Project N° 506391

BRAVO

Brenner Rail Freight Action strategy aimed at achieving a sustainable increase of intermodal transport VOlume by enhancing quality, efficiency, and system technologies

Integrated Project

Priority 6.2: Sustainable Surface Transport

Final Report for Publication

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Organisation name: KombiConsult GmbH **Revision: final 06.12.2007**

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Section 1. Project Execution

1 Project objectives

The BRAVO project refers to the Brenner corridor and was initiated in 2003.[1] Its overall objective is to develop and demonstrate an action strategy on intermodal rail-road transport services comprising major scientific and technological as well as pragmatic activities. This strategy primarily is due to lay the foundations for achieving a significant and sustainable increase in intermodal volume on the Brenner corridor, but over and above that, it shall be designed as a blueprint applicable to other pan-European freight corridors. This action strategy is considered a most important prerequisite to lead intermodal transport out of the current inhibition of growth, against the background as follows.

As one of the key European freight arteries, the Brenner corridor takes up about two thirds of the current trans-alpine freight volume transiting through Austria and Switzerland. At the heart of the Brenner corridor, the link München – Kufstein – Brenner - Verona is functioning like a pipeline "absorbing" practically all individual transport flows on one side and "ejecting" them on the other. This pipeline ensures pan-European goods transport between all countries North and South of the Alps. However, the corridor primarily is serving the trade between Germany and Italy.

Owing to this pipeline effect there is particular pressure both on the transport infrastructure and on the environment, that is the sensitive Alpine eco system and its residents. Pollution is particularly severe because some 70 % of all Brenner freight volume, i.e. 25 million tonnes, is carried by road.

So requests on rail to relieve road transport are massive. In fact, in the period 1989 to 2001, while rail single-wagon traffic has been stagnating at 3.5 million tonnes, intermodal transport volume more than quintupled to 11.1 million tonnes. Out of that, 5.9 mill tonnes are accompanied rolling highway services, 5.2 mill tonnes are logistically demanding long-distance unaccompanied intermodal services designed for the transport of containers, swap bodies and semitrailers. However, in recent years, the growth dynamics of intermodal transport on the Brenner corridor have eased off. A recent study[2] commissioned by the German Ministry for Transport has identified and analysed the following primary weak points, which partly do also apply to conventional rail:

- deficiencies in cross-border coordination and in the quality of service, in particular low rate of punctuality, clearly limiting the competitiveness in logistically demanding market segments: Even though the setting-up of the joint Brenner Servicestelle (Brenner service agency) has improved train monitoring, customer information, and the appreciation of problems, it lacks of a corridor process organization and management which aims at avoiding deficits;
- deficiency in interoperability of equipment, particularly as regards locomotives;

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1 The acronym BRAVO stands for 'Brenner Rail Freight Action Strategy Aimed At Achieving A Sustainable Increase Of Intermodal Transport Volume by Enhancing Quality, Efficiency, and System Technologies'.

2 HaCon/KombiConsult/SGKV: Erarbeitung von Konzepten und Handlungsempfehlungen für eine zielgerichtete Weiterentwicklung des internationalen Kombinierten Verkehrs Schiene-Straße, Nov. 2002.

- lack of efficiency of the resources used (locomotives, wagons, staff), contributing to non-competitive freight rates as regards the transport of general cargoes;
- deficits in the supply of services like non road-competitive transit times on links up to approx. 600-700 kms, and a lack of network density;
- infrastructural capacity bottlenecks on rail networks (main lines and junctions), at key intermodal terminals, and at border stations;
- economic-technological gap: Out of the some 4,000 freight trucks which, on the daily average, use the Brenner corridor in long-distance traffic some 90% are articulated vehicles. And according to the SAIL project funded under the 5th FP, the share of semi-trailer-based traffic in pan-European transport is continuously increasing. First of all, more and more of them are MEGA high-volume semi-trailers for which appropriate wagons currently are not supplied. Secondly, less than 5% of all semi-trailers are craneable. According to expert estimations, in a medium-term view, the share of craneable semi-trailers will at best rise to 10%. What is with the remaining 90%? It exists a gap in the supply of a viable and self-sustaining intermodal technology capable of capturing conventional road-based semi-trailers for unaccompanied intermodal services.

Against this background, representatives of the Ministries for Transport of Austria, Germany, Greece, and Italy as well as all relevant stakeholders of the rail and intermodal transport industry engaged on the Brenner corridor, amongst them many members of this project consortium, elaborated the "Brenner 2005" action plan. It contains a list of activities required to organize the short- to medium-term enhancement of intermodal services in this corridor.

Advancing from this action plan, the project partners are scheduled to develop as the primary scientific objective of this project a more comprehensive **Brenner corridor action strategy** composed of a set of coherent technological components mentioned below, which are due to be implemented and demonstrated in the course of the project.

