EVALUATION REPORT ON RESULTS AND ACHIEVEMENTS OF PILOT PROJECTS

REGION:	D.T2.9.3	VERSION 2
CENTRAL EUROPE		04/2019

Authors: Claudia Geyer
MW Sachsen-Anhalt

André Mangelsdorf
MW Sachsen-Anhalt

Reviewers: Frank Trepte
core-consult

Table of Contents

List of Figures

1. Introduction

In recent years changing market conditions did not only force producing companies to restructure their strategic orientation but also Logistics Service Providers (LSP) were and are still required to draw their attention to innovative solutions in terms of transport chain design. This topic also tackles (multimodal) transport planning, transport planning systems and related activities. As the future of the transport market will confront respective actors with several challenging factors, those companies need to broaden their perspectives and embark on a change process. Increasing transport volumes, shortage of truck drivers, bottlenecks on motorways but also capacity shortages of terminals are only some of the challenges, which will force companies to restructure their current transport strategies.

As long term analyses of the transport market unambiguously point out, a need of multimodality is required. Therefore, a shift towards combined transport would facilitate to bypass congestions, resulting bottlenecks and costly delays. In addition, combined transport processes offer a way to encounter the increasing volumes of freight as the potential of multimodal transport is not exploited yet. Considering the defined CO2 emission targets stipulated by the European Union, a shift towards combined transport would contribute to valuable savings. In the course of that, the European Union considers to change the Directive 92/106 in terms of the definition of combined transport. The intention is to promote a more environmentally friendly transport by combining road and railway.

The Interreg Central Europe project ChemMultimodal exactly tackles the above mentioned topics and thereby aims to shift transport of chemical related products from road to multimodal transportation alternatives. Within the project lifetime, in a first stage a toolbox was developed, facilitating the identification and visualization of multimodal transport routes and CO2 measurement framed by an overall consulting service for chemical companies and LSP.

The second stage of the project, the pilot actions, focused on the implementation of a change process in each pilot site with the help of the tool box, in order to support

multimodal transport of chemical goods. Here, 7 pilot actions in the participating regions Saxony-Anhalt (DE), Czech Republic (focus on Ústí Region), Slovakia, (Upper) Austria, Poland (focus on Masovia), Hungary, (Northern) Italy were implemented, each aiming to involve at least 5 companies shipping/receiving chemical goods where multimodal transport potentials have remained untapped.

2. Pilot Project Methology

2.1. Objectives and indicators

The Objectives of the ChemMultimodal pilot project are to raise chemical company's awareness of multimodal transports and to bring them together with logistics service providers to establish new multimodal routes. The project aims to achieve these objectives by coordinating and facilitating the cooperation between chemical companies, specialised logistics service providers (LSP), terminal operators and public authorities in chemical regions in Central Europe. For that purpose the ChemMultimodal tool box was developed to support chemical companies and logistics service providers in their strategic and operational planning in a moderated process in the course of the pilot actions.

During the pilot phase, the developed tool box was tested if and how the toolbox can contribute to achieve the overall ChemMultimodal project objectives:

- shift of 10% of the traffic from single-modal to multimodal transport for the selected routes by the companies involved in the pilot implementation

- reduction of CO2 emissions by 5% in the selected routes by the companies involved

The indicators of these objectives were measured at the beginning, in the course of and at the end of the pilot phase to determine the pilot phase's success.

2.2. General procedure

On the one hand, the identified potentials for a shift towards multimodal transport in the partner regions (D.T1.1.4) and secondly, the previously developed toolbox served as basis for all regional pilot actions. Building on this, companies shipping/receiving chemical goods who are to be addressed in each pilot were identified. At least five companies were won for cooperation during the pilot phase in each partner region.

For the identification of and the intensification of contact three pilot project meetings (kick-off, mid-term and final), where several companies, LSP and project partners come together to discuss about potential for modal shift, the establishment of new multimodal connections and best-practice solutions, were held in each partner region. Methodological approach and thematic focus for these meetings have been developed to take into account the environment of cooperation and competition of the participants.

Deeper cooperation and moderating in between these meetings took place in bilateral cooperation between project partners and single companies. Within these bilateral meetings for each transport of chemical goods of these companies, the shipping route and modes of transport and tonnage were collected.

