Deliverable 2.3
Best Practice Handbook 2
Version 1.0
Date: 30.01.2015

Project co-funded by the European Commission within the Seventh Framework Programme
Start date of project: 1st January 2012
Duration: 48 months

<table>
<thead>
<tr>
<th>Dissemination Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PU</td>
<td>Public</td>
</tr>
<tr>
<td>PP</td>
<td>Restricted to other programme participants (including the Commission Services)</td>
</tr>
<tr>
<td>RE</td>
<td>Restricted to a group specified by the consortium (including the Commission Services)</td>
</tr>
<tr>
<td>CO</td>
<td>Confidential, only for members of the consortium (including the Commission Services)</td>
</tr>
</tbody>
</table>
Editors

<table>
<thead>
<tr>
<th>Main editors</th>
<th>Simon Bohne (Rapp Trans)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Martin Ruesch (Rapp Trans)</td>
</tr>
<tr>
<td></td>
<td>Gabriela Barrera (POLIS)</td>
</tr>
<tr>
<td>Contributors</td>
<td>Roland Frindik (MARLO)</td>
</tr>
<tr>
<td></td>
<td>Jacques Leonardi (UoW)</td>
</tr>
<tr>
<td></td>
<td>Michael Browne (UoW)</td>
</tr>
<tr>
<td></td>
<td>Maciej Tumasz (UNEW)</td>
</tr>
<tr>
<td></td>
<td>Philip Mortimer (UNEW)</td>
</tr>
<tr>
<td></td>
<td>Konstantina Laparidou (Panteia)</td>
</tr>
<tr>
<td></td>
<td>Marcel Huschebeck (PTV)</td>
</tr>
<tr>
<td></td>
<td>Phillip Lenz (PTV)</td>
</tr>
<tr>
<td></td>
<td>Antti Permala (VTT)</td>
</tr>
<tr>
<td></td>
<td>Jenni Eckhardt (VTT)</td>
</tr>
<tr>
<td></td>
<td>Peter Wolters (EIA)</td>
</tr>
<tr>
<td></td>
<td>Christoph Rizet (IFSTTAR)</td>
</tr>
<tr>
<td></td>
<td>Katja Hanzic (Uni Maribor)</td>
</tr>
<tr>
<td></td>
<td>Jürgen Schrampf (ECONSULT)</td>
</tr>
<tr>
<td></td>
<td>Ronald Jorna (Mobycon)</td>
</tr>
<tr>
<td></td>
<td>Algirdas Šakalys (VGTU)</td>
</tr>
<tr>
<td></td>
<td>Alberto Milotti (Gruppo CLAS)</td>
</tr>
<tr>
<td></td>
<td>Dolores Herrero Tomás (ITENE)</td>
</tr>
<tr>
<td></td>
<td>Valentina Boschian (Bluegreen)</td>
</tr>
<tr>
<td></td>
<td>Valerie Castay (AFT)</td>
</tr>
<tr>
<td></td>
<td>Kim Bui (AFT)</td>
</tr>
</tbody>
</table>

Disclaimer
This document reflects only the author’s views and the European Community is not liable for any use that may be made of the information contained therein.
Table of contents

Overview........................................................................................................................................... 6
1 Introduction ......................................................................................................................................... 7
  1.1 Objectives of BESTFACT ............................................................................................................ 7
  1.2 Best practice definition in BESTFACT ....................................................................................... 9
  1.3 Knowledge basis .......................................................................................................................... 10
  1.4 Structure of the Best Practice Handbook ................................................................................... 10
2 Cluster 1: Urban freight .................................................................................................................. 12
  2.1 Collected cases ............................................................................................................................ 12
  2.2 Cluster challenges and developments ......................................................................................... 14
  2.3 In-depth cases .............................................................................................................................. 14
    2.3.1 Binnenstadservice ................................................................................................................ 14
    2.3.2 Cityporto Padova ................................................................................................................. 18
    2.3.3 The Green Link: last mile with cargo cycles in Paris ............................................................... 23
    2.3.4 Gothenburg City Logistics Initiatives ..................................................................................... 26
    2.3.5 Clean Vehicle Use in San Sebastian/Donostia .......................................................................... 30
  2.4 Case analysis and conclusions ................................................................................................... 35
    2.4.1 Urban Consolidation Centres (UCC) ..................................................................................... 35
    2.4.2 Electric Vehicle Delivery ...................................................................................................... 36
3 Cluster 2: Green Logistics and Co-modality .................................................................................. 39
  3.1 Collected cases ............................................................................................................................ 39
  3.2 Cluster challenges and developments ......................................................................................... 41
  3.3 In-depth cases .............................................................................................................................. 42
    3.3.1 TK’Blue .................................................................................................................................. 42
    3.3.2 East-West Transport Corridor Association .............................................................................. 45
    3.3.3 ENUBA 2 .............................................................................................................................. 49
    3.3.4 Grecor .................................................................................................................................. 51
    3.3.5 Voluntary charter for a commitment to reduce CO2 emissions in road transport 53
    3.3.6 Ferrara Inland Waterway ....................................................................................................... 56
    3.3.7 Greenway ............................................................................................................................. 57
  3.4 Case analysis and conclusions ................................................................................................... 61
    3.4.1 Policy schemes for greenhouse gas emission reductions .................................................... 62
    3.4.2 Innovative technology for zero emission and green logistics ............................................... 63
    3.4.3 Infrastructure and corridor development and management ................................................ 64
4 Cluster 3: eFreight ........................................................................................................................... 67
4.1 Collected cases........................................................................................................68
4.2 Cluster topics and challenges..............................................................................69
4.3 In-depth cases ........................................................................................................70
4.3.1 HPA - Smart Port Logistics.............................................................................70
4.3.2 IXSuite .............................................................................................................72
4.3.3 FREIGHT 4 ALL PROJECT: Italy-Spain demonstrator.................................78
4.3.4 FRETIS / IFT................................................................................................83
4.3.5 MODINT - Bundling at the source .................................................................87
4.3.6 Optrak .............................................................................................................89
4.4 Case analysis and conclusions ...........................................................................93
4.4.1 Process improvements.....................................................................................93
4.4.2 Co-modal journey optimisation .....................................................................94
4.4.3 Co-operative platforms and information sharing .........................................95
5 Project outlook .......................................................................................................97

ANNEX......................................................................................................................98

ANNEX 1: Glossary: Abbreviations used in the BPH and referenced case descriptions ...98
ANNEX 2: Sources used in the deliverable..............................................................101
ANNEX 3: Overview over the BESTFACT methodology and processes..............102
List of figures

Figure 1: BESTFACT project structure ................................................................. 8
Figure 2: Clean vehicles in operation ..................................................................... 15
Figure 3: left: situation without Binnenstadstage depot and distribution (before); right: situation with Binnenstadstage depot and distribution (after) ................................ 15
Figure 4: Ex-ante situation of deliveries to Padova ZTL ........................................... 19
Figure 5: Ex-post situation of Cityporto Padova ..................................................... 19
Figure 6: Proportion of grants in the revenue of Cityporto during starting phase (left) and Earnings before interest, taxes, depreciation, and amortization (right) ....................... 21
Figure 7: CNG van used for last mile deliveries by Cityporto Padova ....................... 22
Figure 8: Electric cycle operation in central Paris | Depot loading and sorting operation at The Green Link, 2013 ................................................................. 24
Figure 9: Operative vehicles of Stadsleveransen used in Gothenburg ......................... 27
Figure 10: The micro terminal Lindholmen in Gothenburg - Source: Stadsleveransen (2013) ........................................................................................................ 28
Figure 11: Logistics flows before and after the UCC and clean vehicle use .................. 31
Figure 12: Cargocycle vehicles in operation in Donostia San Sebastián ..................... 31
Figure 13: TK’Blue benefits for shippers and carriers ............................................. 44
Figure 14: East West Transport Corridor (Regional Perspective). Source: EWTC II project, 2010 ........................................................................................................ 45
Figure 15: East West Transport Corridor (Global Perspective) ................................. 46
Figure 16: The East-West Transport Corridor - Source: EWTC II project, 2012 ............. 48
Figure 17: The ENUBA2 implementation .................................................................. 49
Figure 18: The European Modular System .................................................................. 52
Figure 19: An EMS from GreCOR ......................................................................... 53
Figure 20: Localisation of Ferrara Waterways .......................................................... 56
Figure 21: The GreenWay concept ......................................................................... 58
Figure 22: eFreight reference model ....................................................................... 67
Figure 23: Integration of applications in the IXsuite platform .................................... 73
Figure 24: MODINT schema (Source: Dinalog) ......................................................... 88
Figure 25: BESTFACT WP2 working steps and best practice methodology ................ 103
Overview

The Best Practice Handbook (BPH) follows an easy set of purposes within the BESTFACT project structure:

- To give an overview about current concepts, strategies and actions in freight transport all over Europe
- Disseminating information on successful projects and practices to increase awareness and share experiences
- Enabling knowledge transfer and supporting transferability for best practices
- Offering contacts for further information and exchange

Within the first volume of the handbook 12 BESTFACT in-depth surveys were presented in detail. This second edition of the handbook offers further 45 inventory and 18 in-depth case descriptions. While all 95 inventory cases collected are available online as Quick Info Sheets as an easy reference via [www.bestfact.net](http://www.bestfact.net). For the in-depth cases analysed in each cluster a short summary is provided including the initial motivation and experiences. An expert assessment per case was performed focussing the BESTFACT criteria for best practices:

- Innovation and feasibility
- Strategic focus on strategic business and policy targets
- Impact and positive effects
- Transferability of cases to other companies, initiatives or contexts.

The assessment approach was designed to take into account the market expectations surveyed in the BESTFACT questionnaire asking more than 200 experts “what are the most relevant objectives and topics and targets you are working on?” The analysis presented in the handbook matches the themes and objectives mentioned in the survey responses (cf. BESTFACT (2012): D2.1 Main challenges in freight logistics). Within this handbook the main findings of the BESTFACT cases are cross-checked and summarised for each cluster according to the most important topics. A spotlight was on the conclusions about the conducted work, the addressed as well as the remaining challenges in the respective working fields. Differences in barriers, success factors and related transferability issues were identified and analysed in relation to the BESTFACT clusters. The transferability issues evaluation identifies the common barriers and necessary framework conditions fostering or hindering implementation of cases in new domains.

The consistent form of collection and information provision within BESTFACT broadens the structural understanding of best practice cases. The synthesis of cases per topic shows that under consideration of barriers and framework conditions replicable impacts are achievable. Most analysed barriers relate to missing information, cooperation and investments. Here the BESTFACT approach serves as a communication platform; continuing to include the multitude of available cases, networking events, such as workshops and conferences, and initiatives and their information proves to be of high value. The project widens the knowledge of case concepts and fosters the contacts between involved stakeholders. The timeframe of the project allows subsequent follow-up on cases that had undergone difficulties and managed to succeed. Making the impacts and benefits visible in the handbook to a wider audience across actor groups raises sensitivities and fosters the transferability of innovative approaches on the various cluster challenges identified.
1 Introduction

1.1 Objectives of BESTFACT

The objective of BESTFACT is to develop, disseminate and enhance the utilisation of best practices and innovations in freight transport that contribute to meeting European transport policy objectives with regard to competitiveness and environmental impact.

This will mainly be achieved by:

- Development, dissemination and promotion of best practices within logistics that contribute to increasing freight transport efficiency and meeting European transport policy objectives.
- Focus on competitiveness and environmental impact.
- Provision of a knowledge base simplifying administrative requirements in the freight transport sector.
- Provision of recommendations for policy tools for facilitating best practices and simplifying administrative processes.
- Support for implementation strategies by market sectors in co-operation with private actors, trade associations, regional bodies and technology platforms.
- Support of transfer of best practice between different domains.

The core of the BESTFACT concept is to extend existing best practice methodologies towards implementation strategies within an industrial environment. BESTFACT focuses on the co-ordination and integration of information and know-how on freight transport and logistics solutions. Thus, BESTFACT aims to become an active ‘Single Window’ for freight transport and logistics best practices, contacts and policies.

There are three BESTFACT clusters established to identify, collect and process information and knowledge that will take place in three particular areas addressing:

- Cluster 1: Urban freight transport
- Cluster 2: Green Logistics and Co-modality
- Cluster 3: eFreight

These three clusters have been chosen as they represent the most pressing issues in freight transport and logistics in terms of economic, social and environmental sustainability, as well as being closely linked to important innovations and developments in freight service provision to meet the needs of European economies, and finally as they are in the core of the Freight Transport Logistics Action Plan.
The BESTFACT clustering is regarded as advantageous and suitable for the following reasons:

- Expertise of field experts can be bundled within the clusters, thereby providing a more focused cluster-related scope as well as a higher level of in-depth expertise. Overall, clustering will enhance the quality of the results.

- Improved, focused clustered results will assist in the work package activities the processing of the data. Moreover, the work package leaders in WP 2 and WP 3 will have an easier task in organising and co-ordinating the material collections having only the cluster leaders as their contact point.

- Clustering allows a more comprehensive view of the broad field of freight logistics. Different facets can be considered by the project in a flexible and efficient way.

All BESTFACT clusters apply a common working approach and carry out the following tasks:

- Established a working group consisting of project partners contributing to the best practice collection and evaluation with their specific expertise in the domain and acting as multipliers for the BESTFACT knowledge base.

- The clusters identify and discuss best practice approaches, evaluate in-depth surveys and suggest policy tools.

- The cluster leader will initiate and co-ordinate the collection of best practices. Based on strategic guidelines and topics defined in the initial project stages each partner of the working group will carry out investigations into national information in order to identify best practices. Best practice collection will take place on two levels. On a general level (collection of inventories) a total of 150 cases will be collected in BESTFACT providing a generic description of the best practice. On a detailed level BESTFACT will produce more than 60 in depth cases. The full methodology of the BESTFACT approach towards the case collection is detailed in ANNEX 3: Overview over the BESTFACT methodology and processes.

- The processing of best practices. Applying the methodology of WP 2 the cluster partners will set up comprehensive best practice descriptions and supply a common presentation format, the Quick Info Sheet (QIS). The QIS are available on the BESTFACT knowledge platform.
1.2 Best practice definition in BESTFACT

The central aspect of the project is the identification and promotion of best practices. Therefore a workable definition of best practice was a core task within the project group as a starting point. Best practice in BESTFACT is considered as an existing approach or solution (industrial business cases, measures, administrative procedures, research results) providing a solution for a relevant problem or challenge in freight transport. It is characterised by the following four core attributes:

- **Innovation and feasibility**: Best practice provides an innovative and feasible approach beyond the common practice. Solutions include products, processes, services, technologies, or ideas that are more effective than previous ones and are accepted by markets, governments, and society.

- **Strategic focus**: Best practice addresses both business and policy objectives. It provides value across actor groups and addresses current challenges and problems.

- **Impact**: Best practices have considerable and measurable positive effects on strategic business and policy targets.

- **Transferability**: Best practice should be transferable to other companies, initiatives or contexts.

BESTFACT will recognise solutions that are evolving and show strong evidence for their development. Therefore within BESTFACT two stages of best practice are recognised:

1. **BESTFACT Evolving Best Practice** describes cases that fulfil the best practice core attributes. They have to be implemented and demonstrate a high potential for positive impacts and transfer to other regions or domains. First indication of success has to be given, a case has to be launched and or a prototype running. BESTFACT has to monitor and evaluate these cases to demonstrate what is the innovation and the impact in the context of current developments.

2. A **BESTFACT Best Practice** follows widely the above definition but requires a matured stage of development. It should demonstrate proof of its transferability through an implementation outside its original field or in a wider context. It has to be fully implemented and a working practice with strong evidence of excelling in the best practice criteria.

This two stages approach in the project allows BESTFACT not only to consider running best practices but also foster further development. The consideration of evolving cases assures integration of the latest developments and raises attention to current challenges. BESTFACT will follow up on considered evolving practices and integrate future results into their evaluation.

As stated above, in the BESTFACT perspective innovation is one element of best practices. This understanding enables the project to especially focus on solutions which are going beyond the state-of-the-art. In the common interpretation best practices are not necessarily the overall best case in comparison; BESTFACT does not aim at identifying all practices outperforming other, competing solutions. The identification of all existing and comparable solutions is not within the scope of the project. A best practice for one actor might not qualify for others as best solution but might serve as a good solution for specific problems. The BESTFACT cases will indicate outstanding solutions which can be classified in a defined quality scope. A benchmark between cases is not intended; BESTFACT aims at a wide variety of best practice cases which need to be analysed under differing sets of indicators. This does not yield
an explicit quantification or ranking of cases. Even though some collected quantitative data is accessible, it is only possible to be used on a per-case basis.

1.3 Knowledge basis

The BESTFACT knowledge basis grows over the entire project duration. When selecting and analysing cases to be included in the best practice handbook the full scope of collected materials factors into the process. This knowledge base consists of:

- Cluster internal case collection lists; within each cluster topic a multitude of cases have been considered and been scanned by the involved partners. Some might not qualify due to not matching the most relevant issues or simply not providing enough reviewable materials.

- Collected inventory cases; these cases are the main foundation of the BESTFACT analysis. Over 150 cases will be collected until the end of the project. The descriptions feature a comprehensive solution overview, detailing the success factors, benefits and barriers.

- In-depth cases extend beyond the inventory cases. More than 60 cases will be reviewed until the end of 2015. The process of establishing the in-depth information includes interviews with developers and a focus on costs and benefits of cases. The details of transferability and innovation are highlighted. Additionally specific performance indicators are gathered to measure the success of cases.

- Implementation and policy actions; as a project outcome BESTFACT supports and monitors special actions on private and public initiative where best practices are actively developed. The results are formulated in short reports and are integrated with the cases analysis of related topics within the relevant cluster.

- Workshop presentations, conferences and discussions; the knowledge of the entire BESTFACT network is best reflected within the many BESTFACT events. With the workshops and conferences held, BESTFACT invited highly regarded speakers to present their solutions in day-to-day activities. Case developers, public authorities and satisfied customers alike presented cases which were subsequently integrated into the BESTFACT knowledge and the analysis of the various inventory and in-depth cases.

On these elements the project knowledge pool is built. It serves as the basis for the case analysis per cluster topic in each of the cluster chapters and allows deriving conclusions on higher cluster and cluster topic level.

1.4 Structure of the Best Practice Handbook

The Best Practice Handbook (BPH) serves a set of purposes within the BESTFACT project structure:

- To give an overview about current concepts, strategies and actions in freight transport all over Europe

- Disseminating information on successful projects and practices to increase awareness and share experiences

- Enabling knowledge transfer and supporting transferability for best practices

- Offering contacts for further information and exchange
This second BPH details the cases which came out of the BESTFACT case collection in 2013. The first edition of the BPH detailed cases of the first year of BESTFACT collection, 2012. In a synthesising approach all BESTFACT cases collected will be synthesised in the third handbook which will be released towards the end of the project in 2015.

In this handbook the focus of contents is directed towards a critical analysis of described cases and subsequently their synthesis in their respective clusters and the field of freight transport and logistics. The handbook does not intend to give detailed implementation instructions, but lends support to gaining a dedicated overview and getting in contact with project developers and innovative businesses across Europe.

This handbook will provide insight into all three BESTFACT clusters (chapters 2, 3 and 4). Each cluster follows a common structure to lead readers through the full best practice collection and analysis processes. First the cluster will be shortly introduced. Then the available information base is highlighted, with all available cases which were analysed in the project period per cluster. This includes also further BESTFACT events and presentations held. Out of this basis the current situation in the cluster fields was analysed. This is based on identified challenges and current developments. The current situation in each field will be evaluated from the cluster perspective while overall transport and logistics topics are factored into the analysis. As it is one of the central aspects of the project, the in-depth cases are highlighted in more detail in the subsequent chapters. Their motivation is described, the solution and experiences are shown in short and an overall expert assessment of the contribution to strategic targets is given. The in-depth cases give an overview of real world solutions to current challenges. The connected case analysis and conclusions per cluster focus on a per topic approach. Available cases are grouped into topics applicable to the existing challenges and trends in each cluster. The main developments are shortly highlighted along available cases of the knowledge base and references are given to the strategic targets within BESTFACT. This allows a synthesised view on a set of topics which were dominant in the case collection in the previous year.
2 Cluster 1: Urban freight

Road-based freight transportation operations provide the goods and services required by companies and final customers, and make an important contribution to employment, thereby playing a vital role for the economy. But goods transport operations also cause social, environmental and economic impacts across the world including traffic congestion, air and noise pollution, greenhouse gas emissions, and the consequences of traffic collisions. These impacts result also in direct and indirect health problems for the population exposed to pollutants and bad air quality.

Urban freight transport is a contributor to all of these negative impacts, and has increased its impacts over recent decades as urban populations and geographical settlement areas have grown while also density within cities increased. This resulted in raised demand for ever-more freight flows to support the inhabitants and the resident businesses.

Over time more data is becoming publicly available, resulting in a greater opportunity to carry out relevant analysis of urban freight transport operations. One of the objectives of sustainable urban freight transportation is to develop policies, business and technological solutions that help to reduce these negative impacts. No single solution is capable of solving all these problems. Therefore, a range of potential sustainable solutions have emerged in recent years. These solutions have been developed by a variety of actors from the public sector, industry and the research community.

The diesel-powered combustion engine continues to dominate the goods transport vehicle market and while efforts have been made to develop clean vehicles and vehicles powered by alternative fuels, these represent a very small percentage of the fleet. Changes in business practices and logistics innovations have the ability to make the entire supply chain and distribution system more sustainable. Companies are increasingly reporting the social and environmental consequences of their activities.

The objective of the urban freight cluster is to better understand why selected urban freight solutions represent innovations that are technically feasible, economically profitable in different contexts, sustainable, transferable, and with tangible beneficial impacts. 18 solutions are evaluated in the fields of Urban Consolidation Centre, clean and electric vehicles, postboxes, IT solutions, use of recognition scheme, and others. Five solutions are analysed more thoroughly, the Urban Consolidation Centre of Cityporto Padova and Binnenstadservice, the innovative vehicles and last mile distribution concepts of The Green Link and of Gothenburg City Logistics Initiatives, and the Donostia San Sebastian freight trial.

2.1 Collected cases

The following broad topics were selected as relevant through the application of the BESTFACT best practice selection methodology to the field of Urban Freight.

- Urban consolidation centres
- Electric vehicle distribution
- Parcel distribution infrastructure
- Delivery policy and data

There is a tendency towards more clean vehicle and consolidation centre use to be observed, as can be seen for the cases submitted within the cluster. Other main topics of interventions are efficiency, cooperation, regulation and access restrictions, and data collection as the analysis of the topic analysis of the listed cases showed. The following table summarises the collected cases sorted for their respective topics and gives a short introduction.
## Urban consolidation centres

<table>
<thead>
<tr>
<th>Cases</th>
<th>Inventory Case</th>
<th>In-depth case</th>
<th>Short overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binnenstadservices</td>
<td>✓</td>
<td></td>
<td>Binnenstadservice manages an Urban Consolidation Centre on behalf of retailers and other organizations located in the city centre. Goods destined for these retailers are delivered through this consolidation centre, by freight operators.</td>
</tr>
<tr>
<td>Cityporto Padova</td>
<td>✓</td>
<td></td>
<td>Cityporto is an Urban Consolidation Centre service operational in Padua, Italy, focusing on deliveries to the central area ‘Low Traffic Zone’ of 830,000 m².</td>
</tr>
<tr>
<td>EcoLogis Brescia</td>
<td>✓</td>
<td></td>
<td>“Eco-Logis” is a distribution service operational in the urban area of Brescia (Italy), focusing on the historical city centre and its Low Traffic Zone.</td>
</tr>
<tr>
<td>Gothenburg CL Initiative</td>
<td>✓</td>
<td></td>
<td>The City of Gothenburg has developed and applied a bundle of city logistics policies and solutions. The solutions have been developed coherently and are supervised by a well-established network of experts active in different businesses and public sector institutions.</td>
</tr>
<tr>
<td>Citylogistik khh Copenhagen</td>
<td>✓</td>
<td></td>
<td>The concept of Citylogistik in Copenhagen involves using an urban consolidation centre for the supply of goods to the historical city centre of Copenhagen.</td>
</tr>
</tbody>
</table>

## Electric vehicle distribution

<table>
<thead>
<tr>
<th>Cases</th>
<th>Inventory Case</th>
<th>In-depth case</th>
<th>Short overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Green Link</td>
<td>✓</td>
<td></td>
<td>The Green Link is a company making parcels deliveries in central Paris with an entire fleet of battery electric vehicles.</td>
</tr>
<tr>
<td>Clean Vehicles San Sebastian</td>
<td>✓</td>
<td></td>
<td>An urban freight system where goods are delivered to a small consolidation centre, before being dispatched to the final customer with a fleet of electric cargo cycles.</td>
</tr>
<tr>
<td>La petite Reine</td>
<td>✓</td>
<td></td>
<td>‘La Petite Reine’ delivers purchases from stores to consumers, using electrically-assisted cargo tricycles and electric vans, adapted to dense urban centres.</td>
</tr>
<tr>
<td>Meal delivery Amsterdam</td>
<td>✓</td>
<td></td>
<td>MarleenKookt prepares meals for people who order their meals on a website. The meals are then delivered to the consumers by e-cargobikes.</td>
</tr>
<tr>
<td>Emakers</td>
<td>✓</td>
<td></td>
<td>Emakers offers clean deliveries with a fleet of electric and cycle freight vehicles, and a B2C solution for delivery management and information exchange.</td>
</tr>
<tr>
<td>Citylog EMF</td>
<td>✓</td>
<td></td>
<td>Citylog EMF is a new type of electric freight vehicle. The electric motor propulsion is fuel-cell based, and the vehicle concept consists of a series of ‘self-driven’ vehicles and ‘trailers’ that can be coupled to a train, and un-coupled for loading and unloading operations.</td>
</tr>
<tr>
<td>UPS Karlsruhe</td>
<td>✓</td>
<td></td>
<td>UPS is testing and analysing the use of a fleet of electric vehicles in urban traffic systems to reduce CO2 emissions, noise and particular emissions.</td>
</tr>
</tbody>
</table>

## Parcel distribution infrastructure

<table>
<thead>
<tr>
<th>Cases</th>
<th>Inventory Case</th>
<th>In-depth case</th>
<th>Short overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>LP EXPRESS 24</td>
<td>✓</td>
<td></td>
<td>An innovative urban distribution system of self-service terminals for parcel services.</td>
</tr>
<tr>
<td>Post Receiving Box</td>
<td>✓</td>
<td></td>
<td>The “receiving box” allows the deposit of registered mail at the customer’s residence aided with an RFID card for notification of customers.</td>
</tr>
</tbody>
</table>

## Delivery policy and data

<table>
<thead>
<tr>
<th>Cases</th>
<th>Inventory Case</th>
<th>In-depth case</th>
<th>Short overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMEL regulation Lisbon</td>
<td>✓</td>
<td></td>
<td>The Lisbon Transport Authority has developed a new solution that helps mitigate specific traffic problems, consisting of adapted parking metres and loading bay installed detection sensors.</td>
</tr>
<tr>
<td>GOFER</td>
<td>✓</td>
<td></td>
<td>The project aims at introducing new technical solutions and ways of cooperation: a heavy vehicle driving simulator to study heavy vehicles prioritising measures in urban areas; and a simulation model for access to the Alnabru terminal area in Oslo</td>
</tr>
<tr>
<td>FORS</td>
<td>✓</td>
<td></td>
<td>FORS is a publicly-funded, voluntary certification scheme aimed at ensuring that fleet operators work lawfully and to best practice by meeting specified standard. It encourages behavioural change and is targeted at commercial operators, local authorities and procurement specialists.</td>
</tr>
<tr>
<td>Lean &amp; Green</td>
<td>✓</td>
<td></td>
<td>Lean and Green supports and rewards organizations for reducing CO2 emissions and costs.</td>
</tr>
</tbody>
</table>
2.2 Cluster challenges and developments

Two of the core problems faced by existing sustainability strategies in urban freight transport are the relatively small market share of clean technologies and the slow diffusion of technical innovations. Like in other business sectors, the technology innovation cycle in freight transport and logistics starts with a new idea, then progresses to prototype development and trial, and eventually leads to a full-scale industry or citywide utilisation. But when it comes to clean solutions and electric vehicles, there is a tendency for innovations to remain stuck at the level of small-scale field tests, and this is not well understood. The vast majority of the urban freight sector continues to use diesel trucks and vans, and fleet modernisation is slow.

Urban freight transport is subject to many challenges, and there are many types of innovative solutions that can be developed that aim to diminish the negative impacts. Among the numerous problems mentioned by experts and practitioners, the following list of urban freight challenges was developed from BESTFACT activities carried out including meetings and workshops organised, case studies and inventories collected and interviews with operators:

- High costs of electric vehicles
- Benefits are difficult to quantify
- Diesel fuel technology and infrastructure is dominating the market
- Technical difficulties in running alternative fuelled vehicles
- Cooperation for shared use of consolidation centres is difficult
- Lack of IT use for many small companies
- Lack of affordable logistics space within the urban area

The inventory cases considered in the urban freight cluster, where these difficulties were encountered, are highlighted and an inside approach on how the businesses, authorities and stakeholders were dealing with these difficulties is presented.