The strategy will take into account and further improve the interaction of “traditional” public and new private railway undertaking competing on the same international lines. In the recent past the poor service quality of the traditional railways has called up new private railways to start services on the Brenner. Project partners RTC and Lokomotion have demonstrated a considerable increase of quality of service and forced the traditional railways to improve their service as well. It is indeed the inauguration of competition in the rail freight sector that has contributed to an increase of transport volume and modal shift from road to rail.

The primary scientific objective of this project, i.e. the elaboration of a Brenner corridor action strategy, is broken down by the following scientific and technological sub-objectives:

1. Development of a coherent Brenner corridor management scheme which shall meet the requirements as a sustainable system – maintained beyond the project period - and an open system enabling the access of new entrants;
2. Development of an improved train path availability and allocation process;
3. Development of an interoperable rail traction scheme involving the employment of multi-current locomotives;

4. Development of an EDP-supported corridor quality management system (QMS) including quality agreements;
5. Development of an advanced customer information system (CIS) generating an „estimated time of availability (ETA)" information in the event of delays based on the development of a real-time train location system;
6. Elaboration of a time-schedule (short-, medium- and long-term perspectives) for extending intermodal transport services, e.g. to Southern Italy and Greece;
7. Development of a self-sustained intermodal technology to capture the growing market of conventional road-only semi-trailers for intermodal transport;

In this project, any intermodal shipment transiting the Brenner pass independent of the countries or areas of origin and destination, is regarded to be related to the 'Brenner corridor'. So the Brenner corridor action strategy basically is to apply to the entire volume of transports on the corridor from the Benelux and Northern European countries to Sicily and Greece. Since, however, the "pipeline" München-Verona described above, does represent both the very core and the "Achilles heel" of the entire Brenner corridor, this project will approach the freight corridor topic as follows:

- The project will cover the entire geographical catchment area for Brenner intermodal services;
- Most of the technological components envisaged, from the beginning, will be applied to the entire Brenner corridor, though demonstrations – for reasons of effectiveness and efficiency – might be performed on the core section;
- The focus of the quality management system and customer information system, however, is on the core section München-Verona because, if the performance on this section is not sufficient, the following sections would also suffer. But if the core section is controlled and managed on a high standard, an excellent basis is established to achieve a competitive logistical performance on the entire door-to-door route.

All the objectives set for this project are considered as a most important prerequisite to ensure the achievement of the following overall objectives on the Brenner corridor:

- enhancing the quality and efficiency of intermodal services thus inducing an increased customer retention;
- developing and demonstrating innovative system technologies suitable for broadening the intermodal market base;
- raising the awareness of the benefits of intermodal services both with customers, i.e. freight forwarders and shippers, and interested parties on the Brenner corridor;
- thus, ensuring an increase of intermodal rail transport volume on the Brenner corridor by 50 % within a three years project period.

2 Contractors - Project Consortium

The high-potential consortium unites both incumbent and independent railway undertakings – Rail Cargo Austria (RCA), Railion Deutschland, Trenitalia Cargo, Lokomotion, and Rail Traction Company

(RTC) - the intermodal and terminal operators Cemat, Kombiverkehr and Intercontainer Austria (ICA), and Interporto Bologna that is operating the freight village. In addition, the Swiss wagon manufacturer Ferriere Cattaneo contributes to technological innovations, while the UIRR, Brussels, is responsible a.o. for disseminating the project results. The logistics expert Prof. Hans-Christan Pfohl, who represents the Darmstadt University of Technology, is the scientific advisor to the BRAVO project.

The Frankfurt-based consultancy KombiConsult in cooperation with HaCon, Hannover, performs the project management. BRAVO has been selected by the European Commission, Directorate-General for Energy and Transport (DG TREN) to be funded under the 6th Framework Programme Research and Development since it develops a blueprint for seamless, interoperable rail and intermodal freight services due to be applicable to other European freight corridors.

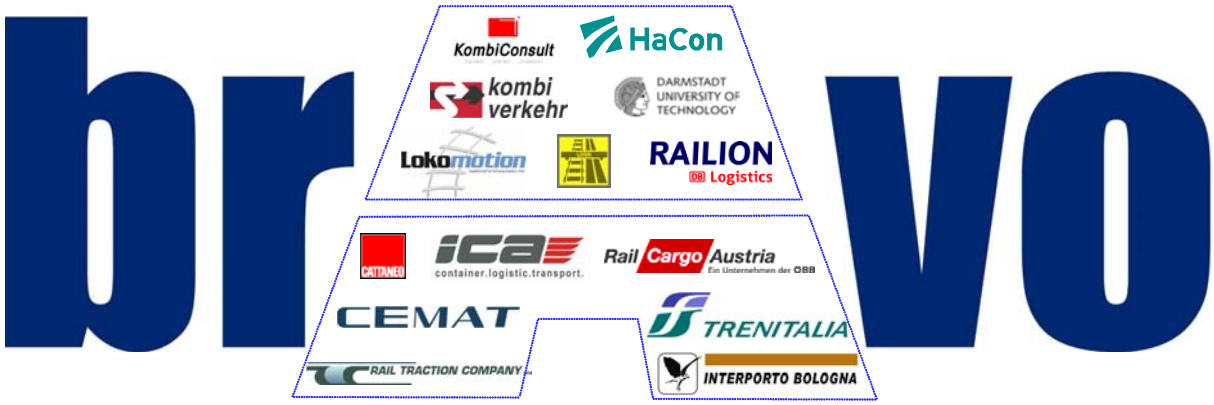
The legal entities forming the **BRAVO Consortium** are listed in the following table:

Figure 1 BRAVO partners and key contacts

N°	Participant name	Country	Key contacts
1	KombiConsult GmbH	Germany	Rainer Mertel, Uwe Sondermann
2	CEMAT Combined Transport Management and Transportation S.p.A.	Italy	Maria Antonietta Zocco
3	Railion Deutschland AG	Germany	Frank Weppner, Dirk Schade
4	Ferriere Cattaneo SA	Switzer-land	Hans Tandetzki
5	HaCon Ingenieurgesellschaft mbH	Germany	Marian Gaidzik, Niklas Galonske
6	Kombiverkehr Deutsche Gesellschaft für kombinierten Güterverkehr mbH & Co. KG	Germany	Christoph Büchner
7	Lokomotion Gesellschaft für Schienentrak-tion mbH	Germany	Harald Schmittner, Niels Jäger
8	Ökombi Österreichische Gesellschaft für den kombinierten Verkehr mbH & Co. KG *)	Austria	Herbert Peherstorfer
	Intercontainer Austria GmbH *)	Austria	Hermann Ungersbäck
9	Österreichische Bundesbahnen (ÖBB) *)	Austria	Georg Musyl
	Rail Cargo Austria AG *)	Austria	Erich Possegger, Georg Musyl
10	Rail Traction Company S.p.A.	Italy	Francesco Grotti
11	Hellas Transport S.A. *)	Greece	Spyros Paparounis
12	Technische Universität Darmstadt	Germany	Hans-Christian Pfohl, Oliver Boldt
13	Trenitalia S.p.A.	Italy	Francesco Delvecchio
14	UIRR S.c.	Belgium	Martin Burkhardt
15	Interporto Bologna SpA	Italy	Angelo Aulicino

*) Ökombi, ÖBB and Hellas Transport from Month 1-12, RCA and ICA from Month 13-36.

Figure 2 BRAVO logo



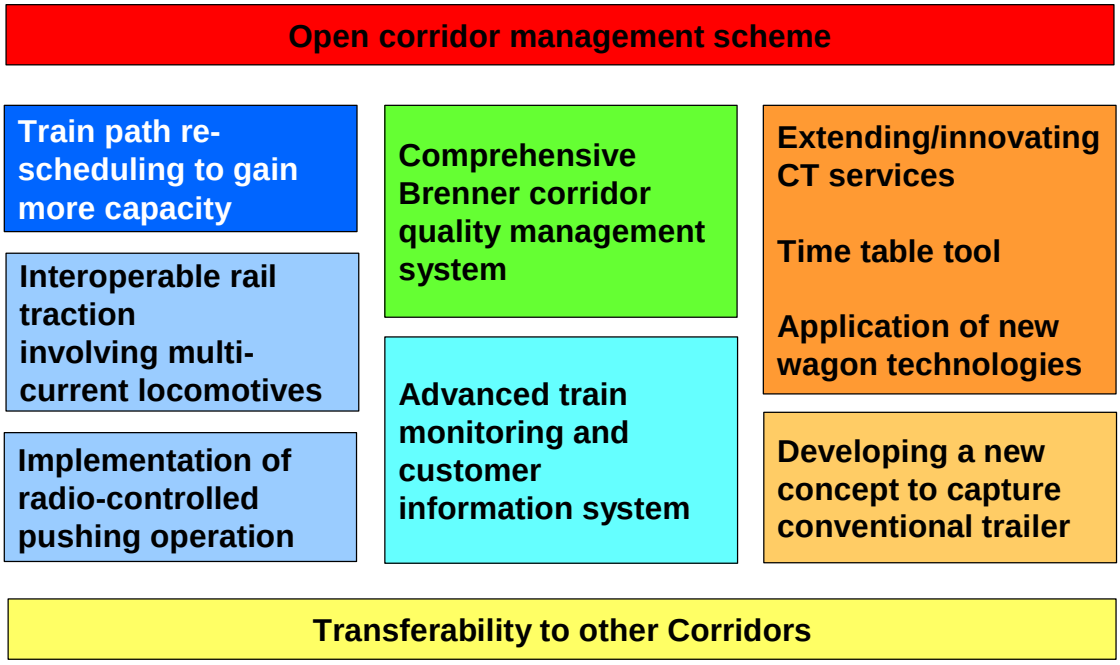
3 Work performed and end results

The following section reports on the work performed and the results achieved by the end of the project in May 2007. It is to be highlighted that BRAVO Partners achieved all major objectives[3].