A preliminary analysis of modal shift feasibility and estimation of CO2 emissions using the respective tool box elements was now possible. The project partners used the IT Tool for visualisation (Intermodal Links) looking for existing regular multimodal connections, which are suitable to the requirements of the company. This visualisation tool provides information on the relevant logistic services provider that regularly organise transports from one terminal to another. The time schedule and duration of transport is included in this tool, giving the company a better understanding if this connection is suitable to their needs. At the end of the discussion with the companies, the project partners recommended to the company to get in contact with the respective logistics service provider in order to obtain a detailed offer for the multimodal transport of its goods. The project partners were observers in this process. The project partners kept track on the identified connections and kept in contact with the company to ask if this recommended modal shift has actually taken place. The results of this modal shift e.g. tonnage and distance were documented. Furthermore, the partners calculated reduction of greenhouse gas emissions with the help of the tool box element for the calculation of CO2 emissions.

2.3. Workshops and (Bi)lateral Meetings in the Partner Regions

Pilot phase workshops were the main instrument to disseminate the project progress in the pilot phase. These workshops were used for awareness rising of advantages of multimodal transport and by this acquiring new company contacts for bilateral meetings. With these workshops, partners provided a platform for the presentation of best (multimodal) practices, facilitating a modal shift even if the companies participating in the workshops were not engaged in further bilateral meetings. For this purpose, in all partner regions a Kick-Off workshop, a midterm workshop and a final workshop were organized. In detail these workshops served for:

Kick-Off Pilot Phase workshop (D.T2.X.2)[1]

- Involvement of chemical companies and LSP
- Illustration of the project's aim
- Accentuation of multimodal transport advantages
- Identification of (before unknown) companies for bilateral meetings
- Identification of the Branch's attitude towards multimodal transport

Mid-Term Pilot Phase workshop (D.T2.X.3)[2]

- Involvement of chemical companies and LSP
- Identification of (before unknown) companies for bilateral meetings
- Presentation of first results to chemical companies and LSP
- Best practice reporting on multimodal shift

[1] X representing the respective partner according to the application form version 2.
[2] X representing the respective partner according to the application form version 2.

Final Pilot Phase workshop (D.T2.X.4)[3]

- Presentation of final results to chemical companies and LSP
- Accentuation of multimodal transport (shift) advantages
- Best practice reporting on multimodal shift

Summarizing, the following workshops took place in the partner regions to facilitate multimodal transport:

Saxony-Anhalt

Work-shop	Date	Part.	Topics tackled
Kick-Off	02.11.2017	51	▪ State of the art of multimodal transport in Germany ▪ Capacities of terminals and existing multimodal routes ▪ Presentation Intermodal links Planner
Midterm	23.01.2018	114	▪ Information about the industrial region Lusatia ▪ Information about capacities of terminals in Lusatia ▪ Presentation of first results of the projects ERFA KV and ChemMultimodal
Final	29.05.2018	36	▪ Results of the ChemMultimodal project ▪ Creation of new Multimodal routes 2017/2018 ▪ EFRE funding for combined terminals

[3] X representing the respective partner according to the application form version 2.

Poland

Workshop	Date	Part.	Topics tackled
Kick-Off	26.09.2017	13	▪ Identification of multimodal infrastructure in Poland potential ▪ Analysing the potential for the transport reconfiguration – the case of Synthos SA ▪ Discussion and workshop on questionnaire concerning transport process map
Midterm	28.11.2017	10	▪ Presentation of current status of the ChemMultimodal project ▪ Information of the progress of the pilot testing ▪ Discussions about ideas on how to switch the used road routes to intermodal road rail solutions
Final	16.11.2018	23	▪ Presentation of the ChemMultimodal project final pilots results ▪ Presentations of modal shift developed by Synthos S.A and by Brenntag ▪ Discussion about different scenarios for modal shift in the chemical supply chains management

Czech Republic

Workshop	Date	Part.	Topics tackled
Kick-Off	20.09.2017	22	▪ Information of tool box elements ▪ Organization of pilot phase ▪ Discussion of possible practical seminars in terminals
Midterm	01.11.2017 29.11.2017 28.02.2018[4]	44 23 23	▪ Project progress review ▪ Possible options and barriers for modal shift ▪ Pilot project dissemination
Final	11.04.2018 07.11.2018[5]	27 52	▪ Discussion on the progress of the pilot phase ▪ Results of each company according to pilot project partners ▪ Information of the promoted possibilities of combined transport in Czech Republic

[4], [5] The event was offered more than once to accommodate more stakeholders.