2.3 In-depth cases

For the second best practice handbook five in-depth case studies were performed in the urban freight cluster. These cases are presented in short in the following chapters. Their motivation is highlighted, the solution and experiences are shown in short and an overall expert assessment of the contribution to strategic targets is given. Most importantly contact information is provided to request more detailed information about all cases and to support dissemination of successfully implemented solutions to all interested parties.

2.3.1 Binnenstadservice

The main problems of urban goods distribution are externalities such as noise, congestion and lack of available parking and road space, accidents, air pollution and CO2 emissions. Before the implementation of Binnenstadservice Nederland, retailers got several deliveries on a day; transport companies had to deal with time windows for delivery and/or restrictions with respect to environmental zones.

Solution

Binnenstadservice (BSS) is an innovative concept applied since five years ago in 15 cities in the Netherlands: Arnhem, Nijmegen, Den Bosch, Amsterdam, Arnhem, Beuningen, Dordrecht, Gouda, Heerlen Maastricht, Nieuwegein, Rotterdam, Tilburg, Utrecht and Wijchen.
Binnenstadservice operates a warehouse and distribution service on behalf of the joint retailers and other organizations located in the (inner) city. The basic approach is that goods are delivered at a distribution centre on the edge of the city. From there the goods are bundled and the last mile to retailers is performed with a high load factor, high density of delivery points, and where possible, with clean vehicles which are subcontracted to local service providers (bicycle, (e)cargo-bike, electric vehicles, and natural gas vehicles). Simultaneously, empties/packaging/paper is returned to the consolidation centre.

Figure 2: Clean vehicles in operation

The business model is based on the fact that the shopkeepers do not pay for the delivery of goods. They however have to pay for the additional services provided by Binnenstadservice (collection of packaging material, empties, paper). It is the transport company that used to deliver the freight to the city centre customers that now has to pay a fee to Binnenstadservice. Then, Binnenstadservice bundles the freight and contracts it out to one logistic service provider per city.

Binnenstadservice started with a public subsidy to allow time to encourage the shopkeepers to participate. Currently, it is a franchise organisation. Every franchisee in a city is an independent local entrepreneur. Ideally the local entrepreneur locates the Binnenstadservice depot ‘under the same roof’ with some other warehouse (not competing with the Binnenstadservice function). In this way the Binnenstadservice entrepreneur can start up without huge investments and she/he can operate at low cost because of the combined functions at the warehouse/cross dock location. The estimated costs in a start-up phase would be of around 10.000 Euros a month.

Figure 3: left: situation without Binnenstadservice depot and distribution (before); right: situation with Binnenstadservice depot and distribution (after)
Experiences and impact

In 2010 TNO made a study on the effects of cooperating with Binnenstadservice (BSS) considering two companies already following this scheme (TWI and Lekkerland). The results showed that if more cities would implement Binnenstadservice, carriers and shippers could benefit from large time-windows, have enough space for (un)loading, comply with local regulations and simplify the administrative issues by having only one contract with BSS for many cities. Considerable savings per delivery were calculated for different scenarios (scenario 0: not having BSS; scenario 1: 1-6 cities with BSS; scenario 2: 20 cities with BSS, scenario 3: 41 cities with BSS); these saving ranges would be:

- Kilometres: 48-72%
- Time: 60-70%
- Costs: 59-71%
- CO2 emissions: 47-71%

The savings would vary depending on type of deliveries, limiting factor for length vehicle round-trip, number of kilometres between city and carriers’ and the number of deliveries in the city.

In 2009-2010 The Binnenstadservice solution was tested by the ‘Transumo’ research team (the Erasmus Rotterdam and Radboud University in the city of Nijmegen with two national suppliers). This research team considered the effects for the city of Nijmegen (air pollution, traffic safety, and noise), the effects on the local entrepreneurs and their willingness to join this solution, and the perception of local consumers and national carriers. The team used different models to calculate the effects on kilometres, CO2, time and costs, both at the local and national level. The zero measurement was the current situation, so without a Binnenstadservice; surveys with local entrepreneurs and national carriers were also carried out. In addition, in 2012-2013 Dinalog Schone Ketting’ and the 4C4D research team carried out a study with 6 national shippers on what would be the effects on the same variables as mentioned above (kilometres, CO2, time, costs) in case a shipper/carrier would cooperate with 8 local Binnenstadservice points. The team did a survey amongst local entrepreneurs in 3 cities.

The main conclusions from the study are:

- **Sales Line shippers and carriers**: The first revenue line is the savings realized by suppliers / carriers that will create a single point of delivery for all its customers based in that city. The analysis at 6 companies shows time and mileage saving and increase of the degree of loading in all cases. The effects are company dependent. For example, the effect in the reduction of time per stop ranges from 5 to 25 minutes. The whole effect is a strong indication of the reduction of costs for shippers and thus revenue-opportunities for Binnenstadservice.

- **Retail Sales Line**: The second line is the appreciation by retailers. The conclusion is that the value is largely determined by the conditions in and around the shop and it is largely based on unburdening of the entrepreneur. This study found that entrepreneurs, who recognize that unburdening helps in their business, choose for Binnenstadservice and are also willing to pay for it.

The research team has placed both revenue lines next to the cost of a Binnenstadservice establishment and notes that this results in a sound business case.

Success factors and barriers
Binnenstadservice is very efficient thanks to the collective receiving and shipping of goods, benefiting all involved parties:

- For shopkeepers: a shopkeeper does not have to sign multiple times for a package that is delivered, but gets it all in one load.
- For transport companies: they can deliver the goods at the distribution centre on the outskirts of the city. They thus do not have to enter the city themselves, which could save them time/money. It also eases the pressure of time windows and environmental zones.
- For shippers: ultimately they will pay less for the transport of the goods, since the ‘last mile’ becomes cheaper.
- For the city: it reduces environmental pollution and makes the city more liveable due to fewer trucks and more environmentally friendly trucks/delivery vans.

On the other hand Binnenstadservice needs a lot of retailers to join to create the critical mass to make it successful. In many cities Binnenstadservice started with a subsidy to create some time to convince the shopkeepers to participate.

One factor that could benefit the scheme would be if shippers require from their logistics service providers to deliver the goods to the Binnenstadservice consolidation centre, and not to the inner city shopkeepers.

**Innovation and transferability**

Technically speaking Binnenstadservice is not a real challenge. Only a warehouse (urban distribution centre) is needed, and a local carrier with a clean distribution vehicle needs to be subcontracted. The ICT system for handling orders, labelling, etc. is already available by the Franchise organisation Binnenstadservice Netherlands. The Binnenstadservice approach is now being transferred to the E-logistic market, to other actors and end receivers in the cities and to other areas beside the inner city.

The Binnenstadservice concept is on a voluntary basis. However, some conditions could facilitate the introduction, as for example strict time windows, limited loading/unloading facilities and strict environmental conditions (environmental zones), since it will ‘force’ transport companies to look for cheaper and easier solutions. The more cities participate in the Binnenstadservice concept, the easier it is for shippers or transport companies to make use of the concept, because it becomes a common practice. In the current situation, where Binnenstadservice does not cover all cities, shippers and transport companies have to deal with different situations and conditions in different cities. Since Binnenstadservice is a franchise organisation with a ‘history’ of 5 years, every new Binnenstadservice entrepreneur in a new city has ‘easier’ conditions to start up, thanks to the ‘lessons learned’ and the coaching from the national organisation. This organisation even provides support to other European cities at this moment (e.g. previous cases included City Depot in Belgium and Citylogistik in Denmark).

The transferability also depends on the absence of the ‘not invented here syndrome’. If the new city wants to “invent” their own solution, it takes some more time to implement such a scheme. The slowest cases are in the cities where a local government is trying to implement their own solution (by procurement for instance).

**Synthesis of results in cluster/topic context**

This case is a good example of an urban consolidation centre and clean vehicles scheme with relatively low operation costs. Thanks to the consolidation of goods, less delivery vehicles circulate in the city leading to a reduction of traffic congestion and emissions. One of the main barriers for its implementation relates to the acceptance of such a concept by shop
owners. Therefore, a good cooperation between different partners is important for the set up and expansion of this solution. Being a franchise, ‘replicating’ the existing model is a key for its transferability.

The customers in the cities where Binnenstadservice is present are all SME’s., i.e. the receivers of the goods are all retailers (shops, restaurants, café’s, etc.). The impact on SMEs relies on a more co-ordinated approach of the deliveries and sending of their goods (fewer deliveries at suitable times), which eases their daily activities. Furthermore, retailers need less storage space in their shops, and their shopping street also becomes more attractive, potentially leading to more clients.

More information
www.binnenstadservice.nl/
Birgit Hendriks, e-mail: birgit.hendriks@eco2city.nl

2.3.2 Cityporto Padova

The main motivation for the introduction of the Cityporto service was the traffic congestion and air pollution in Padua city centre. The congestion was caused by the presence of many delivery vans in narrow streets. In addition, the common practice for delivering goods was to use diesel vehicles, vans and trucks. The Cityporto service and its vans operate with a much higher load factor and clean vehicles (CNG powered), which has helped to reduce congestion and emissions.

Solution
“Cityporto-consegne in città” is an Urban Distribution Centre (UDC) operational in the urban area of Padua, focusing on the local Limited Traffic Zone (LTZ). This zone has a size of 830,000 m². The UDC manager is Interporto Padova S.p.A., which also manages the local freight village, a PPP whose major Stakeholders are the local public bodies: the Municipality, the Province and the Chamber of Commerce. These three bodies subsidised the Cityporto service in the start-up phase (2004-2007), as a stated in a Framework Agreement, which itself is a best example of consultation of stakeholders involved in city logistics issues.

Cityporto now performs more than 100,000 deliveries per year (2012), for 60 customers, the major part of which are couriers and forwarders that are operating in the city, including express couriers, but also SMEs that usually deliver their products on own account. The UDC is a 1,549 m² wide cross-docking platform (including a 229 m² -wide refrigerated cell) located within the freight village. The deliveries are performed by 11 CNG-powered vans; two of them equipped for the delivery of temperature-controlled goods.

Cityporto wants to develop its range of services, in order to address markets which are usually unexploited by city logistics services, and to exploit the opportunities given by the integration of the UDC in the framework of the intermodal terminal and its IT management systems.
Experiences and impact

The introduction of a public-private urban logistics scheme based on the cross-docking and consolidation of freight in a UCC brings benefits both in terms of increased transport efficiency and of reduction of polluting emissions.

Gruppo CLAS made a survey in 2011, focussed on a 24 months long operational period (485 operational days), from July 2008 to June 2010. In the period 122,170 deliveries were performed by the 10 operational CNG-powered Cityporto vans. The vehicles performed 6306 delivery trips in total. For all of them, complete data registered by tracking & tracing IT system were available.

The benefits were assessed by a complex calculation, aimed at comparing:

- The number of delivery trips performed *ex ante* by Cityporto customer (data estimated from interviews), their average distance and the vehicles used (by Euro-category);
- The number of delivery trips performed by CNG-powered Cityporto vehicles, their actual distance covered and their emissions standards.

The following main results were assessed from the survey (all results are referred to the 2-year timeframe July 2008-June 2010):

- The introduction of Cityporto service led to a decrease of total distance covered by Cityporto customers' vehicles, by 727,920 km. Considering the distance covered by Cityporto vehicles (166,478 km) the total distance saved is estimated at 561,442 km.
- The net reduction of polluting emissions, by pollutant, is estimated at:
- CO₂: 220 tonnes
- NOx: 370 Kg
- SOx: 70 Kg
- VOC: 210 Kg
- PM10: 51 Kg.

The Cost-Benefit Analysis made within the assessment of benefits led to a NPV-E of 273,000 €, extended to a 5-year timeframe (2008-2013), which leads to a B/C ratio of 2.94, where the "cost" is the grant provided by the Ministry of Environment in the 2-year timeframe surveyed for the purchase of 2 CNG-powered vehicles.

A less recent survey, performed by CERTeT-Bocconi University in 2006 (Vaghi 2006), showed a B/C ratio of 2.01 for the two start years of Cityporto service, in a Cost-Benefit Analysis where costs side was represented by grants received by Interporto di Padova for the start-up.

Transport efficiency: The latest survey of 2011 allowed the analytical calculation of mileage performed by Cityporto vehicles. According to the calculation, the average mileage per delivery was 1.36 km/delivery from July 2008 to June 2010, compared to an ex-ante situation of 5.95 km/delivery.

The latest Cityporto statistics reports 101,666 deliveries in 2012. The total distance covered by the 11 vehicles in operational is estimated 176,000 km per year, which leads to an average distance of 1.73 km/delivery. The increase in average mileage is due to the extension of the geographical range of deliveries by Cityporto. In 2012 vans started serving the thermal resorts of Abano and Montegrotto about 20 km far from Cityporto UCC.

The Cityporto turnover for delivery service is nowadays around 500,000 Euros, and the service is profitable. The amount of public grants provided to Interporto di Padova (a public in-house company itself) for the service start-up is available. The City and the Province of Padova, Veneto Region and the Chamber of Commerce of Padova provided a total grant of 360,000 € in a 4-year timeframe (2004-2007). The intensity of the grants decreased year by year.

The financial self-sustainability of Cityporto has been achieved at the end of 2007, facing the end of public granting after 2007. The following figures (see below 6.1) show the intensity of grant on total inflows and the financial sustainability of Cityporto service during the start-up period.
Success factors and barriers

Cityporto is undoubtedly the most relevant and successful city logistics system in Italy, recognised as one of the European best practices. It shows some peculiar success factors, such as the location of the UDC within the freight village, operating since decades, renowned among operators, near their logistic platforms and sufficiently far from shops of the inner city. Other success factors are:

- The neutral role of Interporto Padova as UDC manager
- The development of a dedicated IT System for Cityporto services

The adoption of Cityporto service, following a Framework Agreement with interested city stakeholders, has so far proven its effectiveness in reducing congestion, energy consumption and pollution deriving from freight traffic in Padua urban area.

The main barrier to overcome before the service implementation was the attractiveness of the service, this was ensured by implementing a specific regulation for access and loading/unloading in Padova city centre. From 2004 on, Cityporto vans can enter the dedicated lanes used by buses and taxis, and (differently from the common freight vans) they have no time windows for loading/unloading in the LTZ.

Barriers still exist in attracting to such cooperative and efficient city logistics service more time-sensitive goods such as perishable goods since this logistic segments need a time-definite delivery which is often not compatible with the additional cross-docking operation needed in the UCC. However, the service proved to be attractive to parcel business, since nowadays nearly 40% of last-mile deliveries managed by Cityporto is on behalf of an express courier, namely GLS.

Figure 6: Proportion of grants in the revenue of Cityporto during starting phase (left) and Earnings before interest, taxes, depreciation, and amortization (right)

After 2007, Cityporto only benefitted from spot grants achieved for installing the refrigerated cell in the UCC (50% from Italian Ministry of Environment), and the purchase of one test electric vehicle (25% from EU CO2NEUTRALP Project).
Innovation and transferability

The next development steps are aimed at improving Cityporto with additional and innovative features in order to attract to a sustainable city logistics service more freight, delivered by more environment friendly vehicles. Selected actions foreseen are:

- Integration of parcel delivery in Cityporto range of services, through selected agreements with express couriers.
- Integration of perishable goods in Cityporto range of services
- Extension of delivery services to non-urban areas
- Adoption of a new tracking and tracing system for urban deliveries
- Renewal of Cityporto fleet with hybrid vehicles
- Revamping of the current Framework Agreement between the city logistics manager and the City of Padova, and fine tuning of current regulatory fostering policies
- Integration of Cityporto with the rail-road transhipment activity currently performed in Padua intermodal terminal. In particular, integration with the new ICT terminal management system, to be installed in 2013.

Moreover, Cityporto has issued a development plan aimed at reaching 160,000 deliveries per year in 2014.

The Cityporto model has been replicated in other Italian cities, where the local City Administrations implemented (or attempted to implement) similar city logistics schemes, even assisted by Interporto di Padova in the design phase. Those cities are:

- Aosta: Cityporto Aosta is running since 2011
- Modena: Cityporto Modena is running since 2007
- Como: Merci in Centro Como is operational since 2009
- Brescia: Ecologistic Brescia is operational since 2012.

However, although operational, those "replicated" models have not reached the volume of deliveries performed by Cityporto Padova yet.

Synthesis of results in cluster/topic context

Cityporto Padova is a well-documented example of an urban consolidation centre and clean vehicle scheme. It is profitable since 2007 and has led to a reduction of traffic congestion and emissions. The key factors that have contributed to its successful implementation are the
good location of the centre and the existence of access regulations in the city. However, the additional handling at the UCC is still a barrier for certain type of goods.

Many clients receiving their goods through Cityporto are SMEs and some of the transport operators making deliveries to Cityporto are SMEs as well. The future growth prospects of such a solution are good. SMEs can benefit either by becoming a business partner or a client, or by replicating the same solution in a different city or country, as it has been the case for the other Italian cities.

**More information**

The latest presentations and data on Cityporto are available at [www.cityporto.it](http://www.cityporto.it)

Mr Paolo Pandolfo - COO of Interporto Padova: [pandolfo@interportopd.it](mailto:pandolfo@interportopd.it)

### 2.3.3 The Green Link: last mile with cargo cycles in Paris

Before subcontracting the last mile to The Green Link (TGL), each client was delivering either by himself or with another 'last mile subcontractor', with diesel vans or trucks. Diesel van fleets were operated from the client’s depots, located in the suburban area of Paris, at a far distance from the city centre. This transport was generating emission along the way in the morning peak, due to congestion on the main axis. The vans were also emitting during the round trip within the city centre area of delivery. By using TGL’s operations, these emission problems are now resolved.

**Solution**

The Green Link is profitable and do not rely on subventions from the public sector. TGL operates three depots (called ‘green hubs’) and a fleet of 28 electrically assisted cargo cycles and 2 electric vans. The ‘green hubs’, are located in the centre of Paris. The main depot near Gare de l’Est has a size of 350 m². The two other hubs have a size of about 200m², and are located in other central boroughs of Paris, in order to accommodate different distribution areas (one of them is even next to the Seine river side and can be supplied by waterway). The main clients can be either large express carriers such as TNT and FedEx or shippers such as Coca-Cola, Eurodep a pharmaceutical agent specialized in the retail outlet and Saveurs et Vie, a company distributing food at home.

The organisation of the logistics processes is straightforward. The goods arrive in the early morning hours, starting from 07.00, up to 09.30, at the depot. The parcels are coming by truck and vans from the larger regional distribution centres of the clients and then unloaded into the depot via pallets, before being sorted and loaded onto the clean vehicles. The distribution rounds are performed by a staff of 60 part-time and full-time drivers. The rounds start in the morning around 09.00 and end in the early afternoon mostly before 15.00. Very few evening rounds are performed for parcels collection. During the delivery tour, information is sent back in real time and can be communicated to the contributors of flow. The back office platform (CRM) and the Business intelligence tools allow a good reporting of TGL activity. The organisation structure of The Green Link is based on 1 owner and 1 depot manager.
Experiences and impact

The economic impact and the business benefits are good, and the company has developed a business model based on the successful acquisition of private sector contracts, and the cooperation with large parcel service providers.

On the physical transport side, the 28 cargo bikes are self-designed and manufactured having the following characteristics:

- A volume capacity of 1.5-2.1 m$^3$,
- An empty weight of about 100 kg,
- A load weight capacity of 200 kg (max. 30 kg per parcel),
- A gross vehicle weight of 400 kg
- a maximum speed of 25 km/h and
- Autonomy of 20 km with a lithium battery.

The two ‘Goupil’ vans are full battery electric powered, with a capacity of 2.5 m$^3$, 500 kg (a maximum of 30 kg per parcel) a maximum speed of 40 km/h and an autonomy of 100 km with a lithium battery.

On the information system side, the central unit is interchanging data with the contributors of flow, in several formats, and pre-organising the delivery tours. The organisational interface scans the parcels at their arrival, consolidates the tours, dispatches the parcels, and sorts them according to their delivery rank in the tour. A web interface enables the real time tracking of deliveries and sends the final delivery report. A mobile application scans the parcel when delivered and send the delivery status.

The preparation of a new cargo cycle activity needs at least one client, and contact with the municipality to find a depot. The time of implementation of a new cargo cycle site is estimated 3 months: to fit out the depot, make the cycles and manpower training. The cargo cycle operation is then easy but hast to be managed and checked carefully.

Thanks to its electric fleet, TGL claims for delivering daily over 1000 parcels and for having avoided the emission of more than 20 tonnes of CO$_2$ and the consumption of 130.000 litres of diesel since its creation in 2009.

The economic benefits for the operator are given. Profitability is reached after few years of operations. The main cost of this activity is manpower and the rent of the depot:
- The rental costs of the depot that can be considered very high if compared to suburban depot rental prices: about 55,000 Euro per year for the main depot, about 20,000 Euro per year for each other two depots.

- The ‘normal’ delivery tour per working day for a cargo cycles driver is 5 hours, including one hour for preparation, loading and a posterior control. During this tour, the usual number of deliveries is 48. The cost of a cargo cycle driver is 13€ per hour; in the depot, there is a team leader for 10 cargo-cycles. Its cost is approximately 100 € per day, i.e. 10 €/cargo-cycle per day. 20 % can be added to these manpower cost to take into account days off, training and other absences.

To calculate the average costs of delivery the following conditions can be considered: 210€ per working for the current rent of the central depot in Paris; this amount can widely vary according to the depot situation in town and to the surface. This cost is distributed among the various activities. The assumption is that there are 2*10 cargo cycles tours per working day. Therefore the average cost per delivery would be:

Manpower: $1.2\times \frac{(5h \times 13) + 10}{48} = 1.88 \, \text{€}$

Depot rent: $\frac{210}{(10 \times 48 \times 2)} = 0.22 \, \text{€}$

The cost of a new cargo cycles is 7,000 €; with the maintenance approximately being of 10€ per working day.

The other fixed costs are insurance, accounting, and management.

End of 2013, the volume of parcels distributed is 2,500 per day, and the business is expected to grow to a volume of about 5,000 parcels per day in the year 2014. The growth conditions are limited due to the available size of the current depots.

**Success factors and barriers**

The sustainability impacts of this solution are rather high. Due to the substitution of the diesel van fleet through a battery-electric fleet, the supply chain emissions are strongly reduced, as operations are becoming almost completely emission-free for the final distribution in the part of the city that need it the most: the centre. On the supply chain legs between the suburban depots of the customers and the inner-city depots of The Green Link, the operations are occurring in a more consolidated way, so even if there are diesel vans in use on those legs, the overall load factor and the overall efficiency of the supply chain have increased and thus the energy use and emissions per load unit have decreased.

Key success factors of TGL include:

- a good mix of flows (e.g. one flow of parcels arriving early for delivery in the morning, one in the beginning of the afternoon and a third one later in the afternoon) and an efficient management of the transport chain though the information system

- Managerial qualities of the owner and depot manager and excellent contacts to local businesses and decision makers.

On the other hand, high price of real estate rental in central Paris and limited range and autonomy of battery electric cycles are two of the main constraints limiting the rapid growth of this business. Even if a contractor would offer a substantial amount of parcels to be delivered, the operative limitations of the depot and fleet size would not allow starting immediately, as the capacity is now close to be fully used. This is also reflected still in the market share of cargo cycles in total parcel deliveries in Paris, which is still very small (less than 1%) for the moment.

**Innovation and transferability**
The use of a UCC is a transferable practice to any other logistic case faced with the need of consolidating goods. Cargo cycle companies are also numerous all around the world. Not only parcels but also other types of goods such as food, ready-meals or clothes are potentially relevant for this business. If one of TGL clients would try to operate the last mile by himself, he would not have that mix of flows.

Electric vans are very expensive and the depots in central locations are also rare and expensive. Both topics justify that a public intervention would be adequate, for example, in form of helping to find a central depot or access allowances to shopping centres or pedestrian zones for electric vehicles during the day, or other land-use related allocation of free parking and storage space reserved for clean vehicles in city centres.

The Green Link could be extended to other towns but not in rural areas. It is clearly designed for dense cities. The Green Link is planning an extension of its operations into other cities.

There are several cases that look similar for the organisation (a depot with cargo cycles for the last mile): Gnewtcargo in London is a company with a similar business model and both Gnewtcargo and The Green Link demonstrate similar beneficial impacts on the economic, traffic and environmental aspects of their operations. The two companies are not in competition, however, because the local markets are very different.

**Synthesis of results in cluster/topic context**

The Green Link is a scheme relying on electric vehicles and electric bikes. The costs are not higher for the client and still, it is a profitable model contributing to the reduction of traffic congestion, noise and emissions.

This is a successful solution introduced by a private forwarder, a characteristic that at the same time could be a potential limitation for its further expansion. Therefore, the main impacts of TGL, besides further developing the company itself into a larger business, relies in its potential of developing this kind of Best Practice activity and replicate the business model of the start-up phase on markets in other French cities and in other countries.

The Green Link is an SME for last mile logistics. This ‘last mile’ service can help other SMEs like ‘Saveurs et Vie’, which proposes personalized dietary meals: Both SMEs won a call for tenders from the municipality of Paris for delivering old person meals at home. Based on this experience, the Green Link could consider other services at home in the future.

**More information**


Michael Darchambeau: michael.darchambeau@the-green-link.com

---

**2.3.4 Gothenburg City Logistics Initiatives**

The need to develop clean solutions was a key requirement to make the urban logistics activities more sustainable. Deliveries were commonly made by diesel trucks and vans, originating from different suburban depots, which allowed for a high innovation potential in vehicle use and organisation.

**Solution**

The City of Gothenburg developed and applies a bundle of city logistics policies and solutions, starting from the regulation of city centre and shopping area, using consolidation centres and clean vehicles, developing trials of innovative solutions, monitoring and data collection on new vehicles and new technologies. The solutions have been developed and are supervised by a well-established network of expert.
**Stadsleveransen:** The project started in 2012 with a small-scale pilot action of half a year. A small number of shops were contacted (8-10) and asked to redirect their goods through the consolidation centre (using a c/o address). The consolidation centre was set up as a small terminal in the city centre, located in an existing parking garage and a small electric vehicle was used to deliver the goods to the retailers using the terminal. The responsible for the terminal is the trade association of the retailers in the city centre. The terminal was operated by a security company (security guards). The pilot was during this phase mainly financed by projects, the local authority and the trade association together with a property owner in the city centre.

During 2013 the pilot was scaled up and more streets in the city centre were involved in the pilot. In this phase the focus shifted from the retailers to the haulers and two of the haulers with biggest market share in the area did now redirect their goods to the area through Stadsleveransen. This increased the number of receivers of goods to 160 as well as the amount of goods. Up to November 2013 the number of receivers was 200 and discussions were also held with a third hauler to be involved in the demonstration. To help with distribution of the increased amount of goods, a transport company using electric cargo bikes have been added to the terminal. During this phase, additional funding of the demonstration came through selling marketing areas on the vehicle – a solution that serve as an important part in the business model of Stadsleveransen.

The costs consolidation centre operations are:

- The cost for the vehicle is about 33,000 € (of which the trailer is 8,000 €).
- The rent for the depot is slightly below 12,000 € annually.

Stadsleveransen is expected to become a self-sustained business within 2-3 years. One option would be to keep it as a non-profit business within the merchant joint company Innerstaden; the other option is that the business would be supplied by an external service provider. During next phase the area will be increased, the terminal will be moved to a better location with larger space, and the solution will cost money for the haulers or transport operators that chose to use Stadsleveransen instead of performing the deliveries by themselves.

**Micro terminal Lindholmen:** The micro terminal started during the EU project START in 2008 as a small consolidation solution for a campus area, but has since 2011 been fully commercial with 14 companies (increasing) connected to the terminal. The terminal is handling goods receiving/distribution and waste management (clean waste) and also mail. The terminal is operated by the service manager of the properties.
Local freight network: The local freight network in Gothenburg was established as a part of the EU project START in 2005. Since then it has been developed and now has regular meetings 3-4 times per year gathering 20-25 participants from transport operators, trade associations, local authority, academia, property owners and retailers. The local freight network is a type of partnership, where the purpose so far has been to share knowledge and experiences between the participants as well as addressing specific problems arising within the central parts of the city aiming at finding solutions.

Experiences and impact

The main benefits are the environmental benefits associated with the use of clean vehicles, especially lower pollutants emissions, low noise and reduced CO₂ emissions. The other benefits are in the existing established stakeholder participation that enables to react to changes and new developments more effectively. The initiatives have been supported by the Swedish Government and the Municipality of Gothenburg during the set-up and starting phases. It is important to emphasise the specific outcomes of the local freight network:

- the introduction of a length restriction in the city centre,
- walking speed area streets,
- a parking and unloading practice guide.

However, an important outcome is the long-term interaction between the stakeholders that are involved in urban freight transport, the improved dialogue and the possibility to discuss and find solutions to everyday problems that are occurring in an easy way through direct contacts between stakeholders.