The seven workpackges of the project (cf. chapter 1) were composed of several tasks and resulted in ten innovations which are presented in the following chapters.

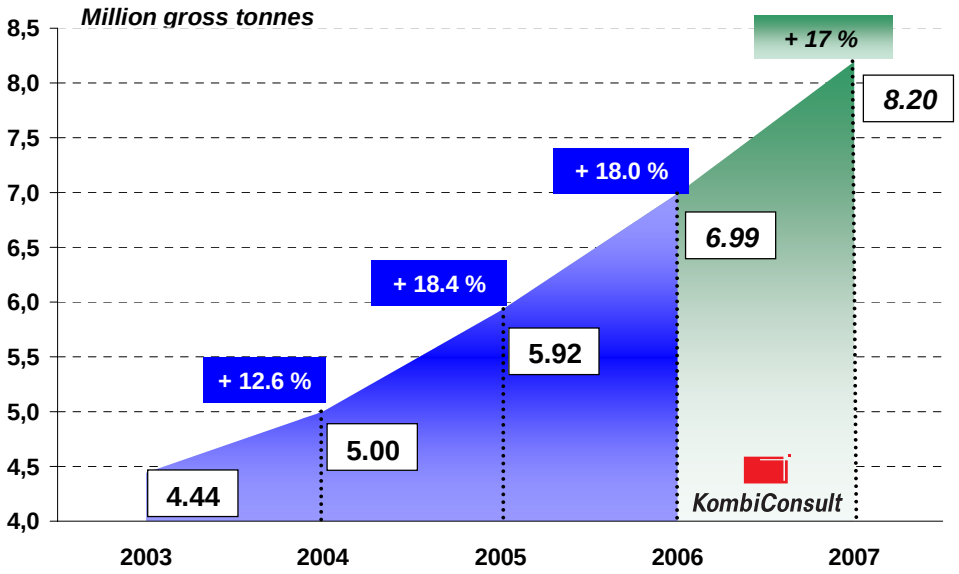
[3] Despite the final authorisation of the radio controlled pushing engines for regular use, which is to be delivered shortly.

Figure 3 *Overview of work-packages*



An increase in traffic volumes of about 57 percent in unaccompanied combined transport (CT) on the Brenner axis has been reported by the operators and railways, which have been participating in the BRAVO project over the last three years. Thus, its demanding objectives have been fully achieved, as the 120 or so invited experts of the European railway and logistics branch, representatives of the European Commission and transport ministries of Corridor countries learned during the final conference in München (Bavaria) on April 17/18, 2007.

Figure 4: *Development of unaccompanied combined transport via Brenner*



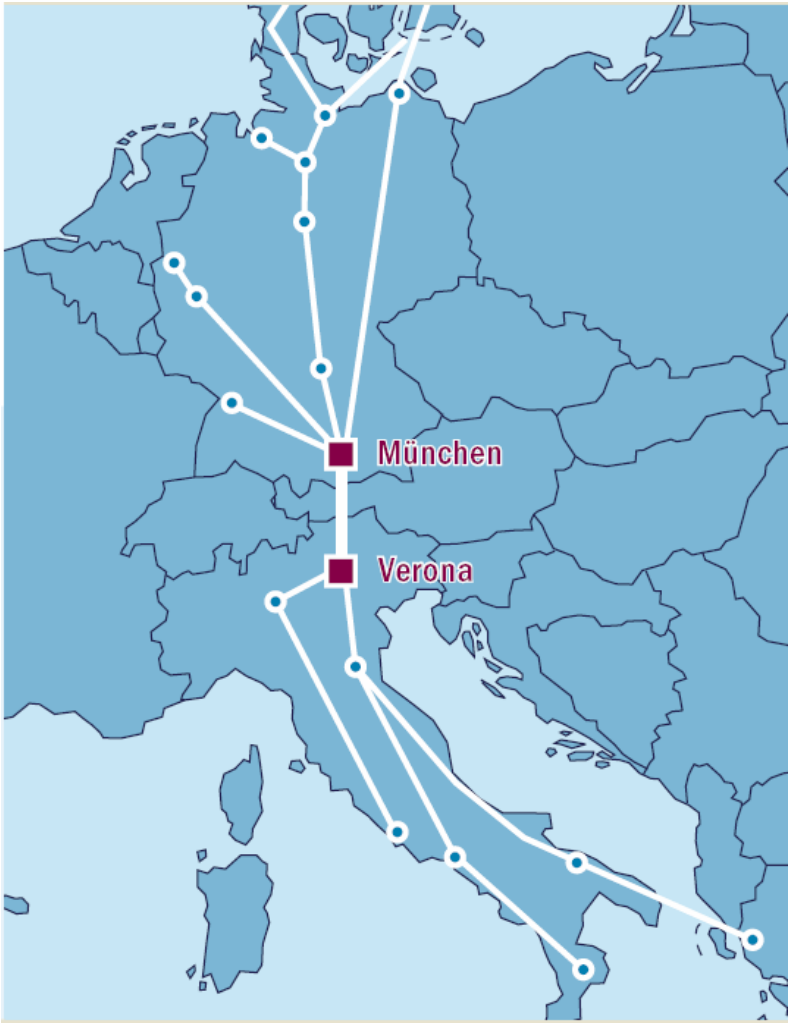
The remarkable traffic volume development was explained by – among others – the implementation of a range of innovative methods have been developed in the BRAVO-Project, and which are part of the **Brenner Rail Freight Action Strategy**:

- Corridor management scheme and train path re-scheduling;
- Cross-border operation of multisystem-locomotives and loco drivers for efficient and reliable rail transportation of, until recently, more than 2100 trains, and optimised infrastructure capacity use;
- Radio-remote control of pushing engines as required to haul heavy trains on the steep Brenner north ramp;
- Brenner Quality Manual with ambitious quality objectives, guidance on how to measure them and how they can be achieved by optimising operational procedures;
- Online train monitoring including estimated time of availability (ETA) information accessible to all parties involved in rail transport: railways, CT-operators and CT-Terminals;
- Improvement of existing and extension of new intermodal services involving also Gateway terminaly;
- Internet timetable displaying all direct and GATEWAY-services (and selected ferry routes) for CT customers accessible via www.bravo-project.com;
- Megatrailer-pocket wagon (T3000) for maximised mega semi-trailers volume in CT when required by the automotive industry, which have already moved about 75 million tonne-kilometres during the operational trials;
- Technologies to capture higher swap bodies or even “non-cranable” semi-trailers to CT;

The Brenner corridor which was used to develop, demonstrate and validate the Action Strategy and the innovations under operational conditions is one of the most loaded trans-European transport corridors, and transiting the sensitive Alpine region.

The strategy is also designed as a blueprint applicable to other pan-European freight corridors.