Slovak Republic

Workshop	Date	Part.	Topics tackled
Kick-Off	19.09.2017	14	▪ Presentation of the project progress ▪ Idea of pilot project ▪ Potential of modal shift
Midterm	12.12.2017 30.01.2018 03.05.2018[5]	11 17 16	▪ Experience of companies with multimodal shift ▪ Barriers of multimodality ▪ Presentation of new multimodal concepts for chemistry
Final	20.11.2018	11	▪ Evaluation of the pilot project ▪ Multimodal project tools ▪ Discussion, proposal for support of combined transport in Slovak Republic

Austria

Workshop	Date	Part.	Topics tackled
Kick-Off	06.07.2017 07.11.2017	36 14	▪ Tool box elements explanation and demonstration with discussion ▪ Good practice examples and ideas for implementations and activities in the future ▪ Discussion of the challenge of the existing mismatch between demand and supply of multimodal transport
Midterm	16.11.2017 23.01.2018	4 4	▪ Introduction of the tool box and its elements ▪ Routes identification and tool box testing ▪ Discussion of current issues and specific challenges of multimodal transport
Final	22.11.2018	11	▪ Presentation of a practical example of multimodal transport ▪ Information on current developments of Container Terminal Enns GmbH ▪ discussion about multimodal transports- experiences, challenges, barriers

[5] The event was offered more than once to accommodate more stakeholders.

Hungary

Workshop	Date	Part.	Topics tackled
Kick-Off	18.10.2017	6	▪ Information about the status of the project ▪ Presentation of the tool box ▪ Pilot activities
Midterm	16.11.2017	30	▪ Information of the project and tool box elements ▪ Discussion about possibilities to extent the tools and the expected consideration of the safety requirements of the chemical industry ▪ Presentation of the CO2 calculator and the Intermodal links platform
Final	17.09.2018	13	▪ General presentation of the pilot phase results ▪ Presentation of the final report ▪ Discussion on the possible changes in the tool box

Northern Italy

Workshop	Date	Part.	Topics tackled
Kick-Off	04.12.2017	70	▪ The state of the art of chemical logistics in Italy ▪ The development of multimodal transport and its prospects in Italy ▪ Discussion of problems and obstacles of multimodal transport
Midterm	05.03.2018	21	▪ Bilateral discussion of the feasibility of modal shift on selected routes ▪ Each company met separately transport companies and lsp to find multimodal transport solutions for selected routes ▪ Discussion of individual company decisions according to costs, reliability, delivery time and so on
Final	03.07.2018	15	▪ Presentation of the main results of the Italian pilot projects ▪ Development plan and further actions to improve multimodality ▪ Considerations for the elaboration of the pilot phase final report

3. Pilot project results

3.1. Quantitative results: Transport shift and CO2 emission reduction

The pilot phase was mainly dedicated to shift transport of chemical goods from road to multimodal transport solutions and by this reducing the emitted CO2. For this purpose the developed toolbox was used in bilateral meetings to identify potentials for multimodal shift and facilitating this shift.

In the course of the pilot actions, project partners involved **58 companies** in discussing potentials for multimodal shift. Here, an overall amount of 75 routes could be identified offering the potential to be shifted from 100% truck transportation to an alternative multimodal transportation mode. Out of the overall amount of routes, **40 routes** were intensively discussed with the respective companies, finally.[6] On these 40 unimodal routes, 1.158 billion tonkilometers chemical goods were transported annually causing CO2 emission of 71.904 tons per year.

Route (100% Truck)	Tonkilometre p.a.	CO2 p.a.
St. Pölten (AT) - Gemert (AT)	717360	44,52
Moustier (BE) - Budapest (HU)	936720	58,08
St. Pölten (AT) - Lortrijik (BE)	82080	5,04
Runcorn (GBR) –Kędzierzyn Koźle (PL)	7957440	493,2
Rotterdam (NL) - Płock (PL)	1758000	108
Gdynia (PL) – Ropczyce (PL)	7030800	435,6
Gdynia (PL) – Aleksandrów Łódzki (PL)	418800	26,4
St. Pölten (AT) - Chatel ST. Denis (CH)	251328	15
Albizzate (IT) – Onda (ES)	3726720	233,64
Šaľa (SK) - Glasgow (GB)	13638000	840
Šaľa (SK) - Breda (NL)	7608000	468
Rotterdam (NL) - Šaľa (SK)	4752000	300
Šaľa (SK) - Yorkshire (GB)	56419200	3492
Šaľa (SK) - Caldas de Reis (ES)	26460720	1632

[6] See appendix A.