For Stadsleveransen the main impact from the view of the serviced final user is the reduced time spent on the street and in front of the facility for loading and unloading by distribution vehicles. The number of vehicles haven’t yet decreased in any perceivable extent. Another clear result is of course less time consumption for the transport companies (delivering to Stadsleveransen instead of a number of drop points in the area). A trial impact assessment was performed by Chalmers University on the impact of the parcels delivered via the UCC of Stadsleveransen. For the assessment, the data were collected, and then the "before"-situation was constructed and the changes calculated.

The results give an indication of some effects, but they need to be used with care, since they are based on several assumptions (load factors, number of shipments, number of receivers, routes, etc).
Furthermore, the data was collected in July, which is the holiday season in Sweden, and hence transport volumes were significantly lower as compared to the usual practice. The measures effect are therefore probably lower than they are in autumn and during the Christmas period as the UCC handles much bigger volumes.

The measured effects are:

- Limited effect (probably due to low season/limited volumes)
  - Only 10 out of 55 receivers get multiple deliveries
  - 82% of retailers are delivered by a single operator

- Still on average positive effects in the UCC distribution area are visible (average values per retailer and week):
  - Number of deliveries: -12% (2.4 → 2.1)
  - Handling time -13% (minutes per delivery: 9.7 → 8.5)
  - Shipment size +14% (number of boxes per delivery: 2.8 → 3.2)

- Also positive effects on transport operators (average values per vehicle trip)
  - Traffic volume and distance: -2% (veh.km: 26.0 → 25.4)
  - Vehicle time: -7% (hours per delivery round: 4.6 → 4.3)

**Success factors and barriers**

Communication and Cooperation between partners have been a key for the success in establishing new city logistics measures such as the consolidation centre and the electric vehicle project. The consultation activities were extensive and a high number or hours have been spent by the municipality service and the project management discussing the potential solutions and different approaches with receivers of goods/retailers, hauliers and transport operators. For this it was possible to rely upon a good network of local experts.

The main difficulty is to obtain an agreement of businesses and retailers to use the UCC and the clean vehicles, as it is requested that some of their long-term, established business customers relationships need to change. The second main difficulty is to cover the additional costs associated with the use of electric vehicles instead of diesel ones.

The main difficulty is to create a sustainable business model and financing structure for the future. It’s a quite complex situation, where a number of stakeholders are supposed to finance the business in reasonable amounts in the future, and where some predicted revenue streams are a bit uncertain. Technically, there are no major challenges at present.

**Innovation and transferability**

City Logistics requires that different stakeholders get involved, including the industry, retail, transport and public sector, depending on which city and which project are being considered. The electric vehicles were first used for parcel distribution, then for recycling, and now for fresh food transport. The solution is fully compatible with existing legislation and market practices. The extension to other cities is feasible, subject to organisational or political decisions.

Similar UCC developments combined with electric freight vehicles are in operation in many other cities in Europe. The particularity of Gothenburg is to have organised the UCC in combination with many other City Logistics actions such as partnerships, planning, vehicle testing, access restriction and others, as described above.

**Synthesis of results in cluster/topic context**
This case is a combination of different solutions: an urban consolidation centre, a microplatform, the use of electric vehicles. All these solutions were implemented in the framework of a strong local freight network. The consolidation centre and the microplatform are expected to become profitable in the near future and are already contributing to the reduction of traffic and emissions. However, a potential barrier, in particular for the UCC is the current limited fleet size.

SMEs are part of the project. For example the electric cargo bike company ‘Move By Bike’ has been added to the terminal Stadsleveransen. SMEs benefit from the project participation and from the future growth prospects of developing more clean transport operations in the city centre of Gothenburg.

More information
Maria Lindholm: maria.lindholm@lindholmen.se
SENDSMART project manager
Lindholmen Science Park AB
Tel 031-764 70 19

2.3.5 Clean Vehicle Use in San Sebastian/Donostia

San Sebastian has a substantial commercial and social activity and it is surrounded on its periphery by many industrial sites that generate a significant flow of goods, vehicles and people to the city centre. Before the project, the city centre had a high volume of traffic. In addition, there were streets in the area exceeding the decibel limit established as common quality goal. The distribution of goods was a key factor in these problems, especially for two existing conflictive areas: Old Town and City Centre, with narrow streets, high number of stores and lots of restrictions in deliveries. There was no homogenization of the loading and unloading times within different sections of the same street, which generated a great deal of confusion among users.

Solution
An urban goods distribution research study was conducted. Elements analysed were:
- Incidents that occurred during loading and delivery
- Infrastructures and other means for shops and transport companies
- Emissions and noise related to urban goods transit, consumption of energy and traffic density
- Traffic control system

Following the recommendations of this study, an implementation plan was developed including the following measures:
- Creation of a freight consolidation centre for the last mile distribution of goods
- Use of clean vehicles for last mile distribution
- Regulatory options to improve loading behaviour
- Increased control in the use of loading bays
- Design of a night distribution protocol
- Use of new technologies to make easier the communication between the distributors and the local shops
Finally, two measures were completely implemented:

- Creation of an urban consolidation centre (UCC): Municipal warehouse perfectly equipped for reception and dispatch of goods with ecological vehicles. This is located in the San Sebastian City Centre with approximately 500 m² of space.

- Use of bikes for deliveries: Goods delivery system using electric cargo bikes. These vehicles are sustainable and adapted to the urban reality offering innovative operations in urban freight distribution, extending service hours and eliminating CO₂ emissions.

This solution was tested with the collaboration of the city council, the Basque Institute of Logistics (IVL-LEE), Gea 21, the bus company DBUS, the Basque University, and the private Company Txita. The test experience continued during 3 years, reporting good results. Before the project development, the distribution of goods (now distributed by Txita) was performed with conventional motor vehicles. At this moment, the vehicles used are electric cargo-bikes.

![Figure 11: Logistics flows before and after the UCC and clean vehicle use](image)

![Figure 12: Cargocycle vehicles in operation in Donostia San Sebastián](image)

**Experiences and impact**

The main benefits of this project are:

- Reduction of trucks within the city.
- Reduction of GHG, noise and air pollution.
- Reduction of traffic congestion.
- Extension of hours of loading and unloading without causing any problems to the neighbours, mainly in the Old Town.
- Improvement of ecological position of the City of San Sebastian.

The new delivery regulation for goods contributed to a reduction in the average journey length of delivery vehicles by approximately 0.5 km. The new last mile delivery service with electric cargo-bikes saved up to approximately 27,000 km per year. As a consequence, a
yearly reduction of 22% in energy consumption was achieved, together with a significant re-
duction of carbon and pollutant emission levels.

Regarding society indicators, surveys conducted reveal that nearly half of the involved popu-
lation (neighbours, shopkeepers and transport operators) were aware of the initiatives put in
place.

Below some costs related to bike deliveries.
- E-bike purchase price: 7250€ + VAT + transport
- Maintenance: 30 €/month-bike
- Insurance: 125 €/year-bike

It is also necessary to consider following costs in Euro:
- Investment costs: vehicles purchase, premises conditioning, telecommunications infra-
structure:

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenses</td>
<td>30,780.04</td>
<td>43,990.98</td>
<td>7,015.88</td>
</tr>
</tbody>
</table>

- Maintenance costs related to reparations, printing, computers, phone, clothing, utilities:

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenses</td>
<td>6,333.83</td>
<td>14,276.11</td>
<td>11,327.42</td>
</tr>
</tbody>
</table>

- Staff costs:

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenses</td>
<td>36,160.22</td>
<td>111,066.68</td>
<td>40,131.35</td>
</tr>
</tbody>
</table>

The new delivery regulation for goods contributed to a reduction in the average journey
length of delivery vehicles by approximately 0.5 km. The new last mile delivery service with
electric cargo-bikes saved up to approximately 27,000 km per year. As a consequence, a
yearly reduction of 22% in energy consumption was achieved, in addition to a significant re-
duction of carbon (13 tonnes of CO₂ saved) and pollutant emission. Therefore, the implemen-
tation of the "Txitrans" measure represents a significant environmental improvement.

As it can be seen in the table below, if the concepts included in the project were the only el-
ements considered (partial results), the balance cost-benefit would be negative, however,
there are other income sources not considered for the project (use of bikes out of San Se-
bastian City) that provide a more real result.

<table>
<thead>
<tr>
<th>Expenses and incomes balance of the San Sebastian solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept</td>
</tr>
<tr>
<td>Expenses</td>
</tr>
<tr>
<td>Suppliers</td>
</tr>
<tr>
<td>--------------------</td>
</tr>
<tr>
<td>Staff</td>
</tr>
<tr>
<td><strong>Incomes</strong></td>
</tr>
<tr>
<td>Invoices</td>
</tr>
<tr>
<td>Subsidy CIVITAS</td>
</tr>
<tr>
<td>Subsidy EVE</td>
</tr>
<tr>
<td>Subsidy Webpage</td>
</tr>
<tr>
<td><strong>Partial result</strong></td>
</tr>
<tr>
<td>Other incomes</td>
</tr>
<tr>
<td><strong>Result</strong>**</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
</tbody>
</table>

* Data from June 21th 2010 to June 20th 2012

** Other 'unknown' small expenses due to use of bikes should be considered

**Success factors and barriers**

There exist some different factors which contribute to the success of this initiative:

- The preparation of the measure in co-operation with local stakeholders.
- The elaboration of a diagnostic study that also includes the opinions and ideas from the stakeholders.
- The pilot experience.
- The combination of new services and new regulations with improved enforcement, together with the implementation of a mayor communication campaign.

Furthermore, the project has numerous strengths:

- Political commitment
- Bike lanes in the city
- Reduction of CO\textsubscript{2} emissions
- Noise reduction
- Access by bike where other vehicles can’t access
- Good image for the city
- Increase of the bike importance
- Commercial support and funding of the service
- Constant contact with the company and municipal support
The main problem in San Sebastian was the dissatisfaction of some businesses about the new arrangements because of the changes that were required in relation to transport services. On the other hand, some supermarkets did not agree with the pilot test conditions and therefore they did not respect the regulations set.

Other challenges of the project are all related to the dependence on:

- The initial investment
- Carriers involvement
- Difficulties to compete with self-employed carriers (low fares)
- Difficulties to find premises with good access to place distribution centre

Finally, some of the barriers relate to the use of cargo bikes:

- City geography: on very steep slopes there could be problems with the use of bikes.
- The load capacity is limited to 100-150 kg.
- Bike battery autonomy (with about 8 hours charging).
- The need of a distribution centre to perform load break and the transfer to the bike located within the distribution area.
- Distribution area bikes:
  - Medium load (70 kg): Up to 3 km from distribution centre.
  - Packages: Up to 6 km from distribution centre.
  - Light merchandise: Up to 8 km from distribution centre.

**Innovation and transferability**

This practice is totally feasible. Nowadays the Txitas Company is operating and economically self-sufficient, working in other projects and expanding its market to other cities.

This solution can be transferred to mail or packages delivery. However, when considering transferability, it is necessary to take into account the geography of the city (on very steep slopes there could be problems with full loaded bikes), the need for high density of drops (as only short distance trips are viable) and the need to create new distribution centres, because of coverage limitations.

The Txita company has already "exported" the service to various other Spanish cities, i.e. Barcelona and Bilbao.

**Synthesis of results in cluster/topic context**

The company delivering the products Txita and their clients are all SME’s. This scheme using electric tricycles for last mile deliveries was led by a public authority decision and it was set in cooperation with other local partners. It depended on subventions for its implementation, though it is now considered as economically self-sufficient. This solution helped to reduce traffic congestion and emissions and can be easily transferred to other densely populated cities. On its own, it is an example for transferability, since it is similar to existing concepts such as La Petite Reine in France.

**More information**

[www.txita.com](http://www.txita.com)

Fermin Echarte: fermin_echarte@donostia.org
2.4 Case analysis and conclusions

The collection of the inventory cases has been an important step in the work of BESTFACT. The focus of the 2013 best practice collection was on urban consolidation centres and clean vehicles. Most cases address these topics either by a combination of urban consolidation centres and clean vehicles (characterized by vehicles of 3.5 to and more) or small vehicles of eBike and small delivery vans.

2.4.1 Urban Consolidation Centres (UCC)

A BESTFACT Urban Freight Cluster workshop entitled “Growth of Small Scale Solutions in Urban Freight, Green Logistics and eFreight” took place in Brussels on 29/30 January 2014 addressing a large number of inventory and in depth cases collected in 2013. 14 presentations were made during the two days that provide the participants with the opportunity to discuss about the latest developments and research into urban consolidation centres, micro consolidation centres and in particular the potential for growth of small scale solutions.

Following the classification of urban consolidation centres as done in BESTUFS three distinct categories of UCC can be identified in the EU:

1. Special project UCCs: these are UCCs that are used for non-retail purposes, for example construction material UCCs. This type of UCC may well serve a single site. However, such UCCs could potentially operate over any given geographical scale of the urban area. This type of UCC may well operate for a given period of time while the specific activity linked to the UCC takes place.

2. UCCs on single sites with one landlord: examples include UCCs at airports and shopping centres (e.g. Heathrow retail UCC by DHL). These UCCs differ from other retail UCCs in the following ways: i) these sites are built as a single development so the UCC can potentially be designed into the planning of the site, ii) the landlord has the potential to insist that tenants use the UCC, iii) the unloading points at the final destination tend to be located off-street in a specially designed delivery area with access via a single route, iv) the UCC operation can potentially be made self-financing through rent structures and handling charges.

3. UCCs serving a town/city: examples include many German city logistics schemes, La Rochelle in France, and Broadmead (in Bristol, UK). These UCC schemes can vary in terms of:

   - the geographical area they serve (which can either be large or small. For instance such schemes can, serve a small district such as a narrow, historic centre of an urban area, a specific retail area, or a larger, more diverse geographical area up to an entire town/city).

   - the number of companies operating the UCC scheme (which can be a single company (e.g. La Rochelle, or several companies (e.g. German city logistics schemes).

Each of these three types of UCC can offer either relatively basic consolidation services or can offer a wider range of value-added logistics activities such as stockholding facilities, ticketing and pricing, goods return and waste collection services. Similarly, each of the three types of UCC could also potentially offer community collection.
Financing arrangements vary between UCC schemes. Some UCCs have been dependent on public funding either from central, regional or local government. Some UCC schemes have received funding from EU projects. Meanwhile, other UCC schemes have been funded through a mix of financial support from commercial partners and contributions from receivers using the scheme. There is a growing number of UCCs that demonstrate that they can operate on a commercial basis without the need for subsidy. Overall commercial viability and attracting goods volumes to the UCC are key indicators for their success.

Within this year material collection new forms of UCC have been analysed and discussed leading to innovations in UCC.

Binnenstadservice is based on a new business model introducing a “last mile as a service” concept in which the shopkeeper has to pay for the final delivery service. Binnenstadservice is organised as a franchise service that allows for a scalability and transferability of the concept. Public benefits are achieved due to a bundling of shipment at city limits and the consolidated delivery on demand of the shopkeeper. Binnenstadservice demonstrated a potential on saving costs and CO2 emissions of more than 50% compared to conventional delivery patterns.

City Port Padova is a successful example for a commercial viable UCC starting with public money in the start up phase and becoming financial self sustainable after a 3 year period. Planning aspects such as geographical location as well as accompanying support measures are success factors for this UCC. Padova is operated by a neutral management which is different to other successful UCC in Europe. Using low emission LNG vehicles and providing consolidated delivery services reduces emissions within the inner city area. Key success factor is the growth of volumes over the year UCC Padova could achieve. Here a closer look at the services provided is needed (which cargo, geographic area, contractual issues). These seem to perfectly fit for Padova.

The Gothenburg City logistics Initiative aims to establish a micro-consolidation centre in combination with delivery using electric vehicles. Therefore, the Gothenburg case is an approach which is tested in similar layouts in different cities in Europe, such as Brussels, Berlin. It demonstrates an approach towards CO2 free inner city distribution. Key issue for a successful continuation is to adopt the right business model. Here the initiative is working in different directions; establishing a non-profit based public private partnership or transfer to a private service provider. Key will be to generate (sufficient) transport volumes from logistics service providers and retailers. In this context the role of the city being an open communication point is very important for the success of the approach.

The Copenhagen khb combines aspects of Binnenstadservice with “classical” UCC schemes such as Padova. Last mile operations will be provided as a service as in the Binnenstadservice case while the UCC together with (electric) vehicle is operated by a public entity. Again the municipality is playing an active role to bring the practice towards a commercial viable level by means of providing communication platform and start up support.

### 2.4.2 Electric Vehicle Delivery

There is a current market tendency to be observed, in which small scale solutions develop within a specialised niche market, especially for clean technology solutions such as small cargocycles, small battery electric vans, for consolidation centres and for the IT used in urban context.

Within a dedicated workshop on “Growth of Small Scale Solutions in Urban Freight, Green Logistics and eFreight” the most up to date business solutions, markets, technology aspects and policy/regulatory frameworks designed to support the uptake of these small-scale solutions has been discussed.
The workshop provided a deeper understanding on the conditions for a future sustained growth of this type of business, and to understand the role electric vehicles can take over within urban delivery. Obviously, the usage of electric vehicles for urban distribution is closely linked to the usage of UCC and micro-consolidation centres.

Out of the BESTFACT activities a classification on eVehicles and their employment within urban logistics processes the following structuring can be given:

- **eBikes**: suited for small consignment sizes such as letter and documents as well as small parcels. Normally operating in a range of 10 to 20 km. Typically, employed for last mile delivery in (large) inner city areas.

- **eVans**: suited for parcels and small shipments sizes, extending the fleet of fuel propelled vans, located at distribution centres. Operating in a range of up to 60 km.

- **eTrucks**: eTrucks up to 12 tonnes as well as hybrid trucks for larger shipment sizes, presently there are prototypes operating in different applications.

Within this year best practice collections many cases on eVehicle delivery have been analysed and discussed highlighting the innovations electric vehicles provide to the supply chain and last mile delivery.

Based on the policy action carried out by Gnewt Cargo a deeper insight into key issues of eVehicle operations and success factors could be gained. Key of Gnewt is to combine commercial success and growth with environmental benefits for the city and inhabitants. These findings can be put into a general context of similar approaches and how this can be transferred to other cities.

Based on the statements received from Gnewt the following key findings can be summarised as follows:

| Initial idea/ similar approaches in Europe | La Petite Reine in Paris |
| - | Green link |
| - | Clean Vehicles San Sebastian/Txita |
| - | La petite Reine |
| - | Cargo cycles trial Berlin |

| Key drivers | Cash rich, fair customers |
| - | Contract on critical mass to set up commercial business |
| - | Central location of depot |

| Problems | Finding suitable land |
| - | Getting licenses for bikes |
| - | Cargo cycles are not really suited for the cargo distribution in the city, goal was to employ electric vans |
| - | Awareness of customers on green distribution is low |
| - | No insurance was provided |
IT requirements are high for a small start up
Grants are not facilitating but raise scepticism on commercial sustainability

<table>
<thead>
<tr>
<th>Facilitation</th>
<th>Marketing and PR on the approach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Partnership and networks</td>
</tr>
<tr>
<td></td>
<td>TFL provided contact for additional clients</td>
</tr>
<tr>
<td></td>
<td>Customer included Gnewt into their insurance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>USP</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quality</td>
</tr>
<tr>
<td></td>
<td>Service level agreements</td>
</tr>
</tbody>
</table>

With the possibility to analyse similar electric delivery solutions and to compare their activity and business model aspects of market success and transferability could be highlighted and deeper insight could be achieved.

Green Link, as well as Gnewt Cargo could show that delivery costs are not higher for the client and still, it is a profitable model contributing to the reduction of traffic congestion, noise and air pollution. This statement also holds for the other cases analysed. However, with regards to the profitability the surveyed Spanish cases shows more difficulties in becoming independent and commercial viable than the cases of Green Link and Gnewt. These cases try to extent their business model with additional services:

- eMaker focus on a easy and simple IT connection to retailers in order to make the final delivery by eBike
- Txita focused on same day deliveries from retail and super markets

Key conclusions on eVehicle delivery fleets:

- Inner city hubs/Terminals are a necessary element of inner city delivery with electric vehicle due to the limited operation range. For small start ups the issue of dedicated delivery infrastructure might not be of key importance. However during the growth process “professional” solutions become of high importance. Public support on planning, land use and partly financial level is needed to establish urban depots
- For the delivery business relationships and partnerships are a key. Co-operation with stakeholders is needed for orchestration of the network. This is co-operation between carriers and the orchestrator. Air quality issue helps to get acceptance.
- The business model for last mile e-delivery services my change. The role of last mile company may be in the beginning carrier’s carrier and develop in future into a carrier to the end customer. End customers are commercial parties. For home deliveries collecting points could be an advantage for the distributor.
- eVehicles are cheaper to run than diesel trucks (35 pounds for electricity in a week, 150 to diesel). Charging places in infrastructure are not interesting as they are not needed.
- For investors eVan delivery is very high risk business and no loans are available.
3 Cluster 2: Green Logistics and Co-modality

Co-modality and green logistics are treated as a unified concept throughout the work of Cluster 2. The focus of co-modality lies on the use of different transport modes on their own and in combination. Co-modality is increasingly linked with green logistics. Green logistics is the integrated management of all the activities required to move products through the supply chain, in a way that it reduces environmental impacts and meets customer requirements at minimum costs. These activities include freight transport, materials handling, packaging, inventory management, storage, waste management and the related information processing. In the past, the externalities produced (e.g. climate change, air pollution, noise and accidents) were not seen as a priority by the companies. Given the high energy prices, the increased congestion (affecting reliability), the requirements of the clients and the stricter legislation by the different governmental entities, more companies have become more active in looking for green solutions for their logistics.

This chapter in the best practice handbook gives an overview of the activities of BESTFACT in this cluster. In the information base all collected and presented cases since the publication of the first handbook are summarised. In this context the challenges and central cluster topics are critically analysed which allows a clustered synthesis of the best practice cases.

3.1 Collected cases

This section summarises the information base of the collected knowledge in the cluster. It consists of the collected inventory cases, the in-depth cases providing further details as well as cases which were presented and discussed at the BESTFACT events. Additionally the project provides support to case developers in extending successful best practice cases while closely monitoring their progress to better assess the impacts and effectiveness; these projects are included in BESTFACT as implementation actions. All these cases are shortly presented in the following chapters.

The second edition of the BPH summarises further 15 collected cases within the Green Logistics and Co-modality cluster, which are related to five cluster specific subjects. Out of the 15 selected cases, 7 cases were considered for an in-depth analysis following the methodology defined in WP2. In the following table the cases are grouped according to main topics and their collection status which is indicated as well as a short overview.

<table>
<thead>
<tr>
<th>Cases</th>
<th>Inventory case</th>
<th>In-depth case</th>
<th>Short overview</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policy schemes for greenhouse gas emission reduction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal CO2 Ordinance in Switzerland</td>
<td>✓</td>
<td></td>
<td>The ordinance allows innovative private actors in transport to set up and develop programmes to reduce emissions within their own field of expertise and to capitalise the achieved CO2 savings.</td>
</tr>
<tr>
<td>Objectif CO2</td>
<td>✓</td>
<td>✓</td>
<td>Road transport signatory companies develop and implement a personalised action plan to achieve a target in reducing fuel consumption. Public authorities, behind the strategy, will supply reporting tools and fund support for companies.</td>
</tr>
<tr>
<td>TK’Blue</td>
<td>✓</td>
<td>✓</td>
<td>TK’BLUE AGENCY is an extra-financial rating agency assessing the environmental footprint in freight transport and logistics.</td>
</tr>
<tr>
<td><strong>Innovative corridor technology for zero emission and green logistics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENUBA 2</td>
<td>✓</td>
<td>✓</td>
<td>The mission of the ENUBA project is to determine whether the existing electrification technologies can be used for different applications in heavy freight transport on highways.</td>
</tr>
<tr>
<td>Case Study</td>
<td>Summary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>---------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greenway</td>
<td>An electric vehicle leasing service, providing a charging and battery swap station infrastructure for customers who pay a package price for the vehicle use.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B&amp;Q GasRec project</td>
<td>This is one example of a whole series of projects in the UK to validate the option of alternative fuels and energy inputs for heavy goods vehicles.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vert chez vous</td>
<td>Vert chez vous has a fleet of vehicles for the next-day distribution of goods in the cities of Paris and Toulouse, operating only on a barge and electrical power or gas powered vehicles.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Franprix</td>
<td>The case shows an innovation by integrating IWW vessels in green transport chains for store deliveries and reliably links IWW to the last-mile transportation modes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cargobserver</td>
<td>The solution is a plug and play 5 Year maintenance free device called Cargobserver and mounted on Containers for a complete monitoring of the transport process on land and sea from origin to destination.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIDRIA</td>
<td>Hidria optimised the packaging waste logistics processes by introducing new technologies.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triple-E</td>
<td>Triple-E is the largest vessel of any kind in operation today and also the longest and widest container vessel possible based on current port restrictions.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Infrastructure and corridor development and management**

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Freight Transport Cluster</td>
<td>A non profit association, increasing the competitiveness of Bulgarian enterprises in the sector of intermodal transport services.</td>
</tr>
<tr>
<td>East-West Transport Corridor Association</td>
<td>An association aimed to establish and develop transportation and logistics networks between Europe and Asia (with focus on the Baltic Sea Region).</td>
</tr>
<tr>
<td>GreCOR</td>
<td>The High Capacity Transport Corridor (HCTC) is a pilot project, promoting co-modular transport in the North Sea Region as one of the four GreCOR pilots.</td>
</tr>
<tr>
<td>Ferrara inland waterway</td>
<td>The Ferrarese Waterway forms the southern link between Po river and the Adriatic Sea with a 70 km route between the bank of the Po river in Pontelagoscuro and its marine outlet in Porto Garibaldi.</td>
</tr>
</tbody>
</table>

It becomes clear that a wide selection of cases benefiting the transport system efficiencies has been selected to be presented in the green freight and co-modality cluster. The localisation of the cases is often difficult due to the multifaceted potential and overlapping areas between the topics also addressing integrated issues. The collection shows a well rounded perspective on all relevant topics.

For each collected case a BESTFACT Quick Info Sheet was prepared, highlighting the key aspects of the projects and solutions. These can be accessed, saved or printed online via [www.bestfact.net](http://www.bestfact.net).

In September 2013 the BESTFACT international workshop on Co-modality and Green Logistics was held in Vienna. In two sessions co-modal solutions and economically feasible solutions and innovations were presented with participants across all public and private actor groups in the field of freight transport and logistics.

It was emphasised how important it is to develop and use best practice cases in the industry. With the heterogeneous development stages across Europe it is not possible to identify best in class cases which can be transferred with equal success for full feasibility independent from framework conditions. Also, while confidentiality and difficult before-after comparisons are limiting level comparison of cases, the BESTFACT approach of analysing a broad range of cases with the expert view of a diverse consortium proves to be a valuable support for actors from all involved industries and governments. The presented cases delivered interesting insights directly from developers and factored into the overall view of the cluster.

**Presentation and context**

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail Cargo Operator: Building a network of high frequency long haul shuttles</td>
<td>RCA Rail Cargo Austria</td>
</tr>
<tr>
<td>The Alps - main gate to Italy and the South-Eastern Mediterranean Countries</td>
<td>Rail Traction Company</td>
</tr>
<tr>
<td>The «Intermodability» Project: analysis of the logistics flows in the Italian FMCG industry that can be potentially shifted from road to rail</td>
<td>Hull University Business School, Logistics Institute</td>
</tr>
<tr>
<td>Case Study</td>
<td>Organization</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>Logistics networks using inland waterways – examples from Mars, Heinz: the scale of IWW operations in NL and EU</td>
<td>Bureau Voorlichting Binnenvaart (BVB)</td>
</tr>
<tr>
<td>Green rail: reality or fiction? Why 45 ft container is the right size</td>
<td>Unit 45</td>
</tr>
<tr>
<td>Sustainability in Operation: Co-modal Bulk Logistics with Mobiler Technology</td>
<td>Asamer &amp; Hufnagl Kies und Betonwerke GmbH</td>
</tr>
<tr>
<td>Best Practice on intermodal bulk transport at H&amp;S Transport</td>
<td>H&amp;S Transport</td>
</tr>
<tr>
<td>New ro-ro service between Trieste and Bettembourg</td>
<td>CFL Multimodal S.A.</td>
</tr>
<tr>
<td>RETRACK - Co-modal Train service from Netherland to Romania and further extension</td>
<td>Panteia &amp; TRANSPETROL GmbH</td>
</tr>
<tr>
<td>Implementing green corridors: What can be learned from SuperGreen?</td>
<td>NTUA</td>
</tr>
<tr>
<td>Metrocargo: the solution for competitiveness of rail freight transport. How innovation makes sustainability and efficiency run together</td>
<td>I.LOG Iniziative Logistiche S.r.l</td>
</tr>
<tr>
<td>There is a lot of green in the yellow: Innovations and practices in postal services</td>
<td>Austrian Post AG</td>
</tr>
<tr>
<td>No Circular Economy without Sustainable Logistics: Mission to eliminate carbon footprint by 2020</td>
<td>Interface</td>
</tr>
<tr>
<td>Developing a sustainable impact via road traffic avoidance at European level at Mondelez</td>
<td>Mondelez, European Business Services Centre</td>
</tr>
</tbody>
</table>

The presented cases and speeches are taken up in the analysis of the cluster topics and challenges as well as in the case analysis where they match the discussed sub-clusters.