Figure 5: ***Corridor with its core section München - Verona***

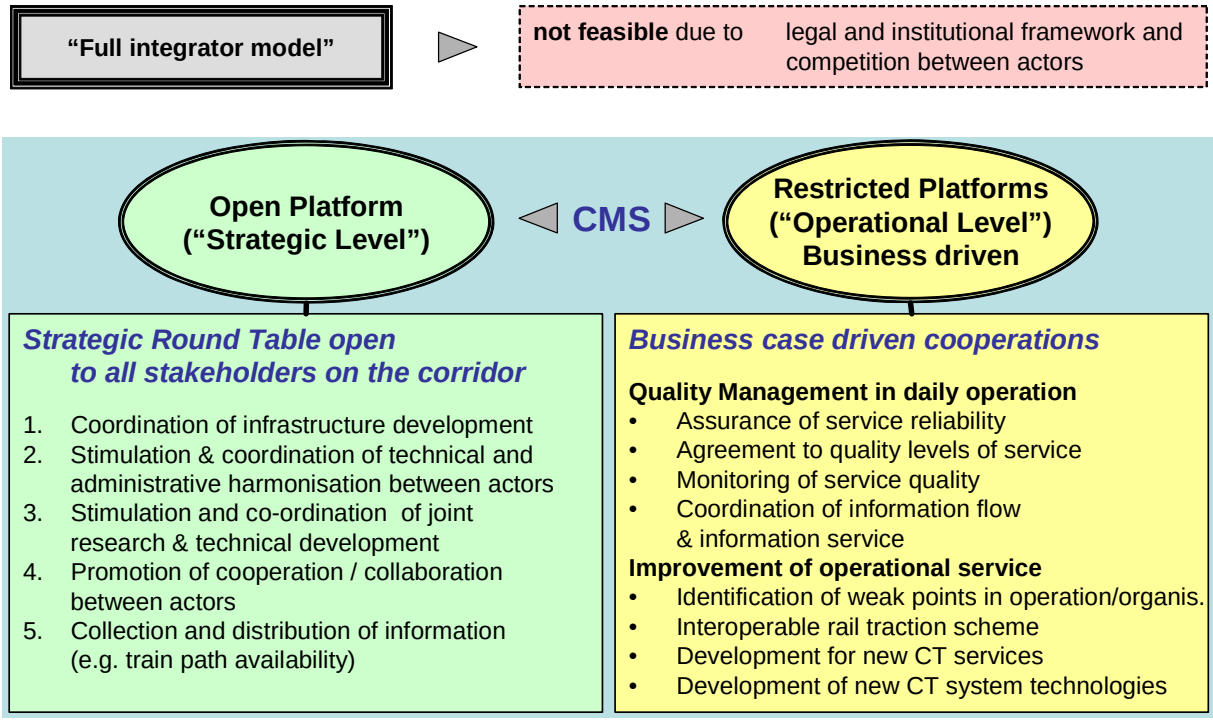


3.1 Corridor management scheme

Former studies have revealed, that rail freight on international corridors is in general constrained by the lack of homogeneous corridor management concepts, as there are segmentations on infrastructural, legal, technical and operational items. Analysing operation procedures in railway corridors, there is no example of an integrated management concept found, coordinating all corridor related activities. Therefore a new basis has been defined, to link the different research activities within the BRAVO project, which correspond to the corridor activities within the Brenner Corridor. It one task of the BRAVO project, to develop a pilot scheme for a sustainable and open Corridor Management System (CMS), which integrates all actors, involved in the BRAVO project and provides for interfaces between the different work packages. The CMS has to be in line with the main goals of the European transport policy – relating to liberalisation, interoperability, safety and the infrastructure development in sense of the European networks – and has to provide for the promotion of cooperation between different actors.

Therefore – while abolishing the idea of a "Full integrator model" – the system is designed as an "platform", as this is the most suitable management structure, considering these framework conditions, the BRAVO consortium being a "pilot case". During the project's duration it was possible to combine business driven research and development tasks even between competing partners, but for the follow-up the consortium opts to dividing e between an "open platform" for strategic and long-term tasks and an "restricted platform" for operational and commercial tasks.

Figure 6 Corridor Management Scheme

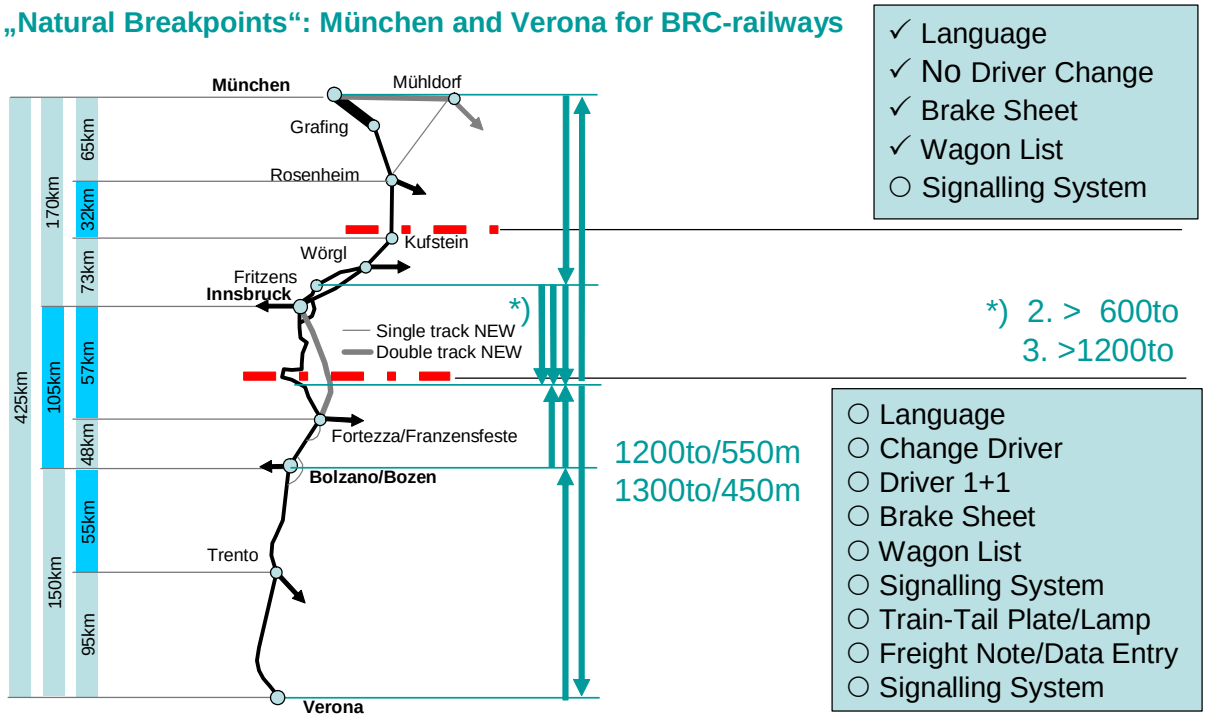


Whereas this structure is defined in a first step, the creation of the business cases will be completed by the succeeding research activities, which are integrated in the system. The central component of this system is an EDP-supported Quality Management System (cf. chapter 3.4)

3.2 Interoperability by Multi-System Locomotives (MSL)

A central task of the BRAVO project is to improve the interoperability of rail operations through the Brenner Pass. The following diagram is showing the infrastructure and operational framework conditions on the Brenner which are quite challenging for regular rail freight services.

Figure 7: ***Infrastructural and operational framework conditions on the Brenner***



The independent railway undertakings Lokomotion and RTC have supported Siemens with its new interoperable multi-system locomotive F4 (construction series 189) so that it can be admitted for operations on the Italian rail network. After receiving authorisation, the F4 multi-system locomotive was immediately brought into use on the Brenner Corridor by Lokomotion and RTC for their regular operations. This formed part of the BRAVO project's demonstration activities. Shortly afterwards, some technical difficulties emerged and resulted in the suspension of the continuous traction. Only after the technical problems were sorted out - again with the cooperation of the BRAVO partners and Siemens - the locomotives were successfully operated in interoperable services.

