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RETRACK

REorganization of Transport networks by advanced RAil freight Concepts

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1 Introduction

1.1 Short description of RETRACK

The RETRACK project is applying an innovative rail freight service concept to the movement of rail freight across Europe. This is being achieved through the design, development and implementation of a commercial trans-European rail freight service along the rail corridor between the North Sea ports of Rotterdam (Netherlands) and Antwerp (Belgium) (Netherlands) and Constanza (Romania) on the Black Sea. The project aims to secure a significant modal shift of cargo from road to rail and to create an effective and scalable rail freight corridor between high demand regions in Western Europe and new high growth regions in Central and Eastern Europe.

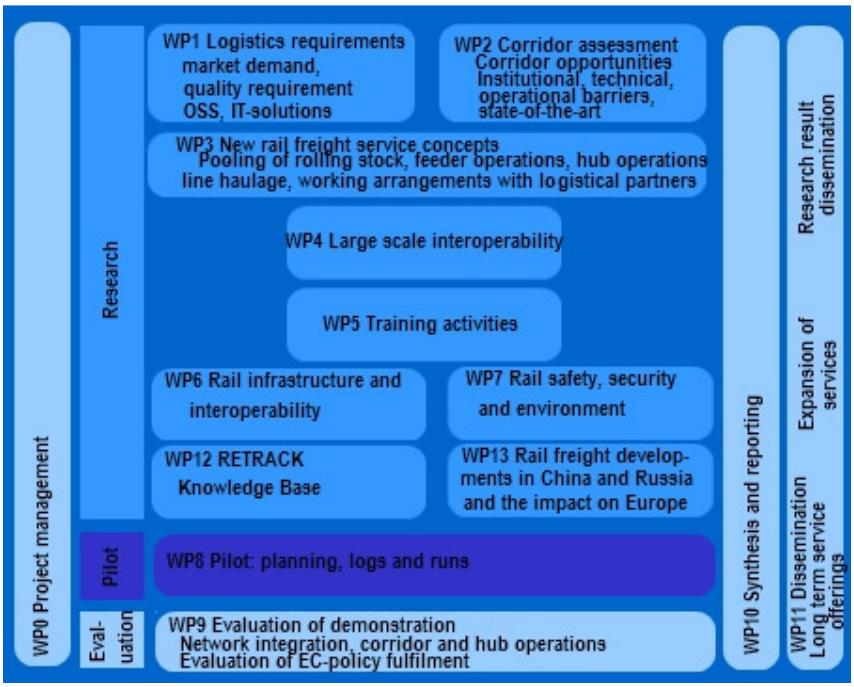
Figure 1: The RETRACK corridor

The overall objectives of the RETRACK project are to conduct research, develop, commission and implement pan-European privately operated rail freight demonstration services (to achieve the EU key objective: modal shift to rail) between Rotterdam, The Netherlands and Constanza, Romania through Germany, Austria and Hungary. This implies passing at least four border crossings, if the entire route is to be used. The route serves

major port and industrial complexes in Belgium, Luxembourg and The Netherlands (together with options to North German ports), major industrial areas in Germany and Austria and links to major cities in Hungary and Romania with new port potential in the latter as a longer term source of traffic.

The RETRACK project is divided into 13 work packages.

Figure 2: WP structure of RETRACK



The RETRACK pilot rail freight demonstration service has operated since February 2010 with demonstration costs partially supported (under FP6) by the EU. It will continue until July 2012.

2 Objectives and methodology

2.1 Set-up of the report

The objective of Work Package 9 is to evaluate the RETRACK pilot freight train service in relation to the degree of attainment of business and EU-policy objectives. In this report we will draft a synthesis of the main results of the RETRACK project. In this synthesis important lessons from the project will be extracted. The synthesis includes an evaluation of the process (in Chapter 3), followed by an evaluation of the pilot (in Chapter 4). Next is an evaluation of the business opportunities after the pilot (in Chapter 5). Finally an evaluation of the impact of the project on business and society will take place (in Chapter 6). The main conclusions and recommendations of the evaluation can be found in chapter 7.

2.2 Methodology

The synthesis is based on an ex-post evaluation of the finished (accepted) RETRACK deliverables. Were appropriate, their respective authors were asked to shed more light on particular issues. The analysis contains qualitative- and quantitative elements.

3 Process evaluation

3.1 Introduction

Process evaluation deals with the way a project was carried out, not with its content. The following questions were used to support the evaluation:

- [Resource use - parties involved] Who were the members of the project team? What were their respective roles and tasks? How did these actors co-operate? Who carried the (ultimate) responsibility for the results of the project?

- [Resource use – budget] Was the budget used as intended? Was it spent in the most efficient and effective way?

- [Planning] What were the main phases in the project? What were the main project tasks and deliverables? How were they planned over the life-time of the project? Was the project planning realistic?

3.2 Resource use - companies involved

3.2.1 The RETRACK team

The RETRACK team consisted of 13 partners at the start, but in total some 18 partners were involved in the project:

Project manager: TNO.

Railway undertakings: EUB, Rail4Chem, Servtrans Invest, Transpetrol GmbH.

Interoperable traction provider: LTE.

Shunting services and local traction: CER.

Consultants: Newrail, NEA, TNO, TOI, TCI Roehling, Wagener & Herbst, Archicom, Babcock&Brown, Deltarail.

Software developers: SOPTIM, ERSA.

During the project a change of partners took place:

- Babcock&Brown (staff problem) Ltd. left during 2007;
- Servtrans and Transpetrol joined the consortium during 2008. Servtrans (non-fulfiment) left the consortium in 2012;
- Rail4Chem (taken over by Veolia) and EUB (cooperation between its partner companies ended) left the consortium in 2009.

3.2.2 Internal and external forces

Each partner is responsible for the tasks it accepted when signing the consortium agreement and its technical annexes. Partners carry a responsibility towards each other, as they need each other to carry out specific tasks, and towards the commissioner, the EU. The ultimate management and financial responsibility is the task of the project manager, TNO. The project manager has appointed project leaders to lead individual work packages.

