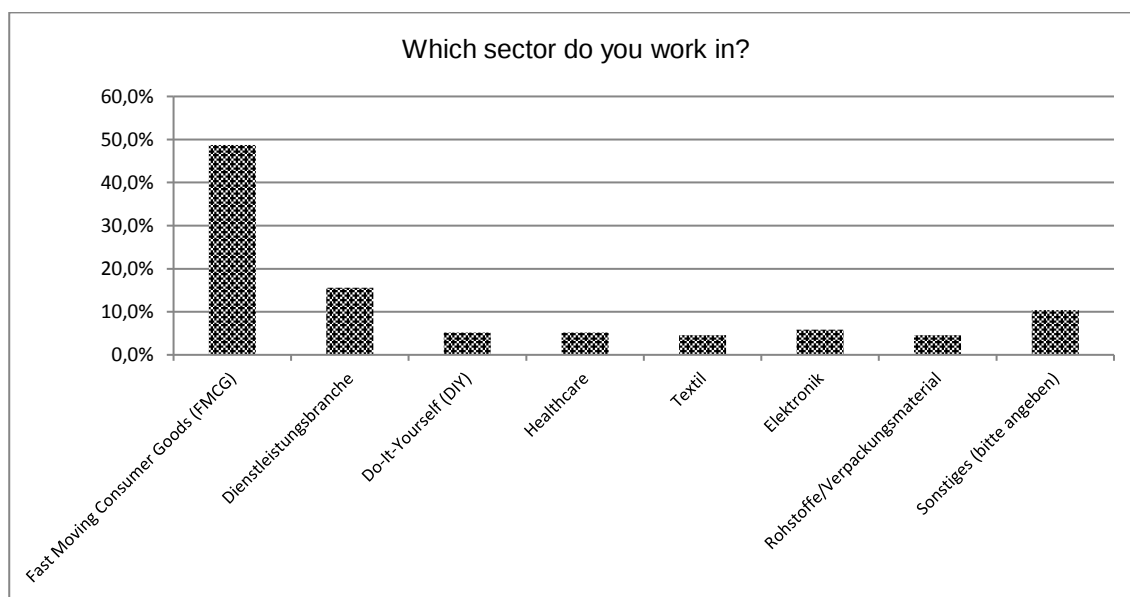
- Market place
- Packaging development
- Real estate
- Education and Research
- Mobile Marketing
- Software
- Brand

Outside the defined target group for the empirical survey are IT service providers, consulting firms and others. In the further analysis starting from question 5, the groupings mentioned are no longer part of the evaluation.

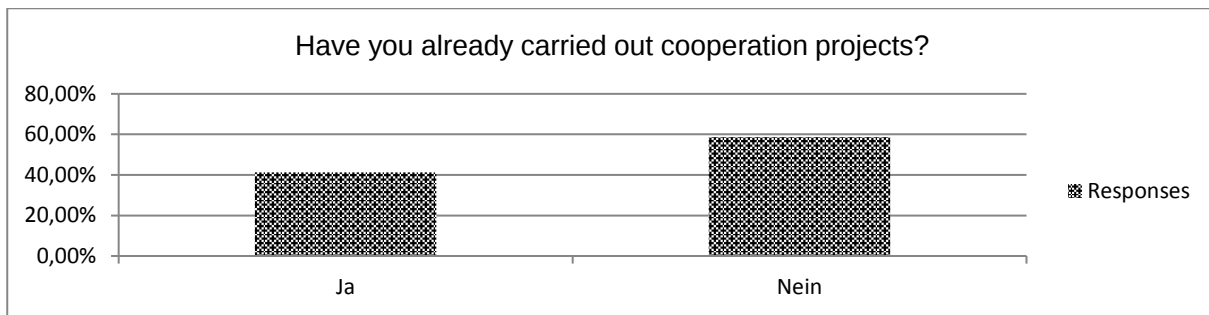
49% of respondents are active in the FMCG industry (fast moving consumer goods). The target industry of the empirical survey was thus made. In addition, 16% of respondents are employed in the service industry. By contrast, 5% work in the do-it-yourself (DIY) industry, 5% in the healthcare industry, 5% in

the textile industry, and 6% in the electronics industry. Another 5% work in the raw materials / packaging material sector. 10% of the respondents used the text box feature to indicate "others":

