KASSETTS
A new ICT approach to transport organisation and optimisation

KASSETTS
ICT solution for logistics

KASSETTS
Towards unrestricted logistical interoperability for SMEs

KASSETTS
Optimise transport and logistics activities
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1 Introduction

In the EU, likewise throughout the world, the volume of transport is expected to grow after the economic crisis. Several transport studies point out this growth, recovering the situation before the crisis. Until 2000, the growth of transport somehow corresponded to the growth of Gross Domestic Product (GDP), but since 2000, it has grown significantly faster. The reason for such trends lays in globalisation and moving of the production to sites with cheaper labour force. Transport is one of the most important factors for territorial competitiveness and of key importance for national and world economies. Transport is not only a major sector of the EU economy but also a key company function in the industrial system. Small and medium enterprises (SME) can hardly access optimised transport solutions because of small volumes and low frequency of their transports. They generate a scattered transport demand producing a large number of non-saturated running vehicles, often managed on own account. This is particularly critical in Central Europe (CE) due to the strong presence of SMEs and of transport supply fragmentation. Moreover this situation affects the CE entire territory because of SME strong transnational trade relations within this area. Therefore the problem dimension and the relevant solutions need to be jointly faced on a transnational cooperation basis. The objective of generating a higher saturation of trucks is twofold: (a) finding a sufficient large number of collaborating SMEs located in the same region to aggregate their payloads, and (b) combining them with the payloads of SMEs in other regions to complete the transnational routes, avoid empty hauls and foster sufficient transport volumes thanks to Information and Communication Technology (ICT) tools.

This is the approach developed by the KASSETTS project. This book presents the main KASSETTS activities, results and perspectives for improving SMEs transport and logistics activities by fostering the adoption of ICT solutions and services.
2 Project overview

KASSETTS was initiated to answer the need of ICT tools to help manufacturing companies, in particular SMEs, in optimising their transnational logistic traffics. It relies on a multidisciplinary partnership with a public mission in Italy, Poland, Slovenia, Germany, Hungary, Slovakia and Czech Republic.

The KASSETTS regions strongly base their future development on SMEs systems and on their transnational trade relations. Transport, logistics and related ICT services play a fundamental role for SMEs as they represent the strategic leverages to be on the Central Europe markets and to be integrated in procurement and distribution chains. Nevertheless SME logistics management is far from being optimal and SMEs can hardly access optimised transnational transport solutions because of:

- small shipping and low frequency of their transports, generating a scattered transport demand and producing a large number of non-saturated running vehicles and low use of intermodal transport (with increasing transport emissions);
- low level of ICT endowment limiting their accessibility to the logistic supply.

KASSETTS wants to contribute solving these problems by creating a stable EU operative ICT network of logistics brokers, based on open source policy, in which every broker is a joint logistic office among SMEs that:

- daily collects manufacturing SMEs transport orders with interfaces to their IT systems;
- aggregates (critical mass) and optimises SMEs demand in terms of vehicles routes and transport means used at regional and at transnational level in dynamic combination with other similar brokers;
- plans optimal logistics transnational chains based on shipping destinations, quantity, timing of different local groups of manufacturing SMEs;
- interfaces this optimised demand to logistics operators.

The main operative reasons for setting up the project were:

- to identify, describe and disseminate best practices concerning logistics competitiveness,
- to enable SMEs to access to information and new technologies in the transport and logistics field (e.g. to make the companies aware of the advantages of ICT-based route planning at the individual level as well as at the district and territorial level) and to exchange logistics information and data,
- to rationalise the operation of the single small truck owners through collaboration with other providers and to form long-term and tight co-operation between small and medium enterprises,
- to harmonise the transport planning process at the individual company - SMEs level as well as at the district level (territorial and industrial areas), to manage more efficiently transport services planning, invoicing, accounting, purchasing and monitoring,
• to optimise the use of internal fleet for better resource usage,
• to reduce overhead costs and to reduce transportation costs,
• to better plan transport, which implies traffic reduction and reduced congestion and which has a direct positive consequence on the environment, e.g. low emission,
• to support critical decisions in terms of internal transport management versus outsourcing, truck purchase vs. rental, price lists negotiation and also in terms of dialogue between logistics chain managers’ in manufacturing companies and logistics service providers’ availability to support their strategic and operational decision making,
• to centralise logistic processes at company level but also among companies to optimise transport flows.

The KASSETTS broker is neither a new logistic operator nor a 4PL, but it improves supply-demand relations of the companies it involves, fosters logistics outsourcing and helps operators in having an organised transport demand.

KASSETTS had 4 main streams of activities:
- It defined a joint strategy for logistic innovation by ICT-based collaboration and a tested roadmap for stakeholders to promote new brokers and make them economic sustainable.
- It developed the broker joint ICT platform, the transport planning services and all of the documents exchange functionalities to interface manufacturing companies and logistics operators.
- It made the ICT tools operative in a real business environment.
- It established the joint broker management system by involving user SMEs and logistic operators. It also created a light EU broker governance management system to ensure its long term sustainability.

The general KASSETTS objective is enabling Central Europe manufacturing SMEs to participate jointly in the dynamic construction of efficient transnational transport solutions by means of knowledge and intelligent ICT services provided by an EU-wide network of intermediary organisations (logistic brokers).

Brokers, in the context of the project, are intended as organisations of different nature to foster SMEs advantages by improving the logistic behaviour through the introduction of innovative organisational models and the use of advanced ICT tools.

The provided knowledge and ICT services include the following: (a) definition of optimal routes for the aggregated local transport demand, (b) transport solutions enhancement in dynamic combination with other brokers, (c) selection of the most suited transport means and convenient transport operators, (d) support the preparation of transport-related documents, and (e) their automatic format conversion and language translation for transnational transport orders management.
3 Steps for achieving results

For achieving successful results by structuring the project the work the activities were divided into six Work Packages (WP). The Work Packages are interrelated, but also produce independent results focusing on the Central Europe as well as on the whole EU area, being the solutions developed applicable not only to the Central Europe area. All project partners were involved in each work package. For a better understanding of the KASSETTS project, a short description of the activities and results of the technical and communication work packages is presented in the next sections, being WP1 devoted to management and coordination.

3.1 Communication, knowledge management, dissemination

3.1.1 Short description

WP2 work package relied on a communication strategy at the transnational, regional and local levels targeted at involving all the KASSETTS key actors with focusing on the broker’s network establishing and growth. In this part of work media and non media tools were used for involving users (mainly small and medium enterprises) and public administrations able to promote the broker network from a policy perspective.

The work package activities led to fulfil these main objectives:

1. Informing the general public and the research community about project status and results. This is an objective focused on the permanent spreading of information about project results and also about the project status at the transnational – EU and national level. At the early phase of the project, the information also served as a supporting tool for addressing potential interest and target groups with “start up” information.

2. Involving relevant partners. This was a crucial objective of the project for achieving a critical mass of operative partners using the broker network. The main target groups were:

   2.1 Users - Logistic service purchasers – especially manufacturing Small and Medium Enterprises.
   2.2 Logistic service providers – transport and logistics operators.
   2.3 Business and public associations – association for intermediation and specialized service providing, promoting joint interests of the associated partners, including logistics associations.
   2.4 Public administrations / policy makers, which can play the role of possible catalysts, creators and developers of policy actions supporting the broker business environment.

3. Achieving efficient communication among project partners. Knowledge management represented a core issue not only to mutually achieve a joint full understanding in the KASSETTS platform development but also to easily share project documents and results in the single territorial contexts involved.
The main communication products are hereafter described. They concern:

**Media**

Media list and contacts defined a list of media with media contacts for establishing personal relationships and cooperating during the whole project duration for promotion purposes.

Press releases made in order to inform about the project start up, about the stakeholders’ consolidation process results, presentation of the 1st and final transnational conferences, presentation of pilot testing and its results.

Articles published in order to present the results of good practices analysis in ICT collaboration, brokers infrastructures and services, brokers operative network set up with involved user companies and logistic operators and through publishing on the final conference also to boost the stakeholders and key actors participation.

Brokers network EU video showed the gains which can be obtained through the brokers and the ease of use the developed ICT tools/services.

**Non-media**

Newsletter concerned the stakeholders involvement and informed them about the project status in relevant project phases, e.g. about the development of ICT tools/services, the joint strategy to promote transnational collaboration in logistics, the pilot activities and their results.

Mid conference presented the mid outcomes and results, brought together policy makers, the industrial, logistics and research environment.

Final conference the final goal was to widen the number of brokers integrating in logistic network after the project end and increasing the number of user SMEs. It consolidated a new perspective on logistics management based on logistics cooperation.

Brochure was a project “business card” to present the project to stakeholders, user SMEs and logistics operators at the regional levels.

Mid publication in the form of a book mainly presenting mid results. It was friendly to read so that it could attract further SMEs and logistics operators into the broker initiatives.

Final publication this book which presents the whole project experience and the benefits developed by KASSETTS for Central Europe.

Exhibition Fair participation to fair exhibitions on transport and logistics, in particular in Berlin in 2009 and 2010 to attract users.

Web site built as the tool which includes all the dissemination outputs and periodically updated. It includes all the main KASSETTS technical materials (www.kassetts.eu).
Regional dissemination

Flyers used to present the project to user SMEs and regional stakeholders in the national languages.

Launching event involved user SMEs, logistics operators regional stakeholders.

Pilots launching events organized in each region before the start of the pilots to promote the KASSETTS brokers network.

3.1.2 Results

Using the main communication channels defined by all the project partners (media and non media) helped to address the most relevant entities from various industry sectors and from the public sector and help the project operational implementation and prepare its future sustainability. At the beginning of the project the most crucial issue regarding communication and dissemination was the attraction of potential users and rising awareness of public entities.

The next table shows the provisional cumulative results of addressing entities from various sectors. All the indicators planned at the beginning of the projects were outnumbered during the project duration and that was the key point to raise interest in KASSETTS, engage user companies and make the potential of logistics cooperation known in the EU and in Central Europe.

<table>
<thead>
<tr>
<th>Entities addressed</th>
<th>Addressed entities through various communication channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressed representatives of public sector</td>
<td>1269</td>
</tr>
<tr>
<td>Addressed representatives of private sector</td>
<td>8228</td>
</tr>
<tr>
<td>Addressed representatives of research/technology development</td>
<td>425</td>
</tr>
<tr>
<td>Addressed entities providing intermediary services and training</td>
<td>279</td>
</tr>
<tr>
<td>Addressed representatives of interest groups</td>
<td>365</td>
</tr>
<tr>
<td>Addressed representatives of infrastructure providers</td>
<td>48</td>
</tr>
</tbody>
</table>
During the project several press releases and articles were planned to communicate the project progress and results. Press releases were all published at local level, in regional languages with adjustments to specific needs of the involved regions. The production of communication materials in national languages eased the access to the project by the local business communities. During the project several articles were published, and also several newspapers and blogs have mentioned the KASSETTS project.