The technical annex of a project is in essence one possible scenario of future project results. In practice another scenario may be more realistic, as actual results will differ in some (minor or major) way from the initial project plan. This is due to internal and external forces, which also influence each other, adding to the challenge of carrying out a project like this.

Internal forces include the following:

1) Staffing and the quality of individual contributions to the project. Each partner should create an internal task force of employees skilful to carry out the accepted tasks in the agreed way. In practice, this is not always the case. If a partner does not have the required staff, then partial fulfilment of the task will be the result. An accompanying factor is (changing) management interest and (reduced) prioritisation of the project over time. Companies may also leave the project, which may have an even stronger impact on the project. Companies entering at a later stage may not fully understand the objectives of the project or have (partially) other objectives.

The RETRACK project team was quite 'volatile'. A key issue was the change of major player (Transpetrol). This company is active in other product markets and partially has other aims and needs than its predecessor Rail4Chem. This was for instance visible in the way in which SOPTIM software was finally used.

Some partners were unable to fulfil the requirements, which forced other partners to cover the gaps. Tasks were redefined, deleted or replaced by new tasks, where possible within the available budget. Some partners had to spend (much) more resources than planned (an example is TNO's major involvement in WP9). In practice, several tasks were partially fulfilled, creating gaps in the information required to write the project deliverables.

2) The quality of the project management. Professional skills are even more relevant for the project manager. Having an experienced consultancy like TNO as project manager may add to the success of a project. But, it is not a guarantee. As described in detail in chapter 6 of D9.2, the initial stage of the project was "a lengthy and complex period when the respective roles, responsibilities of the operational and commercial partners were unclear and raised the

doubt of the pilot service." There is reason to assume that some of TNO's project managers were too optimistic concerning the capabilities and intentions of individual project team partners. On their part, some of these partners seem to have lacked previous experience in working in EU projects and/or pursued their own agenda.

The internal problems were magnified by external conditions, which were probably underestimated. The frequent staff changes at TNO during the project have not helped to stabilise the project team either. We may conclude that the choice of partners and quality of project management could have been better.

External forces include the following:

1) Market conditions. This project was carried out over a period of five years in a market, which was relatively new. It had to be developed in a period in which demand and supply conditions have deteriorated in an unexpectedly negative way. Anchor customers pulled out of the commitment and volumes transported tumbled. As a result the initial assumptions concerning market development and service offerings had to be adjusted downwards. Running an empty train is not a viable proposition, especially in a demand-driven project like RETRACK. The market conditions affected the options for demonstrations, which were considerably delayed as a consequence. Project planning was jeopardized.

2) Legal and contractual issues. The project team is dependent on the commissioner in many ways. This already starts at the moment the project proposal is awarded. Contract negotiations frequently lead to a lower budget and higher/stricter demands with respect to content, as the commissioner wants the highest value for the money. RETRACK was delayed by three months due to late issuing and signing of the contract. This has put additional stress on the project team. In particular WP1 and WP2 were delayed by several months.

During the project all major deviations from the technical annex have to be accepted by the commissioner. Experience shows that a commissioner usually approves well-documented change requests, as long as the overall goals of the project are not jeopardized. Too much deviation from these objectives may create tensions between the project team and the commissioner. If not resolved, rejection of decisions and related deliverables is likely. In case of RETRACK all change requests and several deliverables have been approved by the commissioner, but the remaining deliverables (to be finished before September) are of course pending, which explains why we cannot fully evaluate the acceptance by the commissioner in this document.

3) Government policy (changes). Public policies may have some influence on the market conditions, hence indirectly also on a project like RETRACK. Examples are policies to change the modal shift or to improve customs/border procedures. Usually public policies are internally inconsistent, which may mean that a project like this does not achieve its full potential.

3.3 Resource use - budget

The RETRACK project has a budget of 21.894.371 euro of which 10.972.301 Euro is funded by the European Commission.

The budget was divided as follows: Demonstration 10.702.571 Euro, R&D 9.112.097 Euro, Training 1.312.002 Euro and management 767.700 Euro.

At the end of the project the whole budget will be spent. Compared with the original planning, spending of the budget was delayed and the budget is larger than at the start of the project.

During the life-time of the project the lifetime was extended and the project has been expanded several times.

The most important factor influencing spending was the rail freight pilot for which almost half of the total available resources had been budgeted. The pilot started with one train a week increasing its frequency to four round-trips a week in the final stages of the project. The delay of the pilot also delayed other R&D activities related to the pilot. As a result, a large amount of the total budget has been spent in the final 1,5 years of the project.

The financial resources were well spent, as the trains have run in commercial service for a considerable time. Financial management has supported the aims of the project well, also given the very difficult circumstances the project was faced with.

3.4 Planning

3.4.1 Introduction

Project planning is a tool to manage resources over time. It contains key data, in particular kick-off, start date of individual work packages, deadlines for work package tasks, dates for meetings and termination date of the project.

It is common, especially in a large project, where many work packages are related and running in parallel, to see deviations from the initial planning. In most cases delays are inevitable, but in a minor number of cases tasks can also be fulfilled faster than expected. Tasks and even complete work packages can be shifted over time, and hence carried out either earlier (rare) or (more common) later in time. All these changes are done in

communication with the relevant project partners and the commissioner. They usually also have financial consequences for the project partners, such as changes in payment date or changes in overall and partner budgets.

3.4.2 RETRACK macro planning

In the yearly Periodic Activity Reports (PAR) a detailed overview of the project results and changes in planning of deliverables can be found. We will refer to that as micro planning. We are not repeating the PAR's here, but concentrate on what we will call macro planning, which generalizes results of micro planning in order to draw more general conclusions about project planning. What we are mainly interested in are major deviations from the initial planning.

In this respect, one major change is the extension of the project by two years. The main reason was the severely negative market situation. Interestingly, the CREAM project was also delayed by two years, but in that case the main cause was not so much of an economic nature, but of a technical nature, because some engineering tasks took considerably more time or were even impossible to finish within the project period.