- Logistics
- IT
- Food
- Online media
- Marketing
- Foods
- Ecommerce
- Allen
- Software maker
- Automotive, Industrial, Consumer, Electronics, Healthcare
- Selective Cosmetics
- Automotive
- Consumer Goods
- Furniture u. Furnishings
- Home entertainment
- Carrier
- Furniture
- Consumer Goods
- Toys



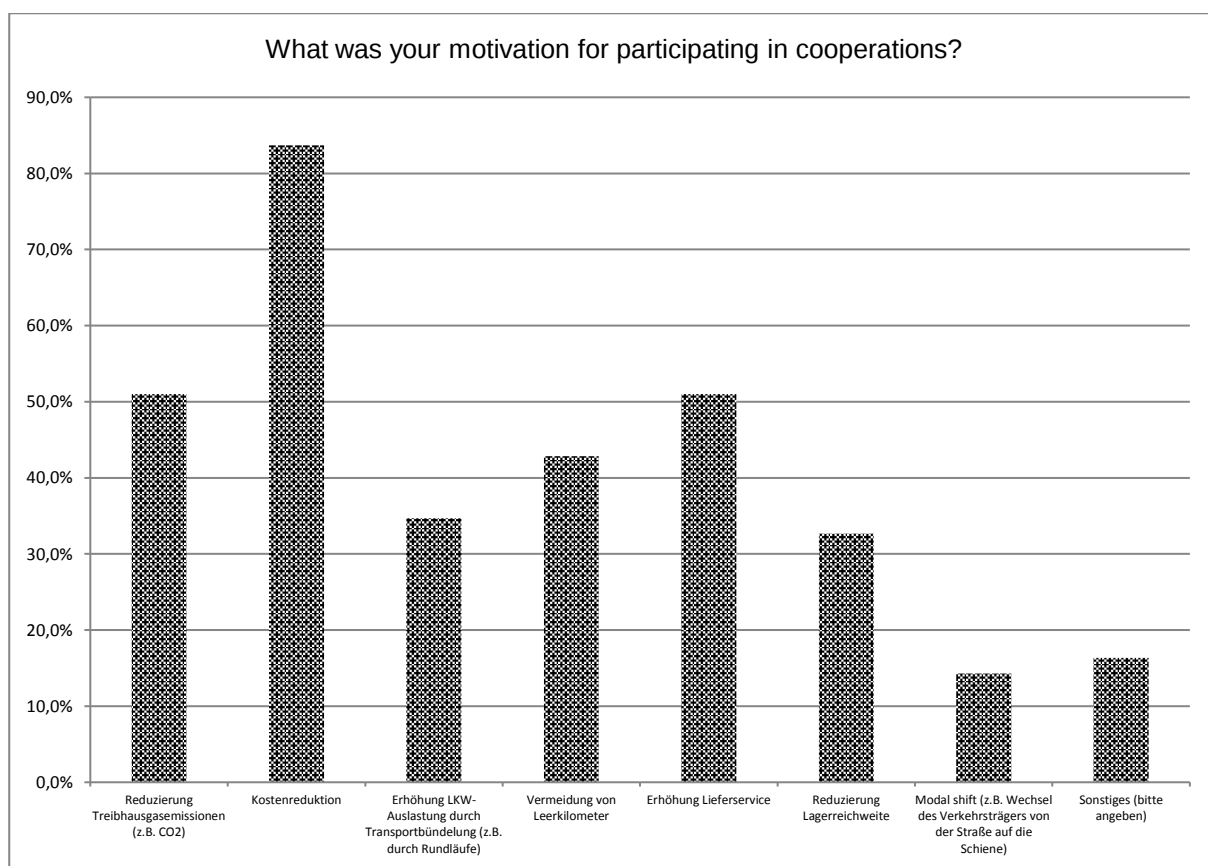
The population in question 5 is reduced from 121 to 92. Background is the exclusion of IT service providers, consulting firms and others (see question 3). 53% of respondents already have experience in cooperation. On the other hand, 47% stated that they had not carried out cooperation projects so far.