A major indicator is the media coverage. As we can see below with the provisional cumulative information collected during the project activities, more than a million people have been addressed.

<table>
<thead>
<tr>
<th>Table 2: Media coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of media</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>Number of press releases</td>
</tr>
<tr>
<td>Number of press articles (incl. online media) in local/regional/national/EU press</td>
</tr>
<tr>
<td>Number of incidences of TV or radio coverage</td>
</tr>
<tr>
<td>Number of people potentially reached by press/media coverage</td>
</tr>
</tbody>
</table>

Communication and dissemination of all relevant content was also carried out through events, workshops, conferences, training sessions, face to face meeting and participation on events organised by the project partnership. As we can see from the table below through the collection of provisional cumulative data, project partners have used events as a communication and dissemination channels. Through events directly organized and participation in conferences, the partners have addressed the potential users of the KASSETTS solution, raised awareness and gained new project pilot participants.

<table>
<thead>
<tr>
<th>Table 3: Event organised and participated to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of event</td>
</tr>
<tr>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>Number of open transnational events organised (conferences, trainings, etc.) with participation beyond the partnership</td>
</tr>
<tr>
<td>Number of participants at the open transnational events organised by the partnership</td>
</tr>
<tr>
<td>Number of visible participation at transnational events organised by institutions outside the partnership</td>
</tr>
<tr>
<td>Number of open national /regional events organised with participation beyond the partnership</td>
</tr>
<tr>
<td>Number of participants at these open national / regional events organised by the partnership</td>
</tr>
<tr>
<td>Number of visible participation at national/regional events organised by institutions outside the partnership</td>
</tr>
</tbody>
</table>
3.2 Joint strategy for collaboration in logistics

3.2.1 Short description

Work Package 3 provided concepts and implementation perspectives for the other work packages.

It produced 2 core outputs. The first one, the “Joint logistic strategy”, was developed with the scope of promotion of collaboration in logistics through the network of brokers, and the second one, the “Roadmap for follow up” was addressed to stakeholders for further extending and deploying the network after the project end.

The activities in this work package were divided into 4 actions: Good practices and experiences analysis, Stakeholders consolidation, Joint logistic strategy and Road-map for follow up. The core ratio of WP3 is to identify models for brokers network sustainability and long term expansion.

Table 4: WP3 Activities

| Good practices and experiences analysis | • Collection of practices and experiences in regions concerning ICT and logistics collaboration  
• Overall picture of significant good practices and successful experiences |
| Stakeholders consolidation | • Analysis and classification of relevant stakeholders  
• Reports on interviews and meetings to present the project concept and results |
| Joint logistic strategy | • Identified success factors and key performance indicators in logistics  
• Joint logistic strategy (core output) |
| Road-map for follow up | • Preliminary version of action plan to discuss with regional stakeholders  
• Roadmap for follow up (core output) |

3.2.2 Results

Efficient transnational transport solutions are fundamental for SMEs to confirm and enforce their position in the European market, to reach integration with customers and suppliers in transnational extended supply chains. Nevertheless, transnational transport remains for SMEs an expensive and hardly manageable aspect of their business.

SMEs difficulty afford the issue of reducing and optimizing their transnational traffics as they individually manage their transport demand and do not have sufficient accessibility to ICT tools and services for managing transport flows in a collaborative way. For these reasons the KASSETTS solution:

- Brings together SMEs and defines guidelines and operational criteria, per region and per sector to reach the organizational, economic and operational conditions for an effective SMEs regional and transnational transport collaboration.
- Sets up a network of brokers, each serving a number of associated user SMEs with information and services according to a mutually beneficial and self-sustainable business model.
- Provides brokers with a suite of easy and free (open source) ICT tools to support demand aggregation and inter-brokers collaboration aimed at dynamically constructing efficient transnational transport solutions.

The WP3 activities focus on four main target groups:
1. Manufactures/user SMEs, as final users of the brokers network services in solving their daily logistic problems.

2. Logistic operators, which take advantage of the proposed solution as they deal with a better organized logistic demand.

3. Policy makers, which have the power and willing to promote policies for the deployment and extension of the logistic brokers network to sustain SMEs competitiveness and reduce regional and transnational traffics. The project provides them with concepts, strategies, plans, methods and tools and a concrete proof of concept for running the open brokers network.

4. “Multipliers”, meant as key stakeholders, which can start and operate the broker network as services delivered to associated and members companies (e.g. Chambers of Commerce, Business Clusters, SMEs associations, industrial areas managing bodies).

Some brokering experiences in logistics were carried out in recent years at the regional and local scale. Nevertheless though transnational transport is a significant bill in manufacturing SMEs balance sheets, brokers at transnational level have not been implemented so far mainly because of their excessive distance from the habits and specific needs of the user companies. KASSETTS has given an operative answer and has built strategies for this purpose.

The strategic building of the project solutions has taken into consideration the different possible profiles of the broker:

- Profile A. User company acting on behalf of a group/supply chain of user companies of the manufacturing and trade sectors, deciding to join their transportation demand to save times and costs.
- Profile B. Consortium of small logistic operators, providing transport organization and planning services.
- Profile C. Public or semi-public body acting as facilitator of the service usage among the companies settled in the industrial areas of its competence. The body takes in charge service activation for the companies as well as facilitates the enlargement of the brokers' network (new brokers to activate) and users (companies). Though within the broker activation both public and semi-public bodies can play a key role, when the service runs permanently it is advised that the public body does not enter directly the broker management and leaves this function to semi-public bodies with a more operative mission or to the profiles A and B on a non-discriminatory basis non to interfere with market competition.

The single partners have moreover built a plan concerning the identification of further brokers which are expected to run the services 2 years after the project end, matched with the above mentioned profiles. This effort was targeted at ensuring the long term sustainability and the extension of the broker network.

Table 5: KASSETTS regions and brokers profiles in 2 years after the project end
<table>
<thead>
<tr>
<th>Region</th>
<th>Broker profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>Profile A</td>
</tr>
<tr>
<td></td>
<td>Profile B</td>
</tr>
<tr>
<td></td>
<td>Profile C</td>
</tr>
<tr>
<td>Poland</td>
<td>Profile A</td>
</tr>
<tr>
<td></td>
<td>Profile A</td>
</tr>
<tr>
<td></td>
<td>Profile C</td>
</tr>
<tr>
<td>Slovenia</td>
<td>Profile C</td>
</tr>
<tr>
<td></td>
<td>Profile A</td>
</tr>
<tr>
<td></td>
<td>Profile B</td>
</tr>
<tr>
<td>Slovakia</td>
<td>Profile C</td>
</tr>
<tr>
<td></td>
<td>Profile C</td>
</tr>
<tr>
<td>Germany</td>
<td>Profile C</td>
</tr>
<tr>
<td>Hungary</td>
<td>Profile C</td>
</tr>
<tr>
<td></td>
<td>Profile A</td>
</tr>
</tbody>
</table>

Table 6: Number of brokers activated in 2 years period after the project end.

<table>
<thead>
<tr>
<th>TOTAL NR OF BROKERS</th>
<th>Profile A</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Profile B</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Profile C</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14</td>
</tr>
</tbody>
</table>

As indicated in Table above 2 years after termination of the project it is envisaged that 14 brokers will be functioning, while during the project duration each partners has already activated at least one broker per region.

Functionalities of the platform

A major issue to ensure and develop logistics cooperation among companies is the identification and development of proper services. Table nr 7 presents the sum up of the available functionalities of the KASSETTS ICT tool provided to the associated companies and logistic operators. Some of the required functions are fully covered by the current version of the KASSETTS ICT platform. Other functions require further interventions.

Table 7: Functionality of the KASSETTS platform.
<table>
<thead>
<tr>
<th></th>
<th>Analysis of profits and potential savings (as a result of entry to the system of transport orders and present data) - historical data analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Configuration of the platform, user profiles and authorities, user login management</td>
</tr>
<tr>
<td>3</td>
<td>Management of basic data (locations, type of material, transport vehicles, loading units) with the ability to import existing databases</td>
</tr>
<tr>
<td>4</td>
<td>Management of Price Lists (Tariffs)</td>
</tr>
<tr>
<td>5</td>
<td>Data exchange between partner ICT systems (order import, invoice and transport mission export)</td>
</tr>
<tr>
<td>6</td>
<td>Submission of transport requests</td>
</tr>
<tr>
<td>7</td>
<td>Entry of available vehicles of companies (daily calendar), carriers and logistics operators</td>
</tr>
<tr>
<td>8</td>
<td>Planning - Optimizing transportation</td>
</tr>
<tr>
<td>9</td>
<td>Geo-reference, distance and times computation</td>
</tr>
<tr>
<td>10</td>
<td>Demand-offer matching</td>
</tr>
<tr>
<td>11</td>
<td>Completion of transnational routes</td>
</tr>
<tr>
<td>12</td>
<td>Assignment, approval and cancellation of transport missions</td>
</tr>
<tr>
<td>13</td>
<td>Issue of transportation orders</td>
</tr>
<tr>
<td>14</td>
<td>Trip monitoring (GPS, feedback from smart phones / tablets)</td>
</tr>
<tr>
<td>15</td>
<td>Update of mission status, extra-costs authorisation</td>
</tr>
<tr>
<td>16</td>
<td>Issue of transport invoices</td>
</tr>
<tr>
<td>17</td>
<td>Reporting (KPI, Costs, delivery delays analysis)</td>
</tr>
<tr>
<td>18</td>
<td>Export of transport orders, missions, sites and location from Kassetts application to excel file</td>
</tr>
<tr>
<td>19</td>
<td>Archives of transport orders.</td>
</tr>
<tr>
<td>20</td>
<td>Message via mail about status of transport orders</td>
</tr>
</tbody>
</table>

**Financial and human resources**

Seen the different profiles of the brokers that we expect will provide the service in the long run, there isn’t a unique vision of the human resources that will take part to it. The Broker, in some of the envisaged cases, is an internal staff member of a private company (SME or Logistics Operator), that means the financial sustainability is simpler than expected: the persons are directly paid by the companies, taking advantage of the savings generated by the Broker; in other cases the Broker is a staff member of a public body, with the expectation that the role will be transferred to more companies or semi-public bodies acting as brokers in the industrial areas.
of the territory it represents. Since the service cannot be granted free to anyone (due to costs of the software upgrades, maintenance, administrative issues etc), the expectation is that each Broker decides/imposes the envisaged financial sustainability to its users.