Table 1, a summary of the yearly activity reports of RETRACK, shows the macro planning. Deviations from the initial planning are explained and solutions to cure the various issues are mentioned.

Table 1: Macro planning of RETRACK

WP	Content	Initial planning	Finished	Challenges and issues	Solutions, remaining issues
WP0	Management	Periodic	Regularly / ongoing	Minor finance-technical issues	Financial project manager appointed
WP1	Logistics requirements	2007-1-9	2007 Q4	Minor	-
WP2	State-of-the-art of current rail services	2008-1-3	2007 Q3	Minor	-
WP3	New rail freight services	2007-7/2009-2	D3.1-3.3 2007-7/2008-12	Major, development of integrated service concept, relation with WP 8, lack of relevant and reliable data	
WP4	Large Scale Interoperability	2008-9	D4.1-4.3 2008-3/2009-5	Affected by change of partners, pilot run dates and final routes, requirements analysis	
WP5	Training activities	2008-1/2009-2	D5.1 2008-7	Major, dependency on WP 8, 'should have started much later'. Reluctance by operational partners.	Staff recruitment, key responsibility transfer to TP
WP6	Development of efficient rail infrastructure	2008-2/2008-12	2009	Major, dependency on WP 2 and 3. Companies leaving, methodological issues (KPI)	Replacement, hiring of external staff, consulting external experts
WP7	Development of efficient rail safety procedures	2008-6/2009-5	2009 (deliverables)	Uncertainty about core tasks of RETRACK, pilot, responsibility between partners, new partners and regions	Downsized, new work plan developed
WP8	Pilot demonstration of new rail freight service	2009-11	Pilot 2010-2 until late 2012	Quality of wagons, many cars rejected, data collection problems	Corridor and market focus, price/service ratio and business models
WP9	Evaluation of the pilot	2007-7/2009-10	D9.1 2007-7	Evaluation influenced by delayed pilot and lack of relevant data because of missing	EUB budget and tasks reassigned over all

				implementation of SOPTIM RMS and SOPTIM CIC. Limited evaluation capacity of operational partner.	partners
WP10	Synthesis and reporting	2007-9/2010-4		'Budget too small for the tasks'	
WP11	Dissemination	2007-7/2010-4	D11.1-D11.7 2007-7/2008-4	Delay of pilot delayed its assessment	-
WP12	Knowledge Base	2010-1/2012-8	D12.1-2	Data elaboration was a major challenge	-
WP13	Eurasia Extension	2010-1/2012-8	D13.1-3	Information from these countries	-

Based on this table, we can draw some important conclusions with respect to the project planning:

1) Planning of a complex project like this is a very challenging task. Internal and external forces have had a considerable impact on the project. Issues have arisen, in particular changes within the project team and deteriorated market conditions, which led to major disruptions of the project. At a certain moment even the question was discussed if to stop the project altogether. When the pilot services finally started, market conditions had turned favourably;
2) Planning is always a bit like playing simultaneous chess on several boards, with some players engaging blindfolded. The many interactions between tasks running in parallel contained a certain risk. When things go wrong, what one can do is to carry out individual tasks as good as possible, to rethink, redefine or postpone other tasks to a moment in time when the conditions have improved. This is what happened in this project;
3) Project management and partners have been aware of what was going on during the various stages of the project. This awareness led to various important adaptations of the work plan. This is a sign of active project management. That being said, one should not ignore the negative impact of the (yearly) changes in project management on the project. Project management was not the stable factor it could have been;
4) All partners in RETRACK have been affected by the many changes of the work plan, but all in all the project has not failed to reach most of its objectives;

5) With a more thoroughly prepared business model RETRACK could have been done a lot quicker. There must be shorter time horizon for the project/demonstration and a clear business model at the start of the project;
6) Since the delay by 2 years also happened with the CREAM project, it should be considered as inevitable.

4 Project enablers

4.1 Introduction

In this chapter we will evaluate what we have called 'project enablers', i.e. tools to support RETRACK staff in carrying out their respective tasks, by enabling collection, processing, presentation, sharing of information. Staff of companies involved received training by Deltarail, Newrail and others and learned how to use the new or improved tools in their daily practice. We will focus on the ICT platform SOPTIM and the database system referred to as 'Knowledge Base'.

4.2 ICT

4.2.1 Introduction

Railway companies, traction suppliers, logistic providers, network managers and shippers use different software to support their daily (planning) activities. Due to the different (local, legal) requirements by each of these parties, (and hence) the involvement of different hard- and software suppliers, it is rather common to find interfacing problems between the applications of each partner. This is why the existing IT infrastructure among RETRACK partners was referred to as 'weak and extremely inhomogeneous'.

To cope with this technical issue, companies rely on manual processing and personal communication. Next to additional work, this allows mistakes to be made when booking and running train services.

4.2.2. Evaluation

The SOPTIM RMS software platform was developed to support the following operational processes: Master data (commercial partners, resources, other), contracts and order management, train path management, dispatching and controlling of trains (view, billing and change logs). Other functionalities are loco- and wagon maintenance and repair. There is also a Customer Information Centre (web interface to the train monitor).

A requirements analysis for this software was presented in Deliverable 2.2. The theoretical match of SOPTIM with these requirements can be found in Deliverable 4.4, while the actual implementation and matching with requirements was discussed in Deliverable 9.7.

It is important to distinguish between trial results and daily use of the SOPTIM software. Some functionality of SOPTIM RMS was trialled, such as GNSS tracking of locos and cloud based infrastructure. It can be developed as the needs of future customers emerge.

Daily use of SOPTIM software is limited. Railway undertakings may operate in different product markets (block trains, wagon groups, single wagons, short-medium-long distance services). The RMS system was developed as a dedicated system based on demand from Rail4Chem for shuttle train services for containers, swap bodies and trailers instead of the services offered today, i.e. grouped wagon and single wagon services. Transpetrol already had their own system. SOPTIM RMS was a great tool, but its level of sophistication was beyond the needs of Transpetrol. The need for connectivity with the existing systems was also a hindrance. It can be implemented and exploited eventually when the service will expand. For this type of services the SOPTIM RMS system will be an improved planning tool.