When answering question 5 with "yes", the respondents reach question 7 to question 15. If question 5 is "no", the respondents will be referred to question 16. The population between question 7 and question 15 is 49.

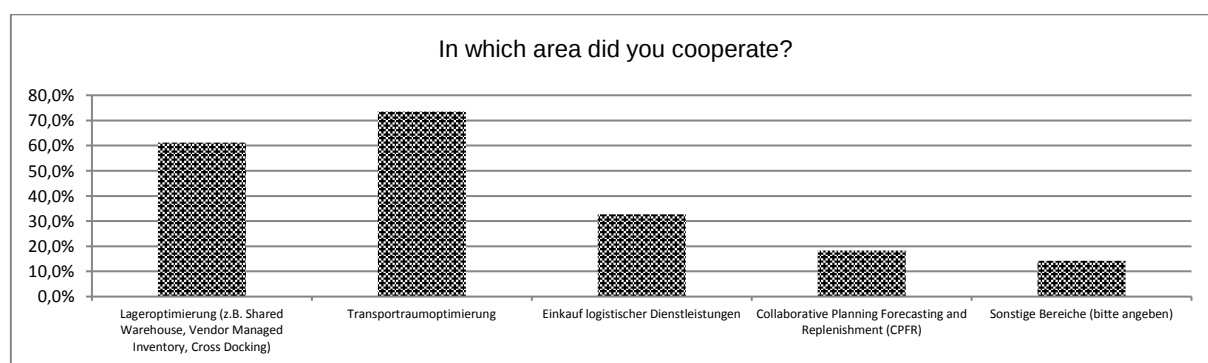
In question 7, respondents are asked to indicate motivation for participation in collaborations. Multiple answers are possible. 84% of the survey participants who have already carried out cooperation projects see cost reduction as the main motivation for participation in cooperations. The reduction of greenhouse gas emissions (such as CO₂) and the increase in delivery service see 51% as motivation for participation in cooperations. 43% see the avoidance of empty miles as a motivation for cooperation. This is followed by an increase of truck utilization by transport bundling (for example through round trips) with 35% and a reduction of the warehouse reach by 33%. Only 14% of the respondents see modal shift (for example, changing the mode of transport from road to rail) as motivation to participate in cooperations. 16% of respondents used the text box feature to indicate "others":

- Data interchange
- Increase sales
- Increase data quality
- CRP
- Capacity utilization and optimization
- Addition of core competences
- Bundling effects, process optimizations
- Part of strategy