Hamburg (DE) - Budapest (HU)	14208	0,88
Šaľa (SK) - Gafanha da Nazare (PT)	44740800	2772
Genova (IT) – Villadossola (IT)	8748000	540
Mediglia (IT) – Latina (IT)	13076400	835,2
Nuova Solmine - Scarlino (IT) – Sannazzaro dei Burgondi (IT)	10950000	681,6
Schwarzheide (DE) - Southampton (GB)	14112000	967,2
Frankfurt Oder (DE) - Rotterdam (NL)	1470000	91,2
Dessau (DE) - Kallo (BE)	3002400	186
Schwarzheide (DE) - Saragossa (ES)	6000000	372
Schwarzheide (DE) - Milano (IT)	3996000	252
Elsteraue (DE) - Novara (IT)	17820000	1104
Szczecin (PL)- Ústí nad Labem (CZ)	29293440	1816,18
Ústí nad Labem (CZ) - Barcelona (ES)	22680000	1406,16
Ústí nad Labem (CZ) - London (GB)	30768000	1907,52
Ústí nad Labem (CZ) - Novara (IT)	13444200	833,53
Oświęcim (PL) - Bilbao (ES)	656640000	40711,2
Brzeg Dolny (PL) – Dublin (IRL)	576000	35,76
Szolnok (HU) - Kyiv (UA)	794880	49,32
Dunaújváros (HU) - Passau (DE)	2226000	138
Fino Mornasco (IT) – Vienna (AT)	8833200	552,24
Schwarzheide (DE) - Gyöngyös (HU)	714000	43,2
Pardubice (CZ) - Brest (FR)	4679100	290,1
Šaľa (SK) - Lyon (FR)	79620000	4932
Šaľa (SK) - Barcelona (ES)	35334000	2184
Linz (AT) - Salzgitter (DE)	7967232	492
Linz (AT) - Gaillon (FR)	9027720	560
∑	**1.158.284.748**	**71.904,81**

According to the project's aims, support for shifting to multimodal transport was given in the following. As a result, 8 routes were successfully reorganised to multimodal transportation with an overall transport volume of 119 million tonkilometers p.a. and associated 2.730 tons p.a. CO2 emissions.

Route (Multimodal)	Tonkilometre p.a.	CO2 p.a.
Albizzate (IT) – Onda (ES)	3418560	89,76
Šaľa (SK) - Glasgow (GB)	12474000	264
Šaľa (SK) - Breda (NL)	7542000	240
Rotterdam (NL) - Šaľa (SK)	4755600	120
Šaľa (SK) - Yorkshire (GB)	51091200	1248
Šaľa (SK) - Caldas de Reis (ES)	14606280	288
Hamburg (DE) - Budapest (HU)	14208	0,33
Šaľa (SK) - Gafanha da Nazare (PT)	25123800	480
Σ	**119.025.648**	**2.730,09**

Besides actually reorganised routes, several unimodal transportation routes were at least tested in a multimodal manner. These 8 tests of multimodal transportation of chemical goods had a volume of 1.565 million tonkilometers causing 53,31 tons of CO2 emission.

Route (Multimodal)	Tonkilometre	CO2
St. Pölten (AT) - Gemert (AT)	58194	1,91
Moustier (BE) - Budapest (HU)	78060	2,44
St. Pölten (AT) - Lortrijik (BE)	6840	0,24
Runcorn (GBR) –Kędzierzyn Koźle (PL)	637200	21
Rotterdam (NL) - Płock (PL)	149000	3
Gdynia (PL) – Ropczyce (PL)	578700	23,05
Gdynia (PL) – Aleksandrów Łódzki (PL)	34900	0,99
St. Pölten (AT) - Chatel ST. Denis (CH)	22205,4	0,68
Σ	**1.565.099**	**53,31**

More, in several cases the final decision to shift transportation from road to multimodal modes is still pending. These still in progress being shifts count 1.51 billion tonkilometers annually and 27.479,95 tons CO2 emitted annually in a multimodal way of transportation.