The human resources required in the broker activities should encompass two types of competences:

- Knowledge in transport process – associated with the setting up of databases (regions, clusters, load, etc.), training of users, supervision by optimization algorithms, process optimization, strategic transport issues.
- IT skills – logins management, permissions, changes in the functions of the platform, service IT.

The best identified staff in KASSETTS project partners institutions are experienced people, often dealing with day to day logistics problems. It shall assure the necessary support to the day by day broker office management, competence to deal with logistics decisions and, when necessary, to the need of updating the envisaged business model according to the logistics requirements. With specific reference to the IT skills it is worthwhile to say that the broker node can also activate externals contractors for sw maintenance and upgrade.
Promotion plan

Promotion and communication plan after the end of the project and during next years will include a set of activities similar to the ones performed in project lifetime. It is envisaged to promote broker idea and KASSETTS IT tool via following means:

- Regular update of the homepage (e.g. How to become a KASSETTS-member? How to become a broker?).
- Presentations on public events, fairs, business and scientific conferences.
- Organization of workshops in Technical Colleges, in Higher Universities, in public authorities and for cluster organizations.
- Direct meeting in companies.
- Articles.
- Papers at the conferences or scientific magazines.
- Advertisement in the specific magazines.
- Advertisement (banners) at logistic web sites.
- Illustration of the KASSETTS performance through handing out of test accounts.
- Promotion of the broker in training sessions.
3.3 Transnational ICT for logistics collaboration

3.3.1 Short description

WP4 provides the needed ICT tools to make brokers collaborate with each other in the definition of efficient transport transnational routes for the user companies. Its core outputs are (a) an ICT platform with networking services including document exchange and multilingual support and (b) easy and powerful distributed planning services for dynamic construction of transport solutions.

WP4 creates the operational conditions for the construction of the logistic broker network (WP5) and the execution of the pilot experiments (WP6). The work was organised into three main activities:

- Logistic documents exchange. Collaboration of companies from different regions calls for constructing a common vocabulary of concepts and terms (logistic domain ontology) that was conveniently extracted by analysing the exchanged documents and their contents. Each involved region proposed 5 to 10 relevant documents types, other document types were derived from standards (i.e. UBL) and previous B2B projects (such as FP6 IST SEAMLESS).

- ICT for brokers networking. The logistic domain ontology, first built in English as lingua franca, was translated by the PPs into their respective home languages. Then the ICT networking functions were designed and developed, using the ontology as the knowledge base for the devised automatic document translation service among companies. The ultimate result is the possibility for each broker to interoperate with the other brokers of the network and to exchange information with user companies and logistic operators.

- Transport planning for brokers. Proper ICT functions and services were developed enabling each broker to dynamically plan efficient transnational transport solutions for the user SMEs and in collaboration with other brokers. Such optimisation functions are fully integrated into the ICT networking infrastructure built in the previous activity, so as to realise a unique platform to support set-up and operation of the broker network.

3.3.2 Results

Logistic domain ontology

The KASSETTS networking scenarios call for providing the KASSETTS platform with a technology assuring the possibility, for the users, to import/export logistic documents from/to their own information (legacy) systems and to exchange documents with the other actors characterised by different data models and languages. More precisely, the expected levels of interoperability are:

- Import/export. Every document moved from the legacy system of a user company to the KASSETTS platform, and vice versa, undergoes an automatic transformation process from the origin data model to the destination data model.

- Document exchange. Every document exchanged through the KASSETTS platform with a partner associated to another Broker undergoes an automatic translation of contents between the origin and destination languages, if different.
This requires the construction of a logistic domain ontology – a reference data model and multilingual vocabulary for that specific application domain – and its use to “annotate” (or “map”) the concepts of every interested legacy systems and to cross-reference the terms from the origin language to English as “lingua franca” up to the destination language.

In the KASSETTS perspective document transformation means simultaneous execution of document structure conversion (from/to the KASSETTS reference data model) and document contents translation (from/to the reference English vocabulary). The significant technological progress that is introduced by the KASSETTS project from the interoperability perspective is in engineering the experimented techniques set-up in the FP6 SEAMLESS project and transforming them into efficient web services with a very high degree of transformation success and the possibility to be easily adapted to other kinds of logistic documents than those taken as fundamental. More precisely:

- The editing operation of (proprietary) data models and their mapping onto the KASSETTS reference data model overcomes the difficulties arising from representation in research-related languages, such as OWL, by introducing easy drag and drop user interfaces.
- The run-time document transformation function is automatic and completely transparent to the sender (receiver) user who will maintain its own legacy system and be relieved by the need to know the data model and language of the receiver (sender) user.

Figure 1: Logistic document class translations

The ontology construction was driven by the following three guidelines:

- The knowledge base available at each actor (and coded in the respective information system, if any) is quite rich of concepts that, however, are only partially used when communicating with partners. The ontology for collaboration in logistics is focused on such part (say, 20%) and disregards concepts that are not exchanged.
- Communication between partners in the logistic domain relies considerably on the exchange of business documents, as confirmed by the daily experience. Therefore the logistic domain ontology must include as first component a data model representing the business documents of interest and the related concepts.

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The multicultural and multilingual collaboration environment devised by the KASSETTS project introduces the further problem of matching related concepts and translating the terms that are used to express them. Therefore the second needed component of the logistic domain ontology is a multilingual vocabulary of terms for collaboration.

The logistic ontology, in a first step, was created in English as *lingua franca*, to be more precise as intermediary language among translations (from/to English and the partner languages) to guarantee communication among people and document exchanges in an international domain. Each concept belonging to the ontology is translated into English language, and each concept in English is translated into a partner language. The local language translations made so far are: Czech, German, Hungarian, Italian, Polish, Slovenian and Slovakian.

**ICT networking platform**

The industrial significance of the ontology, and of the business document transformation and translation functions built on top of it, relies mainly on the opportunity it gives to make different legacy systems of the logistic chain actors interoperate with a very limited effort. Any electronic business document sent by actor A and written in an XML proprietary format can be transformed into the XML standard format derived from the ontology and from that to the XML proprietary format of actor B, the receiver.

The capability of transforming proprietary formats, and languages, one into each-other is the real added value of the KASSETTS ontology, acting as a knowledge bridge between different formats and languages. In the following, we summarise the translation process in all the relevant steps.

Protégé, a free and open-source platform used by a wide community of developers and academic, government and corporate users for knowledge solutions in diverse areas, has been used to build the OWL logistic ontology in English. In order to manage the local language translations, a further application is needed to enable the creation of a collaborative logistic ontology (based on that built with the Protégé editor), the KASSETTS Ontology Manager (KOM). KOM is a web service that enables logged-in users to visualise, export, edit and translate only the part of ontology related to the corresponding languages. KOM is a J2EE application composed by two separated parts: KASSETTS Ontology Manager Web GUI and KASSETTS Ontology Manager Server (KOM Server), operating like a wrapper above the Protégé Server.

![Figure 2: Browsing the Logistic Domain Ontology](image)
XSD files are used to provide a set of primitive data types that are the same data type used in the whole logistic ontology and that can validate every single logistic document in XML format exchanged between two actors of the logistic chain. There are 7 XSD files (one for each language + English language and Glob language) for each logistic document (Consignment Note CMR, Transport Request, Transport Mission, Transport Invoice), which means a totals of $7 \times 4 = 28$ XSD files. The XSD files are built starting from the subclass of “Logistic Document”, each document is scanned finding out each property. The output of the validation process is a document expressed in the “KASSETTS (valid) format” and still in its original language.

Afterwards, the document must be translated into the KASSETTS Glob language in order to be managed by the system. This process is done with the use of a number of XSLT files, used to translate logistic documents from the original language to the KASSETTS Glob language and vice versa. That means $7 \times 2 = 14$ XSD files have been written. The translation of a logistic document from a legacy system (of a user company or a logistic operator) to KASSETTS and vice versa, requires the creation of a mapping file, in XSLT format, defining the conversion rules from/to the proprietary format and the KASSETTS logistic documents in XSD format.

XML mapping projects are often not simply one-to-one mappings of a source to a target component with the same structure. Most XML mappings involve the use of data processing functions to manipulate data between the content models. It may needed to perform logical comparisons, mathematical computations, or string operations, and/or make other modifications to the data to complete the mapping. The XSLT format has been chosen as it is well known, almost a standard de-facto to translate one XML file into another, and can be built using a variety of editors, both proprietary and open-source. Among the proprietary environments, ALTOVA is the most widely spread and complete. In addition, it has a graphical user interface very clear and understandable, as shown in figure.

![Figure 3: Altova MapForce mapping example](image)

At this stage an XML logistic document in proprietary format can be transformed into another XML file compliant with the KASSETTS XSD. The transformation is based on applying the mapping file,
Transport planning for brokers

The KASSETTS ICT platform supports both simulation and planning functions, thus supporting the network brokers both in their activity to involve new user companies and in their daily operations.

Simulation is carried out by executing the software tool on a data pack representing the hypothetical transport condition to study, while planning is carried out by executing the same tool on real-life data pack representing the actual transport problem to solve. At the first sight that tool presents the functionality, uses the data, and produces the outcome depicted in figure 4:

![Figure 4: Overview of the Planner / Simulator functionality](image)

Besides transport requests, a number of context data are needed for the simulation/planning session.

- **Sites** are the picking and/or delivery places (plants, warehouses) to visit, described by their names, contact persons, phone numbers, address, opening time, closing time, waiting time expressed by 4 to 5 values classification, for instance ranging from very fast (e.g. 0 minutes) to very slow (e.g. 90 minutes).

- **Geographic covering.** Experience teaches that most routes move in an area around the starting location or along geographic directions determined by the main roads or connecting the major industrial settlements. In order to adopt this model it is necessary to initialise the simulator with the definition of (partially overlapping) geographic areas whose union assures the complete covering of the territory to serve. From pilot experience: (i) The areas forming the geographic covering are normally designed in daisy-like shape centred on the (main) truck stating location. (ii) It is convenient that the covering areas are partially overlapping with each other. (iii) It is worth providing the algorithm with two or more geographic coverings, differing for number and extension of the component areas.
• **Distance and time matrices.** For each pair of sites to visit it is necessary to know the number of kilometres that separate them on the shortest or most common way, and the conventional time spent by a truck, typically the fastest van, to cover them. This computation is conveniently provided by one of the many geo-location and distance web services.