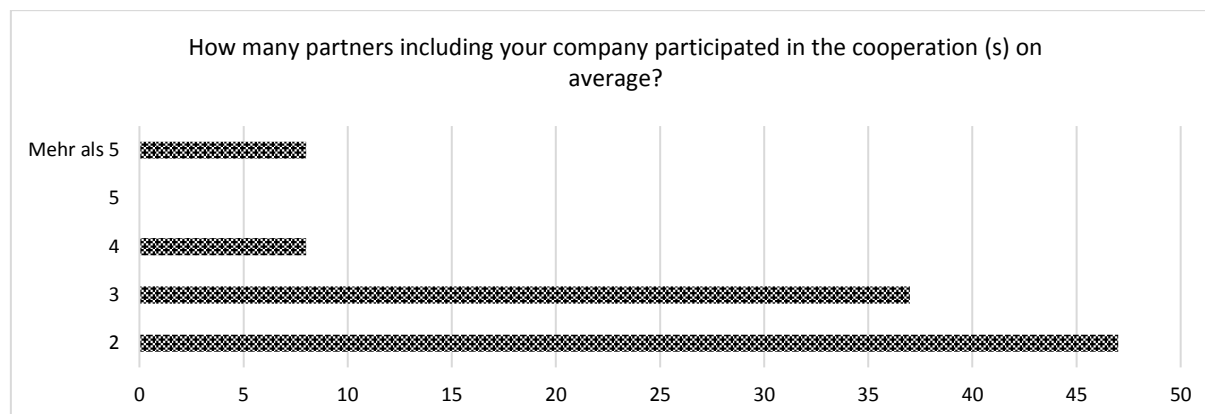


In question 8, respondents are asked to specify the area in which they cooperated. Multiple answers are possible. 74% of the survey participants cooperated in the area of transport space optimization. 61% of respondents have collaborated on warehouse optimization (such as shared warehousing, vendor managed inventory, cross docking). 33% of respondents have cooperated with other companies in purchasing logistics services. 18% of respondents have cooperated in Collaborative Planning Forecasting and Replenishment (CPFR). 14% of respondents used the text box feature to indicate "others":

- Data interchange
- R & D
- Distribution
- Production
- Testing, certification and contract logistics
- Cooperation on last mile

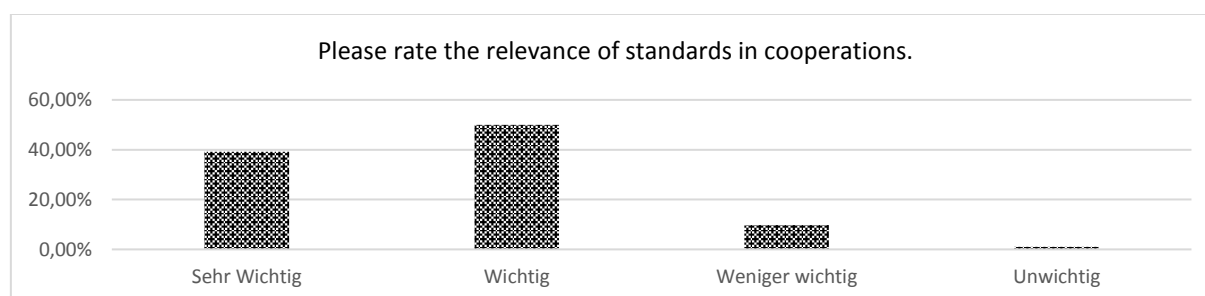


47% of the survey participants who have already gained experience with cooperation states that on average 2 partners, including your company, have participated in the cooperation. 37% state that on average 3 partners were involved in the cooperation. 16% of respondents indicated that 4 or more average partners were involved in the cooperation (s).

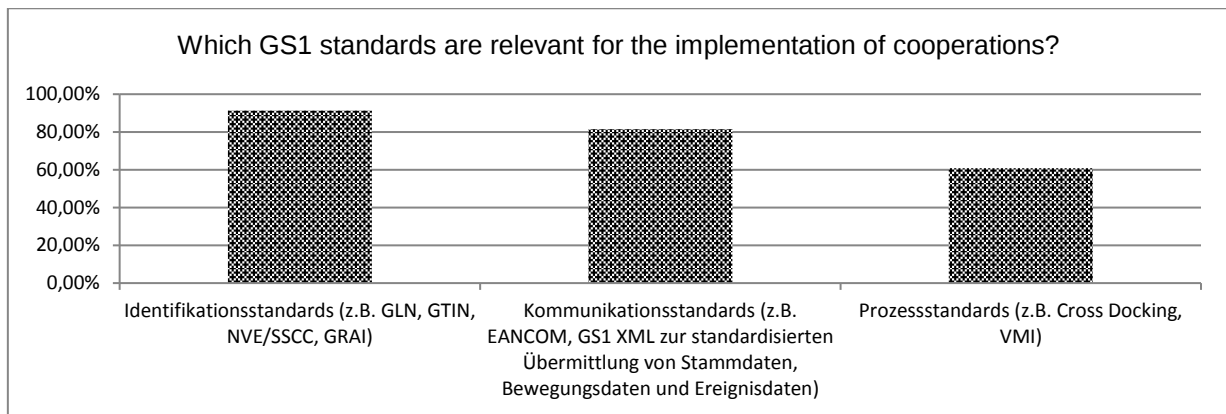


89% of the respondents rated standards in co-operation as important or very important. 11% of respondents rate standards in collaborations as less important or unimportant.