The SOPTIM Customer Information Centre (CIC) was developed, but not implemented among any RETRACK partner or customer. The effects of implementing and use of CIC on information exchange between RETRACK stakeholders could not be evaluated. On information exchange a survey among RETRACK customers concludes that:

- Information services are approximately on the same level as from RETRACK competitors
- Among the nine RETRACK service elements ranked, information flow and information accessibility is among those that could be improved
- More “active” information and better info flow are terms used to express the need for information improvements
- The SOPTIM CIC system could be a tool to improve information management and information exchange in future.

The conclusions from the customer survey indicate that the information exchange between RETRACK stakeholders could be improved if the SOPTIM Customer Information Centre (CIC) is implemented.

4.3 Training

4.3.1 Introduction

The justification, main targets and main direction of the training courses in RETRACK can be found in Deliverable D5.1. In order to develop business along the corridor, reliability of the train service and shorter transfer times are key focus areas, for which a set of key performance indicators (KPI’s) is developed in WP 9 and 5 (D5.1).

Deliverable D5.2 describes the specific content of the training and its organisation in more detail. In order to evaluate the functionality and success of the training activities, Deliverables D5.3 (Training tools) and D5.4 (Training and evaluation) should be available. D5.3 is partially finished, while D5.4 is (as a consequence) not available. This evaluation is limited to the available documents.

Two main training activities were carried out in RETRACK: SOPTIM RMS training and ERTMS training. All training was carried out with computer simulations developed by ERSA and Deltarail. Typical target groups for training are staff working in train control center (TCC), customer information centre (CIC) and train drivers employed by railway undertakings.

4.3.2 RMS user training

SOPTIM RMS software is amongst other benefits used to support the railway undertakings during a train run. Training was split into functional (theory) and operational training. Operational training involved training with RMS under simulated operational conditions with regards to customer information and handling under normal and degraded situations, which they can come across in operating the (pilot) service.

The training material is comprehensive. LTE staff followed this training successfully. At this point no other users for RMS are foreseen. If necessary the training material will be made available to others.

4.3.3 ERTMS/ETCS training.

ERTMS is an evolving railway technology. It will be gradually rolled-out to replace (or run in parallel with) existing (automatic) train control (ATC) systems, starting with the main corridors of the European (freight) railway network. Small sections of the RETRACK corridor are equipped with this system (see Deliverable D2.9). In order to run trains on ERTMS governed sections, railway undertakings have to use ERTMS-ready locomotives. Their staff, in particular train drivers and dispatchers, should receive training in order to understand the capabilities and limitations of ERTMS in daily use. This training includes the latest insights into ERTMS (Code of language, ERTMS Level 2) in interaction with the RMS system.

Language differences may hinder the operation of cross-border trains. TCC (dispatchers) and train drivers should be able to communicate in an understandable way. Standardized technical systems like ERTMS support railway communication to some extent, but more is necessary in order to run trains cross-border in a safe and efficient way. The development

and use of a uniform (Railway) Code of Language is regarded as very important in this respect.

Partner Deltarail developed training courses for train drivers and dispatchers. These courses have been taken by some of RETRACK's and ProRail's railway professionals with positive results, but dispatchers and train drivers further along the corridor still have to follow this training.

4.3.4 Evaluation

WP5 was dependent on WP 4, 8 and 9. A set of KPI's was developed in WP 9 and used as one of the inputs for the operational training manuals in WP 5. WP 4 produced so-called 'exported constraints' (top 10 bottlenecks) for WP 8, which could be used for the operational training. WP 4 relied on WP 8 (pilot) to provide the constraints. As WP 8 was delayed, training material was prepared before the detailed specification of the pilot (corridor) was ready. This means that the training course had to rely more on assumptions than strictly necessary. Nonetheless, the team succeeded in the task of training staff. It is the responsibility of the management of LTE and TP to engage relevant staff in the training courses.

4.4 The RETRACK Knowledge Base

4.4.1 Introduction

A large amount of data and information on rail freight has been collected and processed within RETRACK, as well as in other R&D and integrated projects in the EU. In order to make this information accessible and to translate it into knowledge, a tool has been developed in WP12: the RETRACK Knowledge Base. It consists of the following elements:

- Web portal and content management system (hosted by DEMIS);
- A public and a restricted document repository and search system;
- Table data: data viewer with tables, maps and charts and data editor;
- Geo data: network data viewer with infrastructure and topology;
- Support data exchange with external systems.

This system is closely linked to the European Transport Information System ETIS^{+}. Data about infrastructure, freight flows, transport modes etc. from ETIS^{+} can be uploaded from the RETRACK Knowledge Base. Links with other systems are foreseen, among others with as TENTec, Gisco and modeling systems such as TRANS-TOOLS.

4.4.2 Structure and content

The Knowledge Base is organized along five main topics:

1. Infrastructure supply and demand - rail network link and node data, corridor definitions of the RETRACK main and alternative corridor network,rail network attributes, such as maximum weight, maximum speed, lauding gauge height and width, ERTMS-level and signaling system
2. Market conditions - corridor market players, documents on business models and market players, tabled indicator data on intermodal services, modal shares, OD flows and transport costs in corridor, links to various useful sites and portals
3. Institutional conditions - elaborate documentation: legislation on rail liberalisation at EU and national level and policy documents on transport and logistics
4. Connectivity of the corridor - documentation on corridor studies, network data on RETRACK and alternative international rail corridors
5. Environmental impact, safety and security -table data indicators on emissions of CO2, NOx, particle matter and SOx, documentation from TREMOVE, STREAM etc.

The Knowledge Base is expandable to other (future) corridors. Information on the RE-ORIENT corridor has already been uploaded to the Knowledge Base. Integration of relevant data and information from the developing Green Corridors is another possibility.