• **Fleet.** The list of vehicle types is the necessary and sufficient information to support infinite capacity simulations, that is, simulations based on a hypothetical fleet of unlimited size, each represented by the load capacity, length, width, height, incompatible materials and equipment. In case of finite capacity simulation, that is, with reference to a hypothetical or real fleet which composition is known and limited, it is necessary to add the list of vehicle instances, each represented by its calendar of availability.

• **Price lists.** Price lists are used to propose the most convenient mission assignments to candidate carriers. There is indeed a wide variety of price list models, as well as many specialisations depending on the contractual relationship with the single customer of transport services. KASSETTS adopt a basic model, relating prices to the main route variables or their combinations, and additional parameters, i.e. further quantities acting as correctors or qualifiers (e.g. extra cost for each stop, for stops in uncomfortable places, for long waiting times).

Adopting an iterative approach enables the human expert to organise simulation/planning sessions where some problem variables are modified time by time with the aim of exploring different alternatives to the solution under study, as shown in figure 6:
After the simulator/planner is initialised in terms of geographic coverings, sites, distance matrix and time matrix, the transport requests to simulate are uploaded. Then the (infinite capacity or finite capacity) fleet configuration to be considered for satisfying that set of transport requests is selected together with the price list according to which estimating the route costs. Moreover, the geographic covering is chosen for grouping the transport requests with respect to the defined geographic areas, and finally the computation algorithm is launched.

The outcome is the quasi-best set of routes that can satisfy the input transport requests under the given conditions, each with indication of the assigned vehicle (type or instance). In infinite capacity simulation the algorithm chooses the vehicle type assuring the overall best performances, while in finite capacity simulation the algorithm tries to exploit at best the available vehicle instances.

Once examined the computation outcome the human expert decides what changes are worth introducing for the next simulations, until a satisfactory result is achieved. For instance, if some routes present questionable features it must be allowed to cancel them (while keeping the others) and launch a new simulation by modifying the fleet configuration or choosing another geographic covering.

The outcome of the simulation/planning sessions is a set of transport mission to assign to internal fleet instances and/or logistic operators. Each mission is characterised by:

- **Assigned vehicle, covering area.** It indicates the vehicle type (infinite capacity) or the vehicle instance (finite capacity) chosen to perform that route, and the covering area containing it.
- **Start time, end time, moving rate.** This informs about the route positioning on the time axis (date-and-time) and its duration computed by difference. It also informs on the percentage of that duration spent moving on the roads and the remaining time spent at the visited sites.
- **Stops.** For each of the stops planned for that route it indicates the reached site, the distance covered so far, the arrival time, the estimated waiting and handling times, the list of unloading and loading operations each referencing the relative transport requests, the payload size (total weight, volume, surface on the truck) when leaving the site.
- **Saturation indexes.** These are three values representing the ratio between the maximum payload size during the entire route and the homologous truck features in terms of load capacity and dimensional properties. At least one of the saturation indexes should approach the unit.
• *Estimated costs.* Finally, these are the cost estimates for that route computed with respect to one or more available price lists. They are integrated with estimates on fuel consumption and CO2 emission.

This is indeed a rich amount of data for deriving quantitative indicators. Synthesis indicators on a weekly basis can be derived as well, such as:

• Number of transport requests, number of resulting routes, total length of routes (kilometres), total duration of routes (hours), total fuel consumed, total CO2 emitted.

• Percentage of aggregated routes, average route length, average route duration, average number of stops per route, average moving rate, average saturation indexes, average cost per kilometre.
3.4 Permanent logistic broker network in Central EU

3.4.1 Short description

The main work of WP5 was to establish international business relations among SMEs and logistic operators through an open network of logistic brokers. The scope was to involve all of them in the dynamic construction of efficient transport solutions based on the ICT tools developed in WP4. Two core outputs were developed in this work package, the open network itself and “Light governance model” for network operation and future deployment.

The activities in this work package were divided into 3 actions: New business relations in EU, Open brokers network set up and Network management mechanism.

<table>
<thead>
<tr>
<th>Table 8: WP5 Activities</th>
</tr>
</thead>
</table>
| New business relations in EU | • Involved user/manufacturing Companies  
                           | • Involved logistic operators  
                           | • New business relations introduced by the brokers |
| Open brokers network set up | • Guidelines for logistic brokers to set up and operate network nodes  
                           | • Open brokers network (core output) |
| Network management mechanism | • Organisation and business models introduced by the network  
                           | • Light governance model (core output) |

3.4.2 Results

New business relations in EU

Involved user/manufacturing companies and Involved logistic operators

The variety of stakeholders taking part in KASSETTS was impressive. Not only direct beneficiaries of the Logistics Broker idea (SME, logistics operators) were interested in the project. In fact KASSETTS also played a significant role for policy makers and other public bodies as they could indirectly profit from the success of KASSETTS. All stakeholders were important as every one of them played a different, meaningful and irreplaceable role.

The main strategic focus in this part of the WP was nevertheless to involve manufacturing companies that would be the crucial users of the broker, and logistics operators. Every project partner started involving interested manufacturing SME and logistics operators in its region at an early project stage and established with them relations based on trust and proficiency.

Different paths and approaches can be seen as suggestion and, as a result of that, the arguments and incentives for stakeholders to take part in KASSETTS had been expanded by each PP.

In addition an Excel sheet with relevant information (name of involved SME or LO, branch, location, size, contact details etc.) was created and circulated to the consortium. With the beginning of the simulation phase, the file was updated nearly monthly with the current involvement of companies. Based on this excel file, information about the paths of reaching potential SMEs, LOs, Logistics Brokers and Policy makers as well as the information about involved SMEs and LOs had been attached to the report. The table below illustrates the numbers of involved SMEs and LOs within the project period.

<table>
<thead>
<tr>
<th>Table 9: Numbers of involved companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total numbers involved</td>
</tr>
</tbody>
</table>
New business relations of every broker with the other brokers

This activity concerned possible changes that might have to be faced by the customers and carriers that will become users of the KASSETTS broker application. The results were based on an exemplary general scenario including one customer, one broker and one carrier. Technological, organizational, legal, financial and other changes at each stage of the transport planning process were shown in detail. These descriptions emphasized core topics for the work of all KASSETTS project partners and included possible obstacles that were relevant for the attraction of new users.

The evaluation revealed that changes could be identified on the carrier side and on the customer side. The figures below show the resulting changes for both sides.

Figure 7: Changes on customer side - ©IFF 2011

Figure 8: Changes on the carrier side - © IFF 2011

Open brokers network setup
Guidelines for logistic brokers to set up and operate network nodes

The main objective of this part of the work was to present the guidelines for Logistics Brokers to set up and operate network nodes. These guidelines were a certain support for the partners in simplifying the process of starting and carrying out the work of the regional brokers (see figure 9 below as an example). The main tasks of the broker are briefly described (exchange function, optimizing function, reservation function and the interface function) as well as the possible network structures are explained. Furthermore, the characteristics and requirements of the participating SMEs, logistics operators and brokering institutions are highlighted.

An important part of the activity was to describe the ways to achieve the success factors worked out in the WP3. Requirements and specifications for participation in the project as well potential pitfalls and problems of networking were pointed out, and were used as a toolkit to deal with the identified challenges.

The activity was also addressed to the parties wanting to use the broker-solution (SMEs, logistics operators and potential brokering institutions). Thanks to this work they had a possibility to get to know more about the requirements and guidelines concerning the participation in the broker solution. The description will help them to decide whether or not they are able to take part in it.

Open network made of interoperable logistic brokers

This activity – a core output of WP5 – characterises the setup of the pilot brokers in the regions of the project partners as well as the setup of the transnational brokers.

The setup of the brokers has varied due to regional differences with regards to the logistics situation, the economy or the mentality of the people in the countries of the project partners.

Moreover, the activity has dealt with the setup of transnational brokers in the partner regions and on specific transport axes (Germany – Italy – Slovenia, Germany – Hungary – Poland, Poland – Czech Republic – Slovenia, Hungary – Italy – Slovakia). Those partners who were responsible for the setup of the four supra-regional brokers had faced even more diversified challenges and obstacles compared to the setup of the regional brokers. For a proper handling European-wide traffic flows and different economies and markets were taken into account. The interrelations of these single international brokers are expressed in the enhanced macro network (self-monitoring indirect network), which describes the relations of the brokering institutions and a committee of brokers - an institution, which is responsible for supporting the Brokering institutions in relevant aspects. (see figure 9).

Figure 9: Macro network©IFF2011
The activity displayed best practice cases of selected pilot regions (Slovenia, Italy, Czech Republic) and showed successful examples of activities of the KASSETTS brokers regarding software operation, user training as well as planning of transport missions with the KASSETTS software solution.

**Network management mechanism**

*Organisation and business models introduced by the network*

The activity explained how the broker solution has worked during the course of the project and what else will be necessary to establish a business model after the project has ended and the KASSETTS solution is being launched on the market. It displays the core elements of the framework which is presently applied to the KASSETTS solution and shows what is relevant to properly run the broker solution as a form of business.

The framework has been built of four columns necessary for setting up a working broker network. Based on the guidelines for logistics brokers to set up and operate network nodes and the previously defined software rules (WP4), it was possible to establish the following business foundations, which can be seen below: financial aspects, legal aspects, aspects of technology and soft aspects.

![Figure 10: Potential KASSETTS framework - ©IFF2011](image)

The work also displayed the different types of broker networks: The first network is the micro plane network, which describes the regional relations between the involved SMEs, carriers and a single broker. The second one is the macro plane network, which describes relations between all participating brokers of the different regions (national and supra regional). In this context, possible case scenarios on the micro and macro plane are shown and explained.

To overcome possible problems and potential pitfalls within the set-up and operation of a KASSETTS broker network, all partners compiled their experienced obstacles to join them in a set of recommendations for future activities. Differentiated into three different stages of their possible occurrence, the stage on which involved customers interact, the stage on which the broker acts, and the stage of broker interaction, these recommendations can be applied as guidance by future actors.

*Light governance model for network consolidation and operation*
This core output displays different approaches of the project partners. All solutions/answers are brought together to rate the most suitable approach.

On the basis of different regional and national experiences, the consortium discussed their experiences on the handling of technological, financial, legal and public aspects in an intense discussion. The result was a collection of light rules on how to deal with future decisions on these issues.