Figure 8: Interoperable traction on the Brenner line

The substantial advantages of using these locomotives are:

- More productivity by better exploitation of the machines;
- Higher flexibility;
- Reduction of border stopping time, and thus reduction of total travel time;
- Reduction of shunting costs;
- Higher reliability of the service;
- Reduction of utilisation of the border station, increasing its capacity.

During BRAVO too, standard procedures for interoperability with Infrastructure Managers (IM's) were agreed upon, which will be continued after the project.

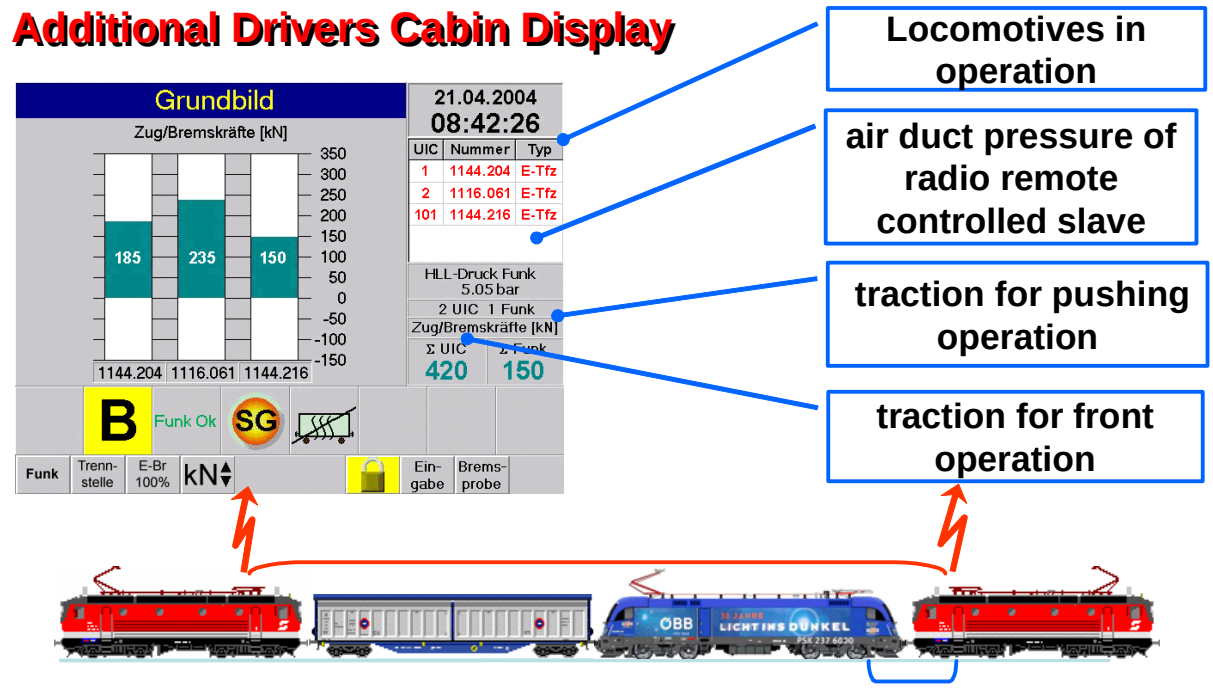
In May 2005, the successful "traction model" was transferred to a new interoperable service which started over the Tauern line, between Cervignano del Friuli and München.

3.3 Radio-remote controlled pushing engines

The BRAVO partner ÖBB/RCA has developed an innovative technology for the operation of pushing engines which are required on the northern ramp of the Brenner Pass for the heavy trains weighing over 1100 tons used in CT. This technology allows the pushing engine, which is located at the end of the train, to be remotely controlled from the train driver's cabin. Therefore, less manpower is required. 20 machines of the type 1144 are equipped with the system, and about 132 drivers were trained to operate the system. With the trials of about 2000 trains, BRAVO has highlighted that this technique also

works perfectly well in tunnels. The final authorisation for regular use from the Austrian Ministry for Transport is expected shortly.