For all presentations held at the workshop there are downloadable slides with more details and information available from the BESTFACT webpage at [www.bestfact.net](http://www.bestfact.net).

3.2 Cluster challenges and developments

The target of delivering 60% reduction in greenhouse gas emissions by 2050 (EC, Transport White Paper, 2011) can only be achieved with a cleaner, safer, smarter and more integrated transport system. The trend towards this development has also been identified in the Horizon 2020 strategy from the European Commission. The increase in co-modality and the use of greener solutions requires changing the ‘business as usual’ approach and develop new concepts and technologies. It starts with a ‘mental shift’ and this is one of the biggest challenges.

Nevertheless, a trend can be seen towards cleaner vehicles and vessels (e.g. using LNG or electric propulsion). The main current barrier is the limited available installations and infrastructure for alternative fuels and propulsion systems. Most of the available identified best practices are also in a starting phase and need further development. The use of electric vehicles has until recently mostly been used for urban distribution due to the limited range of the batteries. However, there are now more evolving best practices identified focusing on the use of electric propulsion for interurban and longer transport distances.

Challenges can also be identified looking at traditional logistics sectors, such as the postal services. In their presentation at the Cluster 2 workshop “There is a lot of green in the yellow” the Austrian Post AG highlighted the changing business environment. The postal services have experienced a 3-5% decrease per year due to electronic substitution. On the other hand, there is a 5-10% increase through e-commerce. The circular processes of a company should bring advantages towards costs, service and the environment (CO2). Some measures taken by the Post are: pick-up boxes, mobile notifications for customers as well as the use of E-bikes. By the end of 2016, Post AG wants to achieve zero CO2 emission due to use of green measures. It becomes more important to discuss environmental issue with the clients and stakeholders and meet their needs towards greener solutions.

Some cases identified have also indicated a trend towards voluntary or even mandatory CO2 reduction plans. This has pushed more companies into making greener decisions in their logistics operations.
There are different possible solutions to achieve benefits for the economy, environment and society. One of the challenges for this BESTFACT cluster is how to maintain an objective and impartial perspective when evaluating a wide inventory of possible candidate projects. This is related to the fact that a solution can be considered as a best practice for one person, while another could consider it to be less innovative. Having different project experts assessing the collected cases based on a specific methodology has helped the selection process to some degree but an objective selection of comparable best of the class solutions is out of reach.

As recognized in all of the work, the commercial considerations still underpin the functioning of the transport and logistics sector with a focus on cost effectiveness, and competitiveness as the key factors which will either lead to the adoption of a project or concept at a wider level or not. Solutions increasing fuel efficiency (i.e. lower fuel costs) or using less expensive alternative fuel can trigger these companies to choose cost-effective and cleaner solutions. In other cases, mandatory solutions are needed to `push' the sector into making greener choices (e.g. CO2 regulations).

One of the main barriers remains the financial possibilities of investing in greener solutions. This is especially the case given the impacts of the economic instability and the willingness of companies, financial institutions and even governmental institutions to fund or co-finance these solutions.

As an example for larger scale initiatives taken on the private side the organisation of Mondelez gives a practical insight in their optimisation processes. As a true global player they are under close supervision to optimise its operations for efficiency as well as sustainability. In their presentation at the BESTFACT workshop in Vienna “Developing a sustainable impact via road traffic avoidance at European level” Mondelez showed concepts how they manage international transports, mainly between plants and warehousing. Their focus is not only on transport management, but the optimization of the whole process. Mondelez auctions the transports and then orders them. Before this measure, higher tariffs where paid while their transport operators were not fully optimised for their load factors, resulting in inefficiencies. The idea was that by reducing the transport costs, Mondelez would pay less and the transport companies themselves would optimize their transport loading factor (reducing the empty runs). Even though, the transport operators have improved, their benefits are still not optimal. Thus an optimisation is not translated into profits for all the stakeholders.

3.3 In-depth cases

For the second best practice handbook seven in-depth case studies were performed in the BESTFACT cluster on Green Logistics and Co-modality. The most important cases are presented in short in the following chapters. Their motivation is highlighted, the solution and experiences are shown in short and an overall expert assessment of the contribution to strategic targets is given. Most importantly contact information is provided to request more detailed information about all cases and to support dissemination of successfully implemented solutions to all interested parties.

3.3.1 TK’Blue

TK’Blue aims at rating in a transparent and simple way, progress made by shippers and carriers in their use of environmentally friendly transport, cutting the emissions of greenhouse gases and reducing externalities: noise, road congestion, emissions and security.

Solution
The TK’Blue Rating assesses the different aspects of the logistics management based on enforceable European criteria:

- The progress made from one year to the next;
- The comparison of the company with its competitors

TK’Blue directly addresses all private stakeholders: Shippers, carriers, freight forwarders and infrastructure managers. Local public authorities can also be involved. The TK’Blue Agency (TKBLA) client company must identify and communicate to the agency the beneficiaries of the rating (Logistics, Supply Chain, Sustainable development, Corporate Social Responsibility -CSR, IT, Top management, etc.), define the scope of the rating process and define the TK’Blue management tools that will be used. The rating scope can relate to a geographical zone, a particular route, or a specific product. The first scope definition generally facilitates the data transmission and enables to reach the minimum threshold of carriers with the TK’Blue index in order to have a significant analysis.

In order to get a representative assessment of the logistics choice’s environmental performance of a carrier or freight forwarder, at least of 85% of the volume transported by carriers and freight forwarders has to have their TK’Blue Index. If the operators within the rating scope had already obtained their TK’Blue Index, the management tools will be already available online after the transportation’s company data transmission. If the operators within the rating scope do not have their TK’Blue Index, the company will ask them to connect on the TK’Blue labelling portal in order to get their index. Each time a client changes equipment or a process within its organisation, an update on implementation is necessary.

The TK’Blue Agency methodology relies on European criteria of negative externalities calculation. The methodology will progress according to European standards.

Experiences and impact

The TK’Blue portal supplies different steering tools facilitating the analysis of the CO2 performances per transport mode and per carrier. Carriers and shippers can also obtain the aggregated CO2 information of a transport operation as well as the method of calculation.

In particular for shippers, the TK’Blue Rating combines their mode choice and the labelling of the carriers they are working with. These are the two core components required for the development of a shipper score on its logistic choices and these choices are taken into account in the rating algorithm. The differentiation between modes is based on all the externalities: air pollution, congestion, accidents, noise, climate change and the upstream and downstream impact. This index reflects the marginal cost of negative externalities for each transport mode.

The carrier’s intra-modal index is based on their energy efficiency equipment and their human resources management. Those two indexes are combined and weighted to calculate the shipper annual TK’Blue Rating. The TK’Blue Rating is directly proportional to the TK’Blue made with one optimodal transport mode. Moreover, the Rating includes assessment and evolution features that enable companies to position themselves in relation to their competitors. The carrier certification index for a given transport mode reflects the willingness to reduce their GHG pollution level. This index is calculated using European criteria and represents the carrier’s efforts in order to increase their energy efficiency, for instance by retrofitting their equipment, filling up the thanks by low emissions fuels or using eco-driving patterns, etc..

Since October 2013, carriers must inform their clients of the CO2 emitted by their transport, (French article L1431-3 of the transport code and the decree No. 2011-1336). TK’Blue gives a simple solution to comply with this regulation. Through the TK’Blue portal, the principals
have access to the CO2 legal information, the CO2 management tools, data collection (global, by shipper, by delivery) and other documents regarding technical and environmental performance.

Figure 13: TK'Blue benefits for shippers and carriers

For now the TK’Blue Agency is only relying on private funds. The main investment cost has been the development of the rating methodology and the corresponding online information system. The system, including the website, has been tested with two French companies: Carrefour, a very large retailer, and Greenmodal, a freight forwarder of CMA-CGM, the French largest shipping company.

Success factors and barriers

The main benefits of the practice for shippers, freight forwarder and carriers are the quantification of their effort to reduce their transport externalities (TK’Blue Rating) and their CO2 (CO2 rating). The recognised and reliable indicator for the Sustainable Development Report that meet the new European regulation on CSR and CO2 information is an important marketing communication tool to value environmental efforts towards clients.

The main weakness of the TK’Blue concept is that it is based on the operators’ motivation to reduce transport externalities. Many shippers and carriers are still reluctant to change: they prefer to wait and see the new rules and the new practices. In addition and a quite important risk, is that carriers wait for each other before entering into the TK’Blue system, which: without carriers will not work.

Innovation and transferability

The practice is easy to employ for client companies because the web system developed by the TK’Blue agency facilitates all data transfers. The companies transmit periodically a data file with information per transport operation, including: reference (shipper’s transport operations number), the carrier (TVA number), mode, fleet identifier (reference for a carrier’s specific fleet), specificity (e.g. empty unit or refrigerated transport), transport date, weight or volume, distance.

The TK’Blue experts support the company in defining the scope and frequency of data transmission. A schedule and procedure for a semi-automatic exportation is established. The client uses the data stored in his own Transport Management System. The information is exported to the rating portal (www.tkblueagency.eu) in Excel or CSV format. The Agency analyses the data received and validates or notify the errors (missing data, lack of reference, etc.).

The software helps in filling part of the information; for example, the distance can be automatically computed if the enterprise provides the set of match Origin Destination Distance. The carriers can confirm if the TVA assigned correspond to their names. Further details will be provided for transportation services performed under specific conditions (for instance combined transport, refrigerated transport). The Parties hereby undertake to respect the confidentiality of information provided, as stipulated in the rating contract. Every year a TK’Blue
rating report is delivered to the company, presenting the TK'Blue rate attained by the company and a detailed analysis of the company's transport environmental policy.

**Synthesis of results in cluster/topic context**

The TK'Blue case is an example of how to assess the energy efficiencies of transport operators. TK'Blue allows different companies to comply with CO2 reporting requirements and also represents a marketing and CSR benefit to those companies using this system. Having a neutral agency dealing with the data provided in a transparent way is a positive aspect from this best practice that could be replicated in other countries, depending on the CO2 reporting requirements.

**More information**

www.tkblueagency.eu

Martin Burgat, email: martin.burgat@tkblueagency.eu

Tel. +33 9 81 01 16 14

**3.3.2 East-West Transport Corridor Association**

There was a lack of management structure within the East-West Transport Corridor (EWTC). Coordinating the activities of the corridor was necessary for its development and branding. Since many businesses usually have short-term perspectives, the EWTC Association could add more medium and long-term perspectives to the corridor, and could contribute to the improvement of its functions and capacity. Moreover, the Association could maintain a necessary dialogue with governmental and international institutions which could not be successfully maintained by individual companies.

**Solution**

The EWTC Association was launched in 2010. It is a triple-helix organization of stakeholders from the public, private, and the academic sector, promoting the EWTC concept in the Baltic Sea region (BSR). The association main mission is to stimulate new business opportunities along this corridor and to profile the brand of the EWTC concept after the INTERREG Programme EWTCII Project life time. The EWTC Association is commonly regarded as working successfully, e.g. creating the stakeholders cooperation and business development, such as the Viking Shuttle, (see dedicated BESTFACT inventory 2012) Mercury and Sun container trains.

![East West Transport Corridor Map](image)

**Figure 14**: East West Transport Corridor (Regional Perspective). Source: EWTC II project, 2010

Since the EWTC is the sum facilities supplied and offered through partnership, the core of the product of EWTC Association is quality of cooperation between the EWTC partners and the extension of partnership: the wider and better the cooperation and the better the integration of provided services, the better is the product.
The EWTC activities are aimed at strengthening the liaison between EWTC partners. This is done through a wide range of activities, the most important of which are: dissemination of information and development of dialogues on offers and needs with the partners. The development of cooperation between EWTC Association partners and stakeholders along the EWTC is pursued through the following activities:

- Organization of the EWTC Association Forums (two times per year);
- Preparation and distribution of a newsletter (on a quarterly basis);
- Upgrading the EWTC website;
- Arrangement of the EWTC Association Council meetings.

The identification and removal of bottlenecks are among the priority functions of the Association. The main activities in this area are:

- To carry out a network sensitivity analysis in order to identify the weakest transport growth links;
- To establish a method for network performance (monitoring/feedback).

One of the main bottlenecks in terms of the system performance is the delays in the transportation process due to documentation and clearance procedures at border crossings and modal shift points in this area. The EWTC Association experts have the capacity to take active part in the harmonization and simplification of the activities, i.e.:

- Establishment of the methodology for identification of administrative bottlenecks;
- Development of a common information network (along the corridor) for document management;
- Proposal of harmonized solutions for transport documents.

Proposals are developed for the implementation of relevant international policy conditions for the EWTC and national solutions affecting the competitiveness of the corridor. Among the key tasks of the Association are promotion of inter-modality and development of green transport ideas.

**Experiences and impact**

The EWTC association contributes to sustainable development by connecting the hubs and facilitating transport needs of growing markets (along the route) between the southern part of the BSR and Asia.
The Association also assist in solving cargo transportation problems and catalysing cooperation along the EWTC through:

- Enhancing intermodal interchanges
- Ensuring hinterland accessibility
- Strengthening connections to eastern freight routes
- Keeping focus on shorter transportation routes between the countries around the Baltic sea
- Closer cooperation between operators and authorities
- Tightening commercial connections between the EWTC hubs
- Deployment of an innovative IT-based “Information Broker system” for transport and traffic information which will increase efficiency and reduce the environmental impact.

The original East West Transport Corridor II project (INTERREG Programme) had a budget of 5.8 million Euros. In addition a grant related to the EU Strategy for the Baltic Sea Region Priority Area was awarded to improve the internal and external transport links. The consolidated estimated budget of this grant was of 44.35 thousand Euros

**Success factors and barriers**

Smooth cargo delivery is assured by well-developed railway infrastructure, synchronized train schedules, competitive tariffs, streamlined state border crossing and customs clearance procedures. Rail transportation helps the ports to constantly increase cargo volumes, speed up vessel traffic and cargo handling operations and thus avoid freight congestion, vessel demurrages and cargo damage. Container trains Viking, Mercury and Saule (Sun) are excellent examples of cooperation among railway, cargo forwarding companies and port authorities. The trains carry 20- and 40-foot containers, semitrailers, trailers and other ro-ro units.

Today the level of cooperation between the borders along the EWTC is not on high level. A couple of close partnerships between the hubs are maintained, but on an international level. The countries need to enhance mutual cooperation in order to develop a transport system that could increase the competitiveness of the regions along the corridor in a global perspective. Synchronized infrastructure plans and economic incentives have been mentioned as areas where closer cooperation is needed.

The EWTC Association, with representatives from Belarus, Belgium, China, Denmark, France, Germany, Kazakhstan, Lithuania, Mongolia, Slovenia, Sweden and Ukraine is responsible for the long term management of the EWTC development pursued after the completion of the EWTCII project. This is an important group of actors with a common interest to develop the intermodal transport, simplify the procedures, enhance transport opportunities across the borders and promote the economic incentives. All the above activities are very important to make the EWTC a competitive transport corridor and to increase its market share.
According to "Global study on trade and transports in the East –West Transport Corridor" prepared by Sweco (2012), the total value of the East-West (Asia–Europe) trade flows, which can generate transport flows through the EWTC was around 552 billion Euros in 2010; this value is expected to double by 2030 (Sweco, 2012). The share of goods transported through the EWTC today is around 2.3%, i.e. a relatively small share compared to the total trade in the entire East –West trade region. A small market share and the expected developments indicate that there is a great potential for the EWTC to increase its market share by 2030 (up to 5%) and by 2050 (up to 10%).

The EWTC Association is an innovative instrument and the catalyst exploiting the potential of market share growth within the corridor. On the other hand, it is necessary to note that East-West Transport Corridor (and its branches) cross territories of more than 10 countries which belong to different economic communities and systems. This determines different national transport policies, their legal regulation and different mentality of transport stakeholders. All the above are the obstacles in developing cooperation and mutual trust of the EWTC Association partners. Furthermore, the EWTC Association is an open organisation which does not have an internal regulation defining responsibility of separate partners. Any partner of the Association is free from legally binding commitments to the EWTC Association and can, after terminating its activities with the EWTC Association (or even without terminating the activity) work in the competing transport corridor.

**Innovation and transferability**

During last 2.5 years the EWTC Association have demonstrated the technical feasibility. This initiative affects not only transport and logistics sectors, but also other branches of economics and different companies, i.e. all the companies which need transport, logistics and goods distribution services. In order to ensure its continuity the Government support is necessary, especially because there are deals with international processes and multiple interest groups involved. The EWTC Association cannot really be extended, because it already involves multiple countries and thousands of companies all over the continent, but it can be transferred to other industries with a similar concept.

**Synthesis of results in cluster/topic context**

The EWTC is an example of how to improve the transport system by managing and coordinating different activities. A strong political support is needed due to the scale and involvement of different countries. Nevertheless, such a body can have an important impact at reducing administrative and regulatory inefficiencies, providing access to different modes of transportation and enhancing the cooperation and visibility of the different actors involved.

**More information**
3.3.3 ENUBA 2

It is predicted that the volume of trucks on highways will continue to increase in the future. Tonne-kilometres in freight transport in Germany alone will increase by 116% by 2050 as compared to 2005 levels. According to Germany’s Ministry of Transport, the transport volume increased from 2010 to 2011 by 8%. The expected increase in transport volume will be accompanied by a raise in annual CO2 emissions. Today’s solutions, which call for building new rail lines, increasing drive system efficiency and optimising logistics systems, are not enough to meet Germany’s ambitious carbon dioxide reduction targets. An expansion of the rail network, for example, would mean that rail lines would not only have to absorb the projected increase in truck traffic but also existing highway freight traffic. This would require a fourfold increase in rail network capacity. Moreover, the additional tracks would take up space that is not available in the densely populated areas where goods are ultimately consumed. According to a study conducted by Progtrans, the BMU, and the German Ministry of Transport, such measures would reduce the annual CO2 emissions to only about 60 million tonnes by 2050. This target could be achieved by also electrifying road freight transport.

Solution

The mission of the ENUBA project is to determine whether the existing electrification technologies can be used for different applications in heavy freight transport on highways. In addition, the study examined the potential economic and environmental benefits of converting to an electrified freight traffic system.

A scanner constantly monitors whether the lane is equipped with an overhead contact line and an adaptive pantograph establishes contact with the overhead contact line. This ensures that eHighway trucks can be used just as flexibly and universally as conventional trucks – because on roads that are not equipped with overhead contact lines, they are powered by their hybrid motor. The solution has not yet been finally implemented in Europe and is in a demonstration phase. The test facility is the former Templin Airforce Base, located in the Uckermark district near Berlin.

Figure 17: The ENUBA2 implementation

Experiences and impact
Apart from the already proven economic and environmental benefits, ENUBA provided highly promising results in terms of technology. In the field trial, the eHighway prototypes demonstrated full performance and suitability for everyday use—regardless of the weather, light conditions and load. Thanks to innovative active pantographs, the electrified trucks demonstrated problem-free operation at speeds of up to 90 km/h. And with the usual flexibility: Thanks to the reliable connection and disconnection of the pantographs and automatic adjustments to movements within the lane, eHighway trucks are as easy to manoeuvre as conventional trucks.

The overall costs of implementation depend highly on the distance that will be equipped with the technology. For a similar implementation in Los Angeles (USA) on a 30km strip, the estimated costs are about $14 million. This includes the whole demonstration project, including infrastructure and Trucks with different drives. The German Advisory Council on the Environment estimates infrastructure costs at €1.1 million to €2.5 million per kilometre (including guard rails and overhead power lines).

Success factors and barriers

The main advantages of the ENUBA project include:

- The eHighway system can be completely integrated into the existing infrastructure: This was one of the main goals of ENUBA. A difficult to implement and expensive system would not be adapted by municipalities and public authorities. So the system was developed to be as easily implementable as possible. This assures low implementation costs.

- Hybrid drive technology: electric power supply will be provided on electrified roads; on other roads the other drive system will be used: The system is very flexible as it is an additional one, not an incompatible alternative to the current system. It is important to consider that it is more economical viable the higher the coverage of eHighways.

- The system is independent from the other drive system of the truck. Could be natural gas, diesel, electric, etc.: Not only is the system independent from different roads in different countries but also to different drives in the vehicles. The trucks can be run with diesel, natural gas or anything other. The electric drive is fully independent of the other drive.

- The overhead contact lines allow vehicles to feed braking energy back into the grid. Then power can be used by other trucks, for example: The power can be fed into the vehicle and back into the system. Brake recuperation turns braking energy into electricity again and feeds it back into the system. This two way stream increases efficiency.

- It is just as easy to drive as in a regular truck: No behaviour changes by the drivers needed, because drivers retain full control to speed up, slow down, steer, and detach from the wires and switch back to diesel power.

- Independence of fossil fuel and locally emission free: The price of fossil fuel is unpredictable. The solution gives logistics service providers the independence of fossil fuel and lets the trucks run locally emission free.

On the other hand investments in infrastructure and new vehicles are necessary. In most cases, the solution is fully dependent on public authorities (e.g. District managers). They have to take actions and create a business case for this solution.

Innovation and transferability

One of the main goals of the solution was easy transferability. The implementation of the system on public roads lies in the hands of administrative bodies at national level. The practice makes sense on highly frequented highways and also in urban areas with high traffic.
There are no similar cases in Europe. In addition, the intelligent pantograph could be used for eBus and rail applications.

**Synthesis of results in cluster/topic context**

ENUBA 2 and its predecessor are an innovative example of how electrification could be applied in heavy freight-road transport. This system could also be used in other areas (e.g. ebuses) and could have an important role to play in densely populated areas in which switching to other modes (e.g. rail) is limited. ENUBA is designed as a relatively ‘easy’ concept to implement which still requires some infrastructure investment (though the investment could be lower than constructing more rail infrastructure) and political will at the national and regional level. The pilot in Berlin is following the concept already tested in Los Angeles, and therefore, proofs the potential for transferability of the ENUBA system.

**More information**

Holger Sommer, Siemens AG - Infrastructure & Cities Sector, Mobility and Logistics Division, Technology and Innovation
Werner-von-Siemens-Str. 65 , 91052 Erlangen, Germany
Tel.: +49 9131 7-25139, holger.sommer@siemens.com

### Grecor

The Nordic region is a sparsely populated area which translates in long transport distances. Trucks are using regular diesel and truck loads are smaller when compared to GreCOR European Modular System (EMS), which are not widely used in Europe. Volvo’s new motor technology enables usage of liquefied gases in diesel trucks. LBG has no environmental effects in principle. True lifecycle effects depend on the manufacturing technology and material used. Therefore, the vehicle and fuel technology is supporting the reduction of emissions from road traffic.

**Solution**

The High Capacity Transport Corridor (HCTC) is based on three technological issues: the European Modular System (EMS), Intelligent Transport Systems (ITS) and a methane-diesel tractor able to use liquefied natural gas (LNG) and liquefied bio-gas (LBG) and regular diesel.

PostNord Logistics and Volvo LNG/LBG vehicles route between Gothenburg and Oslo for a first stage pilot. Vehicles are EMS vehicles (25 m long and 60 t max weight). The final goal of GreCOR is to create a fully functional High Capacity Transport Corridor within the whole Oslo-Ranstad (NL) area. ITS services will support greener road transports by e.g. combining loads, higher payload in addition to more flexible motor technology which could result on a reduction in CO2 per tonne-km emissions from 20 % to 80 %.

Volvo is also investigating problems related to transport efficiency in the corridor. In addition to PostNord Logistics, Volvo also investigates other transport companies’ issues, including:

- New flexible engines capable of using LNG/LBG and regular diesel
- EMS vehicles: 60 t max overall mass, 25,25 m length

EMS vehicle may include:

- a truck with 7,82 m cargo space and a trailer with 13,6 m cargo space
- a hauling truck, a 13,6 m semitrailer and a mid-axle 7,82 m swap body
The role of ITS in the HCTC concept is to support the driver towards achieving greener road transports. One of these aspects is to combine loads and get higher payloads. Other stakeholders involved in this Interreg IVB North Sea funded project are, besides PostNord Logistics and Volvo: CLOSER/Lindholmen Science Park Swedish Transport Administration.

**Experiences and impact**

High productivity in transport is vital to sparsely populated Nordic countries. Availability of LNG/LBG is a key question regarding emissions. An LNG station exists in Gothenburg. The main impacts of this solution are:

- Increased energy-efficiency and productivity
- Fewer vehicles mean less congestion and better utilisation of infrastructure
- Fewer vehicles also seem to lower accident risk
- Standard loading units (containers and semitrailer) can be used
- Emission reduction (other than CO2)

**Success factors and barriers**

EMS trucks are able to carry standard size loading units (semitrailers and containers). Bigger maximum weights compared to common maximum weights in central Europe (40/44 t) increase productivity and energy efficiency.

LNG has slightly smaller environmental effects than regular diesel has. It causes no SO2 or particle emissions and CO2 emissions are smaller. LNG’s specific CO2 (56 g/MJ) emission is 20% smaller than diesel. On the other hand, LBG has no environmental effects in principle. The true lifecycle effects depend on manufacturing technology and materials used. The availability of LNG/LBG is a key question regarding emissions.

The main barriers for the implementation and spread of HCTC concept include:

- Infrastructure limitations (road, rail, terminals)
- Strong resistance of heavy vehicles in some EU countries prevents spreading high capacity trucks.
- Minimum volume is required (e.g. 25-35 000 TEU/year) to make services profitable

---

2 Source: Nylund. 2009. Possibilities of vehicle and fuel technology in reducing emissions from car traffic.
Implementing new technology to trucks is challenging:
- Legislation in several EU countries is not allowing today 60 tons trucks
- New gas distribution network is needed for trucks. This restricts usage range.
- Gas requires new technologies in addition to standard diesel truck – compression of gas into high pressure, cooling Motor technology

**Innovation and transferability**

Heavy vehicles need a proper road network and new size regulations. Gas-based fuels need delivery infrastructure. The economic success of alternative fuels depends on taxation in some extend.

All the actors in the truck freight are able to adapt this practice, within the local/national legislation. Therefore, this solution can be extended if regulations are adapted. The 60 t module trucks are normal equipment in Nordic countries. However, liquefied gas fuels are not widely used in heavy vehicles. The BESTFACT case Argonon, LNG Dual Fuel project has similar idea of a diesel engine using both diesel and liquefied gas in a vessel.

![Figure 19: An EMS from GreCOR](image)

**Synthesis of results in cluster/topic context**

The three innovative technological aspects of the HCTC have created a unique pilot, which delivers important reduction on emissions and results in a more efficient system. However, the required infrastructure and the regulatory changes that would be needed to expand such a system make its implementation specific to certain areas.

**More information**

[www.grecor.eu](http://www.grecor.eu)

Sofia Löfstrand
+46 31 322 99 65
Sofia.lofstrand@volvo.com

3.3.5 **Voluntary charter for a commitment to reduce CO2 emissions in road transport**

Those involved in the supply chain (individual transport companies, shipper cooperatives, etc.) had issued declarations of intent with regard to reducing CO$_2$ emissions, but the public
authorities were not necessarily on board and/or the objectives to be achieved were not quantified.

Companies often have problems freeing up the time internally to conduct monitoring and evaluate results (intermediate and final results predicted at the time they sign up). The time required to be devoted to it is often neglected by companies. It is important that one person within the company is responsible for the project, centralises data and motivates staff. Support from an outside adviser (the representatives) is usually essential to monitor the meeting of the commitments made by the company when signing up, and to provide assistance.

Solution

In December 2008, ADEME (French Public agency for the Environment and Energy Management) and the Ministry of Transport, together with the carriers’ representative organisations, launched a voluntary charter for a commitment to reduce CO₂ emissions in road freight transport, asking each signatory company to identify potential fuel savings and to implement a practical approach for achieving those savings. In exchange, the public authorities would recognise actions taken under the charter.

To sign the charter of voluntary commitments and thereby join the scheme, the applicant must fill in the online Web tool on the website www.objectifco2.fr, while complying with the following prerequisites:

- Carry out a CO₂ diagnosis using the online Web tool on the website www.objectifco2.fr. Its aim is essentially to assess the situation and choose the scope of commitment. This requires companies to have a good understanding and monitoring of: their fleet, the fuel consumption for each vehicle and/or driver, their driver training and awareness raising actions, as well as their transport flows.

- Choose/Define two environmental performance indicators specific to the company (g CO₂/km and an activity unit for obtaining the g CO₂/t.km indicator) with a 3-year reduction target.

- Define an action plan over a 3-year period based on the following four key areas:
  - Vehicle
  - Fuel
  - Driver
  - Organisation of transport flows.

- Choose at least one action for each key area bearing in mind that every action chosen should correspond to a quantified and measurable target to be achieved within a predetermined time period so that the results obtained can be monitored and assessed.