Route (Multimodal)	Tonkilometre p.a.	CO2 p.a.
Genova (IT) – Villadossola (IT)	8748000	192,00
Mediglia (IT) – Latina (IT)	14137200	374,40
Nuova Solmine - Scarlino (IT) – Sannazzaro dei Burgondi (IT)	10950000	231,60
Schwarzheide (DE) - Southampton (GB)	14112000	360,00
Frankfurt Oder (DE) - Rotterdam (NL)	1627500	31,60
Dessau (DE) - Kallo (BE)	4333464	72,00
Schwarzheide (DE) - Saragossa (ES)	6000000	159,60
Schwarzheide (DE) - Milano (IT)	3996000	84,72
Elsteraue (DE) - Novara (IT)	21067200	510,96
Szczecin (PL)- Ústí nad Labem (CZ)	33638400	713,12
Ústí nad Labem (CZ) - Barcelona (ES)	15600000	363,48
Ústí nad Labem (CZ) - London (GB)	31200000	677,02
Ústí nad Labem (CZ) - Novara (IT)	14084400	328,16
Oświęcim (PL) - Bilbao (ES)	1313280000	22713,60
Brzeg Dolny (PL) – Dublin (IRL)	607680	11,52
Szolnok (HU) - Kyiv (UA)	794880	18,24
Dunaújváros (HU) - Passau (DE)	2226000	75,96
Linz (AT) - Salzgitter (DE)	7967232	274,80
Linz (AT) - Gaillon (FR)	9027720	287,16
∑	**1.513.397.676**	**27.479,94**

Besides the reorganized, tested and to be decided routes, 5 potential routes for multimodal transport were discarded mainly due to economic reason. Chemical goods on these routes will be continued to be transported on roads, amounting to 129.180.300 tonkilometers p.a. causing 8.001,54 tons CO2 p.a.

Summarizing, the ChemMultimodal project was able to shift **11,89%**[7] of the originally on road transported tonkilometers to multimodal transport.

By this, CO2 emissions could be reduced by **10,50%**[8].

[7] For detailed calculations see appendix A.

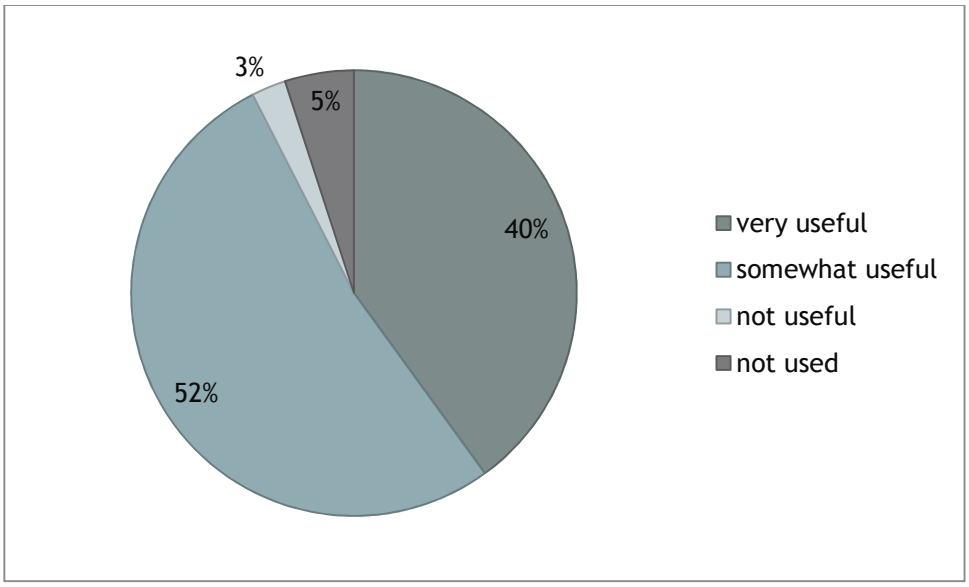
[8] For detailed calculations see appendix A.

3.2. Qualitative results: Lessons learnt

The pilot phase was successfully used to raise awareness for alternative transport modes, to visualize intermodal routes and to identify unimodal routes that show the potential for alternative ways of transport. For that reason, each region organized pilot workshops and bilateral meetings to familiarize regional stakeholders with multimodal transport solutions and to test the ChemMultimodal toolbox in cooperation with selected companies on already existing routes. During the pilot phase, the toolbox was highly accepted. The participating companies were very interested in testing the toolbox and exploring potentials for multimodal reorganization.

The IT visualization tool “Intermodal Links Planner” helped chemical companies to get a first overview of possibilities to shift transport volumes on specific routes by checking if the connections exist and which operators run the routes. This tool was assessed by the companies as a good possibility to receive general information about existing terminals and LSPs, frequency of departure, arranged feed and delivery of transports to/from different terminals on the selected routes. Unfortunately, sometimes information was not exhaustive and needed to be integrated using other sources. For instance, specific information regarding possibilities to handle and store dangerous goods at transshipment terminals was missing. Especially, at the stage of matchmaking between chemical companies and the LSP’s, it was sometimes challenging to get suitable offers from the LSP’s. Although, the “Intermodal Links Planner” provided a first idea of feasible routes and services, it was still difficult to connect to specific transportation companies. Summarizing, this tool box element was evaluated as useful or very useful by the majority of the users (see figure 1).