When linking question 9 to question 26, it becomes apparent that especially those respondents who have stated that they have cooperative projects with many cooperation partners rate standards as very important. 62.5% of people who have carried out cooperation projects with more than 4 cooperation partners rate standards as very important.



For 91% of the respondents, GS1 identification standards are relevant for the implementation of cooperations. According to this, communication standards with 81% and process standards with 61% are relevant for the implementation of cooperations. The evaluation of the question shows that especially GS1 identification standards represent a basis for cooperation.



6.2. Expert Interviews

In order to validate the results of the empirical survey, in-depth interviews with logistics experts were carried out after the completion of the survey. A coordinated interview guide was used to conduct the interviews in a structured manner. The interviews with the interview partners were recorded and subsequently evaluated. In the evaluation, comparable statements on specific topics were collected to support the results of the empirical survey.

In total, eight interviews were conducted. Four interviewees work as logistics managers at manufacturing industrial companies and have all gained experience in cooperation projects in the supply chain. Three further interview partners work for different logistic providers in the field of reusable transport packaging and have also been able to gain extensive experience in cooperation projects. The companies act as suppliers to the manufacturing industry and, thanks to the tracking and tracing of their reusable assets, have enormous data transparency that can be used for synergy analysis for cooperation projects. Another interviewee is working for a major German general cargo forwarder and in this function a key partner for industry and retail companies in order to successfully co-operate. The company was already involved in a large number of pilot projects and was able to gather extensive experience against this background.

Structure of the interview guide

The interview guide was structured as follows and was used as the basis for the expert discussions.

Question 1:

What was your motivation for participating in logistic co-operations?

Question 1a:

Were your expectations regarding the motivation to participate in a cooperation project fulfilled?

Question 1b:

In which point did you get the best results?

Question 1c:

Which results would you have expected in advance of the cooperation?

Question 2:

What were the biggest challenges in the cooperation / s?

Question 2a:

Lessons Learned: Are there any things that should be changed in future collaborative projects?

Question 3:

The set goals were not or only partially achieved. Please enter the reasons below.

Question 3a:

What was decisive for the success achieved?

Question 3b:

What proportion did standards have?

Question 3c:

Are standards a success factor in your view?

Question 4:

How many partners including your company participated in the cooperation (s) on average?

Question 4a:

In your opinion, which is the ideal size (number of partners) of a cooperation project? (e.g. in terms of maximum synergy potential and manageable project management)

Question 4b:

In your opinion, what is the ideal duration of a cooperation project? (e.g. in terms of cost and income (ROI))

Question 4c:

Does it make any difference whether SMEs or large companies are involved in the cooperation and why?

Question 5:

Was at least one competitor involved in the cooperation (s)?

Question 5a:

Do cooperation projects with competitors in your view have the same or higher potential as cooperation projects with non-competitors?

Question 5b:

Did your co-operation project have neutral coordinators who were not involved in the project? (Trustee Model)

Question 5c:

Do you think that a neutral third party can be helpful in a cooperation project and why? (or why not)

Question 6:

Which GS1 standards are relevant for the implementation of co-operations?

Question 6a:

Which GS1 keys and barcodes were used?

Question 6b:

Which GS1 EDI interfaces were used?

Question 6c:

Which GS1 process standards were used?

Question 6d:

Are there other conventions that you use in addition?

Question 6e:

Is there any further need for standardization?