Based on the groundwork of the developed organization and business model, this activity helped the started up brokers and future brokers to organize their business, and expand the KASSETTS network of Logistics Brokers, Logistics operators and SMEs to cooperate according to the KASSETTS approach.

Placing this >>Light governance model<< at suitors’ disposal, this core output can be regarded as a step towards the future sustainability as well as towards a future financing model of the KASSETTS approach. In combination with further outputs in WP3 the follow up of the project was prepared.
3.5 Pilots of transnational collaboration in logistics

3.5.1 Short description

WP6 was a transnational test of the “Broker software”, involving all the 8 partners of the KASSETTS project. The work was a direct follow-on of activities in previous work packages, especially WP4 that had modified and fine-tuned the software according to requirements of international transport and regional needs, and of WP5 that had set-up a transnational network of brokers in the partners regions, each with its own local network of user companies and logistics operators.

The main goals of the work package were to:

• set-up 4 international pilots in order to test the developed software and logistics concepts
• to carry-out real-life pilot actions.

The final aim was to validate the effectiveness of the network of brokers and assure the sustainability of the initiative by supporting interested companies in the further use of the software and further development of the network.

The setting-up and operationalization of broker offices followed the same logical steps in all partner regions. The very first step connected with the pilots was broker training. Brokers in the regions had to learn how to use the broker software and test it on generic data. The brokers were the key people in the pilots since they were the ones who were in direct daily contacts with companies, software developers, as well as administration and management staff, and carried out the day-to-day tasks of planning, communication and coordination. Thus, it was instrumental to assure adequate training and excellent understanding of the KASSETTS project concepts, but most importantly, mastering of work and operation of the “Broker software”. In parallel, brokers were also active in the involvement of user companies and logistics operators. This activity was carried out in work package 5 and directly fed into work package 6.

The next major activity was the training of users, which actually started with the preparation of several kinds of training materials. All partners translated a training manual and several training videos, which were prepared by the University of Modena. These materials were used in the training sessions, which were prepared for user companies and logistics operators, but also for self-training.
After attracting the interest of a company for cooperation, simulations had to be performed. This phase was critical in the project since companies decided whether to cooperate in the project or not based on the results. Typically, companies provided a sample of their transport data, which the broker tried to plan as optimally as possible. The results were best for bigger samples of transport orders. Consolidation could not always be performed because of different types of cargo, different time-windows and the variety of destinations. This is also why certain companies did not choose to continue with cooperation in the project, but that was expected since the beginning.

If the results of simulations and the functioning of the software and the broker were evaluated as successful and interesting by the company, cooperation was intensified by regular planning of transport orders. This could be done in two ways. The first, most typical way was that companies used the KASSETTS system in parallel with their own planning in order to evaluate possible savings. The data collection was performed by all partners by importing excel files (the standard application format or by using a simplified format for the companies). In some cases accounts were provided to user companies to assure autonomy in data entry. Once the data was obtained, the brokers planned the transport requests week by week. At the same time, KPI reports were generated to verify the quality of the obtained results.
The second way that was chosen by some companies was to use the software for internal planning (without cooperation with other companies) either by accessing the software installed at the remote server in Modena or by installing the software at their own premises or at a hired server. In most such cases these companies are still using the software for their internal planning.

Figure 12: Unloading of semi-trailer truck

Source: Courtesy of a logistics operator
3.5.2 Results

The international broker network has been functioning since the end of 2010 and remains operational also after project end. The period of monitoring has lasted from November 2010 till November 2011, but there have been differences between partners – some starting earlier and some finishing later than others; still, the overlaps were long allowing for transnational collaboration and cooperation. The table below presents the numbers of entered orders and periods of monitoring for each partner:

<table>
<thead>
<tr>
<th>Country</th>
<th>Period of monitoring</th>
<th>Number of orders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>01.01.2011 - 31.09.2011</td>
<td>4,141</td>
</tr>
<tr>
<td>Slovenia</td>
<td>01.11.2010 - 31.09.2011</td>
<td>2,243</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>01.01.2011 - 31.09.2011</td>
<td>1,131</td>
</tr>
<tr>
<td>Germany</td>
<td>01.04.2011 - 31.11.2011</td>
<td>328</td>
</tr>
<tr>
<td>Poland</td>
<td>01.02.2011 - 31.07.2011</td>
<td>1,533</td>
</tr>
<tr>
<td>Hungary</td>
<td>01.11.2010 - 31.05.2011</td>
<td>557</td>
</tr>
<tr>
<td>Slovakia</td>
<td>01.01.2011 - 31.09.2011</td>
<td>1,138</td>
</tr>
<tr>
<td><strong>TOT</strong></td>
<td></td>
<td><strong>11,071</strong></td>
</tr>
</tbody>
</table>

During the period of monitoring, partners have observed fluctuations in the number of the orders coming from companies. These fluctuations were caused by changes in the availability of companies to cooperate in the project as well as variations in the number of cooperating companies. Generally, the number of cooperating companies and the numbers of orders received per month have been increasing. The network as a whole has been able to consistently achieve positive results for the involved users.

It has to be noted that there have been some initial problems with the achievement of positive results at certain broker nodes, but these were caused by lack of experience with the planning software. Eventually, all cases have shown that provided with sufficient numbers of orders and with adequate experience with the “Broker software”, the brokers are able to generate significant savings for the users, thus validating the concept of Broker offices and demonstrating the feasibility of the practice.

A pilots report was produced showing the operations of the broker. This report also includes the user perspective, presenting the feedback of brokers, user companies and transport operators about the effectiveness of the broker software and broker network in finding better solutions to transport problems. The report also provides metrics measuring the success of the entire project from a user perspective as well as a qualitative assessment.

The best examples and results have been included in the four pilot reports, which are the core outputs of this work package. Each of the four reports presents the results of one pilot that involved partners from three countries. The reports underline results for 3 weeks, i.e. one week of operation of each of the partners.

In order to evaluate the success of the pilots, a list of Key Performance Indicators (KPI) has been created. It covers a range of indicators that are used to monitor the successfulness of planning and evaluate the actual benefits of the system. The KPI reporting functionality was originally created to
produce weekly reports on broker work. It compares the KASSETTS solution to the so called “BEST NULL” scenario, which assumes that:

- Companies order transport services directly at transport operator, without knowing the demand of other customer companies.
- Transport operators use the smallest vehicle available to transport the given order.

In contrast, the KASSETTS scenario is the optimised, best solution for the inserted transport orders with maximum aggregation of orders from different companies. It thus contributes to a best solution for all involved companies and lowers their costs. The indicators were divided into general and comparative indicators. General indicators are overall indicators, which mean that they provide a general outlook over the work of the broker node. Comparative indicators, on the other hand, are used to compare the effectiveness of planning with the software to simple planning (“BEST NULL”).

General indicators are:

- Total number of orders (1) – Total number of all inserted and successfully calculated transport orders for the selected time frame.
- Total weight transported (2) - Total weight of transported cargo of all inserted and successfully calculated transport orders for the selected time frame.
- Percentage of international orders (3) – Percentage of international orders for the selected time frame.
- Percentage of regional orders (4) - Percentage of regional orders for the selected time frame.

Comparative indicators are:

- Number of missions (5) – Number of missions calculated by the tool using optimization algorithms (one mission may consist of one or more transport requests).
- Total length of routes (6) – Total length of all routes (performed kilometres) performed by vehicles used in transportation process.
- Tons-kilometres performed (7) – Total tonne-kilometres performed when serving transport requests.
- Percentage of aggregated missions (8) – Percentage of missions where at least two orders from different companies were transported on the same vehicle
- Fuel used (9) – Estimated amount of fuel in litres used by the vehicles which performed the designated transport missions.
- Total CO₂ emissions (10) - Estimated CO₂ emissions in kilograms produced by the vehicles which performed the designated transport missions.
- Total time on road (11) - Total time shown in hours for selected vehicles on the road.
• Percentage of time on road on total durations (12) – Percentage of vehicle effective work time (that a vehicle spends on the road) on the total missions durations, that contain also the time for load/unload, the wait time before starting the operations and the driver’s break time.

• Number of vehicle types used (13) – Number of vehicle types used in the transportation process. Different vehicle type represents vehicles with different characteristics (weight and size load capacity, etc.)

• Total costs (14) – Cost of order(s) obtained from the cost subdivision algorithm. End value of the mission (consist of one or several orders) is left to agreement between transport provider and client company or client companies if mission consist of transport request (orders) from more than one client.

• Saturation coefficient (weight) (15) – Calculated coefficient depending on the characteristics of the goods transported – weight. Coefficient is calculated as the ratio between the occupied vehicle capacity and available vehicle capacity.

• Saturation coefficient (volume) (16) - Calculated coefficient depending on the characteristics of the goods transported – volume. Coefficient is calculated as the ratio between the occupied vehicle capacity and available vehicle capacity.

• Saturation coefficient (surface) (17) - Calculated coefficient depending on the characteristics of the goods transported – surface. Coefficient is calculated as the ratio between the occupied vehicle capacity and available vehicle capacity.

• Share of empty km (18) - Percentage of performed kilometres where vehicle was not loaded (empty runs) compared with all performed kilometres.