4.4.3 Evaluation

A large number of projects has and is being carried out in rail transport. In most cases, there is limited or no collaboration among the research groups involved. This leads to repetition of work, inefficient use of resources and limited overall increase of knowledge. The RETRACK Knowledge Base is a serious attempt to deal with this issue. It is interesting, as it offers opportunities to merge and unify datasets, to cross-analyse results of studies, etc. There are however important conditions that have to be fulfilled before it can become a success:

- It should be clear from the start which data should be collected and for what purpose(s). This calls for a requirements analysis, which starts with the identification of target groups. Once the target groups have been identified, the scope (content, geography etc.) of the data collection should be defined. Within that scope, the type and nature of data has to be chosen. By focusing on a corridor instead of single

countries, a certain focus in data collection has been achieved. It is not clear, whether the issue of 'wide' versus 'deep' data collection has been addressed properly;

- It is important to guarantee a certain level of quality of the data. There are examples in other projects where data has been collected just because it was easily accessible (read: for free). When processing the data, most of it turned out to be of little or no value. It is then important that any data source should be checked before it is added to the Knowledge Base. From the available information, it is not clear who is responsible for database management;
- The option of adding new material to the Knowledge Base should be limited in order to prevent unauthorised use of and corruption of datasets. By distinguishing general users and registered users and distinguishing between documents with public and restricted access, this risk is reduced, but not removed.

It is necessary that RETRACK has a policy for exploitation and dissemination of the information contained in the Knowledge Base. It should in particular address the issue of how to keep the Knowledge Base 'up-to-date'. The discussion about this topic is ongoing.

5 Pilot evaluation

5.1 Introduction

The intention of the RETRACK pilot was to demonstrate, within the new market conditions, that private railway undertakings would be able to collaborate and co-operate in the development of new pan European rail freight services that would be competitive, reliable and attractive compared with the existing rail freight services provided by the national incumbents.

5.2 Pilot delayed and scope changed

5.2.1 Clients and services

The original RETRACK pilot demonstration was scheduled to run between January 2008 and December 2010. As RETRACK was getting into a position to launch services, demand was falling in response to the international economic recession. Significant investment in marketing the service was rendered useless as traffic volumes declined. Existing train service providers cut back services and competition hardened. The timing for a wholly new entrant was not promising.

The startup was delayed and eventually commenced in February 2010. The traffic scenario is in stark contrast to what was envisaged in the early phases of the project. Traffic started with one rotation per week serving a small customer base (low priced grain cargo) from East to West. This grain cargo has provided a flexible, but consistent source of revenue and volume, allowing sales staff to attract higher value traffic.

Over the months service frequency was increased to the current three rotations per week. Customer numbers increased significantly and cargo became more diverse by the addition of hazardous and liquid fluids and automobile parts. The direction of traffic became more balanced by adding more West to Eastbound traffic.

Single wagon services, particularly of hazardous and liquid substances, have secured premium revenue. In contrast to many voices in the industry, single wagon traffic can be carried out profitably. Cost coverage is now over 70% and is expected to grow in future. This success has been achieved with little marketing. Since May 2011 more marketing and sales efforts have taken place. This will attract even more customers with more high value cargo. This would imply a modal shift to rail thanks to a pragmatic, reliable and competitively priced service for wagon groups and individual wagons.

5.2.2 New freight train operation model

The RETRACK trains represent a service and business model that has been proven in the context of available traffic, service times and route options. Responding to the market demand, the train has been operated at different levels of traffic ranging from very low levels of traffic (a single wagon) to full length and weight limits. This business model demonstrates adaptability to accommodate varying loads. The RETRACK service offers a smart combination of transporting different kinds of goods in different directions; grain freight transported one way and manufactured goods the other way. The problem has been the recession. The adoption of the satellite (or hub-and-spoke) concept for traffic served to points not directly on the main line also demonstrates pragmatism, adaptability and flexibility in terms of commercial and operational response.

TP has a developing strategic position to become a major rail freight player in the emergent liberalized market beyond the traditional role of its parent company as a wagon supplier. TP led the commercial and operational planning of the services; controlled the operation and management of the train including the buildup of wagon loads and other cargo offerings, shipper contacts, pricing, in transit monitoring, the resolution of any disruption and delay response, arrangement of train crews and shunting. The concentration and distribution of wagons to/from Köln (Cologne) is completed by a railway undertaking controlled by TP. This provides a greater measure of flexibility and control than that formerly provided by previous subcontractors.

5.3 Pilot performance

5.3.1 Success factors

The fact that a new service could be developed in a highly competitive market by a new entrant, is strong evidence of a successful initiative, because a new entrant frequently does not have the ‘deep pockets’ and the network to (cross-)subsidize new services as the incumbent railway companies have.

The RETRACK train services is the only international wagon group rail product, which is

-privately operated;

- strictly oriented on the customers needs;
- developing market-oriented single-wagon and wagon–group systems;
- using proven technology;
- systematically linking these products & systems into an integrated European network;
- providing a cohesive management & control for the entire network.

The whole RETRACK service is run by a limited number of people and a flexible group of incumbents indicating that this is a LEAN concept used on rail freight service. Another success factor for the RETRACK team is the use of personal contacts in approaching the market and customers as well as getting slots.

5.3.2 Operational bottlenecks

Given the complex nature of the RETRACK project and service offering as a whole, there were undoubted complications and factors that limited the performance of the service:

- Relative positioning of new operators in relation to the market dominance (capacity, access to train paths in volume, opaque commercial practices and accounting) of existing operators.
- Market response (i.e. from the existing operators) to the pilot project is very important for any new service. In the case of RETRCK this has been muted to date but could be predatory if key relationships on traffic were threatened by the new competitive services (e.g. automotive traffic) on price, for example.
- The RETRACK pilot did not undercut prices in the market but has been able to offer better flexibility than the incumbents and this has induced traffic interest. Other existing or new services may take this as an important lesson.
- There was some naivety in the project proposal and at the start of the RETRACK pilot in the sense that the market strength of the incumbent operators along the corridor was not correctly assessed in particular in relation to the movement of inter-modal traffic. The project came to life in response to real time cargo opportunities and commercial potential to start up a wholly new service on the corridor with flexible satellite options.
- Exposure of the dominating role of the national incumbent (e.g. DB in Germany). The reality of the regulatory regime and its effectiveness in Germany is still questionable. The position appears to be less extreme in Austria and Hungary.
- Intra-sector rivalries and positioning at a commercial and technical level still favour the incumbent rail operators despite the pressure from EU rail reforms. Developing cross border relationships, alliances, allegiances for train operations and ownership of railway companies further complicates the position. There has been some evidence of discrimination against the RETRACK new service (e.g. for allocating siding space) and this has led to the use of the parallel rail system to the incumbent that straddles the Austrian/Hungarian border.
- Access to train tracking systems on an unrestricted basis to monitor train activities in transit. Transpetrol's position of being a railway undertaking through acquisition made

this process somewhat easier but could be seen as a barrier to effective market entry if this facility is not freely available to new service operators on pan-European cross-country routes.