Result Analysis

For the present document D.6.10 only the statements on research question 6 with the respective sub-questions were evaluated. The interview results of the remaining questions will be part of the study to be published and the Deliverables D.8.4.

In principle, all interviewees see standards as a key success factor to enable friction-free collaboration in the supply chain. In particular, six of the eight respondents cited agreed communication standards such as EDIFACT, EANCOM or GS1 XML as basic prerequisites for enabling cooperation between companies. One interviewee put it in a nutshell and said that co-operations without data exchange standards are doomed to failure from the outset. In addition to data exchange, process standards are also mentioned by respondents as an essential tool for defining certain guidelines and rules for cooperation. In this context, it was stated that the co-ordinated processes in co-operation projects should as far as possible be congruent with the standard processes in the rest of the business. The advantage is seen that distribution volumes can only be allocated quickly and flexibly between the different processing forms.

In addition to data exchange and process standards, data analysis standards are seen as the third major cornerstone. To identify promising cooperation projects, the synergy analysis of very large amounts of data is a necessity. The basic data for carrying out the analysis must be standardized to the trustee and provided in a well-structured manner. It is also important in this context that the data can be used for analysis without interpretation. Respondents were of the opinion that a predefined data template is probably the most straightforward approach.

The interviewees were divided on the need to use contractual standards within a cooperation. However, the opinion prevailed that contractual aspects with cooperation partners and service providers are usually very individualized and, against this background, difficult to standardize.

7. Summary

The main objective of the NexTrust research project is to increase efficiency and sustainability in European logistics by designing interconnected, trusted networks that collaborate together along the entire supply chain. Its innovative business model aims to create long-term solutions. NexTrust acknowledges the current successful collaboration efforts and models in place in the market. It is focussing, in a first step, to establish a new way of working together, targeting where efficiency gains are needed, and where it is possible to achieve a breakthrough to solve real problems of inefficiency in the logistics sector on a sustainable basis.

NexTrust is hereby following a 3-step trusted network research methodology. The first research step is the "Identification" of opportunities, followed by Preparation, implementing potential matches into pilot scenarios, and then the Operation phase, where we validate the trusted network pilot scenarios in real market environments.

Therefore, the NexTrust research activities have confirmed that smart visibility is needed to enable a more intelligent, sustainable supply chain. In this way, European logistics will be able to build trusted collaborative networks by bundling transport flows, so as to yield significant reductions in GHG emissions while simultaneously improving transport cost efficiencies.

The key prerequisite of NexTrust is that horizontal and vertical collaboration in the supply chain requires in order to become a sustainable practice. Facilitating the process is the "neutral trustee" function, which is absolutely required to guarantee anti-trust compliance with EU law, to insure that companies' own legal compliance rules are respected and that confidentiality is in place, allowing to exchange non-commercially sensitive information between the trusted collaborative partners. Furthermore, the trustee is responsible to ensure that the collaborative network will be constructed in such a way that a fruitful long term, sustainable relationship between partners can be maintained on a flexible, community basis.

NexTrust's main premise for the cultural mind-set is that re-engineering the supply chains can be used to carve out the currently fragmented logistics "silos" into smaller, manageable components that can then be restructured and replaced with more efficient connective networks to achieve benefits across entire supply chains. Enabling visibility across these fragmented "silos," allows us to match and thus consolidate freight flows, creating synergies across shippers and LSPs that are not visible today. Information and communication technology (ICT) including collaborative tools (C-ITS) is clearly identified as a major supportive need to add value as catalyst and enabler for trusted collaborative networks. The ICT enabling function is the key component and door opener to identify the accurate appropriate and efficient collaboration opportunities. At the same time, it shall be underlined that NexTrust learned that tackling cooperation only from ICT side will not lead to success, if the cultural mind set is not in place. Hence, NexTrust research is to find and establish in the near future successful innovative collaboration scenarios under market conditions, which will be then supported by scalable ICT solutions.