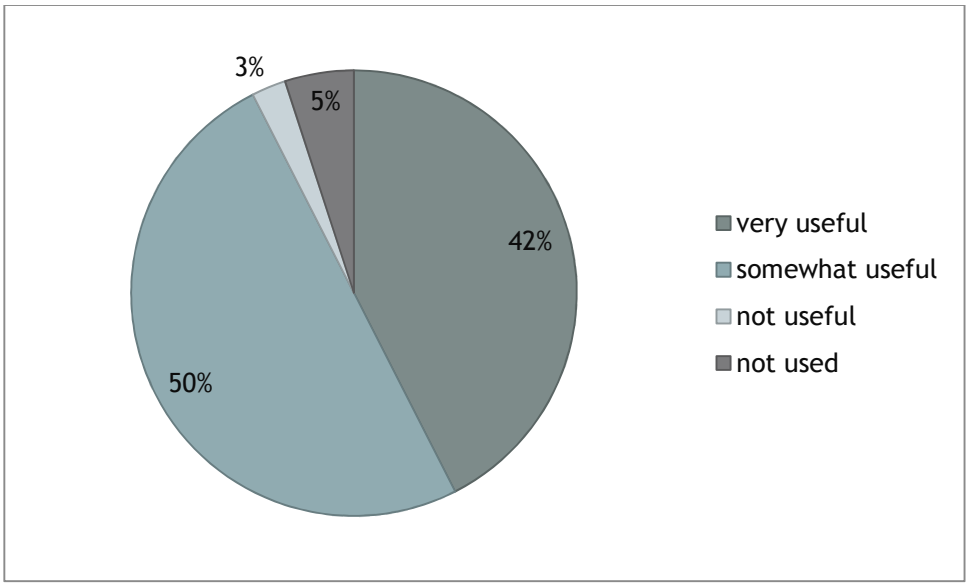
Fig. 1: IT-Visualization Tool[9]



The tool "CO2 Calculator" was successfully used to demonstrate the environmental benefits of multimodal transport. With help of the "CO2 Calculator", companies were able to estimate transport related CO2 emissions for every tested route. This element was evaluated as self-explanatory and very easy to handle. Unfortunately, for most companies transport related CO2 emissions were of minor interest in choosing the transport mode due to missing market demand. But it may play an important role for marketing CSR purposes. In cases, when the measurement becomes necessary, the tool provides data in a very transparent and clear manner. Accordingly, the tool-box element was rated as shown in figure 2.

[9] For data base see appendix B.

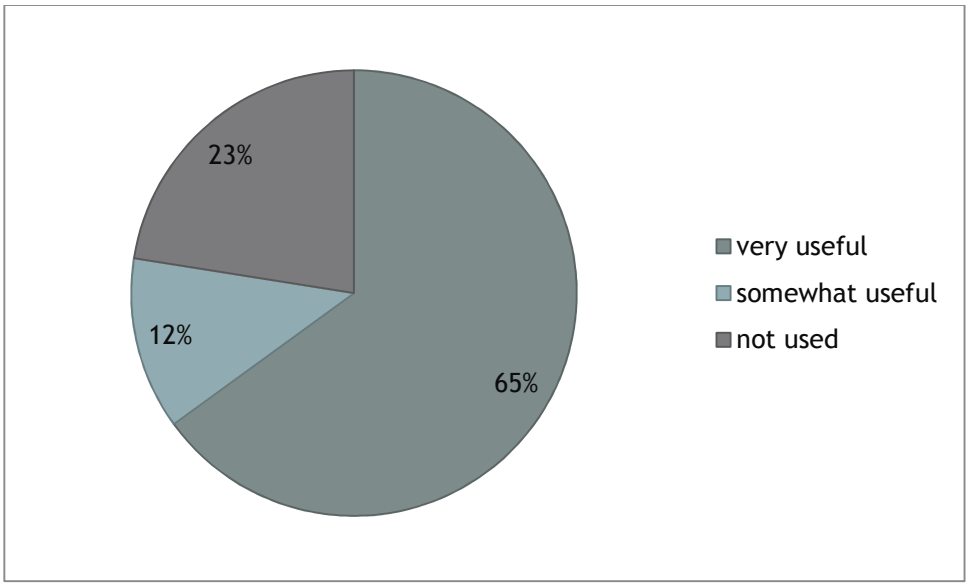
Fig. 2: CO2 Calculator Tool[10]



As most useful evaluated element of the toolbox, the "Consulting Concept" was used as a guide for the collaboration between the project staff and the participating companies. The tool was considered as very helpful in supporting the facilitator to work with chemical companies and logistic operators and to deepen the collaboration between them during bilateral meetings. (see figure 3)

[10] For data base see appendix B.