In order to provide an example of what the results looked like on a weekly basis and how they were analysed, a weekly KPI report is provided below. These reports are directly generated by the broker software. The report presents the results for one week of operation of the Slovenian broker. The results for the presented week are good in all aspects. Altogether, 203 orders have been aggregated on 81 transport missions; decreasing the total number of missions by 34. Approximately 37 % of the orders were international while 63 % were national orders.
Table 11: Example of weekly KPI report (Slovenia)

|-------------|------------------|----------------|

<table>
<thead>
<tr>
<th><strong>KASSETTS</strong></th>
<th><strong>BEST NULL</strong></th>
<th><strong>DIFFERENCE FIGURE</strong></th>
<th><strong>%</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.1.</td>
<td>1.2.1.</td>
<td>1.3.1.</td>
<td>1.4.1.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>GENERAL</strong></th>
<th><strong>KASSETTS</strong></th>
<th><strong>BEST NULL</strong></th>
<th><strong>DIFFERENCE FIGURE</strong></th>
<th><strong>%</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>total number of orders</td>
<td>nr.</td>
<td>203</td>
<td>203</td>
</tr>
<tr>
<td>2</td>
<td>total weight transported</td>
<td>tons</td>
<td>407.25</td>
<td>407.25</td>
</tr>
<tr>
<td>3</td>
<td>percentage of international orders</td>
<td>%</td>
<td>36.95</td>
<td>36.95</td>
</tr>
<tr>
<td>4</td>
<td>percentage of regional orders</td>
<td>%</td>
<td>63.05</td>
<td>63.05</td>
</tr>
<tr>
<td>5</td>
<td>number of missions</td>
<td>nr.</td>
<td>81</td>
<td>115</td>
</tr>
<tr>
<td>6</td>
<td>total length of routes</td>
<td>km</td>
<td>89.470.23</td>
<td>113.889.97</td>
</tr>
<tr>
<td>7</td>
<td>tons-kilometres performed</td>
<td>km</td>
<td>483.589.87</td>
<td>455.362.00</td>
</tr>
<tr>
<td>8</td>
<td>percentage of aggregated missions</td>
<td>%</td>
<td>23.46</td>
<td>0.00</td>
</tr>
<tr>
<td>9</td>
<td>fuel used</td>
<td>litres</td>
<td>28.027.73</td>
<td>32.763.64</td>
</tr>
<tr>
<td>10</td>
<td>total CO2 emissions</td>
<td>tons</td>
<td>73.97</td>
<td>86.47</td>
</tr>
<tr>
<td>11</td>
<td>total time on road</td>
<td>hours</td>
<td>1.401.0</td>
<td>1.686.0</td>
</tr>
<tr>
<td>12</td>
<td>% of time on road on total durations</td>
<td>%</td>
<td>78.86</td>
<td>85.84</td>
</tr>
<tr>
<td>13</td>
<td>number of vehicle types used</td>
<td>nr.</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>14</td>
<td>total costs</td>
<td>EUR</td>
<td>88.725.28</td>
<td>106.569.69</td>
</tr>
<tr>
<td>15</td>
<td>saturation coefficient (weight)</td>
<td>%</td>
<td>42.82</td>
<td>46.61</td>
</tr>
<tr>
<td>16</td>
<td>saturation coefficient (volume)</td>
<td>%</td>
<td>34.33</td>
<td>32.47</td>
</tr>
<tr>
<td>17</td>
<td>saturation coefficient (surface)</td>
<td>%</td>
<td>45.67</td>
<td>44.29</td>
</tr>
<tr>
<td>18</td>
<td>share of empty km</td>
<td>%</td>
<td>32.88</td>
<td>40.54</td>
</tr>
</tbody>
</table>

Source: KASSETTS elaborations.

Aggregation (consolidation) of transport orders was quite successful in this week since 23.46 % of all mission had orders from more than one company on board of the vehicle. In this way, the broker has managed to lower the number of missions by 30% from 115 to 81, which also means fewer vehicles would need to be engaged in the transport processes. One cannot say exactly how many vehicles less would be needed, since one vehicle may perform more missions in a given time period.

The following positive effects need to be underlined:

- reduction of total length of driven routes by 21%;
- reduction of transport costs by 17 %;
- reduction of fuel consumption by 14% (over 4.700 litres less fuel used).

In addition, empty running has been reduced, as well as total time on road. The results of the Slovenian pilot may be evaluated as very successful and are at least partially due to the high number of orders during the chosen week.

Results of other partners in the pilots were analysed in the same way, producing a range of different outcomes; yet, all conveying the positive message that the software and brokers are capable of optimizing the current logistics situation in Central European SMEs. A summary of the main results achieved by all the partners during broker operation are presented in the table below:
### Table 12: Results of partners with values of the main KPI

<table>
<thead>
<tr>
<th></th>
<th>SLO1</th>
<th>SLO2</th>
<th>IT1</th>
<th>IT2</th>
<th>PL1</th>
<th>PL2</th>
<th>DE1</th>
<th>DE2</th>
<th>SK</th>
<th>CZ</th>
<th>HU</th>
<th>HU2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLANNING PARAMETERS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of orders</td>
<td>203</td>
<td>84</td>
<td>492</td>
<td>399</td>
<td>109</td>
<td>94</td>
<td>20</td>
<td>66</td>
<td>42</td>
<td>90</td>
<td>52</td>
<td>66</td>
</tr>
<tr>
<td>Percentage of international orders</td>
<td>36,9%</td>
<td>67,9%</td>
<td>34,8%</td>
<td>24,8%</td>
<td>56,9%</td>
<td>38,4%</td>
<td>100%</td>
<td>81,8%</td>
<td>28,6%</td>
<td>70%</td>
<td>82,7%</td>
<td>40,9%</td>
</tr>
<tr>
<td>Percentage of regional orders</td>
<td>63,0%</td>
<td>32,1%</td>
<td>65,2%</td>
<td>75,2%</td>
<td>43,3%</td>
<td>61,6%</td>
<td>0,00%</td>
<td>18,2%</td>
<td>71,4%</td>
<td>30,0%</td>
<td>17,3%</td>
<td>59,1%</td>
</tr>
</tbody>
</table>

**CHANGES IN INDICATORS**

<table>
<thead>
<tr>
<th></th>
<th>SLO1</th>
<th>SLO2</th>
<th>IT1</th>
<th>IT2</th>
<th>PL1</th>
<th>PL2</th>
<th>DE1</th>
<th>DE2</th>
<th>SK</th>
<th>CZ</th>
<th>HU</th>
<th>HU2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in percentage of time on road</td>
<td>-6,97</td>
<td>-4,24</td>
<td>1,6</td>
<td>4,76</td>
<td>-3,94</td>
<td>-5,86</td>
<td>-17,21</td>
<td>-4,12</td>
<td>-9,09</td>
<td>-13,63</td>
<td>-6,04</td>
<td>-5,11</td>
</tr>
<tr>
<td>Change in percentage of empty running</td>
<td>-7,66</td>
<td>-7,4</td>
<td>-1,54</td>
<td>-1,56</td>
<td>-1,48</td>
<td>-2,27</td>
<td>-8,83</td>
<td>2,7</td>
<td>-7,05</td>
<td>0,12</td>
<td>-5,37</td>
<td>-6,89</td>
</tr>
<tr>
<td>Change in percentage of aggregated missions</td>
<td>23,46</td>
<td>37,5</td>
<td>36,21</td>
<td>38,06</td>
<td>18,18</td>
<td>20,12</td>
<td>37,5</td>
<td>24,44</td>
<td>41,18</td>
<td>19,05</td>
<td>29,03</td>
<td>25,64</td>
</tr>
</tbody>
</table>

**ACHIEVED SAVINGS**

<table>
<thead>
<tr>
<th></th>
<th>SLO1</th>
<th>SLO2</th>
<th>IT1</th>
<th>IT2</th>
<th>PL1</th>
<th>PL2</th>
<th>DE1</th>
<th>DE2</th>
<th>SK</th>
<th>CZ</th>
<th>HU</th>
<th>HU2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of missions</td>
<td>-30%</td>
<td>-26%</td>
<td>-26%</td>
<td>-21%</td>
<td>-23%</td>
<td>-19%</td>
<td>-27%</td>
<td>-20%</td>
<td>-29%</td>
<td>-22%</td>
<td>-24%</td>
<td>-11%</td>
</tr>
<tr>
<td>Total length of routes</td>
<td>-21%</td>
<td>-19%</td>
<td>-20%</td>
<td>-11%</td>
<td>-8%</td>
<td>-18%</td>
<td>-22%</td>
<td>-3%</td>
<td>-14%</td>
<td>6%</td>
<td>-18%</td>
<td>-21%</td>
</tr>
<tr>
<td>Fuel consumption savings/CO2 emissions reductions (%)</td>
<td>-14%</td>
<td>-14%</td>
<td>-11%</td>
<td>-7%</td>
<td>-7%</td>
<td>-18%</td>
<td>-11%</td>
<td>-3%</td>
<td>-16%</td>
<td>-9%</td>
<td>-7%</td>
<td>-13%</td>
</tr>
<tr>
<td>Total time on road</td>
<td>-17%</td>
<td>-17%</td>
<td>-12%</td>
<td>-2%</td>
<td>-9%</td>
<td>-6%</td>
<td>-29%</td>
<td>-1%</td>
<td>-17%</td>
<td>9%</td>
<td>-15%</td>
<td>-19%</td>
</tr>
<tr>
<td>Total costs</td>
<td>-17%</td>
<td>-16%</td>
<td>-20%</td>
<td>-11%</td>
<td>-11%</td>
<td>-13%</td>
<td>-14%</td>
<td>-13%</td>
<td>-12%</td>
<td>-6%</td>
<td>-21%</td>
<td>-22%</td>
</tr>
</tbody>
</table>

Source: KASSETTS elaborations on 12 weeks of pilots operations

As can be seen in the table, all pilots have achieved savings in terms of fuel and CO2 consumption, with lower numbers of missions, shorter total lengths of routes and lower total costs of operations. The only exception has been the Czech pilot with a 6% increase in the length of routes.

The relatively big differences in savings between partners can be attributed to many factors. The theoretical expectation was that pilots with more orders would exhibit higher savings, but a statistical analysis revealed that this was not the case for this sample. It has to be noted that the entire size of samples and number of pilots (12) is not big enough to allow meaningful analytical work that could explain the differences in results. Yet, what can surely be concluded is that the KASSETTS concept was successfully validated through significant savings achieved by all the partners.

The fact that needs to be underlined at the end is that KASSETTS has proven that it has an important effect on effectiveness in the work flow connected with transport ordering and planning and the overall efficiency of road freight transport. It proved that it can enable the process of order consolidation and thereby decrease the total number of missions and the total length of routes. This in turn means less delivery and heavy goods vehicles on EU roads, lower CO2 emissions and reduction of other externalities linked to road transport such as noise, wear and tear on infrastructure, safety, and congestion. All these effects can be reached coupled with reductions in fuel consumption and overall operational costs.
4 Project overall benefits

The contribution of the project to the economic dimension of sustainability is expressed in 2 complementary directions:

- higher efficiency of regional and transnational transport costs and establishment of new transnational business relations.
- increased efficiency which directly arises from the joint participation of manufacturing/user SMEs, through their brokers, in the dynamic construction of optimal transport solutions.

In terms of innovations introduced by KASSETTS:

- The project addressed manufacturing SMEs which are generators of freight traffics, thus aiming at solving transport problems at their roots. It merged organizational and ICT innovation for SMEs to make the broker solution sustainable and usable.

- The brokers reduced regional and transnational traffics by improving access to information and services. The brokers goal was not to make the supply chain longer but to better organize transports as a sort of new “joint logistics office among manufacturing SMEs”, which helps them interfacing to logistic operators. In practice different operational solutions were envisaged based on the different types of user profiles as mentioned in the previous part of this book. That was also possible thanks to the extensive range of services offered by the platform, which was usable by manufacturing SMEs, logistics operators as well as by public authorities for logistics audits in industrial areas.