When reviewing the signing of the charter, other more qualitative elements may be taken into account, such as:

- human resources that the company considers deploying in order to lead and implement the action plan internally;

- the method chosen for measuring and monitoring the fuel consumption; etc.

Upon launch, 15 signatory companies joined the charter. Today one thousand have signed thanks to the action by the public authorities, trade associations and CO₂ project representatives. The number of CO₂ representatives is growing, with some regions having several, so as to make more companies aware and provide them with assistance.

Experiences and impact
Road transport companies usually make fuel savings by reducing their CO2 emissions and so reduce their costs.

The management and costs of the charter are:

- For ADEME: monitoring by its departments at a regional and national level (one person full-time at a national level) of the rise in the use of the measures, technical support and coordination of the actions of its representatives. The representatives (on average one in each of the 21 French regions, usually part-time) are financed by ADEME and the training bodies that employ them.

- For companies: costs vary depending on the measures taken, but usually the return on investment is quick.

- For the government: participation by its regional departments in steering committee meetings.

The “Objectif CO2” Scheme helped to reduce 715 000 tonnes of CO2 between 2009 and 2012 (4 years’ time), and on average about 1% annually per company out of the 3% during the years of commitment. Companies save between 2.2% and 3.6% of fuel consumption during their 3 years of commitments.

**Success factors and barriers**

The strategy is based on tools, guides and methods, including:

- A series of “action sheets”: The purpose of the action sheets is to help companies decide on the various solutions likely to be implemented in order to reduce the fuel consumption and CO2 emissions of their transport activity, by providing detailed and independent information. They are classified into the four key areas of the scheme: vehicle, fuel, driver and organisation of flows

- [www.objectifco2.fr](http://www.objectifco2.fr): This Website is the central tool for the scheme. Its objectives are to: review the relevance of entering the scheme (self-assessment), assess and monitor CO2 emissions on the chosen scope; assess the potential CO2 and fuel savings, as well as the return on investment, according to the actions chosen; monitor the progress of the objectives; monitor the predefined environmental performance indicators over the 3 years of commitment.

Representatives (usually employees of training bodies) are responsible for making companies aware of the approach (information) and for providing assistance and monitoring signatory companies to the charter. It is necessary to involve carriers associations and directly some representative carriers when constructing the approach and to involve them in setting objectives, methods and tools, in order to achieve better acceptance.

For the companies, the practice offers a quick return on investment, due to the fact that CO2 emissions are closely related to fuel savings. However, a company’s motivation tends to diminish after signing the charter. Individualised support is essential to maintaining motivation.

**Innovation and transferability**

The objective is to further extend the number of signatories to the charter. New representatives have been recruited for this purpose.

This original public policy approach encourages and supports voluntary strategies by transport companies to reduce CO2 emissions (“soft law” rather than standards and taxes) and could be further replicated.

**Synthesis of results in cluster/topic context**
This case is another example of public support and recognition towards transport companies goals in CO2 reduction. The charter could be easily transferred to other countries/areas in Europe, however, important coordination and motivation efforts are needed to keep and meet the charter aims and the commitment from the operators.

More information

www.ademe.fr

Gérald Lalevée: Gerald.lalevee@ademe.fr

Tel: +33 (0) 493957909

3.3.6 Ferrara Inland Waterway

The Ferrarese Waterways form the southern link between the Po River and the Adriatic Sea with a 70 km route between the bank of the river in Pontelagoscuro and its marine outlet in Porto Garibaldi. The main idea is to develop an environmental friendly mobility system alternative to those of road and rail, increasing the transport capacity and transport reliability. The combination of short sea shipping and inland navigation provide an efficient alternative, facilitating the international as well as the local transport needs linking the seaport of Ravenna and inland port of Mantua-Valdaro. Moreover, the industrial area of San Giovanni of Ostellato is located in a restricted neighbourhood of the waterway. This covers an area of about 105 acres, on which more than 30 companies from the provinces of Emilia-Romagna and Lombardy are located.

Figure 20: Localisation of Ferrara Waterways

The main barrier to overcome is the lack of funds for the completion of the construction investments (about 100 million Euros). Some sections of the whole intervention are already designed but without or only with partial funds. The total costs for Ferrarese waterway are estimated at 242 million Euros, for 70 km of work. Of these costs, 145 million are financed by Italian funds (Law 413/98) and 4 million by the European TEN-T funding.

The waterway Ferrara, once completed, will integrate maritime and inland waterway transport, covering all components of traffic in which the means of transport may be constituted by the tidal vessel, namely by a vessel designed specifically to perform coastal navigation at sea and enter directly in the waterway without making transhipment.

The Province of Ferrara expects positive impacts on local and regional economic development: this investment could be a driving force for the growth of local economies since several companies already operate along the Po river and the Ferrara inland.
Nevertheless, the financial needs and the political support required for the implementation of such a concept could also pose a problem for other regions considering a similar case.

### 3.3.7 Greenway

GreenWay (GWO) operates a unique electric mobility system, which is the world’s first to allow transportation companies and other businesses to eliminate their dependency on oil prices & to decrease their environmental footprint, while incurring the same or lower level of costs, as they are currently paying for their gasoline/diesel vehicles.

GreenWay transforms expensive and somehow complicated technology into a convenient and affordable service. Unlike the Tesla Motors or BetterPlace, the service is specifically aimed at B2B customers that use light commercial vehicles and drive enough distance to make EV an economically reasonable choice.

**Solution**

GreenWay's first client started the EV operation in May 2013 with two fully electric vans. After six months, the 1st results could be announced. On average, 38,502km were made per vehicle in that period. It is more than any other electric vehicle in the World. The client, Med-art, who is pharmaceuticals and medical material distributor in Slovakia, have used the vans all 106 working days without a single interruption, while achieving cost savings in comparison with running an ICE vehicle.

GreenWay started by offering their vehicles in the category of vans up to 3.5t. (converted Citroen Jumper). They have sufficient reach, drive on similar routes and prevail in the fleets of GreenWay’s identified potential clients. The EV’s are available for a comprehensive rental/service package, not for sale. Through the form of a monthly fee, GreenWay is able to stabilise the client’s cash flow for several years and thus eliminate undesirable impact of the increase in crude oil prices on the client’s business. The GWO service is not bound to a particular vehicle. The operator is entitled to replace the EV with a new model at any time. The operator guarantees the mobility service, which means that the client is entitled to use a substitute vehicle in case of a failure.

GreenWay operates a network of battery swapping stations where the customer can change the battery for a fresh one at no additional cost and within 5-7 minutes. In current technical possibilities, the battery swap station represents a tool for effective use of EVs. Without the station, the EV would have to stop after up to 200km and charge the battery, which would take dozens of minutes. Battery swapping is also considered preferential to rapid-charging, which might reduce the battery capacity.

Further details on the system include:
- **Battery swap:** after parking at the station, the driver identifies himself/herself with a chip card, the station lets him/her in and the display will show him/her the battery. Subsequently, the driver will swap the battery. Every driver must have completed a brief training to receive the authorisation to operate such a semi-automatic station. The whole action is supervised by GW dispatching. A trained driver can do it in about 5.5 to 7 minutes. The battery swap station is semi-automatic, which means that the software monitors and manages the steps of the driver. The battery swapping is conducted by the driver by means of a specially adjusted trolley. Neither the stations nor the EVs have in-built batteries, which makes possible to adapt them to the latest technologies thus reducing battery size and weight. The battery in the van takes about 1m³. It is located in the load space of the van. The battery has a separate and frameless cover, creating the elevated platform for placement of goods. The battery is put out of operation after it reaches 80% of its capacity, which should correspond to seven years of using. Subsequently, it can be secondarily used as an emergency power unit for cottages or households. After the expiration of battery service life, the battery is recycled in the usual manner.

- **Flexibility:** the technical equipment in the system is specially developed to meet the clients’ needs. At the same time, it is designed to allow future modernisation and adaptation to a technical development. The battery swap stations can be disassembled within a few working days and moved to other location or client.

- **Energy mix** in the Slovak Republic is characterised by a very favourable ratio of low emission energy, and therefore the emissions from electricity production are lower than specified by the EU. Yet, the company takes steps necessary to ensure the energy source produced with zero emissions.

![One fee includes:](image)

Figure 21: The GreenWay concept

**Experiences and impact**

The GreenWay vehicles are homologised throughout the EU. The GreenWay development-phase started on 17th October 2011 backed by a consortium of 10 partner companies. There were as many as 25 people directly engaged on the development-phase. The first tailor made EV was tested in one year after the project started. The two battery swap stations were introduced into service in October 2012 and the complex “system” testing was finalized by end or 1Q 2013, delivering technical proof of concept. GWO entered the commercialization phase in the second quarter of 2013 by signing the first commercial contract with a client and introducing 2 vehicles to its fleet. In November 2013 GWO started the operation on neighbouring market of Austria with clear business intention to facilitate the top tier customers. The Green Way Operator intends to become the leading electro mobility operator in the area of Bratislava, Vienna, Brno and Budapest, and gradually expand to more advanced electro-mobility markets of the Western and Northern Europe.

The main benefits of the GreenWay concept include:
- Financial benefits: EV without acquisition costs: the customer does not buy the vehicle. GreenWay provides a complex mobility service, which includes the long-term rental of an EV, access to the infrastructure, electricity, insurance, and all additional services.

- Zero administrative costs: while using the GreenWay service, the customer’s only responsibility is to pay the monthly fee. No fuel receipts, no payment cards, no insurance payments, no liquidated damages, no repairs or leasing. In order to increase the customer’s effectiveness, GreenWay is able to provide data necessary for the analysis of the vehicle use. Worrying about employees’ unethical behaviour relating to fuel transitions can be easily mitigated.

- Economic benefits: Transparent price structure: The monthly fee includes a fixed number of kilometres. The fee charged for each extra kilometre is very low and reduces the average price.

- Low energy price: The low price of energy is the key to success. Compared with a traditional diesel powered vehicle, the operating costs of electric vehicle per kilometre are significantly lower. The more kilometres you clock up, the more you save. GreenWay also offers a fixed price which is not subject to change for a very long time, eliminating risks resulting from unexpectedly fluctuating fuel prices.

- Benefits in the field of services: Continuous support through GreenWay’s despatching and call centre: through continuously monitoring data ‘en route’ such as battery capacity, charging, and range GreenWay is able to provide a high-quality service which increases reliability. All essential data is transferred to the central office every five seconds. In case of any problem, the customer can contact the operator who can find a solution as quickly as possible.

- Benefits for the society: Clean and quiet ride: The service provides the most ecological mode of transport of goods available. No matter how efficient the latest diesel engine may be, in terms of produced emissions the electric motor will always beat it. GreenWay brings another key change into the environment: silence.

- Environmental benefits using GreenWay is a clear sign of the customer’s focus on sustainability or environmental responsibility as corporate values. It is a way of showing green credentials without paying a high price.

The project introduces stability into fuel purchasing and also involves the use of a zero carbon fuel source. The local emissions are zero, and total emissions (well to wheel) are substantially reduced. Clients pay a monthly fee for delivered services. The total amount of the fee depends on the number of km ordered by the client. In the event that the client drives more km, he will pay an additional fee for each extra km. For the dispatching services the cost of operation depends on the geographical coverage, but in general it is about 1 million EUR per year for a midsize country, comparable with Slovakia.

The biggest cost driver by far is the investment in technology – vehicles and infrastructure. The cost of a battery swap station is about 150,000 EUR. The cost of an electric Van with two 60 kWh batteries heavily depends on the scale of order. Significant economies of scale could be achieved. Up until now private funding was used. No public or EU funds used due to low flexibility and long implementation.

<table>
<thead>
<tr>
<th>(original ICE vehicles)</th>
<th>(with GreenWay )</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCO = 0.22 € / km</td>
<td>Monthly subscription plan of 70,000 km</td>
</tr>
<tr>
<td>(or 1,300 € monthly for 70,000 km p.a.)</td>
<td>each additional km costs 0.13 €</td>
</tr>
</tbody>
</table>
1 vehicle drives 38,502 km in 6 months incurring costs of 8,570 €

1 vehicles drives 38,502 km in 6 months incurring costs of 7,727 €

savings for the client: 9.8%

Diesel powered Light Commercial Vehicles (LCV) produce 210 g CO2/km on average. An electric vehicle has zero tailpipe emissions. Even when the energy mix in Slovakia is taken into account, with 190 g of CO2 per each kWh of domestically generated electric energy, the e-VAN in the GreenWay system is responsible only for 50 g of CO2/km. Therefore, the reduction ranges from 76% to 100% on local emissions / global emissions (10-11 litres of diesel fuel per 100km is replaced with 30-32 kWh of electricity per 100 km).

Success factors and barriers

The service is designed for clients using light duty vehicles in their everyday activities. Basic prerequisites for efficient use of EVs include repeating routes and sufficient number of km driven a day. The combination of many components ensures comfortable and safe use of EVs. The service is based on a long-term rental of LCV EVs, which includes the amortisation of cars, costs of electricity necessary for battery charging at the client’s premises, the use of GreenWay’s battery swap station and quick charging station infrastructure, online monitoring, maintenance, service, insurance and all the other additional services. The full service offers individual packages so as to meet as many specific requirements of the clients as possible. GreenWay also plans to extend the offer of its packages to other categories of EVs.

Switching to EVs is very demanding financially. The investment is recovered in a relatively long period. No electric vehicle with required driving range is mass-produced yet (high price of low production volume cars). For the market with no subsidies the breakeven number of kilometres is relatively high (over 60,000km/year), which requires the electric vehicle with at least 190km driving range.

The success of the business case depends on the assumption about the price decrease of the electric vehicles in the course of next 3-7 years. About 30% price reduction could be generated internally by the growth, large volume orders and economics of scale.

Innovation and transferability

- Operation economically comparable to diesel-engine vehicles
- Saving in total operating costs
- Eco-friendly transport of goods with zero emissions (after factoring in the emissions from electricity production the actual value is less than 55 g CO2/km)
- Use of eco-friendly image as a tool of corporate communication and competitive advantage
- Leasing of the fleet without buying a single van
- Fixation of the amount of the monthly fee for a period of at least one year
- Advantageous price for extra km
- Advantageous price of the service for long-time clients
- Overview of current routes, online monitoring of the current state of the fleet
- Simple invoicing (without receipts, fuel cards, cash and their possible misuse)

The local energy mix should be considered in terms of environmental impact. In addition, different types of vehicles may prove just as successful as this practice. Geography is not a
problem – Slovakia is a country with hills, mountains and cold winters and hot summers, the EV’s fared well in these conditions.

Local incentives for purchasing EV’s may support the establishment of the operator in different locations. Today, there are no similar cases identified, though the business model is easily transferable to any EU country. Outside of the EU the local homologation of the technology has to be considered.

**Synthesis of results in cluster/topic context**

GREENWAY OPERATOR A.S. is a SME. The ability to rent an EV at a competitive flat rate can be extremely beneficial to any SME, especially since no investment is necessary. In addition, having green credentials can further enhance the participating companies’ position in many markets. It is important to consider that still the success of the business case depends on the assumption about the price decrease of the electric vehicles in the course of next 3-7 years.

**More information**

GreenWay Operator a.s. Bajkalská 5/B, Bratislava 831 01, Slovakia  
Peter Badík  
Tel: +421 911 668 346, peter.badik@mye.sk

### 3.4 Case analysis and conclusions

In the Green Logistics and Co-modality cluster seven cases were considered within the BESTFACT in-depth review. These cases provide added information on costs and benefits of the best practice cases. Together with the cases presented at the BESTFACT events and all other cases constituting the cluster information base a broad knowledge base was constructed. Furthermore there was the BESTFACT international workshop on Co-modality and Green Logistics held in Vienna. The case analysis considered the presentations and discussions at this event and highlights them in correspondence with the main analysis topics.

To receive a comprehensive overview of the progress made in the field a structured analysis of all available information was performed to analyse the application of practices in regards to identified challenges and developments. Therefore the sum of cases was structured into three topics:

- Policy schemes for greenhouse gas emission reductions  
- Innovative technology for zero emission and green logistics  
- Infrastructure and corridor development and management

Each topic allows a synthesised analysis of the corresponding cases in relation to the BESTFACT evaluation criteria. Highlighted cases give a short overview of the main aspects of a solution, benefits and costs or weaknesses as far as available. Through an expert view on the cases also a justification of the level of transferability and innovation is given in relation to the current situation and challenges in the field. For in-depth cases obviously the level of available information is more detailed.

The analysed cases related to the topics have been individually described and cross-analysed. From the evaluation it becomes apparent that the focus of the solutions in this cluster is not necessarily on the competitiveness and profitability of the organisations but instead is focusing the efficiency and quality of services. Along with the aims to reduce emissions and utilise the infrastructure in ideal ways the solutions on innovative organization of
transport and logistics services provide a wide array of effects on relevant best practice targets.

3.4.1 Policy schemes for greenhouse gas emission reductions

Often the risks of adopting technologies which reduce the GHG emissions are not outweighed by the economic benefits foreseen by private actors. Here it is of great value for public authorities to intervene and to stimulate the uptake of innovations and additionally motivate adoption of cleaner transport choices.

The BESTFACT topics of Knowledge, Tools and Methods showed the importance of data collection and statistics. While public actors also emphasised the need for modelling and forecasting methodologies, private actors in the industry requested working and implementation guidelines (BESTFACT D2.1). The presented cases show the fulfilment of all these topics reflected and show an innovation in developing new mechanisms supporting organisations to realise innovations themselves.

The Federal CO2 Ordinance in Switzerland provides a case where a program is set up to reimburse actors who are switching from road to rail transport for additional costs. The reimbursements are not made by the government but instead result from a certificate trade of fuel importers to offset emissions. With low project development costs ranging from 10,000 - 80,000 € private logistics service provider and shipper can register their program to participate in the certification trade for each reduced tonne of CO2. For the public actors only administrative costs for the government and the governing bodies accrue.

In December 2008, ADEME (the French Public agency for the Environment and Energy Management) and the Ministry of Transport, together with the carriers’ representative organisations, launched a voluntary charter for a commitment to reduce CO2 emissions in road freight transport, asking each signatory company to identify potential fuel savings and to implement a practical approach for achieving those savings. In exchange, the public authorities would recognise actions taken under the charter. When launched, 15 signatory companies joined the charter. Today one thousand have signed thanks to the action by the public authorities, trade associations and CO2 project representatives. This original public policy approach encourages and supports voluntary strategies by transport companies to reduce CO2 emissions ("soft law" rather than standards and taxes) and could be further replicated. This case is an example of public support and recognition towards transport companies goals in CO2 reduction and is unique in providing a framework facilitating CO2 reductions on national level. The charter could be easily transferred to other countries/areas in Europe, however, important coordination and motivation efforts are needed to keep and meet the charter aims and the commitment from the operators.

Since October 2013, carriers in France must inform their clients of the CO2 emitted by their transport. (French article L1431-3 of the transport code and the decree No. 2011-1336). The TK’Blue scheme gives a simple solution to comply with this regulation. TK’Blue aims at rating in a transparent and simple way, all progress made by shippers and carriers in their use of environmentally friendly transport, cutting the emissions of greenhouse gases and reducing externalities: noise, road congestion, emissions and security. The TK’Blue Rating assesses the different aspects of the logistics management based on enforceable European criteria (e.g. yearly progress and comparison with competitors). The TK’Blue Agency methodology relies on European criteria of negative externalities calculation and progresses according to European standards. Overall, the TK’Blue case is an example of how to assess the energy efficiencies of transport operators. TK’Blue allows different companies to comply with CO2 reporting requirements and also represents a marketing and Corporate Social Responsibility benefit to those companies using this system. Having an independent agency dealing with the provided data in a transparent way is a positive aspect from this best practice that could
be replicated in other countries, depending on the CO2 reporting requirements. The innovative and unique process based approach is one-of-a-kind in Europe and demonstrates the strength of private initiatives based on cooperation and willingness to comply to set standards.

3.4.2 Innovative technology for zero emission and green logistics

The smaller and more individual innovation solutions to logistics processes are commonly tailored for a specific use. Their economic benefits relate closely to a specific business model or company practice. On the other hand there are some improvements which can generate great qualitative benefits for enterprises. The quality is usually difficult to compare with costs and thus it is important to minimise costs for innovative solutions entering the market. The cases collected in this year show a clear progress on implementation of technology and processes which aid to become more competitive and advance with low investments needed.

The device used in the Cargobserver case allows a maintenance free monitoring of containers in all transport processes. The extended version of the tracker costs less than 2€ per day in operation and allows for permanent control of quality and position of the container and reduces insurance fees due to reduced risks of losing shipments. The Cargobserver excels because it can operate autonomously for several years. Even though comparable solutions have been developed, none proves as useful as the Cargobserver which is in use at multiple companies of different sizes.

HIDRIA is a provider of integral solutions for climate technologies and automotive technologies in Slovenia and was faced with a problem in their logistics of waste packaging. In order to improve the handling and removal of packaging waste and lower its costs and emissions deriving from waste transport, HIDRIA optimised the packaging waste logistics processes by redefining their collection stations, implementing technology for compacting, sorting and separating. They improved reusability of materials and space requirements in transport for higher load factors. This saved 120t CO2 annually. The associated costs related mostly to personnel training and new equipment, but are not published. In addition to its greening impact on the companies footprint it was internally considered as an innovative approach, since it was steered centrally but applied locally in seven different plants. By solving two main challenges with one solution this case showed a high innovation potential. By optimising the waste logistics it was possible to increase the load factors and reusability of materials. As the idea of optimising reverse logistics and transport efficiency will be interpreted differently between different companies it is critical to adapt to local and business specific conditions to reach a full transferability.

GreenWay operates a unique electric mobility system, which is the world’s first to allow transportation companies and other businesses to eliminate their dependency on oil prices and to decrease their environmental footprint, while incurring the same or lower level of costs, as they are currently paying for their gasoline/diesel vehicles. In their solution it is vital that the e-vehicles are not limited compared with conventional counterparts. They offer sufficient reach, drive on similar routes and prevail in the fleets of GreenWay’s identified potential clients. The EV’s are available for a comprehensive rental/service package and not for sale, which stimulates promotes the integrated service offer of GreenWay. Through the form of a monthly fee, GreenWay is able to stabilise the client’s cash flow for several years and thus eliminate uncertainties. GreenWay operates a network of battery swapping stations where the customer can change the battery for a fresh one at no additional cost and within 5-7 minutes. The battery swap station represents an important and innovative tool for effective use of the EV and solves one of its main problems in commercial use - availability and accessibility.
The mission of the ENUBA project was to determine whether the existing electrification technologies can be used for different applications in heavy freight transport on highways. In addition, the study examined the potential economic and environmental benefits of implementing an electrified freight traffic system through the use of overhead contact lines above highways (as an eHighway) with trucks connecting via pantographs and hybrid engines as backup systems. Only the combination of the feasibility, a viable market proposition and a working field test prove the innovation potential of this case. Apart from the already proven economic and environmental benefits, ENUBA provided highly promising results in terms of technology. One of the main goals of the solution was easy transferability and implementation of the system on public roads in the hands of administrative bodies at national level. The practice makes sense on highly frequented highways and also in urban areas with high traffic volume.

ENUBA 2 and its predecessor are an innovative example of how electrification could be applied in heavy freight-road transport. The system also be used in other areas (e.g. eBus) and could have an important role to play in densely populated areas in which switching to other modes (e.g. rail) is limited. The pilot in Berlin is following the concept already tested in Los Angeles, and therefore, proves the potential for transferability of the ENUBA system.

The service and cooperation topics are reflected in the case of Vert chez vous and Franprix. Vert chez vous has a fleet of vehicles for the next-day distribution of goods in the cities of Paris and Toulouse, operating only with bikes or vehicles on electrical power or natural gas for vehicles. A river shuttle (“Vokoli” barge) provides multimodal distribution for packages. The Vokoli makes five stops. At each stop, a delivery team by bicycle leaves to make deliveries in the area (tours of 1½ hours), then rejoins the Vokoli two stops further on. Efficiency gains are sought by integrating barges and inland waterway transport to circumvent congested roads. The distribution of Franprix is organised similarly, with their deliveries by inland waterway vessel to nearly 100 Franprix stores in Paris and the town of Boulogne-Billancourt. Once the barges reach the city centres the shipments for the stores are loaded onto trucks. Thus congestion in transport is avoided, almost 4,000 truck trips are saved and the reliability is increased. Required investments were made by the Port of Paris to renovate the quay.

The cases show an innovation by integrating IWW vessels in green transport chains and reliably linking to the last-mile transportation modes. The cases have been successfully transferred within France and are only limited in their extensibility through the availability of appropriate waterways.

The use of cleaner vehicles depends widely on expected additional benefits. Efficiency gains and monetary benefits are the main drivers behind implementation of cleaner vehicles on the private business side. GHG reductions alone do not convince users to switch to new technology. Also conventional propulsion systems together with efficiency optimisations can lead to cleaner transport chains. The 400m long 18,000 TEU vessel Triple-E sails on the Asia to Europe route, which represents business at a current value of several billion Euros for Maersk. Combined with an energy saving propulsion system, its size is a major factor in its efficiency and performance. Between 20 to 50% of GHG emissions savings can be realised compared to other vessels on the route. This comes at an estimated 16% cost increase for the vessel investment.

3.4.3 Infrastructure and corridor development and management

Transport associations are often referenced in the cluster as a best practice due to their unique function of fostering cooperation among actors striving for common goals along the supply chain or along common transport corridors. In the best practice collection it becomes apparent that the cooperative approaches increasingly focus on the development along corridors. On the one hand this allows a development considering local and individual peculiarities, high volume transport streams and the public framework conditions. On the other hand it brings different actors together for collaboration and adjusting services and initiatives to work
into the same direction. The cases presented support the integration of new regions in the existing markets, expanding the reach or the efficiency of transport services. Also greening of supply chains often needs an orchestrated effort to penetrate a market, taking a corridor perspective to the respective development supports the dissemination considerably.

RETRACK is a co-modal train service to run from the Netherland to Romania with further extensions into the south-east of Europe. From the beginning of the project, a significant growth could be seen in the number of clients and the transported cargo using the RETRACK service. Due to market restraints in the budget and available resources RETRACK was not developed as a standard shuttle train system with huge and basically fixed costs, but required a more flexible and more complex approach. It combines classical shuttle trains with local and regional antennae- and shunting services into a flexible, living and adaptable system. A key success factor was fully controlling the corridor and combining expertise of different actors and rail services. The flexible shuttle train concept, combining Western and Eastern European requirements for efficient intermodal transport is the main innovation shown. The transferability is potentially high along other rail corridors connection high production and demand regions for product groups.

Along the East-West Transport Corridor (EWTC), which crosses territories of more than 10 countries belonging to different economic communities and systems, there was a lack of management structure. Since many businesses usually have short-term perspectives coordination of activities on the corridor was necessary for its development and branding. The EWTC Association adds a medium and long-term perspective to the corridor, and contributes to the improvement of its functions and capacity. Moreover, the Association is in dialogue with governmental and international institutions which could not be successfully maintained by individual companies. The EWTC Association is commonly regarded as working successfully, e.g. creating the stakeholders cooperation and business development, such as the Viking Shuttle (see dedicated BESTFACT inventory 2012), Mercury and Sun container trains. The EWTC Association provides a well established corridor management supporting setup of services. It provides an important impact at reducing administrative and regulatory inefficiencies, giving access to different modes of transportation and enhancing the cooperation and visibility of the different actors involved as well as a link to other transport corridors.

The Nordic region is a sparsely populated area which translates to long transport distances. To increase the efficiency on the main transport routes the High Capacity Transport Corridor (HCTC) concept was established. It is based on a technological innovation providing a parallel development of an alternative fuels and the required infrastructure for long distance transports. The final goal of GreCOR is to create a fully functional High Capacity Transport Corridor between the Oslo and Ranstad (NL) areas. The innovative technological aspects of the HCTC have created a unique pilot, which delivers important reduction on emissions and results in a more efficient system. However, there are required infrastructures and regulatory changes that are needed to expand such a system. This makes its implementation specific to certain areas.

The BESTFACT implementation action ECOSLC shows the success potential also for private initiatives in corridor development. The circle line concept aims at increasing the efficiency of transports by organising logistics of containers which could be filled after their initial use and be used for further logistics activities before returning to their source. The monitored extension of this program resulted from filling empty waste containers while returning from The Netherlands to the UK. This allowed efficiency increases stemming from a higher utilisation of capacity while also improving reverse logistics. The result is a sustainable Circle Line logistics system that operates in six countries based on collaboration between SME as well as large companies. The Circle Line operating system was seen as a feasible solution to manage bundled cargo if their key requirements can be fulfilled: transparency of chain data and
chain information, trusted data systems to share confidential chain related data and a trusted third party organizational approach that is accepted by all cooperating chain partners to manage continuity of mutual trust. Thus one of the main innovations of the solution a trusted third party is needed to facilitate all transports. Lessons learned by one partner in a Circle Line are directly shared with all other partners and where possible directly implemented by them as a new approach, leading to a collaborative learning approach. There is further potential for expanding the circle line concept by integrating deep sea shipping standards like on time delivery guarantee at the end of the chain and chain transparency by sharing chain data that may lead to new added value logistics products and services that improve the total chain results.
4 Cluster 3: eFreight

The term eFreight has been used for EU policy and is the name of an EU-funded research and development project. Consequently, for use in the context of BESTFACT, which is about presenting best practices related to logistics, a clear and unambiguous definition of the scope of the eFreight Cluster is required, so that appropriate projects and systems/solutions that are truly best practices (state-of-the-art) can be provided. eFreight provides the common framework for information exchange in multimodal transport of goods. The BESTFACT Cluster 3 ‘eFreight’ observes, reports on, and disseminates information regarding activities that are part of the eFreight developments in order to promote and facilitate the implementation of eFreight concepts.