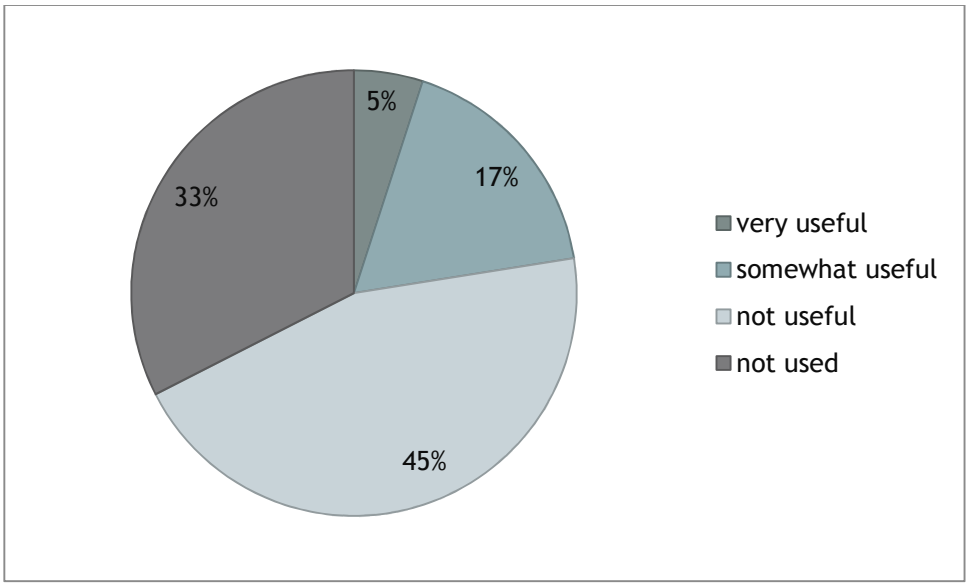
Fig. 3: Consulting Service Tool[11]



The main function of the "Planning Guidelines" during the pilot phase was to ensure that the right questions were asked when potentials for multimodal transport were investigated. Unfortunately, the tool lacks of a section to compare truck transport to intermodal transport based on the parameters distance, transport time, CO2 emissions etc. Additionally, it was very time-intense to insert the data for every single route in a separate sheet. Consequently, this tool box element in its first version was not evaluated as useful like the other elements. (see figure 4)

[11] For data base see appendix B.

Fig. 4: Planning Guidelines Tool[12]



According to the experiences made and the feedback received, the project partners improved the applicability of the tool box in a fine tuning process following the pilot phase.[13]

The pilot phase also helped to get detailed insights into the challenges of multimodal transport and the main reasons why unimodal road transport is still the most common transport mode in the chemical sector. The project partners were able to identify the most important factors that are significantly influencing decisions of transport and logistics managers in their choice of the means of transport. A main lesson from the pilot phase is the fact that, a significant increase in the share of multimodal transport could be realized by time-efficient information transmission between the interested parties and multimodal transport providers. Even though, several partners have experienced great openness towards multimodal transport, most partners recognized still existing barriers preventing multimodal transport solutions. Multimodal transport planning requires higher knowledge, experience and skills to manage complex multimodal

[12] For data base see appendix B.
[13] Fort he revised toolbox elements see deliverables D.T1.2.6-9 and D.T2.2.5.

solution, which makes it very difficult for logistic and transport managers of ,especially, SME's. Since there is no common planning platform and only a limited number of external solutions for data exchange, the access to information concerning existing routes is very restricted and intransparent. The pilot actions and close cooperation with the companies and LSP's helped to solve at least a few of those challenges. In particular, the establishment of contacts, connecting different actors of transport logistics and the possibility to use the knowledge of project partners had let to added value of the project. Sharing information between partners on transnational level helped the project team to realize that problems of multimodal supply chains cover more than a region, but have a multinational or even global dimension.

In general, the project partners made good experiences with pilot activities. Especially, the pilot workshops and the bilateral meetings with chemical companies and logistics service providers have been assessed as very positive. They helped to deepen contacts between multimodal operators and chemical companies and other stakeholders involved in the transport chain. While there are still external factors that influence transport decisions, companies also need to educate themselves and increase awareness internally about multimodal alternatives.