- The proposed approach was strongly rooted in the single regions and sector thanks to the fact that the broker was strongly driven by SMEs. This means that the solution was properly adapted to the regional contexts as a condition for user SMEs to consider it a credible EU-wide collaboration workspace.

Most of the companies involved in pilot programs were from the production and retail sectors. Several materials were transported during the pilot testing phase using standardised packages like pallets and also boxes of various dimensions.

A broker performance evaluation was conducted by KPI for KASSETTS, which helped user companies to observe the benefits of implementing KASSETTS. By comparing KASSETTS results with those from traditional transport organization, several benefits were identified. Reduction in the quantity of transport missions needed for transport requests fulfilment was up to 30% and the reduction in the total length of these routes was up to 22%. These results are closely related to fuel reduction where the reduction was up to 18%. These benefits disclosed an overall cost reduction up to 22% for the involved manufacturing companies.

One of the project’s objectives focused on the environmental aspect, such as a reduction in CO₂ emissions by traffic optimization and load factor increase. In this aspect, the KASSETTS broker provided very promising results. During pilot testing, reduction in CO₂ emissions were up to 18% and the total time on road by vehicles was reduced up to 29%.

Although the project has reached its final stage, the KASSETTS broker solution will continue to be a powerful tool that can be implemented as a future source of benefits and competitiveness for its users. The completion of the project will by no means hinder the initiatives of the KASSETTS broker solution and will continue in each project region through real life implementation, and also for
educational purposes. During the project final phase all partners have moreover put their efforts into the preparation of KASSETTS usage after the project end.

In recent years the industrial sector almost in all European regions was overwhelmed by the international crisis. Compared to recessions of the past, the current crisis did not only hit on the economic performance of small businesses, but also strongly influenced medium and large companies. In particular, companies that for years were defined as the drivers of the regional economic development and which were strongly positioned on the local and international markets are now suffering. The crisis called for interventions on whole supply chain, in terms of improvement of procurement and distribution processes as means to effectively and efficiently be on the market and in particular to strengthen the whole economic system. For this purpose companies operational networking in logistics plays a crucial role. Networking is meant as improved logistics practices based on vertical (within the supply chain) and horizontal (among manufacturing companies which are positioned in the same level of the supply chain) logistics cooperation. The broker solution gave an operational answers to this vision: under the present economic conditions it can boost organisational, technological and business changes to “use” logistics as key leverage to be on the market by promoting cooperation along the supply chain (better organisation of transport to/from customers and suppliers) and among companies (joint transport organisation of different industrial companies as well as of small transport providers).

The most important issue regarding future operations of the broker is its financial feasibility. Calculations of RDA MURA point to the fact that there is need of approximately five companies with five orders per day as the minimum „usage rate” for KASSETTS broker. By this minimum number of users the broker is able to provide a minimum 5 % reduction in transport mission costs on average if an average value of a transport order would be above 150 EUR. It can be said that the starting up of a broker office in any region is not financially very demanding and the cost/benefits ratio is so very good.

There is no evidence of specific disadvantages stemming from KASSETTS. On the other hand benefits are evident both at territorial level, in terms of reduction of transport impacts, and in economic terms, in terms of savings for user SMEs. One important element to be considered when adopting the KASSETTS e-services is that they concern SMEs’ operational work (that is to say transport organisation) and that they imply an organisational innovation and a day by day change of the tools used for transport daily management. Therefore, a commitment to innovation and performance improvement is a key point for the software and e-services use.

Some specific traits of the project approach and products will finally support the follow up of the project activities.

First of all the fact that, though some maintenance costs will be needed for the ICT platform, the software and services are publicly and free of charge available and based on open source standards. That eases the access of SMEs to ICT solutions.

Secondly the KASSETTS model is easily transferable to other EU and Central Europe regions. It was thought as a modular and open architecture for future growth of the network.

Thirdly the KASSETTS tools can serve different purposes: operational management of transport and logistics processes, logistics audit and simulation to map the territorial impact of transport activities, training to logistics staff for logistics improvements.

To conclude KASSETTS is and will be used in the project regions and in Central Europe as a new and permanent tool for logistics management and for policy making.
5 Project partners

5.1 Institute for Transport and Logistics, Italy

The Institute for Transport and Logistics (ITL) is a non-profit body born on the 17th December 2003 under the initiative of Emilia-Romagna Region, Bologna, Piacenza and Ravenna Provinces with the mission to contribute to the development and promotion of the transport and logistics system in Emilia-Romagna, through research, consultancy and training activities. ITL is a body governed by public law according to the Directive 2004/18/EC.

ITL’s partners are: Emilia-Romagna Region, Bologna, Piacenza and Ravenna Provinces, Piacenza and Ravenna Municipalities, the Universities (Bologna, Modena and Reggio Emilia, Parma, Politecnico di Milano - Polo di Piacenza, Cattolica del Sacro Cuore - Sede di Piacenza), the Emilia-Romagna Union of Chambers of Commerce, Ravenna Port Authority.

ITL’s strategic and non-profit mission relies on a stable network among public administrations, logistics nodes, the business and logistics operators, business clusters and associations, research and training bodies to develop specific operational, study, research projects and support policy making.

ITL works in strict cooperation with the bodies in charge of programming and implementing the transport and logistics policies, in particular Emilia-Romagna Region and the Local Public Authorities, and with the business and logistics world, thus qualifying as the regional joining structure between public, business and research.

ITL’s objectives are:

- Promoting the technological, process and organisational innovation in transport and logistics.
- Supporting policy making in mobility, transport and logistics, by supporting public administrations in their policies definition, implementation and monitoring, also thanks to ad-hoc empirical researches and permanent statistics elaboration - Logistics Observatory.
- Spreading the logistics culture in Emilia-Romagna through information activities, events organisation, logistics forums coordination and training activities.
- Developing logistics training, through both curricula and standards definition and training activities support.
- Matching the regional and local priorities in Emilia-Romagna with EU funding for specific logistics projects and policies development.

ITL is the Emilia-Romagna Logistics Competence Centre (LoCC) and it is in charge of the Presidency of the ENLoCC network (European Network of Logistics Competence Centres)\(^1\).

In the last years ITL has worked in regional, national and EU projects in different transport and logistics domains. The main projects concerned:

\(^1\) www.openenlocc.net
Logistics and infrastructure policies development | Logistics platforms development | Co-modality and rail and maritime transport (MoS, SSS)
Supply chain management in specific sectors (healthcare, agro-food, dangerous goods, mechanical) | Logistics training | City Logistics
Transport and logistics services development | Territorial marketing | Industrial logistics in production systems

ITL’s technical structure works with 3 branches in Bologna, Piacenza and Ravenna, which operate as a network on the specific projects.

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5.2 University of Modena and Reggio Emilia, Italy

This University of Modena and Reggio Emilia foundation dates on 1175. Today it is a medium-sized athenaeum offering high quality services to its students, as certified by several national surveys. In particular, the Faculties of Engineering and of Economics are deeply rooted into the local economy, carrying out applied research projects that push companies and public organisation towards innovation.

In 2011 the Department of Information Engineering and the Department of Economics of the University founded the Softech-ICT laboratory (www.softech.unimore.it) grouping about 100 researchers aimed at promoting and performing RTD and technology transfer activities in the ICT sector and the related organisational model. Softech-ICT is part of the Emilia-Romagna Regional High-Technology Network.

One of the 9 thematic areas where the laboratory is active is “Design and development of enterprise networks”, devoted to study and prototype innovative tools and methods for SME collaboration and logistics. Solid competences available in this unit are:

- (a) Enterprise networking, meaning ICT tools for constitution and operation of enterprise networks, especially made of small companies, with specific functions of partner search, technical data exchange, distributed planning and workload assignment, functional integration of virtual factories (Esprit/IST/ICT: PLENT, COWORK, VIVE, GNOSIS VF, BIDSAVER, INDIA, PROVE-SME, eBEST);

- (b) Logistic optimisation and networking, meaning web-based tools for interoperability in logistic supply chains (STIL regional project), collaboration tools for small transport owners (IST: TROP, CITRO), impact simulation of demand aggregation (INTERREG: ILOG, CORELOG, MATAARI, INTERREG Central Europe KASSETTS);

- (c) Single European Electronic Market / Digital Business Ecosystems, meaning how to allow European companies access the eMarket independently of size and location (IST: SEEMseed); leader of the IST SEAMLESS project constituting a European mediator network offering basic collaboration ICT services to SMEs in business ecosystem;

- (d) RFID applications, meaning identification and tracing techniques for logistics and document management within the network (CIP: RFID-ROI-SME; eFASHION regional project).

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5.3 The Institute of Logistics and Warehousing, Poland

The Institute of Logistics and Warehousing (Instytut Logistyki i Magazynowania, ILiM) is widely acknowledged as Poland's centre of competence in logistics. It is an interdisciplinary, state-owned R&D unit where logistics is perceived as a subject of research as well as the field of practical application. Consequently, activities carried out in the Institute embrace both organisation and technology. The Institute is the leading Polish supplier of up-to-date solutions supporting management of materials and information flows. The Institute's areas of competence embrace logistics and supply chain management including logistics processes, transport system designing and optimisation, intermodal transport systems, optimisation of distribution networks, etc. Moreover, it provides solutions within e-business, IT and data communication, covering warehouse management systems, implementation of EPC/RFID solutions and GS1 standards and solutions.

The Institute is very active in the field of research and development, initiating and participating in domestic and international projects. Apart from coordinating the projects POLLOCO (FP5) and FOR-EMC (FP5, Thematic Network of 26 members from 20 countries), CENTRAL LOCO (FP6), KOMODA (FP7) as well as B2B LOCO (FP7) the Institute has also participated in many European projects: 5th Framework Programme: e-Thematic, SIT; 6th Framework Programme: TRACEBACK, DIFFERENT, FREIGHTWISE, BRIDGE, BESTUFS I and II, Co-DESNET, eMENSA; 7th Framework Programme: GRIFS; CIP - ICT PSP: SPOCS; Interreg III-B: BASIM, INLOC, BALTIC TANGENT, CORELOG, INTER BALTIC; Interreg III-C: ENLOCC, ECO4LOG, SRLOG, TRIPLE HELIX; Interreg IV-C: CASTLE, SUGAR; Interreg CE: KASSETTS; FLAVIA Interreg BSR: TRANSBALTIC; LEONARDO DA VINCI: NEDLOG; EC tenders: FIAP, COMPETE; DiSCwise Bilateral project PL/DE: E-Coach for Understanding and Implementing Efficient Consumer Response in Supply Chains; Tedim: NeLoc; Eureka: G-PVLBS.