The scope of the eFreight cluster is defined using the reference model for freight transport and logistics as a basis.

Figure 22: eFreight reference model

The users of the projects/systems/solutions/services that are within the scope of the eFreight Cluster are related to the Logistics Demand and Logistics Supply domains. Logistics Demand is the domain of the transport users, or the Logistics Services Clients (LSCs). Logistics Supply is the domain of the Logistics Service Providers (LSPs). In this project, LSC comprise:

- FreightForwarders
- Intermodal (or Combined Transport) Operators
- Carriers in all modes
- Terminals of all kinds (ports and inland)

The eFreight Cluster does not include systems and solutions used by authorities, but may, if relevant, include systems that actively interact with authorities to improve the quality of logistics and freight transport operations. Also emergency management solutions are not defined as relevant for the scope of the cluster.
4.1 Collected cases

In the eFreight cluster 13 cases in total were collected as inventory cases and six in-depth surveys were performed. Clustering the cases in distinct topics is not as straightforward with the presented solutions, as the functions and processes are widely overlapping between solutions. Three main topics emerge from the case selection and allow a further analysis per topic:

- Process improvements
- Co-modal journey optimisation
- Co-operative platforms and information sharing

<table>
<thead>
<tr>
<th>Cases</th>
<th>Inventory case</th>
<th>In-depth case</th>
<th>Short overview</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process improvements</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MODINT</td>
<td>✔️</td>
<td>✔️</td>
<td>In ‘Bundling at the source’ multiple suppliers of fashion retail products collabo-rate horizontally to bundle the volumes in Asia and prepare shipments of multiple suppliers sorted for individual stores.</td>
</tr>
<tr>
<td>MixMove-Match.com</td>
<td>✔️</td>
<td></td>
<td>Building customer-specific delivery units for shipper 3M at the EDC Jüchen, to increase capacity usage of trucks on the long haul. An application based on GS1 standards is used.</td>
</tr>
<tr>
<td><strong>Co-modal journey optimisation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optrak</td>
<td>✔️</td>
<td>✔️</td>
<td>Application of a new routing and loading system for road freight transport of pallets</td>
</tr>
<tr>
<td>Freight Arranger</td>
<td>✔️</td>
<td></td>
<td>Freight Arranger is an online brokerage which allows freight consignors to book door to door transit rail freight through any rail freight operator.</td>
</tr>
<tr>
<td>IXSuite</td>
<td>✔️</td>
<td>✔️</td>
<td>IXSuite is a suite of software application consisting of three main modules suitable for integration. The main purpose is to support the optimized execution of intermodal logistics processes in order to provide increased insight, efficiency, flexibility and service levels.</td>
</tr>
<tr>
<td>Amatrak</td>
<td>✔️</td>
<td></td>
<td>AMATRAK has the goal to reduce freight traffic by using intelligent control and by charging freight vehicles in the procurement and outbound logistics efficiently. Based on a multi-agent technology, the mileage is reduced by an intelligent route planning and disposition.</td>
</tr>
<tr>
<td><strong>Co-operative platforms and information sharing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPA - Smart Port Logistics</td>
<td>✔️</td>
<td>✔️</td>
<td>Development of a general port IT-platform that is combined with Smartphone apps. This makes available the latest information about traffic and services.</td>
</tr>
<tr>
<td>Single Window Odessa</td>
<td>✔️</td>
<td></td>
<td>Single window concept in Odessa commercial sea port with the purpose of the project is to reduce paperwork and to rely on the exchange and processing of electronic information, to save costs and time in the import process.</td>
</tr>
<tr>
<td>CoSPaM</td>
<td>✔️</td>
<td></td>
<td>CoSPaM aims to introduce an innovative approach that ensures the collaboration of multimodal transport stakeholders of the corridor from Interporto Bologna with the Port of Patras under a unified framework.</td>
</tr>
<tr>
<td>ITS Adriatic Gateway</td>
<td>✔️</td>
<td></td>
<td>Mutual cooperation to increase the potential, the quality and the efficiency of the Northern Adriatic ports, transport infrastructures and related services with the general goal to become a European multi-port gateway.</td>
</tr>
<tr>
<td>FRETIS / IFT</td>
<td>✔️</td>
<td>✔️</td>
<td>FRETIS is a unique state-of-the-art software package that provides the user with a complete and comprehensive tool for the management of freight transport operations in a fully intermodal environment.</td>
</tr>
<tr>
<td>Freight 4 All</td>
<td>✔️</td>
<td>✔️</td>
<td>The project aims at integrating different actors and IT systems/backend involved in a transnational transport chain in the MED area.</td>
</tr>
<tr>
<td>Italian VTS</td>
<td>✔️</td>
<td></td>
<td>The Italian VTS (Vessel Traffic Service) is a system for controlling maritime traffic entering domestic water, improving safety at sea and supporting operations inside ports.</td>
</tr>
</tbody>
</table>
4.2 Cluster topics and challenges

The role of ICT in transport and logistics has become increasingly important throughout the last decades. This stems from the increased demand for efficient, fast, reliable, flexible and safe transport operation, and the transport users’ request for readiness of information on shipments and cargo. In transport chains that consist of several legs, several actors are involved. The information flow between the actors along the transport chains is often fractured. This causes missing and incorrect data and unnecessary delays. This is especially true for transport chains where more than one transport mode is involved. In particular, there is still a lot of paperwork around all phases of transport (transport planning, execution, and completion), requiring re-entry of data, which is regarded to be an obstacle for correct and efficient information processing.

Moreover, the information flow between the actors is not standardized. This is a result from the fact that many actors each have their own tradition and idea of information exchange and information processing. The diversity of information and communication equipment and data formats used has become a problem for the introduction of advanced ICT systems, as necessary tailor-made interfaces are very costly.

This problem does not only affect the business-to-business (B2B) relationships in the transport-related information flow, but also the communication between businesses and authorities (B2A/A2B) as well as the exchange of information between authorities (A2A). So-called ‘one-stop administrative shops’ mean that there are single access points that co ordinate the administration and speed up processes. With these single access points, necessary transport-related documents will have to be presented to authorities only once. The implementation of the paperless customs procedures aims in that direction. A variety of advanced ICT solutions has been introduced in the transport and logistics industry. Examples are:

- freight forwarding software with various functionalities,
- route planning systems,
- e-commerce platforms,
- online freight exchanges,
- integration into ERP systems of shippers, or
- GPS-based vehicle tracking and online tracking and tracing for clients

Despite this, there is still a lack of efficiency and consistency in the flow of information regarding the transport documents that are exchanged and regarding the large number of communication relationships among the actors involved. Moreover, Intelligent Transport Systems (ITS) are regarded as an enabler for a paperless information trail in the management of the physical flow of goods, but for this purpose their implementation and usage should be accelerated and coordinated across Europe.

European transport policy addressed these issues and introduced the concept of eFreight in the “Freight Transport Logistics Action Plan”, which was followed up during the Swedish Presidency in 2009 through development of a roadmap for eFreight. The ITS Action Plan and Directive (2010) also refers to eFreight in relation to interfaces between road transport and other modes. The policy development is continued based on the latest version of the White Paper for transport, where eFreight is identified as one of the important initiatives.
4.3 In-depth cases

The in-depth cases allow a more detailed analysis of current challenges and appropriate solutions. The collected cases are presented by setting their before situation and introducing the found solutions. As far as available success factors, benefits and costs of the practices are given. Because transferability of cases relies heavily on framework conditions in other fields, further information sources are referenced and contact details are provided.

4.3.1 HPA - Smart Port Logistics

Road capacity within the port of Hamburg is restricted, and the options for modifying the roads to take more road vehicles are limited. The plan is to switch more and more freight to railways and vessels, but the traffic volume on the road will stay high. Thus, Europe's second-largest container port urgently requires an efficient road traffic management system if it is to continue growing.

Although state-of-the-art IT processes (e.g. DAKOSY) have already been used at the port of Hamburg, they were not connected in a platform that integrates all logistics-related data and offerings. Therefore, DAKOSY is integrated into the project. CB radio was used to connect freight-forwarders to the truck drivers and truck drivers among each other.

Solution

The Hamburg Port Authority (HPA), Deutsche Telekom and SAP are jointly starting a logistics IT solution designed to link up port-based companies, partners, and customers more closely. The "Smart Port Logistics" pilot project has resulted in a comprehensive IT platform that incorporates mobile applications (Apps) and thus makes it possible for traffic information (e.g. dynamic traffic graph and infrastructure information) and port-related services (e.g. parking information, situation at terminals) to be accessed from mobile devices such as tablets and smartphones. Two other actors are involved in the project: Hoyer, responsible for petrol station management and for consultation, and Allgemeine Deutsche Automobil-Club e. V. (ADAC), which provided traffic information.

The objective of the project is to optimize both traffic and logistics operations in order to allow larger quantities of goods to be transshipped in the port area. The first stage in the implementation was a pilot project. In this pilot, the comprehensive IT platform was developed that incorporates mobile applications (Apps) and thus makes it possible for traffic information (e.g. dynamic traffic graph and infrastructure information) and port-related services (e.g. parking information, situation at terminals) to be accessed from mobile devices such as tablets and smartphones. During a three-month test phase, 30 trucks were fitted with tablets and linked up to the Smart Port Logistics system. This system supplied the truck drivers with real-time traffic information from HPA's Port Road Management System and details of available parking space in the form of current, personalized messages about the traffic situation in and around the port area. HPA and the freight-forwarding company can use a Geo-fence to inform truck drivers in a specific area. This can be done by text messages or a map. The participating freight-forwarding companies were also able to track their transport orders in real time. From this pilot and the test phase, the system will go into regular operation. It is expected to be launched in 2014.

Experiences and impact

The main results are:

- less traffic jams in and around the port area: In the pilot phase it became obvious that information of the current traffic situation influences the trips of the truckers. This will help balancing the traffic onto the existing roads in the port area and therefore decrease the number of traffic jams.
- less waiting time at container terminals and their gates: The same applies for waiting time at the container terminals. The trips can be fully optimised when all disruptions and jams can be considered. This helps the Hamburg Port Authority (HPA) to use their road network a lot better than before.

- less time to respond to traffic disruptions: Having all traffic information in real time, gives the Hamburg Port Authority (HPA) the opportunity to react a lot faster to problems in the road network than before.

- no misunderstandings (compared to communication via CBS, which was used before): Before the IT platform was introduced, most of the real time communication was done by CB radio between the drivers and drivers and their dispatchers. This system led to misunderstandings and of course there wasn’t an interface to include this information into the trip planning process or the current navigation.

- optimised trip planning for freight-forwarder and/or driver: To transport service providers, reliable traffic information, information about parking lots, etc. helps their trip planning a lot, because they can now optimise their trips and the driver’s rest periods much better.

- hauliers save time and money: Optimised trips and less congestion that save time and money lead to benefits for the hauliers.

In the process, a business case is will be made. In the pilot, each party bears a part of the costs. This division is strictly private. For the business cases it is not yet decided who will contribute in what way to the costs of the system. Thus, the cost indication is very difficult at the moment.

**Success factors and barriers**

The main benefits are:

- improved communication between driver and trip planner (in both directions): The driver can get in contact with the trip planner and the other way round. The trip planner always knows exactly if and why the driver will be late.

- the data is easy to access and use: T-Systems provide its TelematicOne solution that can receive information from all large telematics systems. This ensures a very simple way to access the data and integrate it into the own software solution.

- it helps to have important information at the right time at the right place, such as traffic situation, parking lots, congestion at terminals, next trip, customer

- no registration necessary: The registration process is mostly a barrier. At the HPA solution, no registration is needed. This will probably help to generate many participants.

In the beginning, DAKOSY, the internal IT service provider, was not included in the consortium. Later on, this proved to be a problem. Therefore, it is important to keep in mind the sensitivities of internal IT service providers when forming a consortium. Therefore all stakeholders should be included.

**Innovation and transferability**

This central control portal for logistics services suppliers consolidates freight and traffic information in a single application. The 3 month test phase showed that this practice is feasible in technical terms. Hauliers, dispatchers and drivers were very pleased with this solution.

**Synthesis of results in cluster/topic context**
Most users of the system will be SMEs, like hauliers, transport service providers, etc. The involved SMEs will save time and money because of less congestion and more information about the traffic situation in the port area.

More information
Sascha Westermann
Intermodal, operational IT-Traffic management/ CI-V-1 Services
Hamburg Port Authority AöR Neuer Wandraham 4, 20457 Hamburg
Phone: +49 40 42847-3223
eMail: sascha.westermann@hpa.hamburg.de

4.3.2 IXSuite
Until the 1990s, there was a low degree of automation in intermodal transport planning, execution and completion. TMS (Transport Management System) used to be entirely based on file administration, meaning the paper-based file systems were being replaced with an electronic file system while processes were still completely reliant on manual/human intervention. Additionally, before the Cat4Suite was developed, there was less electronic data exchange between inland terminals, intermodal transport operators and their business partners. The actors had proprietary information systems that most often were not connect- ed. Between the carriers of the different transport modes information used to be ex- changed via paper, phone or fax. This resulted in flaws, low degree of transparency and sub-optimal transport planning as well as reduced possibilities for event management during transport execution.

In 2007 the standardisation of these solutions started, and this ended in the development of the IXSuite. Existing customers and projects have continuously challenged the experts to invent and develop good solutions for rapidly challenges such as increase service and demands. IXSuite is well utilised in the intermodal logistics industry and has become the lead- ing intermodal TMS.

Solution
IXSuite is a suite of software applications. The IXSuite consists of three main modules that are suitable for integration:

- IXTransportOperator: TMS for Transport Service Providers, irrespective of the transport mode (road, inland waterway): The loading unit (i.e. container, trailer, pallet and box) is central to the process. IXTransportOperator offers specialisation modules for liquid and bulk transport, general cargo transport, and container haulage. Intermodal transport is an option for each of these specialisation modules. The integration of travel time prediction, on-board computers, EDI, and traffic information provides the possibility to dynamically plan and monitor transport operation;

- IXTerminalOperator: Inland TOS (Terminal Operation System), including virtual depot management, for the needs of tri-modal hinterland terminals. Drivers of cranes and mobile handling equipment and terminal staff equipped with handhelds can be provided with orders and status information on loading units and terminal gate processing. This module integrates seamlessly with the IXTransportOperator module based on the common work- flow module. Together with IXTransport Operator, IXTerminalOperator forms a hinterland management platform for intermodal transport;
- IXRailOperator: for intermodal train operating. Train schedules routes and rail capacity are grouped together in templates with all necessary resources including rolling stock and personnel. The administrative workflow from contract to invoice is separated from the execution workflow. Apart from order management and financial processes, core rail operator processes consist of rail freight forwarding (grouping of orders or loads and planning them on voyages) and rail transport execution (positioning loads on wagons available on a certain voyage and tracking & tracing of trans-ports).

![Diagram of integration of applications in the IXSuite platform]

Figure 23: Integration of applications in the IXSuite platform

Most customers use more than one module of the IXSuite. The most frequent combination consists of the IXTerminalOperator and one of the two other modules.

In June 2013, in cooperation with PTV, a pilot application of an intermodal route planner was presented at the Munich transport logistic trade exhibition, allowing for ‘synchronomodal’ trip planning. It will be provided as an extra module for the IXSuite. The intermodal route planner automatically chooses the right transport mode, implying an optimisation of consignment routing across an entire transport network that consists of transport links of various transport modes. The optimum combination of modal links within the complete transport network can be chosen based on costs, lead time, or CO₂ footprint. This begins when preparing quotation, continues during transport planning and also supports the dispatcher during transport execution. If changes are necessary, a new route calculation will be carried out automatically. Each customer has its individual transport network. Therefore, software users can fully integrate their own data, such as costs and schedules.

The whole IXSuite has a functional architecture that is multi-site (covering multiple intermodal terminals), multi-company (covering own and 3rd party’s terminals and transport equipment), multi-language and multi-currency (usable across several countries). Following the application mission of ‘intelligent execution’, the suite is based on the so-called ‘Execution Model’ that is:

- process driven and workflow based,
- independent from the chosen mode of transport (‘modality independent’),
- and characterised by an open and real-time architecture.

Operational processes are supported by workflow management and pro-active event man-
agement. Plans are monitored and checked, and there is pro-active communication (via
alerts and notifications e.g. on waiting hours) in case of exceptions along the intermodal
transport chain as an integrated feature. For example, as changes in the number of contain-
ers or changes in terminal arrival times are directly shared with each modality leg, the deci-
sion on modal choice for on-ward carriage will be made well-informed.

There is an integrated graphical plan board that is characterised by:
- Drag & drop functionality
- Flexible views
- Integrated maps

Smart flags

Regarding the modality independence, systems originating from transport execution are
capable of multi-modal transport operations by nature. In IXolution’s TMS, the unit that
needs to be transported and the goods that are to be moved build the starting point for
transportation. IXSuite has an integrated document management and capabilities for a full
financial handling from quote to invoice, covering costs, purchase and sales, including
self-billing. The integration into the existing ICT infrastructure of the customers allows sup-
porting company processes such as sales, offers, order management, cost calculation and
invoicing. The open architecture enables real-time interfacing. The electronic data inter-
change (EDI) between the actors along the transport chain is based on software adapters
(interfaces).

Experiences and impact

The IXSuite benefits are:
- Financial benefits: Increased company profitability (ROI calculated by dividing the opera-
tional profit by the capital employed, port-to-door/door-to-port transport costs in EUR per
consignment/TEU/year, cash cycle = time between order reception and payment).
- Economic benefits: Increased efficiency/productivity of logistics processes (port-to-
door/door-to-port transport costs expressed in EUR per consignment/TEU/year, dwell
time of trucks, rolling stock and inland vessels in terminals measured in minutes or hours,
waiting times of trucks at terminal gate in minutes, energy consumption per TEU-km or
ton-km, mileage of trucks engaged in terminal haulage between certain pickup and deliv-
er points, average load factor of trains and barges expressed in TEU, handling produc-
tivity in intermodal terminals quantified in moves per hour, cycle time of intermodal loading
units in intermodal terminals ex- pressed in minutes or hours).
- Benefits in the field of services: Increased competitiveness (market share in container
hinterland transport calculated by dividing the number of transported TEU by the total
transport volume in TEU along all transport relations offered), Increased quality (port-to-
door/door-to-port lead time measured in hours, punctuality rate for consignments arriving
in the seaport or for consignments delivered at the consignee calculated as a percentage
of on-time de- liveries), Image (Lean & Green certificate, ISO 14001 certificate of the in-
termodal transport operator or the intermodal terminal operator).
- Benefits for the society: Ideal utilisation of infrastructure (percent- age of delays in the no.
of truck/train/barge arrivals, capacity us- age of roads, railway lines and inland water-
ways), competitive logistics and transport system (number of intermodal transport ser-
vices per week to and from certain terminals, modal shift from road to rail and inland wa-
terway in a certain year expressed in the number of consignments or TEU).
- Environmental benefits, expressed in CO2 or CO2equivalent: Limited climate change (CO2/CO2e in g per port-to-door/door-to-port consignment or ton-km or TEU), expected annual savings of CO2/CO2e emissions in kg due to modal shift to railway and inland waterway transport in hinterland carriage), reduced emissions (CO, SO₂ etc. expressed in g per port-to-door/door-to-port consignment or ton-km or TEU), reduced resource use (terminal areal productivity quantified in TEU/sqm)

- Other signs/indicators of success: Degree of automation/paperless environment (electronically handled documents expressed as a percentage of the total number of documents handled p.a.)

The IXSuite financing that is presently applied is private funding. This is not expected to be subject to change. The licence per user averages at EUR 2,000 per user as one-off fee. Ixolation is looking to transition this into a recurring revenue fee-based licence, but this has not occurred yet. The implementation and customisation rates average at EUR 880 per day. A low-end implementation (10-15 users) requires 30-40 days, and a high-end implementation (150-200 users) requires 80-120 days, depending on the project’s complexity and goals. So the implementation and customisation costs could range from about 26,400 EUR (easy implementation, 10 users) to about 105,600 EUR (complex implementation, 200 users).

While standards like EDIFACT are used, implementation to particular parties is still tailored. In practice, there is point-to-point message implementation. Ixolation uses an internal XML (Extensible Markup Language) format for its own data flows. This internal format is based on international standards. All messages start or end with this XML format. To convert messages to or from this internal XML format there is Message Map- ping.

Examples for EDI standards that are occasionally used in this business case are:

- COPINO = Container pre-notification message, CODECO = Container gate-in/gate-out report message (EDIFACT standard messages that are important for terminal operation)
- IFTMIN = Instruction message (EDIFACT standard message for issuing a transport or freight forwarding instruction for a consignment)
- XML and CIDX for the Elemina and Transwide platforms (Liquid&Bulk module of IX-TransportOperator TMS)

UBL (Universal Business Language) is used for exchanging invoices in the Netherlands, but has not played an important role for this business case. The eFreight common framework is a standard framework for freight information exchange covering all transport modes and all stake-holders. The IXSuite can support the business processes of Operational Planning, Execution and Completion as covered by the eFreight Framework. The eFreight Framework provides standardised XML electronic business documents that are based on OASIS UBL 2.1. UBL is an XML counterpart to traditional EDI standards such as EDIFACT. It enables EDI functionality over the Internet and the transmission of standardised messages. The eFreight Framework is capable of converting any message formats.

**Success factors and barriers**

The success factors of the IXSuite include:
- Modality Independence: The fact that the IXSuite has separate modules for transport management for 3 inland transport modes (road, rail, inland waterway) and terminal operations has led to a good position in the market for TMS/TOS. There is support for distribution, liquid & bulk, container haulage, rail, and terminal operations. There are several Transport Service Providers within Europe that specialise in intermodal transport and that equally are operators of intermodal terminals. If not, at least they have offices or agents, in those inland terminals that are important to them. As these companies have the job of planning and also executing tri-modal transport and terminal handling, some of these have relied on the software suite of Ixolution/ GreenCat/ CatLogic. As they develop their integrated hinterland processes, so Ixolution is developing an integrated standard application that combines intermodal transport flows with asset based rail transport and tri-modal multi-site terminal management. For these customers, the IXSuite provides full integration of all modules to support one ‘synchromodal’ workflow managing all individual modes of transport. There is an integrated graphical planning board covering all modes of transport.

- Process driven: Workflow management automatically divides transport orders into execution legs and tasks for each leg, which are monitored by the system for progress and exceptions. The key asset is to be able to oversee and monitor the full process so that there is full visibility and manageability of all operational and financial aspects.

- Open architecture for real time interfacing: Another success factor is the integrated EDI capabilities regarding electronic communication with business partners. The increased transparency and flexibility resulting from the real-time information on events and resource availability improves the quality of transport planning, especially for the following transport legs.

The main barriers and limitations to overcome for the implementation were:

- Traditionally, customers have a business problem and look for software solutions to solve this. In intermodal transport operations, customers often create a new service (like a terminal or rail service) and launch the physical service together with a software implementation. This is more complex, as the proposed software implementation is based on a theoretical business case, while in practice operational issues arise and have a huge influence on this implementation.

- As the standard product is designed around an intermodal structure, it is still Ixolution’s main focus to bring all requirements and developments in line with this structure. This allows the implementation of the same software in all the different situations. Many technical and conceptual aspects had to be brought in place to support this approach. Test Driven Development and Continuous Integration as the main concepts helped to do large developments with a guarantee that the existing functionality keeps working.

- There were common challenges that occur during implementation projects: Budget, deadlines, unclear scope descriptions. It turned out to be important to involve all stakeholders including the staff that will use the solutions. By far, change management has been the most difficult challenge. The impact of changing an IT system should not be underestimated.

- Regarding the development of the IXSuite, a common challenge was the difficult market conditions in the past years.

There are no considerable weaknesses that can be found for the IXSuite. Potential weaknesses will always be addressed and solved in future versions of the IXSuite: If there is a new customer requirement demanding a new functionality of the software, this will be conformed to in a customer-specific environment first. Then, Ixolution merges this additional
functionality back to the main product, and there will be an upgrade for all other existing customers. Currently, there is a high interest in the intermodal route planning function.

**Innovation and transferability**

There are no special requirements for the transfer to different countries, regions or cities. IXsolution claims the software suite to be multi-national and ‘world proof’. There is an international support structure. The core market is Europe, though. IXsolution is transferrable to other companies. But the focus is (and will be) on intermodal geographical routes. The implementation and use of a TMS/TOS by a commercial actor in Europe is not bound to regulation. Nevertheless, a political framework promoting intermodal transport increases the benefits of the IXSuite.

INPLAN Container Line 2.0 is a software system for the operating of container hinterland transport by rail and inland waterway. The solutions of the German company INPLAN GmbH also provide a range of software for ports and terminal operators, including container handling and depot management. Already a decade ago, the company INPLAN had a product called ‘INPLAN Logistik Container’, which had similar functions as the forerunner of IX-TerminalOperator, the Cat4TerminalOperator. A basic difference which sets IXsolution apart is that the IXSuite is also suitable for continental traffic and has its focus on inland terminals; whereas INPLAN is port-oriented (the starting point is the seaport with its onward transport links).

Central Systems & Automation Ltd from the UK has a state-of-the-art TOS designed for ports, inland terminals and general cargo operations called Autostore. It features e.g. yard management, vessel planning, rail planning, activity charging, EDI and web access for agents and hauliers, both for single terminals and multiple networked operations. The Inland Terminal Management System has a ‘Rail Planning’ module (very similar to the IXRailOperator).

A prototype of an intermodal route planner for Europe was developed in the BE LOGIC project. Another intermodal route planner is currently under development in the WEASTFLOWS project. Furthermore the interim IT tool, a web-based routing tool for intermodal goods transport in Europe, was developed within the project SoNorA.

Finally, there are several TMS providing nearly the same capabilities as IXTransportOperator, but that do not include the management of terminal operation. To sum up, a combination of TMS and TOS in the segment of intermodal transport seems to be unique.

**Synthesis of results in cluster/topic context**

By EU definition, in terms of the number of employees and turnover, IXsolution is a small company. IXsolution provides ‘intelligent software for international and intermodal transport’. It further develops the IXSuite software suite and caters for software implementation, marketing and customer support. At the time when CatLogic originally developed the Cat4Suite, that company represented a SME as well.

There is neither a specific advantage that can be derived for SME when using the IXSuite, nor is the solution specifically aimed at SME. Compared to bigger companies operating a whole network of intermodal routes or terminals there may be the advantage to use a state-of-the-art software solution when relying on the IXSuite without having to provide a large-scaled own IT department.

But generally speaking companies can improve their efficiency and competitiveness as well as their image when using IXSuite modules. This has a positive impact on the companies’ profitability.

**More information**
4.3.3 FREIGHT 4 ALL PROJECT: Italy-Spain demonstrator

Freight 4 All aims to tackle the fragmented functioning of transnational multimodal freight transport chains by providing an interoperable and distributed ICT solution. It will facilitate the remote collaboration of the involved parties and join use of available e-logistics systems, thus strengthening territorial cohesion and providing costs effective and sustainable services. The real life cases and extensive communication programme will effectively capitalise results to the wider transport community.

Freight4all contribute to the improvement of the global transport performance of the MED area (Mediterranean Area), considering environmental sustainability and aiming to the economic development, through the accomplishment of the following objectives:

- Improve the competitiveness of transport and business actors (and their regions) with the enhancement of collaborative transport logistics through efficient electronic transactions, by introducing open and flexible interfacing tools.
- Facilitate the transport and environmental sustainability through co-modality competitiveness by cancelling the information flow fragmentation using ICT.
- Improve the economic development of remote regions through better and low cost accessibility to e-logistics services of distant providers, via the internet at any place of the world, facilitating e.g. documentary procedures.
- Provide equal opportunities to multimodal transport actors in providing ICT based value added services for the whole MED market place.

The Italy-Spain demonstrator aims at integrating different actors and IT systems/backend involved in a transnational transport chain in the MED area. In particular, the focus is on the enhancement of interoperability between the systems in order to smoothen the information flow linked to the physical transport service and optimizes the planning and monitoring activities related to transport services.

Solution

The Freight4all Distributed ICT Platform addresses the collaborative management of long transnational transport chains taking advantage of existing e-logistics platforms functioning at various regions across the MED area. The innovative approach introduces a generic layer that facilitates the smooth interaction of available ICT capacities with common and/or complementary services. The key elements of the platform are:

- Gateway: the main functionalities include advanced administration and security capabilities thus effectively supporting the accessibility to the services of the platform.
- Workflow: This component coordinates basic, composite and process services meeting the requirements of corresponding use cases thus making available complex orchestrated services for handling transport chains from different transport business perspectives. It also provides advanced accessibility and effective publication/discovery of different services.
- Interoperability and Interconnectivity: It is the core integration component allowing the seamless interaction of all Freight4all Distributed Platform components on the one hand and the platform with its clients (backends and external systems) on the other.
- Assessment & Benchmarking: It can statistically exploit the extensive range of data generated from the electronic transactions undertaken through data handling and reports generation for selective lists of performance indicators.