4. Conclusion

WP T2, namely the pilot implementation, focused on the usage, test and fine-tuning of the developed ChemMultimodal tool-box in order to develop recommendations to increase multimodal transport of chemical goods. On the basis of the identified modal shift potential of several companies, the cooperation with LSP and terminals were intensified to facilitate bundling of transports and establishment of new multimodal connections. During the implementation of the pilots, the partners met to improve and fine-tune the practical application of the tool-box.

The pilot projects have shown that transport decisions depend on product-specific characteristics (e.g. special equipment needs, short transit times) and, especially, on flexible supply of transport alternatives. Although safety is one of the main reasons for multimodality, the cost-effectiveness of transports still plays a major role. As experienced during the pilot phase, modal shifts must result in cost reduction or service improvement; otherwise chemical companies are not interested in a modal shift. In order to make multimodality more attractive and competitive, the offer of multimodal solutions needs to be increased and the infrastructure should be improved. The ChemMultimodal Transnational Strategy proposes measures to enhance framework conditions for multimodal transport in Central Europe. Especially, infrastructure adjustments play a key role in improving potential offers for multimodality. Besides infrastructure conditions, other external factors play a significant role such as the crude oil price which has an impact on the transport costs. As the price of oil is currently rather low, the decisions of transport and logistic managers are often made in favor of truck transport.

The chemical logistics sector is not as well interconnected as expected on transnational base. Although chemical transports were often handled beyond national borders, the big picture is not seen by the people involved. More, the information possibilities are very limited and intransparent. There is no common planning platform - on European base. So, it was a big added value of the project to be able to use the contacts and the knowledge of the project partners.

The ChemMultimodal tool-box – in particular, the Elements Visualisation and CO2 Calculator – will be used after the end of the pilot project phase. All participating companies were sufficiently advised how to use the tool-box elements. Beyond that, the Elements Visualisation and CO2 Calculator can be transferred to any other industry sector that carries a critical transport quantity. Action plans for each project territory will provide further details how the tool-box is used to promote multimodal transport in the future.

Appendix A

Companies involved and routes identified

Partner	number of companies	number of routes identified	number of routes discussed
LSA	10	7	7
CZ	8	5	5
PL	6	6	6
IT	15	10	5
SK	2	8	8
HU	6	5	4
AT	11	34	5
∑	58	75	40

Shift from uni- to multimodal in % on annual basis

$$\frac{\text{tonkilometers reorganized routes (MM) + tonkilometers tested routes (MM)}}{\text{tonkilometers all identified routes (truck only)}}$$

(119.025.648 + 18.781.193) / 1.158.284.748 = 0,1189749 = 11,89%[14]

[14] Even if tests are not considered, 10,27% of the former unimodal routes are now transported multimodal.

CO2 reduction by shift from uni- to multimodal in % on annual basis

CO2 emissions 100% truck = 71.904,81

CO2 emissions reorganized routes (MM) + CO2 emissions tested routes (MM) + CO2 emissions routes in decision process (truck) + CO2 emissions discarded routes (truck) = CO2 emission after pilot phase = 64.350,39

$$\frac{\text{CO2 emissions 100\% truck - CO2 emission after pilot phase}}{\text{CO2 emissions 100\% truck}}$$

(71.904,81 - 64.350,39)/ 71.904,81 = 0,106621378 = 10,50%[15]

10,50% equals an absolute reduction of 7554,42 tCO2/p.a.

[15] Even if tests are not considered, CO2 emissions were reduced by 9,91%.

Appendix B

Toolbox usage

Partner		very useful	somewhat useful	not useful	not used
LSA	IT-Visualization	7			
	Consulting Service	7			
	Planning Guideline			7	
	CO2 Calculator		7		
CZ	IT-Visualization		5		
	Consulting Service	4	1		
	Planning Guideline			5	
	CO2 Calculator	4	1		
PL	IT-Visualization	2	2	1	1
	Consulting Service		1		5
	Planning Guideline			1	5
	CO2 Calculator		4	1	1
IT	IT-Visualization		5		
	Consulting Service	5			
	Planning Guideline			5	
	CO2 Calculator		5		
SK	IT-Visualization		8		
	Consulting Service	8			
	Planning Guideline	2	6		
	CO2 Calculator	8			
AT	IT-Visualization	3	1		
	Consulting Service				4
	Planning Guideline		1		3
	CO2 Calculator		3		1

HU	IT-Visualization	4			1
	Consulting Service	2	3		
	Planning Guideline				5
	CO2 Calculator	5			