- Access to sufficient specialist rolling stock fit for purpose on a sustained basis (a minimum number to be there for the duration of the pilot).
- Retention or displacement of lower paying traffic/commodity flows (for example grain in the case RETRACK) that underpinned the start up operation.
- The need for a clear equable basis for cost and revenue sharing agreement in a consortium or the identification of specific contracted partner roles to be remunerated from train revenue. This should include locomotive and rolling stock re-positioning.
- Recognition that short term commercial and marketing positions may have to be adopted as pragmatic measures to formulate, define and support the ultimate emergence of a credible commercial service concept.

5.3.3 Operational achievements

The pilot service was comfortably able to secure the acquisition of acceptable train paths. Train length has normally been less than the 750m maximum allowed on the main operational axis. This is an operational limitation that all rail freight undertakings must comply with. Very heavy trains have been routinely operated between Köln & Rotterdam as required without major difficulties.

5.3.4 Commercial success

A survey among customers revealed their satisfaction with the service in terms of reliability and competitiveness. As a result a long term relationship with customers could be developed. The RETRACK freight service has been able to divert or shift cargo from road and inland waterways to rail. The grain traffic was previously carried in part by barges so there is a move to rail for this (>35%). The aluminium oxide traffic for Austria is a direct transfer from road to rail. Other traffic is partly won from other freight train services or is wholly new traffic.

Despite these successes, in order to sustain competition with road hauliers, the RETRACK service needs to be more efficient in terms of productivity by adopting new operational and technical measures. They need to be proactive to meet changing customer requirements in a similar fashion to the road hauliers.

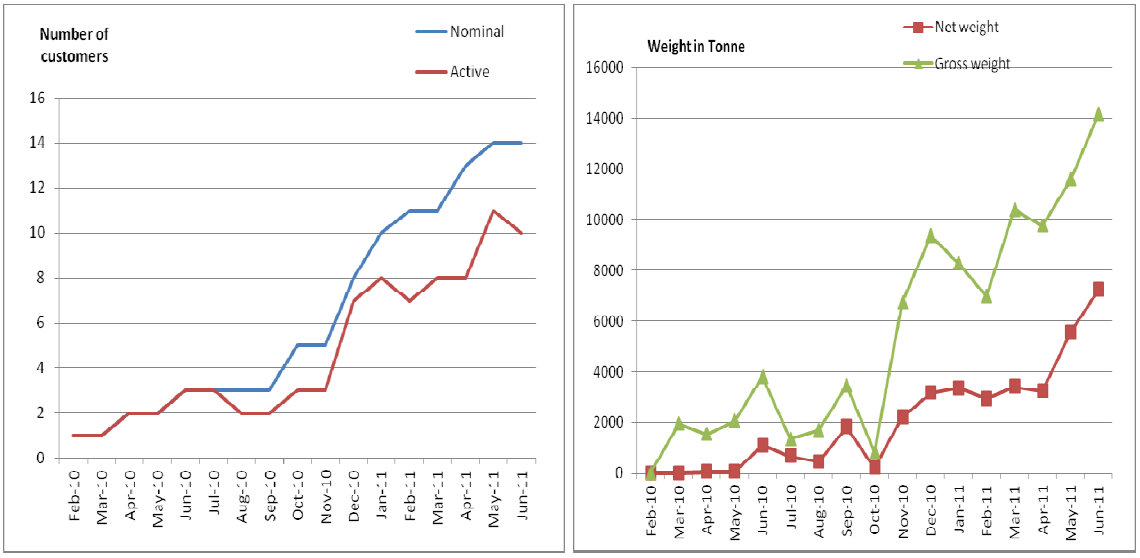
Figure 3: Competitive position of RETRACK

Pan-European Rail freight transport; Evidence from a pilot demonstration result

PROGRESS TOWARDS COMPETITIVENESS

Service type	Competitor's service compared to RETRACK Figures in %		
	Higher than RETRACK	Lower than RETRACK	Approximately same as RETRACK
Level of Price	75	0	25
Reliability	0	0	100
Available capacity	25	0	75
Info mgnt	0	50	50
Transhipment time	0	50	50
Handling time	0	50	50
Frequency	75	0	25
Flexibility	0	66.7	33.3

Figure 4: Commercial success of RETRACK



The RETRACK service now has a strong commercial position to exploit and is approaching a break-even position.

6 Post pilot

6.1 Expansion to hub/feeder lines

6.1.1 Introduction

The aim of a service network is to fulfil the transport needs of customers by shipping goods between one or more origin-destination pairs in an efficient and cost-effective way. In practice, a network can be configured in different ways, ranging from ('simple', direct) point-to-point/line connections to ('complex') hub and spoke networks.

The choice of network configuration/design depends on a range of factors. The most important are technical (e.g., available infrastructure, manpower, locomotives and their capabilities), logistic/economic (e.g., service level, volumes transported, goods characteristics, transport costs and price, investments in the network), spatial (e.g., locations of customers in space, location of nodes in space), environmental (e.g., distance, prescribed routes, detours, running empty) and policy (e.g. supporting certain policy goals, ability to use certain subsidies). Network design is partially based on objective and partially on subjective reasoning (for instance, historic motivations). Given the long list of determinants, it is difficult or even impossible to argue that one network configuration performs better than another in all circumstances. To make it even more complex, it is also likely that a railway undertaking uses different networks or different logistic strategies for different commodities.