- Repositories: A number of repositories are introduced in sur- porting and validating the whole platform operations. They ad- dress various dimensions such as security, services, common data, mapping and validation rules etc.

- Reference Standardisation Frameworks: The openness and expandability of the system is very much facilitated through the compliance with available and emerging standards.

The Italy-Spain demonstrator involves a freight integrator that is responsible for planning and executing a complete transnational door- to-door multimodal transport chain.

The business scenario consists of export flows of containerized cargo from Bologna catchment area to Valencia surrounding area. Most of these flows have overseas ports as final destination, but transhipment in Valencia takes place and part of the cargo is landed and trans- ported in the hinterland to the final customer.

The scenario of this transnational transport chain focuses on a complete transport service including the planning phase and the monitoring of the transport

The tested activities are related to the planning, execution and monitoring of a D2D multimodal transport chain. In summary:

- Planning of a complete D2D multimodal transport chain by the freight integrator.
- Booking of each single transport service/leg by the freight integrator and related booking confirmation by selected service providers.
- Monitoring of the transport by the freight integrator through the FREIGHT4ALL monitoring tool, based on the information received by the backend involved. The backend is the internal system where the database is harboired and which is not accessible to the public interfaces. The monitoring tool contains all the information related to the nodes activities and arrival/departure of the cargo (as well as the exceptions) are collected and elaborated in order to be easily accessible by the shipping agent
- Survey phase: all the aspects to consider in the project were defined in order to develop a useful tool.
- Harmonization model and System architecture documents written after the extensive survey which show necessities observed in the previous phase (lead by VPF)
- Development of a distributed ICT platform, including a very heavy software development phase for the electronic transactions (lead by IPBO)
- Demonstration and Validation of the system including monitoring key performance indicators which allow to measure platform success (ITL leading the component)

Experiences and Impact

The Freight4all Distributed Platform is not another e-logistics solution. It coordinates the incremental exploitation of e-services provided by state of the art systems thus ensuring increased user accessibility and orchestrated management of representative freight transport business oriented operational and administrative scenarios. Freight4all success is based on the high stakeholder orientation by involving major intermodal hubs, capable to bring real cases and corresponding actors. The regional authorities supported the local transport community to obtain access to the major transport networks. The mix of decision makers and business actors ensured the involvement of a representative number of relevant users from various regional communities towards long term business affairs.
The innovative character of Freight4all is based on the new concept of advanced interoperability and interconnectivity tools that enable increased virtual accessibility to collaborative e-logistics services 4ALL. Supply chain actors have easy access to information and services through open ICT solutions while particular emphasis have been put on remote locations (e.g. islands) incorporation in the main transport corridors, facilitating information interchange such as documentary procedures.

The end solution is founded on a harmonised operational and organisational framework and comprehensive system architecture being able to break fragmentation barriers and build complementarities for users and dispersed systems.

The cost of the implementation of the complete Freight 4 all project, with all the simulation experiences, can be calculated as approximately 1.7 million € for investment activities. Moreover it would be necessary to consider other costs related to consortium operational activities that should be added to the investment costs but we have not concrete information about them. This project was financed by European Regional Development funds with a total of 1,287,000 € for research activities and development of the Freight 4 all European demonstrators.

The platform stores a code list that can be updated by the users that includes ISO, LCODEs, equipment types, zip codes etc. The messaging that is being interpreted and sent through the interoperability and interconnectivity module are in EDIFACT, plain text or XML. Freight4all is a distributed and open freight transport ICT solution which integrates different stakeholders, included in the main categories of stakeholders of eFreight project, specially transport users and transport service providers. Freight4all is a B2C platform.

eFreight provides standardised XML electronic business documents counterpart to traditional EDI standards such as EDIFACT. It enables EDI functionality over the Internet and the transmission of standardised messages. Messages sent by Freight4all interoperability and interconnectivity module are in EDIFACT, plain text or XML.

**Success factors and barriers**

The main benefits of the complete project are:

- Integration with minimum adaptation requirements (less cost) of any transport oriented ICT system into the FREIGHT4ALL distributed environment.
- Interoperability of existing transport ICT solutions through smart interfacing (using the FREIGHT4ALL monitoring tool, cf.3.2).
- Accessibility to all users of the transport community from both the Public and Private sectors no matter their technological infrastructure.
- Confidentiality and security of business transactions through the division of users/systems into autonomous, independent, self-administered groups.
- Publishing of transport related services thus enhancing the collaboration between geographical areas and users.
- Evaluation of the transport chain performance through the use of KPIs at several levels.
- Support to e-document exchange for any information and communication protocol.
- Cross-sector applicability in any business sector with complementary and remote operations.
- Multidisciplinary integration of actors involved with various business disciplines with common interests.
The main benefits of the demonstrator are:

- Foster and improve the cooperation among the business actors involved;
- Create and enhance the integration of the different IT systems along the transport chain;
- Improve the service performances of the whole transport chain and of each one of the service provider involved;
- Reduce the time needed for the transactions; offer the accessibility to transnational service providers systems;
- Exploit the backend capacity and the service provider’s capacity, by extending their “area of influence” through the FREIGHT4ALL platform

System integration has grown in popularity owing to its various benefits like reduced complexity and costs, simplified operations, and optimized IT infrastructure. But this has opened up various risks related to security, performance, and reliability linked with interoperability of the systems. It was a risk fully recognized from the submission of the proposal. As a first step, the interoperability risk was handled by identifying the interfacing requirements of the back end systems and by a second phase where the informational design supported the identification of the information characteristics of the e-services developed. Semantic and syntactic operability potentials have been exploited to achieve the interoperability required between both the back end systems and Freight 4 all platform.

Since testing is a very critical process, the interoperability testing was performed based on a testing manual template that provided test scenarios to simulate back end system communications, network protocols, message exchange and transformation, between services. The core partners involved in the interoperability activities had a trustworthy experience record and were well aware of the latest technological development in this area.

The success of the demonstration activities is related to the selection of the business case (distribution of containerized goods from Bologna area in Emilia-Romagna via La Spezia to Valencia and its hinterland) to become a demonstration case. In order to overcome the risk, a set of criteria was established with the most important to be transnational character of the business case, freight flows and transactions between the involved partners and existing back end systems that were going to be integrated through the Freight 4 all platforms. Another risk related to demonstration activities was the time period that the demo case was going to run in real life conditions in relation to the commitment of the business actors in the process. Therefore, the project partners that provide the demo case were in close cooperation with the “demo user group” enabling their gradual familiarization with the Freight 4 ALL system and making them part of the whole process.

The expected benefits to running this demonstrator are derived from turning what would normally be paper based activities into electronic transactions. When previously paper based activities are converted to electronic means, all the actors in the chain benefit from the time saved transporting these documents and from the saving acquired from the absence of duplicates as well as errors.

So, benefits of this project have been measured as time savings. The two tables below show all time savings: Time saved in minutes:

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>Final</th>
<th>B-F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAC</td>
<td>320</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>305</td>
<td>95%</td>
</tr>
<tr>
<td>AFT</td>
<td>60</td>
<td>45</td>
<td>-</td>
<td>-</td>
<td>45</td>
<td>15</td>
<td>25%</td>
</tr>
</tbody>
</table>
The main weakness of the platform developed in Freight 4 ALL project is related to language. All the demonstrators were developed in English, so this tool could be difficult to use by English non-speaking companies and its growth could be limited by this aspect.

**Innovation and transferability**

One of its main benefits is the integration possibilities with minimum adaptation requirements. The Freight 4 ALL platform has the capacity to interface with most existing systems, thereby freeing users from the constraints inherent to frequent changes in communication protocols. The fully flexible and configurable, the Freight 4 ALL platform is simple to deploy and adapt thanks to a dedicated admin interface.

For the success in other areas, it should be supported by the regional authorities, in order to obtain access to the major transport networks by investing in this kind of platforms. Moreover, decision makers and business actors should be involved in the project.

It was tested in different countries and demonstrated its transferability. It could be also transferable to other sectors like, for example, supply chain organization, or any other sector that needs a big number of agents interacting between them.

This case is an improvement of Port Community Systems that uses Valenciaport PCS as a backend.

**More information**

[http://www.med-freight4all.eu](http://www.med-freight4all.eu)

Freight 4all partner, Valenciaport Foundation
4.3.4 FRETIS / IFT

In current typical logistics transportation processes, there is significant lack in the communication flow between the actors involved and communication flows are performed only via fax, e-mail or phone calls. The majority of administrative issues are manually performed and very often it is very difficult to track the cargo and automatically detect its position.

Using modular application environment technology, the peripheral subsystems are fully interoperable and interconnected, thus allowing the full integration of the various sections in the Container Terminal. Container terminals have to implement complex pricing policies, resulting in numerous combinations of invoicing cases. All of the functions allow manual intervention, previewing and printing, allowing for paper and electronic environments to be combined in the most optimum way

Solution

FRETIS is a unique state-of-the-art software package that provides the user with a complete and comprehensive tool for the management of freight transport operations in a fully intermodal environment.

By using advanced Information Technologies, FRETIS provides the most cost effective solution for the management and control of all Intermodal Freight Transport related operations either in terminals or along the physical transport chain. It is the optimum in user friendliness – efficiency – expandability. The full FRETIS suite consists of the following systems:

- IFT, the Intermodal Freight Terminal system. This provides full control of intermodal terminal operations (i.e. Freight Terminals, Freight villages, Port Terminals, Rail Terminals and so on). It has a set of 11 interconnected, interoperable and integrated modules, which can be installed and work independently or in groups for maximum flexibility and cost effectiveness.

- ICM, the Intermodal Chain Management system. This set of modules gives full control of the intermodal freight transport chain operations providing the intermediate (i.e. Freight Integrators) users a tool for chain planning and control while all supply chain actors with dynamic information on the transport progress concerning both the cargo and transport means. Shipping companies and shipping agents interact with the system in order to send pre-announcements and loading/unloading plans or either IMO FAL forms and get back status and results of the loading/unloading procedure.

- FPC, the Fleet Planning and Control system. This system is the ultimate tool for managing fleets of road trucks. By using the appropriate on-board equipment, GPRS or other communication for linking the vehicle to a control center and INTERNET for backend applications, the carrier can plan, control, redirect and manage on-line the road transport operations of any fleet of vehicles.

- RTM, the Rail Transport Management system. RTM is used for planning and monitoring (Tracking and Tracing) the transport procedure of cargo, wagons and complete trains along a rail corridor. By getting information from any of the available types of recognition and communication technologies the system enables the full and user friendly monitoring of the position of train and cargo along their route.
- e-DOCS, the electronic DOCument Submission system. This application allows the exchange of formal and business documents for all actors of the supply chain. It supports a wide variety of data and communication protocols, thus facilitating the involvement of all the transport users with various levels of ICT capacity. E-DOCS is supported by an advanced communication platform functioning as a state of the art broker for electronic transactions over Internet.

The modular structure contributes to the partial exploitation of the package while its internal integration serves its exploitation for global services in the context of an Application Service provider (ASP).

**Experiences and impact**

The integration between information and communications technology, capability that the supply chain processes, and the modes supporting those processes can permit the optimization of trade-offs between the components of supply chains as well as between the service and cost aspects of the modes within supply chains. An integrated intermodal transport system is a significant and critical factor in the successful execution of supply chains, both domestically and internationally. The awareness of and requirements for options in the intermodal execution of supply chains are being driven heavily by information and communications systems. Existing modal-based information systems require users to re-enter similar data at each interface, possibly according to different messages or EDI standards. The implementation of generalised systems for electronic communication between the different partners in the intermodal chain would mean that there is the opportunity to change operations at short notice along the journey. ICT systems enabling tracking and tracing along the complete transport chain across modes, would allow for a quick detection of errors and false routings. TREDIT’s FRETIS platform offers a complete ICT solution to enhance communication among different roles in the transport chain provides the possibility for chain planning and enables the visibility throughout the chain by integrating modal based solutions.

FRETIS platform offers an integrated solution for planning and monitoring Multimodal transport. Its mode-specific applications help organize and execute each leg of the chain, while ICM module focuses on the complete transport chain. The Terminal Operating System IFT (Intermodal Freight Terminal) has a unique role within the whole FRETIS platform: provides the possibility to plan and organize activities within the nodes of the transport chain. Container Terminals can be managed in a very efficient way through TREDIT’s IFT system, by using the functionality provided by available modules. The complete FRETIS platform with its subsystems offers a complete solution for enhanced visibility of door-to-door transport.

The electronic Document Submission is a robust document control mechanism eliminating much of the bureaucracy and paperwork. The solution is particularly favourable with smaller customers for easy/low cost access to the Document Submission System. The Customer Service module offers an interactive web-based/M2M application, providing accurate and real-time information to the port customers through the Internet. The solution enables the port clients to monitor the cargo status as it progresses through the operational/administrative and port activities chain. A reliable mechanism identifies the container and vehicle IDs through the installation of an Optical Character Recognition (OCR) system while the automatic identification of the driver is performed through the “smart card” identification system. It is fully integrated with the Resource Management Application, also providing automatic vehicle guidance and parking control.

The Loading/Unloading Control enables the terminal manager to organize efficiently the distribution of human and mechanical resources, monitor productivity either in real-time or through cumulative statistical projections and provide clients with estimates about the process completion time.
The Yard Planning module offers effective yard utilization and minimizes the lead time associated with the stacking activities. It also has an advanced housekeeping function, which maximizes the available space by concentrating sparse containers. The Yard Inventory module is the ultimate tool for ensuring 100% accuracy in recording the yard status. It provides the ability to “walk the yard” collecting electronic data, thus eliminating all previous human errors.

The Geographical Information System (GIS) provides the user with a graphical environment capable of managing the stacking area and coordinating all activities required for supporting the terminal’s operation.

The Resource Management module performs the automated organizing, delegating and monitoring of all container transfer activities within the terminal. The Resource Management Application allows for better utilization of existing equipment for minimum carrier idle time. It also contributes to reductions in operating costs and improvement in performance level.

The related costs are:
- Technical preparation of the involved stakeholders.
- Adaptation on terminal layout (to be used for yard management)
- Internal tests.
- Meeting with the Companies’ IT responsible persons.
- Integration with client’s own systems (e.g. ERP etc).
- The operation costs mainly depend on level of deployment, i.e which modules are going to be operational and needs for customization

Due to the FRETIS flexibility and the possibility to make use of different information packages per need, it is possible to take the eFreight common framework into account in this case. In particular, the e- Document application is an open system that provides the necessary interfaces for facilitating the electronic document exchange between parties and systems. Electronic documents can be created including cargo handling orders/ notifications and commercial messages (quoting, ordering, invoicing etc.). Careful consideration is made to ensure that all involved parties could benefit from the system regardless of their IT infrastructure, providing - in any case - a high degree of security and information confidentiality.

The solution covers a wide range of transport-related operations. It is easily interfaced – rather than integrated – to TMS, WMS, ERP or other complementary package. It offers generic compatibility and capability for integration with client software of any format and ICT capacity.

In particular, the e-Document application stands on the “top” of the applications, since it supports and provides information to the other applications through the different stages of the transport chain. It substantially contributes to the breaking of “barriers to entry” for the SME’s, since it allows all kind of communication approaches and message protocols to be utilized by the clients’ systems. E-Document undertakes a quite sophisticated message validation thus ensuring the accurate and correct information transmission in the various data repositories, while providing reverse assistance to the sender spotting the mistakes in the original message.

**Success factors and barriers**

The main success factors of FRETIS as an integrated transport chain planning and monitoring system are related to its following features: modular, flexible, extensible, scalable archi-
Some of the major obstacles or problems faced by the actors involved are:

- Lack of experience with IT tools by the operators.
- Installation of Optical Character Recognition (OCR) system for the automatic identification.
- Inefficiencies in the direct control of cargo
- Discontinuities in the information flow create bottlenecks along
- Multimodal Transport Chains (MTCs).
- Lack of integrated ICT solutions allowing the full range of electronic transactions required for the smooth and timely information and cargo flow.
- Lack of integration of actors.

Undesired external effects concern the need for customization especially in port operations based on port/terminal operational procedures and lack of integrated ICT solutions allowing the full range of electronic transactions and lack of integration of actors

**Innovation and transferability**

The modular structure contributes to the exploitation of FRETIS while its internal integration serves its exploitation for global services in the context of an Application Service Provider (ASP). FRETIS is based on a robust and secure communication platform which allows the smooth accommodation of relevant modules for advanced interoperability and expandability. It includes an e-Document application that is an open system that provides the necessary interfaces for facilitating the electronic exchange between parties and systems, so no particular conditions need to be in place for the FRETIS implementation and application. The system is quite flexible and can make use of information packages developed in several EU projects as Freighthwise/ eFreight/ RiSING/iCargo as per needs. It is an Internet based product facilitating the consolidation of the core transport logistics functionalities for the whole range of freight transport players.

A reliable mechanism identifies the container and vehicle IDs through the installation of an Optical Character Recognition (OCR) system while the automatic identification of the driver is performed through the “smart card” identification system. The expected arrivals/ departures are compared with the actual ones and the result is stored in the main database. An automatic barrier and traffic lights system undertakes the required physical control of the gate towards the inner area of the terminal, while the entries/ exits are also presented on the GIS. It is fully integrated with the Resource Management Application, also providing automatic vehicle guidance and parking control. At the gate, the operator provides to each driver a printed message regarding the exact position/slot within the parking area. This information is also made available to the yard management for the collection/delivery of the containers to/from the stowage area. Entry/Exit control is ideal for minimizing vehicles waiting time and congestion at terminals and exercising a high degree of security on inbound/outbound flows of containers, vehicles and drivers.

**Synthesis of results in cluster/topic context**

Tredit S.A. is the owner and the developer of the FRETIS solution and it is a Greek SME specialized in transport and logistics consultancy. Moreover, direct customers of the FRETIS solution are also SMEs, small logistic operators, freight forwarders, shipping agents. The impact on SMEs considered as stakeholders or customers mainly concern the benefits offered
by FRETIS in terms of enhanced communication among different actors in the transport chain, the visibility, better utilization of resources, better planning of the chain, of monitoring the cargo status as it progresses. All these aspects have direct effects on the optimization of the utilization of resources and costs, on minimization of additional activities to manage the chain, on the in-crease of profitability and of efficiency.

More information
http:// www.tredit.gr
A. Bizakis: abizakis@tredit.gr

4.3.5 MODINT - Bundling at the source

The main goal that led to the development of MODINT was to reduce the logistics costs of fashion products and to reduce the number of truck/van movements in cities. Before its implementation, individual shopkeepers organised their transport individually.

Solution

In ‘Bundling at the source’ multiple suppliers of fashion retail products collaborate horizontally to bundle the volumes in Asia and prepare shipments of multiple suppliers sorted for individual stores. This means that shipments containing goods of multiple suppliers are delivered to shops in one go (as opposed to many different shipment deliveries). The principle works as follows:

- Shops order their fashion products at the importers
- Importers then bundle all orders and start producing the fashion products through their Chinese suppliers
- The suppliers send the finished products to a warehouse close to Shenzhen (or Shanghai). In this, the products from 15 different suppliers but with the same final destination (e.g. shop X in city Y in The Netherlands, or shops in street Z in city Y in The Netherlands) are grouped to single shipments and placed in container(s).
- The containers are shipped by truck to the port of Shenzhen and from there by ship to Rotterdam.
- The containers are unloaded in Rotterdam and shipped by truck to a warehouse of DHL in the Netherlands.
- Finally small trucks or delivery vans distribute the fashion products to the shopkeepers. Since the fashion products of 15 different suppliers are grouped per shop, ideally there will be only one stop per shop (compared to 15 in the situation before bundling at the source).
Bundling at source location

Figure 24: MODINT schema (Source: Dinalog)

The solution is not very technical. It is mostly an organisational issue. However, with respect to ICT the following can be mentioned:

- In the current practice the orders of the various importers are more or less manually entered into the ERP system of Greenway. This is not a problem, since the volumes are still easy to handle in this way. Ideally, the orders of the importers should be automatically imported into the ERP system of Greenway, thus avoiding manual work and risk of mistakes. In particular when there will be growth: a) in the number of importers participating in the concept; b) in the range of goods to which it is applied, and/or c) in the number of countries where the concept is applied.

- The need of an integrated ERP system with automatic links to the ERP systems of the importers will become more and more important. This will not only help to ease the input of the data, but also the progress of the transport order can be monitored more easily (shipped from factory, arrival in port, on-board ship, arrival in Rotterdam, etc.).

- EDIFACT is used between Greenway and Ewals Cargo Care.

- The eFreight common framework is taken into account in this business case. Both TEP and TES messages could be used, between importers and Greenway, between Greenway and logistics company

- The importers should link their order management system to the system of Greenway, and Greenway should integrate their system with the system of the logistics service provider. However, up to this moment that is not yet the case (apart from EDIFACT between Greenway and the logistics service provider).

Experiences and impact

- Financial benefits:
  - Picking and packing is done in China (low labour costs) and not in The Netherlands, thus saving costs.
  - In addition better rates could be agreed with DHL compared to the rates individual importers would have got.
- One leg in the chain can be cancelled, i.e. the trip from Rotterdam to the importers to pick and pack for the different stores. Now containers go directly to DHL, saving 500 Euro per container.

- Benefits for the society:
  - Reduced container trips from Rotterdam to importers
  - Reduced number of trucks/delivery vans in cities
  - Potentially: higher load factor of containers.

- Environmental benefits, expressed in CO2 or CO2-equivalent

- Other signs/indicators of success: The ‘bundling at the source’ is now expanding from 1 to 4 warehouses in China, including an increasing range of products (e.g. also sportswear, sport shoes, etc.)

The concept is now also planned to be rolled-out to Turkey and Bangladesh and has also started in Sweden. There are future plans for Denmark, Germany and Belgium.

**Success factors and barriers**

The principle is very simple and logic: bundle all products for the same final destination. The approach taken by MODINT was realistic and down to earth: not big plans and paper work, but pragmatic approach and quickly to realise. Since the branch organisation took the lead, including 15 of its members, they are a serious counterpart for the logistics sector, offering a good volume. Still, the concept needs a critical mass, otherwise there is not much to bundle. Therefore, a lot of energy is required to keep the attention of the importers.

Finally, the current ERP systems are not advanced enough once the concept will grow. Currently the orders of the importers’ ERP’s are exported to the ERP of Ewals Cargo Care. Forecasting of required warehouse capacity is now done manually, whereas this should in fact be done automatically, matching the orders with the available capacity in the warehouse(s).

**Innovation and transferability**

This practice is feasible in technical terms. It has started in clothing/fashion, but already expanded to sportswear. There is not really a regulatory framework needed. However, the terms had to be changed from ‘Free on Board’ to ‘Free Carrier’ in order to be able to deliver the finished products in the Chinese warehouse (and not on board the ship). As mentioned before, a branch organisation in the fashion industry has already copied the concept in Sweden, and it is expected also to be picked up in Denmark, Belgium and Germany.

**Synthesis of results in cluster/topic context**

All shop-owners are SME’s. They don’t have an active role but are main beneficiaries of lower logistics costs, fewer deliveries and less truck/van movements in their streets.

**More information**

Willem-Jan Drost of MODINT, Tel: +31-30-2320900

E-mail: wjdrost@gmail.com

**4.3.6 Optrak**

A fleet of 30 trucks were delivering up to 500 orders within set time windows on a daily basis across Scotland and Northern England. The operator wanted to achieve more accurate, efficient and consistent transport planning. One goal was to more precisely control vehicle loading, as sometimes planners would over or underestimate what orders can fit onto a vehicle,
leading to warehouse staff repacking orders or requiring an extra vehicle to be sent out to handle the overflow. As no advance software support for trip planning was in used at the operator headquarters. The combining of volume load data with routing data was not standard, which lead to inefficiencies and high frequencies with trucks not optimally loaded by volume.

Solution

Filshill (the operator), a Scottish convenience wholesale distributor, has integrated Optrak’s vehicle routing and loading software with the Swords back office system from Sanderson in August 2010. As main result, the operator has removed 2 vehicles from its fleet thanks to a more accurate route planning and effective vehicle loading. This solution has improved indicators such as km per delivery unit, total distance travelled and vehicle utilisation (load factor) whilst reducing the time spent planning by 80%.

According to the operator, results from the routing system improve with more accurate data. Therefore, recording and managing customer and product data were modified. Because usually the planner was facing the situation to run out of vehicle floor space, rather than weight on a vehicle, it was important to establish accurate volume as well as weight information for each product. It was possible to request the majority of this information from the manufacturer and to measure the size of the remaining products on site. However, this task of variable volume measuring seems to represent a challenge on the long run.

The operator had to pay attention to information such as customer opening and closing times, which had never been formally recorded before. The process of gathering better customer data has been useful for other parts of the business as it was possible to have a more accurate and up to date customer database. Sanderson modified in parallel the Swords system so that it was making sure to store and maintain this data centrally.

The operator ran the software solution, especially the route and load planning support tool, in parallel to manually planning during the final stage of the preparation before going live. This allowed time for the operational set up such as the routing and loading rules to be fine-tuned to ensure the procedures were feasible and the new trips achievable.

The fleet manager has used the software solution for strategic planning to assess the impacts of different ‘what if’ scenarios, e.g. to assess the impact of seasonal changes in demand on its transport resources. The software solution shows what issues need to be looked at and it allows the planner to weigh up different options. It is beneficial to do this analysis before picking, as once pallets have been assembled it is more time consuming to make any changes. The operator also have changed to a more standardised way of routing, as the three main planners are now skilled in using the software solution, and produce their results in a more consistent way. The digital map is used for seeing where deliveries are located and it is also used to shift an order from one trip to another.

Optrak realisation works through the following sequence of activities:

- **Plan:** produce an initial plan; either using Optrak Operational Planning or by loading fixed trips directly from an ERP or Sales Order Planning system
- **Inform:** The system will notify the drivers of their tasks via the on-vehicle computer. When required, it will let customers know when to expect deliveries.
- **Track:** The software solution will monitor vehicle positions and delivery activities, recalculating the schedules and checking for problems such as vehicles running behind time.
- **Alert:** Problems and other events can trigger an alert to be sent to the operator through emails or SMS.
- Act: Adjust the plan, inform the drivers or the customers and ensure the revised plan is carried out.
- Analyse: After the plan has been executed, follow-up with performance analysis. Track KPIs, extract and analyse data (Excel). Identify problem areas for improvement.
- Publish: Use PDF and Excel reports to communicate performance to colleagues and customers.

Using routing software to create optimised daily trips meant that drivers had to get used to changes in their working practices. It took three to four months for the drivers to adapt to the new system. Previously drivers followed reasonably similar trips across the week but now it is expected they will make other deliveries on the outward or return leg of a trip.

**Experiences and impact**

Benchmarked improvements since the introduction of the solution include:
- Improvement in a key performance indicators (KPIs), delivering more orders with fewer vehicles.
- Vehicle utilisation has gone up and there is an increase in the number of orders carried monthly by each vehicle by up to 11%.
- 3% improvement in mileage per order, and reduction in fuel use.
- On Time In Full (OTIF) delivery performance has increased, which plays an important role in successfully growing the customer base.
- The quality of the route and load plans has increased.
- When adding up the cost of fuel, insurance, road tax, salaries of the drivers and mates, each vehicle costs £50,000 per year. The operator was able to take the first vehicle off the road relatively soon after going live and a second followed. The solution helped make a rapid and sustained transport saving within the first year.
- Total CO2 reduction per item is -3%. Total mileage reduction per item is -3%
- Total saving is about £100,000 per year.
- The external costs of the company operations (congestion, accidents, noise, health and emissions) have been reduced by 3%, in accordance with the mileage reduction per item delivered, and with the CO2 reduction per item.

Optrak does not receive public funding; Filshill were not receiving subvention for implementing the Optrak solution

**Success factors and barriers**

Before implementing the new system, the customer situation had some gaps that would need to be filled in order for the case to be come successful: no powerful software product implemented before start and low loading factors in road freight transport operations. The following success factors are identified for the case:
- Willingness to change operations by the fleet manager,
- Knowledge of the fleet manager about the software solution on offer
- Knowledge about potential benefits
- Implementation of a feasibility analysis of the software product use, demonstrating the suitability of the solution for the type of operations of the business
In addition, the cooperation with public sector authorities is not given. The confidentiality of customer data hinders the wide diffusion of case studies demonstrating the potential benefits for other users. This confidentiality issue is a general challenge for this type of solution on the market. Therefore the market is showing a high potential for future growth. Furthermore, there is another potential source of public benefits that remain untapped. As the eFreight discussion is showing, the cooperation with freight operators on information management could be greatly enhanced. At the operator level, there is a pool of very good monitoring data available now at Filshill. But this data is not used by any public sector authority. It would be possible to use this type of loading efficiency and routing efficiency data in order to take appropriate decisions on future efficiency improvements.