8. Project References

- [1] www.nextrust-project.eu project website
- [2] www.estep-mittelstand.de project website

9. Acronyms and Abbreviations

ACROYNM	EXPLANATION
2D	2 Degrees Network
ARC	Arcese Transporti
BDF	Beiersdorf
BLU	Bluewave
BOR	Borealis L A T
CD	Cross Docking
CGF	Consumer Goods Forum (siehe auch TCGF)
CI (dissemination level)	Classified, as referred to in Commission Decision 2001/844/EC
C-ITS	Co-operative Intelligent Transport Systems
CO (Dissemination level)	Confidential
COL	Colruyt Group
CPFR	Collaborative Planning, Forecast and Replenishment
CRI	CRITT Transport et Logistique
CT	Co-ordination team
DACH (ECR-DACH)	German speaking region (Germany, Austria, Switzerland)
DEC (deliverable type)	Websites, patent filings, videos, etc.
DEL	Delhaize
DEM (deliverable type)	Demonstrator, Pilot, Prototype
DESADV	Despatch Advice
DIN (DIN SPEC)	Deutsches Institut für Normung (DIN Specification)
DSL V	Deutscher Speditions- und Logistikverband e.V.
E2E	End-to-End
EANCOM®	EAN + Communication (EDI Standard)
EC	European Commission
ECM	Equal Cost Method
ECR	Efficient Consumer Response
EDI	Electronic Data Interchange
ELG (-WebTM)	
ELU	ELUPEG
EN	European Standard (European Norm)
EPC	Electronic Product Code
EU	European Union
EVO	EVO Dutch Shippers Council
EY	Ernst & Young
FIEGE	FIEGE Logistik
Flspace	Future Internet Space (project)
FMCG	Fast Moving Consumer Goods
FTL	Full Truck Load
GHG	Green House Gas
GIV	Giventis
GLN	Global Location Number

GPC	Global Product Classification
GPP	General Project Partners
GS1-BE	GS1 Belgilux
GS1-CH	GS1 Switzerland
GS1-D	GS1 Germany
GSMP	Global Standards Management Process
GTIN	Global Trade Item Number
H2020	Horizon 2020
HRI (Non-HRI)	Human Readable Information (Non-Human Readable Information)
HUB	NexTrust Collaboration Hub
ICT	Information and Communications Technology
IGD	Institute for Grocery Distribution
INEA	Innovation and Networks Executive Agency
ISO	International Organization for Standardization
IT	Information Technologies
KC	Kimberly-Clark Europe
KKL	Kneppelhout & Korthals
L&G	Lean & Green
LSP	Logistics Service Provider
LTL	Less Than Truckload
MDZ	Mondelez
MS1	Milestone Number
NIB	NexTrust Industry Board
NOR	Norwegian Logistics
NPPC	Nextrust Pilot Participation Community
NT	NexTrust
PAN	Panasonic Europe
PAS	Pastu Consult
PING	Pinguin Foods Polska
PROZEUS	Prozesse und Standards (Processes and Standards)
PU (Dissemination level)	Public
R (deliverable type)	Document, Report
RFID	Radio Frequency Identification
RV1	Review Number
SAT	Self-Assessment Tool
SSCC	Serial Shipping Container Code
SME	Small and Medium-sized Enterprise
SKU	Stock Keeping Unit
TCGF	The Consumer Goods Forum
TEU	Twenty Foot Equivalent Unit
TRL	Technical Readiness Levels
TRV	Tri-Vizor
TSP	Transshipment Point
TTW	Tank-to-Wheel
TÜV (TÜV NORD CERT)	Technischer Überwachungsverein
TX	TX Logistik
UNI	Unilever

VLE	Vlerick Business School
VMI	Vendor Managed Inventory
VU	VU University of Amsterdam
WEN	Wenzel Logistics
WKTS	Wolters Kluwer Transport Services
WP	Work Package
WPL	Work Package Leader
WPLG	Work Package Leader Group
WTW	Wheel-to-Wheel
YSC	Ysco

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