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5.4 Fraunhofer Institute for Factory Operation and Automation IFF, Germany

The Fraunhofer Institute for Factory Operation and Automation IFF is an autonomous research unit in the Fraunhofer-Gesellschaft’s network. It is a partner to regional, national and international companies and governmental and municipal agencies. Its mission is to directly support business and benefit society with its applied research. Years of experience in industry projects and work in distinct corporate environments have shaped our know-how.

The institute is technologically oriented towards conceiving, engineering and producing innovative and customised solutions in the fields of:

- logistics,
- automation,
- process and plant engineering and
- digital engineering.

Operating globally and market-driven, the institute aspires to develop holistic solutions in these fields. To do so, the institute relies on an international research network of partners from business, industry, research and academia.

Guiding Principles

In collaboration with the business community, the scientific community and the state, the researchers at Fraunhofer IFF produce innovative products and services geared to the market and demand in a dynamic, constantly changing environment. They work interdisciplinary and employ professional project management with high-tech lab facilities and equipment. Their ongoing preliminary research guarantees research results for our clients and partners' needs and benefit.

Fraunhofer IFF leads cooperatively, supporting creativity and individual responsibility. Our researchers' further development and higher qualification is a priority.

The institutes’ climate is sustained by a pioneering spirit and competition. Personal integrity and fairness in dealings with each other are valued highly.

Research Services

Development

The Fraunhofer IFF researchers design, plan and develop technical and organizational solutions for their clients' challenges, ranging from product creation to the development of digital tools and their customization for your specific needs. The Fraunhofer IFF analyzes and evaluates physical and digital corporate processes. The information obtained could be used to plan a factory or a logistics system.

Implementation

The Fraunhofer IFF develops new methods of maintenance and service management and implements them in the field. They include the commissioning, optimization and integration of complex
systems and end applications. Researchers develop services that support machinery and plants. The acquisition, analysis and evaluation of data and the identification of relevant parameters are examples of method the Fraunhofer IFF applies to assure reliable operation. These methods and tools are continually refined. The support of the institute enables companies to implement sustainable objectives.

**Optimization**

The Fraunhofer IFF can boost operational energy and resource efficiency and output. This may entail identifying, inspecting, classifying and measuring objects and structures and surface testing. Researchers assess conditions, identify new performance indicators and support decision making. They will reveal potentials to optimize automated products and systems. Among other things, the institute uses digital modeling and simulation methods and tools to do so. Technology implementation and information management are just as much a part of operations optimization as are image analysis, data evaluation and pattern recognition.

**Qualification**

The Fraunhofer IFF uses state-of-the-art virtual engineering systems to qualify company staff throughout the entire life cycle of products, technical equipment and systems. Advanced training integrated in process consulting incorporates state-of-the-art workplace safety and ergonomics. An organization and its staff are developed by transferring empirical knowledge customized to specialized needs. The Fraunhofer IFF designs, implements and evaluates technology-driven training programs. These methods facilitate realistic training and qualification anywhere and anytime. Configurable levels of training can be customized for specific requirements.

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5.5 Technical University of Kosice, Slovakia

TUKE has nine faculties, around 16,000 full-time undergraduate students. Almost 900 teachers work here, and the same number of research and administrative staff. Technical University of Kosice is the driver of ICT innovation and development in the East-slovakia region. The main faculties related to the business, innovation and networked economy are the Faculty of Economics, Engineering and Informatics and BERG. Their research projects (5,6,7RP) focus on business networking, socio-economic analysis of ICT impact, e-business, trust building in the business networks, knowledge management, web technologies, logistics, eGovernment, regional development, etc. University staff has extensive experience in participation and management of international projects in these fields. Among the EU RandD projects TUKE recalls e.g. WEBOCRACY (web supports to eDemocracy), PRISMA (Innovative models and assessments for eBusiness), BEEP (Best eEurope Practices), KNOWWEB (Web support of company knowledge management), Seamless (Small Enterprises Accessing the Electronic Market of the Enlarged Europe by a Smart Service Infrastructure), Abilities (Application Bus for Interoperability In enlarged Europe SMEs), FLUID-WIN (Finance, Logistics and Production Integration Domain by Web-based Interaction Network). Through the active cooperation with regional authorities, municipalities, chambers of commerce and commercial sector, the University provides also knowledge transfer from research projects into practice for achieving better competitiveness of commercial sector in the region. The key persons are project and research managers in several international projects in the field of business networking, e-business, e-government and they are also focused on RandD activities in control and management, software quality audit, e-logistics and project management.

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5.6 Transport Research Centre, Czech Republic

Centrum dopravniho vyzkumu, v. v. i. – CDV (www.cdv.cz), the Transport Research Centre, is a public research institution, which employs more than 100 experts in various spheres of transport. CDV has been established in 1992 as a successor to the Czech Transport Departments Research Institute in Zilina. Its 20 years of existence qualifies it for the top position in Transport Research and transport policy development. CDV performs projects and provides services and technical support mainly for the Czech Ministry of Transport and other governmental bodies; conducts research and development for various transport projects and furnishes expertise and consulting services for public bodies as well as for private companies. CDV is involved in a wide scope of international activities and is an integrated partner in European research community. CDV has introduced and obtained the certificate of a quality assurance system meeting the requirements of CSN EN ISO 9001:2001.

CDV’s objectives are:

- Supporting of effective freight transport services research
- Outsourcing business development and innovations
- Analysis, expertise in the field of transport and logistics
- Promotion and proposal activities for the optimisation of the transport network and processing of traffic engineering measures
- Expert assistance of telematics and information systems

CDV’s technical structure works with branches in Brno, Prague, Olomouc, Tisnov.

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5.7 South Great Plain Regional Development Agency, Hungary

The South Great Plain Regional Development Agency Nonprofit Ltd. (DARFÜ Dél-alföldi Regionális Fejlesztési Ügynökség Nonprofit Kft.) founded by the Regional Development Council in 1997, takes part in preparation of the regional development plans, co-ordinates the regional programs, and helps the appropriation of decentralised support arriving from the National Government and the European Union. Since our agency is responsible for the balanced development of the South Great Plain Region which includes the border belt shared with both Serbia and Romania, this condition makes our role more important in terms of logistics. As an important actor of spatial development, the RDA is focusing on the following activities:

- Strategic spatial planning,
- Contributing to the preparation of the Regional Development Program of the Plan Europe for the forthcoming planning periods,
- Project-development activity,
- Taking part in territorial co-operation projects in order to utilize the experiences during the regional planning procedure,
- Since 2004 the Agency helps the implementation of ideas connected to development of the Region. After 2007 project development became one of the key activities of the RDA as its experts are assisting project owners to elaborate their project ideas into projects ready to finance.
- The agency acts as an Intermediary Body regarding the management of the regional funding system in the frame of the “New Széchenyi Plan” supported by the EU Structural Funds. Besides that the Agency is managing several decentralised national programmes available mainly for municipalities.

We have relevant experiences concerning international logistics as our agency was involved in the TECNOMAN project (CADSES) initiated by a wide European consortia and we also took part in the partnership of an INTERREG III/A HU-RO-SCG cross-border co-operation project called RELOAD.

The TECNOMAN was running between 2003 and 2004 with partners from Austria, Germany, Poland, Czech Republic, Serbia, Romania and Greece. Findings of TECNOMAN perspectives support the idea of reinforcing cluster management activities as well as the horizontal cooperation between integrator and supplier SMEs. Other findings of the project show that reinforcing cooperation between SMEs, universities and research organisations shall have to form part of the South Great Plain’s development programme. As an element of the above point, setting up of innovative networks with the participation of R+D oriented SMEs and R+D organisations shall have to be fostered in the upcoming period.

In June 2007 the RELOAD project (Regional Elements in Logistics Opportunities – Assessment and development) was initiated by the South Great Plain Regional Development Agency, with the general objective of establishing long-term and tight cooperation between SMEs of our region and Vojvodina (Serbia), to strengthen the cross border partnerships and to harmonise the ideas of economic development, considering the changed conditions by Hungary’s accession to the European Union.

The project’s specific objective was on one hand to produce such a synoptic material from the logistic situation of South Great Plain Region which would be usable for the SMEs of both Hungary and Serbia, and on the other hand to harmonise the planning process and execute its co-operation. By the
effects of the project the logistic partnerships and the profitability of the logistic centres’ services became stronger.

**South Great Plane Regional Development Agency**

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Regional Development Agency Mura Ltd, Slovenia

Regional Development Agency Mura is the leading developmental institution in the Slovenian region of Pomurje, implementing tasks and projects in regional development. The agency's activities are directed to constant stimulation of progress and development on the regional level, and to fostering public-private partnership. By offering our expertise, technical and administrative support to regional economy we enable faster achievement of economic objectives. By being engaged in different EU projects, the Regional Development Agency Mura stimulates international cooperation of companies and by this contributes to Pomurje’s vision to be integrated in a wider Euro region. Integration and interconnection of developmental activities make yesterday’s visions tomorrow’s reality.

Regional Development Agency Mura operates as the leading development institution and an agent between the public and private sector. As such it can contribute to a more stable economic and equal social development of the Pomurje region. It is active as a “learning organisation” which can quickly adapt to changes. By applying modern working methods and techniques, it constantly puts people above everything else and treats them as creative human beings.

Constant agency activities:

- voucher system of consulting
- guarantees in the Pomurje Guarantee scheme
- one stop shop
- information service on business opportunities
- implementation, reporting and monitoring of the Regional development programme
- promotion of Pomurje as a region
- preparation and conducting of projects which foster the regional development on the national and international level

Reference projects:

- Managing and implementation of the pilot project, to establish a regional development centre in Murska Sobota
- Preparation of Strategy for small business development in Pomurje region
- Establishment of Innovation office for Pomurje region
- Co-operation in the preparation and implementation of the Development Strategy of Pomurje region
- Preparation of the Pomurje Regional Development Program
- Futourism, spuring integrated and sustainable development of tourism regions, Interreg III C
- Methods and Tools for Evaluating the Contribution of Cohesion Policies to Sustainable Regional Development
A new ICT approach to transport organisation and optimisation

KASSETTS

ICT solution for logistics

Towards unrestricted logistical interoperability for SMEs

KASSETTS

Optimise transport and logistics activities

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