The market of this type of solution is not transparent. A multitude of solutions all with different features coexist on the market. When a customer would like to improve the efficiency of its operation and decide to buy into a solution, there is no guidance available on which would be the best and most suitable system.

The main risks identified include:

The confidentiality question might lead to the complete ignorance of this type of solution
The absence of translation hinders the diffusion to non-UK markets

Innovation and transferability

The transfer to other European markets will be difficult for reasons of the presence of competitors in many countries with other national languages. However, this solution is not limited to pallet transport, but is applicable to general cargo and special cargo as well. The only framework condition is the knowledge, willingness to change and skills of the fleet manager at the customer business.

A small scale implementation for few vehicles can be tested before to be scaled up to a full scale implementation within a company. A transfer from one company to another is technically feasible and economically profitable depending on the previous practice. Any road freight transport operator company with manual scheduling and routing, and a low load factor is a potential customer.

Similar competitors might achieve similar results (Baumgartner, Leonardi TRD 2008) with other software systems. The market survey of Baumgartner and Leonardi (2008) show an average CO2 benefit of about 15% for the implementation of scheduling and routing systems in German road freight transport.

For the Optrak application at Filshill, no other software solution was tested, so there is no comparison with similar systems available. The confidentiality of the data obtained from the customer was a hindrance to a broader, transparent assessment and thus a barrier to transfer-ability.

Synthesis of results in cluster/topic context

Filshill and Optrak are SMEs in UK. Optrak is the solution provider. Filshill is the client, a road freight transport operator.

Medium size road freight transport operators such as Filshill can benefit from this solution. Optrak can benefit from future growth.

More information

Tim Pidgen, Optrak: http://optrak.com/content/contact-us
4.4 Case analysis and conclusions

In the eFreight cluster the emphasis in solutions was put on best practices covering B2B solutions enhancing B2B cooperation. Regarding infrastructure and technologies there is naturally a focus on IT-technologies and solutions which contribute to transport optimisation which justifies the investment into IT as a supportive tool in transport operations.

The cases in this cluster are sorted in three distinct topics, to allow a clustered analysis of the degree of innovation, transferability and the level of impact of the cases. The following topics were identified:

- Process improvements
- Co-modal journey optimisation
- Co-operative platforms and information sharing

A trend that can be singled out in the cross-case analysis for BESTFACT is the increased number of cases dealing with intelligent co-modal shipment planning either along corridors/routes or within transport networks of logistics service providers (e.g. MixMove-Match.com, Freight Arranger, AMATRAK, IXSuite), involving cargo bundling and informational integration. These solutions aim at a higher efficiency, but also a higher quality of transport for the land transport modes (mainly road and rail, but also inland waterway). Secondly, like in the first BESTFACT year and BPH, there seem to be large efforts aimed at a reduction of time the vehicles and the cargo spend at seaports. This occurs through an improved electronic exchange of information among the actors (e.g. ITS Multi-port Adriatic Gateway, Single Window Odessa, HPA - Smart Port Logistics). Such solutions allude to waterborne (deep sea and feeder shipping) or hinterland transport. Air freight is not covered by the cases presented in this BPH.

In all, the concepts contained in the inventory help to make Europe’s transport and logistics system more competitive.

4.4.1 Process improvements

The process improvement solutions identified provide innovation through technical solutions which derive from relatively simple ideas. The ingenious benefit is added by implementing the ideas into practices which work, which can be easily integrated with existing solutions and which convince actors to adopt. The challenge to bring different organisations into collaboration offers at the same time a powerful way to reach higher transport efficiency.

MODINT provides a good example of how eFreight can improve the efficiency by combining process redesign and IT systems. The approach to bundle freight at the source shifts a last-mile logistics challenge to the first mile. Because the first mile in this case is located in China the work can be fulfilled already more cost efficient. Also the overall transport chain waiting times are used more efficiently in the warehouses after production, instead of at the destination, where labour and transport inefficiencies are more costly. The collaboration of the European partners also leads to a significant volume of demand.

The MixMoveMatch concept was originally developed by an industrial shipper. Now MixMoveMatch.com is provided online as Software as a Service. It is designed to support logistical concepts across company boundaries. Therefore, the data handling becomes a sensitive issue. In turn it can be seen as a collaborative approach for cargo bundling, which benefits from increasing user numbers, while still maintaining data security. Furthermore MixMoveMatch can be simply integrated into TMS, WMS or ERP systems. It addresses both
business and policy objectives and shows a high positive impact on both the efficiency and sustainability of the logistics sector.

4.4.2 Co-modal journey optimisation

Next to solutions which have actors collaborate the coordination and cooperation along one supply chain is a key strategic target for the majority of actors in freight transport and logistics. Efficiency gains and quality improvements are commonly achievable trough eFreight solutions eliminating communication barriers, setting standards and centralising information within either one tool or at least one dataset. The presented solutions all offer their individual benefits. There are no solutions able to cover all user needs uniformly across all actors. Framework conditions and prerequisites have to be considered, which makes an objective analysis of similar solutions difficult. The analysis focuses rather on the individual benefits.

The IXSuite is a co-modal TMS making use of existing standards, providing a wide range of options and possible individualisations. In the topic of co-modal journey optimisation also other BESTFACT cases work along the same principle as the IXSuite. Concerning the TOS function, SyncroTESS by INFORM GmbH optimises terminal resource planning and handling of intermodal loading units in terminals. As is the case for IXSuite, terminal gate processing, train loading and truck operations planning are covered. SyncroTESS has order management and administration capabilities, too. But regarding the planning of inland waterway transport, SyncroTESS does not have any specific functionality. Additionally, there is lacking capability as regards the rail freight forwarding. This is where the IXSuite provides an innovative benefit. The BLU case also provides for all TOS functions, including the terminal handling of inland vessels, but it cannot be used to plan intermodal transport as is the case for a TMS like IXTransportOperator and IXRailOperator.

FRETIS is a modular software package that provides the user with a complete and comprehensive tool for the management and control of all intermodal transport related operations either in terminals or along the transport chain. FRETIS does also cover e.g. controlling of the terminal gate processes, terminal resource planning, railway transport planning, electronic document handling or administration. Compared to FRETIS, the IXSuite has gained more commercial awareness and its development is more driven by the requirements of actual customers. Furthermore, FRETIS seems to be too sophisticated for the purposes of a medium-sized transport service provider with regard to the integration of the many technologies involved.

Amtrak provides a different solution which relies on an artificial intelligence and a software-based, self-controlling multi-agent system while being based on open source software, eliminating all licensing costs. A multi-agent system is a system of several different specialized units, which collectively solve a problem. In Amtrak, the multi-agent system is capable to make route planning and vehicle assignment in real time. Changing customer order data and vehicle conditions can be incorporated dynamically. The work of a dispatcher is supported in real time and the planning and decision capacity improved.

Optrak is basically a tour planning tool, but especially allows interconnected planning including trip scheduling with customer notification. The case is specifically interesting because of the data quality, the openness of the system provider and the client regarding the data publication, the clear benefits obtained and the easy transfer that is made possible by the use of a standard product that has a proven market record.
4.4.3 Co-operative platforms and information sharing

A key challenge identified in the eFreight cluster is the problem along border crossings or with international transports. There are significant cultural differences related to legal issues, procedures or just language involved in most transport activities today. The focus is on data exchange in standardised formats, crossing system barriers as well as language barriers to allow efficiency gains in co-modal transport chains.

In the current typical multimodal transport scenarios the different actors involved in the transport chain, interact using various information and communication protocols or transport logistics back-end systems. Their current ICT capacities have great differences and a significant fragmentation. Furthermore, some of them have a low technological capacity: they don’t have IT solutions or they don’t use specific tools for their communications; the exchange of information takes place only via fax, e-mail or, phone calls. Thus each player is able to produce information which cannot be used by all the other actors involved. Furthermore, the direct control on the cargo, for the freight integrators or transport managers, is quite complicated as the process is not transparent and smooth. Also the cooperation with other important transport players is quite difficult, thus preventing the possible synergies and collaborations framework between users.

For the presented cases the challenge is not only the business side of supply chains but also the integration of authorities for import and export regulations, safety and security protocols as well as the interaction with all other transport and traffic functions in the ecosystem.

The HPA - Smart Port Logistics case is in principle an ITS platform as a PPP which improves the access to port facilities while also relieving the city infrastructure. This is truly a unique approach within Europe. Since in Hamburg the port infrastructure is interwoven with the city an efficient management is especially important in avoiding conflicts and increasing acceptance with the public. The solution is also easily transformable to other ports or similar areas, e.g. airports and rail-freight terminals. The HPA Smart Port Logistics solution can be seen as a “Cooperative System” in the sense of the eFreight framework.

In Italy the eFreight advances are visible through cases highlighting public and private initiatives. The Italian vessel traffic service (VTS) provides a country wide vessel and port traffic management system. It is developed by public authorities and improves the transport system in terms of efficiency as well as safety at sea. It is the world’s largest system to control domestic waters. Part of its success is the capacity to integrate other technical systems in ports, such as the E-Port system in Genoa. The Adriatic Gateway ITS is a data exchange among the northern Adriatic ports establishing a network capable of cooperating in efficient ways. This builds a regionalised cluster of ports which eliminates barriers in communicating and data exchange. Within the system further intermodal service providers are integrated focussing not only a horizontal but also a vertical organisational perspective. Through the use of EDI technology the ease of integrating interested parties is kept.

The Single Window Odessa allows all parties involved in the transport process and state regulatory authorities to send and receive information from a single source (single information system), in a single format, on the basis of one-time submitted data (i.e. there is no re-keying of information). Before the implementation the entire document workflow in the Ukrainian ports as well as the planning of the workflow for import goods in the ports was carried out paper-based. The true innovation thus also results from the scope of the practice and the common practices in place. Now, the solution makes it possible to stamp permit marks in electronic documents and data. As these functions streamline the communication and administrative processes it is also important to note, that the solution is easy to integrate in comparable markets.
Corridor strategic planning and monitoring (CoSpaM) is a case used and applied in various scenarios and multimodal freight corridors involving Interporto Bologna as node. The CoSpaM solution aims to design incremental and collaborative operations, transport monitoring and control along established multimodal corridors. Therefore it has to be fully integrated with the multimodal corridor platform and has to be effective in planning and control of door-to-door freight transport chains by the cargo responsible bodies (freight integrators). The tool has been specifically designed for the multimodal collaboration and allows a strategic orientation towards the integration of the Interporto concept. Similar cases are existing, but mainly focus on the seaports. The CoSpaM can be seen as the first port community system for freight consolidation and hub centres (Interportos).

Freight 4 ALL is a coordination platform integrating different actors and IT systems along transnational transport chains for sea-hinterland transports. The focus of the solution is the interoperability of systems via a generic layer available for ICT systems. It differs from other solutions by not just adding functions into one tool but by coordinating the exploitation of different state-of-the-art systems through added user accessibility and management. Freight 4 ALL is utilising standard messages and demonstrating efficiency improvements with minimal adaption requirements of users.
5 Project outlook

In its final year 2015 BESTFACT will have a collection of more than 150 cases collected. Together with the industry network, the presented cases at the many BESTFACT events and the implementation actions monitored within the project the knowledge base of BESTFACT entails a vast source of information within the three associated clusters. The final best practice handbook will summarise the most important topics in each field and give a comprehensive overview of the current solutions emerging from the market.

The project focussed on involving the developers in BESTFACT events and lending support in the development and implementation process. In the end of 2015 this process will lead to the finalisation of the BESTFACT stories told over a span of four years within three clusters. Therefore, the synthesis within the clusters will be supported by an analysis of the developments in the field and remaining challenges beyond the project.

Questions and remarks concerning this handbook are welcome. Please direct your input or comments to info@bestfact.net.
## ANNEX

### ANNEX 1: Glossary: Abbreviations used in the BPH and referenced case descriptions

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Explanation/Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2A</td>
<td>authorities to authorities</td>
</tr>
<tr>
<td>A2B</td>
<td>authorities to businesses</td>
</tr>
<tr>
<td>AES</td>
<td>Automated Export System</td>
</tr>
<tr>
<td>Ah</td>
<td>Ampere-hour</td>
</tr>
<tr>
<td>ALU</td>
<td>Aluminium</td>
</tr>
<tr>
<td>ANPR</td>
<td>Automatic number plate recognition</td>
</tr>
<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
</tr>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
</tr>
<tr>
<td>ASTRA</td>
<td>Swiss Federal Roads Office</td>
</tr>
<tr>
<td>ASYCUDA</td>
<td>Automated System for Customs Data</td>
</tr>
<tr>
<td>AVI</td>
<td>Automatic vehicle identification</td>
</tr>
<tr>
<td>AWB</td>
<td>air waybill</td>
</tr>
<tr>
<td>B2A</td>
<td>businesses to authorities</td>
</tr>
<tr>
<td>B2B</td>
<td>business-to-business</td>
</tr>
<tr>
<td>BESTFACT</td>
<td>Best Practice Factory for Freight Transport</td>
</tr>
<tr>
<td>BESTUFS</td>
<td>Best Urban Freight Solutions</td>
</tr>
<tr>
<td>BHT</td>
<td>Bremer Hafentelematik (export declaration system in Bremen port)</td>
</tr>
<tr>
<td>BPH</td>
<td>Best Practice Handbook (this document)</td>
</tr>
<tr>
<td>CB radio</td>
<td>citizens’ band radio</td>
</tr>
<tr>
<td>CBA</td>
<td>Cost-Benefit Analysis</td>
</tr>
<tr>
<td>CCTV</td>
<td>Closed Circuit Television</td>
</tr>
<tr>
<td>CH</td>
<td>Switzerland</td>
</tr>
<tr>
<td>CL</td>
<td>Cluster</td>
</tr>
<tr>
<td>CL1</td>
<td>Cluster 1 (of BESTFACT project, dealing with urban freight)</td>
</tr>
<tr>
<td>CL2</td>
<td>Cluster 2 (of BESTFACT project, dealing with urban freight)</td>
</tr>
<tr>
<td>CL3</td>
<td>Cluster 3 (of BESTFACT project, dealing with urban freight)</td>
</tr>
<tr>
<td>CO2</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>CO2e</td>
<td>Carbon dioxide – equivalent</td>
</tr>
<tr>
<td>CRM</td>
<td>Customer relationship management</td>
</tr>
<tr>
<td>DE</td>
<td>Germany</td>
</tr>
<tr>
<td>DPD</td>
<td>Dynamic Parcel Distribution</td>
</tr>
<tr>
<td>DSRC</td>
<td>Dedicated Short Range Communication</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>eBXML</td>
<td>Electronic Business using XML</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
</tr>
<tr>
<td>EDI</td>
<td>Electronic Data Interchange</td>
</tr>
<tr>
<td>EDIFACT</td>
<td>EDI For Administration, Commerce and Transport (UN)</td>
</tr>
<tr>
<td>EGNOS</td>
<td>European Geostationary Navigation Overlay Service</td>
</tr>
<tr>
<td>EMKEP</td>
<td>Elektrifizierung von MB Kleintransportern in Entwicklung und Produktion (Electrification of Mercedes Benz Vans in Development and Production)</td>
</tr>
<tr>
<td>EnBW</td>
<td>Energie Baden-Württemberg</td>
</tr>
<tr>
<td>ENS</td>
<td>Entry Summary Declaration</td>
</tr>
<tr>
<td>ERP</td>
<td>Enterprise Ressource Planning</td>
</tr>
<tr>
<td>ES</td>
<td>Spain</td>
</tr>
<tr>
<td>ESB</td>
<td>Enterprise Service Bus</td>
</tr>
<tr>
<td>ETC</td>
<td>Electronic Toll Collection</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>EUR</td>
<td>Euro</td>
</tr>
<tr>
<td>EXS</td>
<td>Export Summary Declaration</td>
</tr>
<tr>
<td>FAL</td>
<td>Facilitation of International Maritime Traffic</td>
</tr>
<tr>
<td>FHL</td>
<td>Freight House Manifest</td>
</tr>
<tr>
<td>FI</td>
<td>Finland</td>
</tr>
<tr>
<td>FKZ</td>
<td>Förderkennzeichen (project identification code in German research funding system)</td>
</tr>
<tr>
<td>FR</td>
<td>France</td>
</tr>
<tr>
<td>FVD</td>
<td>floating vehicle data</td>
</tr>
<tr>
<td>FWB</td>
<td>Freight Waybill</td>
</tr>
<tr>
<td>FZB</td>
<td>House Waybill Message</td>
</tr>
<tr>
<td>GHG</td>
<td>Green house gas</td>
</tr>
<tr>
<td>GIP</td>
<td>Graph Integration Platform</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>GS1</td>
<td>Global Standards One (Organisation)</td>
</tr>
<tr>
<td>GSM</td>
<td>Global System for Mobile Communications</td>
</tr>
<tr>
<td>HEATCO</td>
<td>Developing Harmonised European Approaches for Transport Costing and Project Assessment</td>
</tr>
<tr>
<td>HGV</td>
<td>Heavy goods vehicle</td>
</tr>
<tr>
<td>IATA</td>
<td>International Air Transport Association</td>
</tr>
<tr>
<td>ICE</td>
<td>Internal Combustion Engine</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>IFCSUM</td>
<td>Forwarding and consolidation summary message</td>
</tr>
<tr>
<td>IKONE</td>
<td>Integriertes Konzept für eine nachhaltige Elektromobilität (Integrated Concept for a Sustainable Electro Mobility)</td>
</tr>
<tr>
<td>ILOS</td>
<td>Intelligente Güter-Logistik im Städtischen Gebiet</td>
</tr>
<tr>
<td><strong>Acronym</strong></td>
<td><strong>Definition</strong></td>
</tr>
<tr>
<td>------------</td>
<td>---------------</td>
</tr>
<tr>
<td>IMO</td>
<td>International Maritime Organisation</td>
</tr>
<tr>
<td>IRR</td>
<td>Internal Rate of Return</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organization for Standardization</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>ITS</td>
<td>Intelligent Transport Systems</td>
</tr>
<tr>
<td>Kg</td>
<td>Kilogramme</td>
</tr>
<tr>
<td>Km</td>
<td>Kilometre</td>
</tr>
<tr>
<td>Km/h</td>
<td>Kilometre per hour</td>
</tr>
<tr>
<td>KPI</td>
<td>Key performance indicator</td>
</tr>
<tr>
<td>kW</td>
<td>Kilowatt</td>
</tr>
<tr>
<td>kWh</td>
<td>Kilowatt-hour</td>
</tr>
<tr>
<td>LEZ</td>
<td>Low Emission Zone</td>
</tr>
<tr>
<td>LPG</td>
<td>Liquefied Petroleum Gas</td>
</tr>
<tr>
<td>LPR</td>
<td>license plate recognition</td>
</tr>
<tr>
<td>LSP</td>
<td>Logistic service provider</td>
</tr>
<tr>
<td>LT</td>
<td>Lithuania</td>
</tr>
<tr>
<td>LTL</td>
<td>Litas (Lithuanian currency)</td>
</tr>
<tr>
<td>LU</td>
<td>Luxembourg</td>
</tr>
<tr>
<td>m³</td>
<td>Cubicmetre</td>
</tr>
<tr>
<td>MCA</td>
<td>multi-criteria analysis</td>
</tr>
<tr>
<td>mill.</td>
<td>Million</td>
</tr>
<tr>
<td>MoS</td>
<td>Motorways of the Sea</td>
</tr>
<tr>
<td>MRN</td>
<td>Movement Reference Number</td>
</tr>
<tr>
<td>NCTS</td>
<td>New Computerized Transit System</td>
</tr>
<tr>
<td>NL</td>
<td>The Netherlands</td>
</tr>
<tr>
<td>NOₓ</td>
<td>Generic term for mono-nitrogen oxides NO and NO₂</td>
</tr>
<tr>
<td>NPV</td>
<td>Net Present Value</td>
</tr>
<tr>
<td>NVOCC</td>
<td>non-vessel operating common carrier</td>
</tr>
<tr>
<td>OASIS</td>
<td>Organization for the Advancement of Structured Information Standards</td>
</tr>
<tr>
<td>OCR</td>
<td>Optical Character Recognition</td>
</tr>
<tr>
<td>OSGi</td>
<td>Open Service Gateway Initiative</td>
</tr>
<tr>
<td>PE</td>
<td>Polyethylene</td>
</tr>
<tr>
<td>PET</td>
<td>Polyethylene terephthalate</td>
</tr>
<tr>
<td>PL</td>
<td>Poland</td>
</tr>
<tr>
<td>PLDA</td>
<td>Paperless Customs and Excise</td>
</tr>
<tr>
<td>PM₁₀</td>
<td>Particulate Matters (particles of ~10 micrometres or less)</td>
</tr>
<tr>
<td>POI</td>
<td>Point of Interest</td>
</tr>
<tr>
<td>PPP</td>
<td>Public private partnership</td>
</tr>
<tr>
<td>PROMIT</td>
<td>Promoting Innovative Intermodal Freight Transport</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>PS</td>
<td>Polystyrene</td>
</tr>
<tr>
<td>QIS</td>
<td>Quick Info Sheet (BESTFACT publication format)</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>RFID</td>
<td>Radio-frequency identification</td>
</tr>
<tr>
<td>ROI</td>
<td>Return on Investment</td>
</tr>
<tr>
<td>SAD</td>
<td>Single Administrative Document</td>
</tr>
<tr>
<td>SDTS</td>
<td>Summary Declaration for Temporary Storage</td>
</tr>
<tr>
<td>SME</td>
<td>Small and medium-sized enterprise</td>
</tr>
<tr>
<td>SOA</td>
<td>Service Oriented Architecture</td>
</tr>
<tr>
<td>T2L</td>
<td>Document for Proof of Community status (SAD)</td>
</tr>
<tr>
<td>TAF-TSI</td>
<td>Technical Specifications for Interoperability for Telematic Applications for Freight</td>
</tr>
<tr>
<td>TEN-T</td>
<td>Trans-European Transport Network</td>
</tr>
<tr>
<td>TEU</td>
<td>Twenty Foot Equivalent Unit (20' container)</td>
</tr>
<tr>
<td>Tkm</td>
<td>Tonne kilometres</td>
</tr>
<tr>
<td>TMS</td>
<td>Transport Management System</td>
</tr>
<tr>
<td>TPA</td>
<td>truck parking area</td>
</tr>
<tr>
<td>UBL</td>
<td>Universal Business Language</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>V</td>
<td>Volt</td>
</tr>
<tr>
<td>WADIS</td>
<td>Wagendispositions- und Informationssystem (rail wagon management and information system)</td>
</tr>
<tr>
<td>WMS</td>
<td>warehouse management system</td>
</tr>
<tr>
<td>WP</td>
<td>Work package (referring to the BESTFACT working structure)</td>
</tr>
<tr>
<td>WP2</td>
<td>Work Package 2 (of BESTFACT project, dealing with Methodology)</td>
</tr>
<tr>
<td>XML</td>
<td>Extensible Markup Language</td>
</tr>
<tr>
<td>ZEB</td>
<td>Zero Emission Boat</td>
</tr>
</tbody>
</table>

**ANNEX 2: Sources used in the deliverable**

The described cases were provided by the project partners within the BESTFACT consortium in cooperation with the case owners and developers. For further information and contact details please see the information provided with each individual case or consult the Quick Info Sheet prepared for each case, which are available for download on the BESTFACT webpage (www.bestfact.net).

- BESTFACT (2012): D2.1 Main challenges in freight logistics
- BESTFACT (2012): IR2.1 Methodology for BESTFACT Best Practice and Working Instructions [internal document]
- BESTFACT (2013): IR2.2 BEST Practice implementation action 1 (Guidelines for Best Practice Implementation Actions and Policy Tools)
ANNEX 3: Overview over the BESTFACT methodology and processes

The methodology for the BESTFACT Best Practice collection, evaluation and processing was developed within WP 2 of the project. A multi-step process was established that will be repeated over the course of the project duration each year. As a result the three Best Practice Handbooks are produced to summarise the project developments in a comprehensive format.

The evaluation of best practices is based upon the research into strategic targets and challenges in the field of freight transport and logistics previously conducted in BESTFACT (cf. D2.1 Main challenges in freight logistics). The results of the process contribute to the evaluation approach used to identify and select suitable cases for BESTFACT. Over a multi-step process proposals were evaluated according to the best practice criteria mentioned above. The following charted process steps were defined to collect and consolidate all available information into the cluster case descriptions and this handbook.
The phase 1 comprised of the first identification round resulting in a collection of cases that do generally fulfill the requirements of BESTFACT within each cluster. A closer expert evaluation determined which cases would be reviewed in the first year of BESTFACT activities as inventory cases, leading to an extensive information collection and structured compilation for each case, performed by consortium members of the project. Given the nature of the expert evaluations in the case selection and description process, biased assessments might be possible. Throughout the work within the project double-checks and four-eye-principles are employed to the benefit of quality and independence of the work.

The evaluation of cases considers a simple multi-criteria approach analysing four central best practice aspects. Within the criteria an expert ranking is performed evaluating the fulfillment on a level between 0 and 3. The level 0 leads to an exclusion of a case. Because BESTFACT cannot assess cases on a comparable quantitative set of performance indicators cases are not ranked and the expert scorings are not published.

For the expert evaluation as a first step the information accessibility is checked. For further consideration within the process a minimum of information and access to this information is needed. This information has to allow an assessment and evaluation of the additional criteria for the inventory consideration.
Further on cases are evaluated for their level of **innovation and technical or economic feasibility**. Solutions should be innovative and include products, processes, services, technologies, or ideas that are more effective than previous ones. They should be accepted by markets, governments, and society. The experts rate the expected level of innovation (low or high) and also estimate the technical or economic feasibility of a practice (low or high) in one criterion.

<table>
<thead>
<tr>
<th>Level</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Segment and rating guidelines</strong></td>
<td>Full: access to all needed information, readily available (e.g. direct download) or helpful contacts or affiliated partner</td>
<td>Broad: access to first basic information and details available on request, further sources available and free of charge</td>
<td>Limited: access on request possible, access only for limited user group, charges to receive information, anticipation of availability issues</td>
<td>Not available / accessible: Possibility of review of the item is highly doubtful due to restricted information and / or (repeatedly) no response by developer or responsible contacts</td>
</tr>
</tbody>
</table>

An important factor within BESTFACT is the **impact of cases on both strategic business and policy targets**. The potentiality of each case is evaluated separately for a set of indicators. Since impacts will not occur on a comparable, quantifiable scale across cases the judgement is based on expertise in the field and relevant experiences with the set of strategic targets.
As mentioned above the transferability of best practice cases is also used as a main criterion for the distinction between an evolving case and a best practice. The transferability of cases to other domains, situations, framework conditions or business structures has to be secured. At least a partial implementation with certain (necessary) adjustments should be possible outside of the originating environment.

After the expert evaluation the cases are described and collected for the BESTFACT inventory of cases (see below).

It is important to note that the application of the multi-criteria approach does not yield a universal scoring of the cases. The nature of the cases, their field of application and the expert judgement are too arbitrary and differing to be considered as a valid ranking criterion. BESTFACT strives to promote best practice cases and ensures that cases excel the threshold levels of the best practice definition. Evolving cases are integrated into the processes to foster their development and help to realise their potential. Cases that offer the potential for further consideration, providing substantial benefits and presenting high levels of innovation are referred to the second phase of case evaluations.

The second phase of case evaluations determines which cases are accessible and relevant for the BESTFACT in-depth surveys. The in-depth evaluation required a deeper understanding of cases and involved developers, owners or users to provide more detailed information; interviews or demonstrations were conducted. The results of the in-depth surveys are presented in this handbook adjacent to the cluster sections.
As the outcome of the two phases BESTFACT evaluated 50 cases for the case inventory until the publication of this first handbook. In total 12 in-depth surveys were prepared and are presented in this handbook. Within each cluster a synthesis across the cases was performed and the results are presented in the following main chapters dedicated to each cluster. In the coming years BESTFACT will expand its inventory of best practice cases. The following table gives an overview of the cases evaluated so far and an outlook to the next years.

<table>
<thead>
<tr>
<th>Cluster Cases</th>
<th>Cluster 1: Urban Freight</th>
<th>Cluster 2: Co-Modality and Green Logistics</th>
<th>Cluster 3: eFreight</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory cases until end of 2013</td>
<td>15</td>
<td>25</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>In-depth cases until end of 2013</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>BESTFACT aim of inventory cases (2015)</td>
<td>45</td>
<td>60</td>
<td>45</td>
<td>150</td>
</tr>
<tr>
<td>BESTFACT aim of in-depth cases (2015)</td>
<td>17</td>
<td>26</td>
<td>17</td>
<td>60</td>
</tr>
</tbody>
</table>

To provide an additional benefit to the public, businesses, authorities and other users the Quick Info Sheets (QIS) were produced for every case evaluated. These will provide a short overview of solutions, implementation and further useful information. These QIS are linked within this document for each case and can be downloaded from the BESTFACT webpage at [www.bestfact.net](http://www.bestfact.net).