In practice each railway undertaking has a different service network and this network can change over time depending on one or more changes in the earlier mentioned parameters.

6.1.2 The RETRACK service network

The RETRACK service network started as a linear connection, which is rather common for a start-up. Once the service is established, marketing and sales are used to capture new customers to use the existing service in the RETRACK corridor. A next step is to expand the linear connection towards a network with more than two nodes. The latter means that the services will cover a larger geographical area. Here a typical chicken-egg issue emerges, because the costs of expansion usually outweigh revenues in the start-up phase, as the volume is usually too low to at least provide a break-even situation. To compensate for this, governments, like the EU, provide short-term subsidies to lower start-up costs. RETRACK is one of the projects benefitting from such a subsidy scheme.

Two directions for the expansion were discussed: Towards South East Europe (SEE) and towards North East Europe (NEE) using a hub in Hungary to link existing RETRACK and

new initiated services. To implement these expansions there is a need for increased cooperation with complementary rail service providers.

For SEE services RETRACK rail operators have to cooperate with operators like DB Schenker Rail, Express, Interfracht, Proodos and national incumbents. In the development of this new service Transpetrol could act as a rail forwarder and coordinator between RETRACK and the Rail network South East Europe (SEE) operators.

The NEE services are for wagon groups using all kind of wagons and commodities. In the North East Europe Railnetwork concept Transpetrol will operate as a rail forwarder, coordinating with the SEE services. It may act as operator in Poland, in cooperation with national incumbents and private railways.

A third option is to combine SEE and NEE services into one Combined Railnetwork.

The actual opportunities to geographically expand RETRACK services depend on the commercial requirements and operational conditions.

An interesting question that can only be answered in future, is whether the expansion of the corridor will impact the way RETRACK is doing business? Does it have to change its transport concept, in particular by acting more in line with how the big players like DB Schenker run trains? Cooperation will on the one hand open new markets for RETRACK, but also create dependencies, which may threaten the unique selling points of RETRACK.

6.2 Eurasian extension

6.2.1 Introduction

Asia's share in the world economy is growing (fast). Many of the countries in this part of the world have a growing population, a growing income per capita and invest large amounts into railway infrastructure. Outdated rail infrastructure is replaced, missing links are closed and rail networks are expanded. A Eurasian land bridge emerges. By offering much shorter transit times, for certain commodities rail can now compete directly with deep sea shipping on very long distances.

The main goal of WP 13 is to identify potential for and promote trade and transport by rail between EU, CIS and China. This is done by

- Research to identify new markets and business opportunities;
- Identification of barriers and bottlenecks in the existing rail routes;
- Developing business cases of rail transport between Central Europe and China.

In this project, three rail corridors were investigated;

- the Trans-Siberian corridor;

- the Central –Kazakhstan corridor;

- the RETRACK rail corridor.

6.2.2 Conditions for success

Rail corridors are in essence combinations of rail networks, consisting of single or parallel connections between several origins and destinations. For normal operations the following has to be arranged:

- Removal of technical barriers. Technical interoperability is essential for rail operations. Rail is plagued by a large number of technical barriers, which can only be overcome in two ways: use of interoperable locomotives (and staff) and/or technical standardization of trains and infrastructure. Both demand large investments;
- Removal of operational bottlenecks. There are shortages of wagons. There is a lack of inspections and backlog in maintenance of infrastructure and rolling stock. Terminals tend to have monopolies, leading to high prices and unofficial payments for services and low quality of operations;
- Removal of legal bottlenecks. There are different legal regulations, different systems/standards of cargo documentation and there is no united information system;
- Removal of commercial bottlenecks. Prices should become more stable. Customs procedures have to become much more efficient. Safety should be raised. Protection of national players should be removed.

6.2.3 Challenges and chances

The rail networks in the corridors between the EU and China offer interesting opportunities for rail transport. But, the rail infrastructure in the majority of the countries in the corridor has a low level of maintenance and (as a result) limited capacity for routine operations. Central Asian countries and Russia are making the first steps towards railway sector reforms. All of the countries are actively involved in different international and bilateral agreements which provide a legal basis, as well as an operational framework for the cooperation in the region.

In WP13 a model-based analysis of the rail corridors was conducted in order to assess the current (2010) and future (2020) attractiveness of these corridors for the delivery of cargo by rail from Europe to China. Rail corridors were further compared with the maritime transport solution.

If the technical problems can be reduced and agreements between the respective countries reached, then commercial services are feasible. There have been a few pilot trains between

Europe and China already and commercial services between Europe and Russia have started.

7. Project impact

7.1 Introduction

The RETRACK project is one in a series of EU projects whose aim it is to strengthen the competitiveness of railways against competing modes of freight transport. In contrast to the CREAM project, which consisted largely of incumbent players with established working relations over many years, the RETRACK partners were more like a loosely coupled team.

Nonetheless, this team succeeded in achieving its main goal, which was to prove that it was possible to develop and commercially operate a specific railway service in a market (single wagon and wagon groups), which is regarded as difficult by many experts in the field. During many years, incumbent players have reduced or even abandoned such services, arguing that they were not viable.

Promoting railway services is not a goal on its own for the EU. It is a means to achieve higher level goals, in particular socio-economic development, lower environmental impact and improved transport safety.

In this chapter we will elaborate the contribution of RETRACK to these goals.

7.2 Societal impacts

7.2.1 Introduction

The following areas are of particular interest in an evaluation of the results of this project:

- Modal shift opportunities;
- Market development, professionalization, co-operation, employment;
- Safety, security and environmental impacts.

7.2.2 Modal shift opportunities

Modal shift is an area of long-lasting debate among policy makers. Despite many efforts to increase modal share of rail via dedicated and very elaborate policy packages, European transport data shows that freight rail services continue to loose market share in almost all countries in Europe. This could imply that general policies (to create a 'level playing field') may not be the right way to progress or that these policies are not implemented as intended.

RETRACK is a test case for EC reform packages and/or deregulatory directives. It provides some evidence that there are European countries that protect their incumbent operators in various ways, thereby reducing competition and the opportunities to serve the customers of railways to the fullest extent possible.

RETRACK shows that more efforts are necessary to support newcomers in the railway market, provided that they offer services that are a real addition to the available product portfolio. As we have learned from the success of road haulage, transport companies can only sustain in the long run by providing dedicated logistic solutions. Large incumbents tend to favour large customers with large and constant, hence predictable transport demands. The willingness or ability to offer dedicated, infrequent, small-scale logistic services is in general higher in smaller companies.

In our modelling tools we have 'transposed' the limited number of RETRACK services to the overall rail market. From this it follows that a significant modal shift in certain product markets seems feasible.

7.2.3 Market development, co-operation, employment

RETRACK offers a flexible, pragmatic, and adaptive service to cope with the different market requirements. RETRACK shows that single wagon or wagon group services, which compete directly with road haulage (unlike block trains) may be offered successfully. RETRACK has established relations with some long-term customers.

The impact of the project in terms of employment cannot be determined in quantitative terms. In qualitative terms, one may argue that there is no reason to expect that the project had a large impact on employment. As far as a modal shift occurred in some submarkets, a change from road to rail or barge to rail transport does not create many additional jobs. One may however reason that by creating jobs in the SWL market, jobs in other rail markets are positively affected (read: secured). Seen in that way, there may be a positive impact on employment.

7.2.4 Safety, security and environmental impacts

Transport safety has become more important on the political agenda in recent years. In general, rail transport tends to be much safer than road haulage. The modal shift achieved by RETRACK trains will therefor have a small, but meaningful impact on transport safety.

Security of transport is a major problem with railways, as it is unaccompanied transport. There are many examples of theft of goods, in particular while being stationed at railway yards without surveillance or staff not being part of the project team. For transport of grain and liquids in bulk this presents not a real issue, but for transport of consumer products like washing machines it is. In the CREAM project, there have been security issues related with these goods, but in RETRACK there have been no reports of security issues.

Rail transport can be regarded as less damaging for the environment than road haulage, if and only if a certain load factor, electric traction and a limited number of road kilometres is made in pre- and end haulage This environmental 'gain' holds for air pollution and climate impact, but not for noise.

This implies that a modal shift from road to rail will, under the right circumstances, have environmental benefits. Since the RETRACK service led to a modal shift in some product markets, it may be regarded as an example of contribution to the EU sustainable transport policy.

Using the European model TRANS-TOOLS and a dedicated modal split module it has been calculated what the impact of the improvements of the RETRACK service would be if applied on a European level. To evaluate the impact of RETRACK on the European rail freight transport on a long term, it is decided to take the year 2030 as the time horizon. Based on the European trend scenario 2030 scenario calculations have been made, not only for rail transport, but for all European freight flows. Three different scenarios have been defined in order to estimate the impacts.

The increased level of service as determined in one of the project scenarios will lead to a substantial (>5%) increase of the rail freight transport in Europe. This will lead to a decrease of emissions of greenhouse gasses and pollutants of between 0,6 and 0,8 %.

The impact of the decrease of border resistance alone will lead to a marginal impact on the ton kilometres of rail freight (0,15 %) and the emissions of pollutants and CO2 (between 0 and 0,05%).

8. Conclusions and recommendations

The RETRACK project, carried out in the period 2006-2012, has proven that it is possible to start a new, commercially viable rail freight service on the pan-European corridor between the Benelux and Romania. Combination of demonstration and research has lead to an effective knowledge transfer between operating companies, R&D organisations and governments.

RETRACK has been successful as a demonstration project for the following reasons:

- RETRACK succeeded in finding the single wagon and wagon group freight potential in the corridor, in two directions.
- The RETRACK partners offer a flexible, pragmatic, and adaptive service to cope with the different market requirement; for example RETRACK is offering single wagon load (SWL) in combination with wagon groups.
- The RETRACK service has achieved a modal shift from road to rail, albeit that the total modal shift impact is limited, due to the fact that a substantial part of the new volume is shifted from rail to rail.
- The RETRACK service has contributed to the EU sustainable transport policy objectives. The shift from road to rail has lead to a decrease of the emission of pollutants, noise and CO2. The service has improved the connectivity and accessibility of the regions along the corridor.
- Commercial railway undertakings, as represented in RETRACK, are more flexible to develop and implement new services than the incumbent market players. Short and direct chains of command enabled a flexible and effective customer-oriented approach.
- The open, non-discriminatory access to rail freight in the EU was a key to establish the RETRACK service. The RETRACK service is contributing to remove the remaining barriers to the implementation of EU non-discriminatory open access freight transport policy.

Transpetrol and its partners were able to offer a customer-oriented service that fulfilled the requirements of new market segments. The total time horizon of the project (2006-2012) has been extremely long. Project partners have left the consortium; the economic crisis has changed the perspective and expectations of the market partners. This has lead to major shifts in scope and potential of the rail service.

However, valuable lessons have been learned. Lessons that can be applied to other new commercial rail freight initiatives in existing and new corridors.

The following policy recommendations can be made:

Support of new initiatives:

EC should consider further funding options to support credible new projects similar to RETRACK in terms of scale and ambition. It can be considered to adapt the Marco Polo Programme, funding support for short, medium and long haul projects at a national and international level.

Development of ICT systems:

For further development of RETRACK and similar services, an ICT system (i.e. SOPTIM RMS and SOPTIM CIC) must be implemented to attract new and existing customers and to increase efficiency when expanding the RETRACK services. Implementing an ICT system to support the RETRACK concept will reduce the problems of data collection and data availability for analysis and monitoring.

Stimulate knowledge development and transfer between research and public and private partners:

The concept of an 'integrated project' has successfully proven that co-operation between research and consultancy companies on one hand and private and public parties on the other leads to effective knowledge development and transfer. The RETRACK Knowledge Base is a valuable tool for the exploitation of information and knowledge on rail freight. This system can be deployed for other corridors and integrated in other European data systems, such as ETIS+. The Commission should consider the possibilities and potential of further development and integration of knowledge systems.

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