Figure 9: ***Schematic view of radio controlled pushing engines***



3.4 Brenner Quality Manual

"Quality" is essential for the development of rail freight services. Often limited to "punctuality", the Brenner Quality Manual, for the first time, does not only include the operational processes but also the quality criteria and respective challenging quality objectives that were agreed upon for the project:

Punctuality

- 90% (with a max. tolerance of 15 min.) related to MAD (mise à disposition = time of availability)

Reliability

- Max. train delay of 180 min. related to MAD
- Changing of annual schedule: latest on Thursday of the prior week

Flexibility

- Cancellation of regular trains up to 48 hours prior to departure with graduated charge
- Interim timetable modifications within three months after submission of request
- Defined reaction time of the Railway Undertakings

Customer Information

- Real time monitoring of each train;
- Reporting on Estimated Time of Availability (ETA);
- Co-ordinated international reporting scheme on actual train journeys incl. train- and wagon-n°

Rolling Stock

- Monthly agreement on wagon types;
- 95% rate of use of agreed wagon sets

Transport of documents

- 99.9% rate of reliability of accompanying transport documents related to 1000 trips

The Brenner Quality Manual is available for all involved project Partner in the working languages German and Italian. Employees of the involved companies taking part in this project have been trained; the processes have been tested during demonstration and continuously improved. They will remain in force even after the project.

Figure 10: Brenner Quality Manual - "Manuale della Qualita" - "Qualitätshandbuch"

During the final conference, participants agreed to set a benchmark for other European corridors. Partners of the BRAVO project confirmed to continue the established quality working groups and endorse their potential for transfer to other corridors such as the "Tauern" or "Turkey"-corridor.

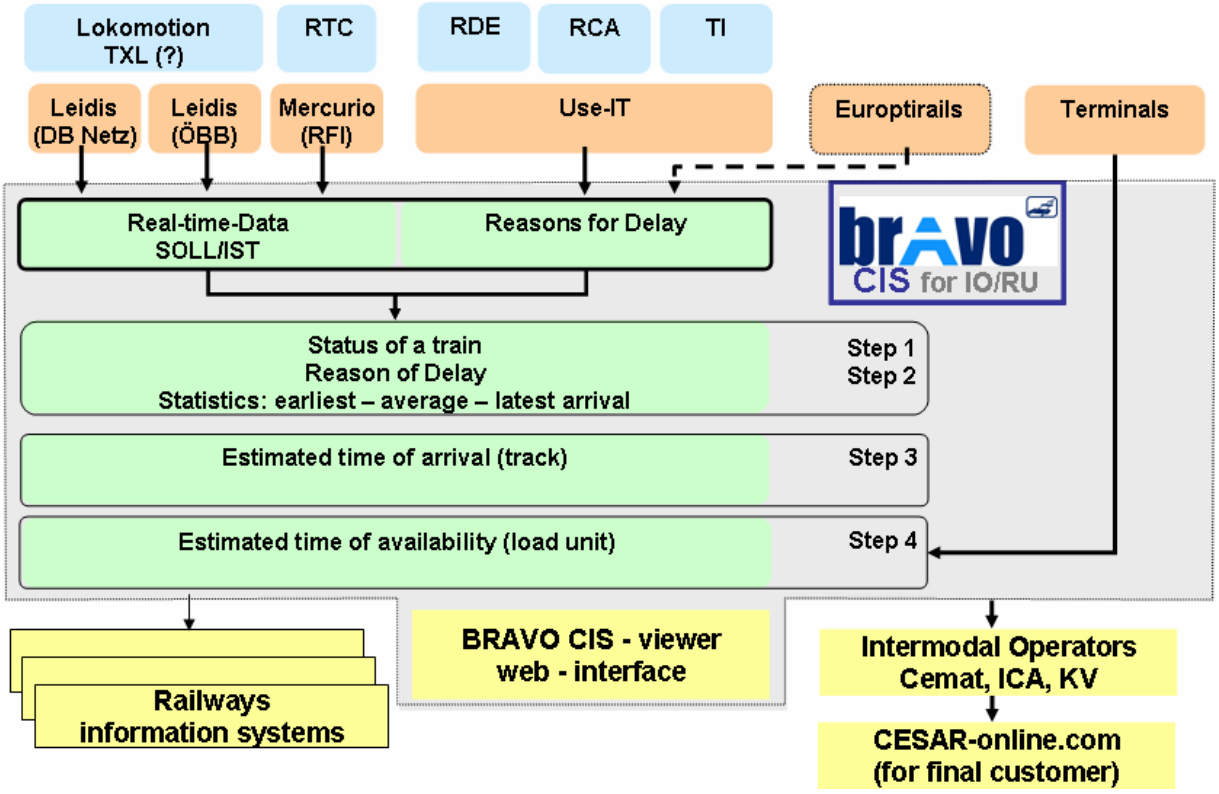
3.5 BRAVO train monitoring and Customer Information System (CIS)

In order to inform customers in case of irregularities, railways and intermodal operators have developed a train monitoring and customer information system (CIS) which has been technically realised by HaCon, Hannover, and which allows to monitor cross border train movements in real time.

- The system is supplied with data from the infrastructure managers DB Netz and ÖBB Netz directly for the trains of Lokomotion;
- Data on trains of RTC in Italy is provided by mirroring the RFI data, while
- Railion, Rail Cargo Austria and Trenitalia have opted to provide information on their trains from own tracking systems via a central data collector/distributor developed in the framework of the UIC-Project "Use-It".

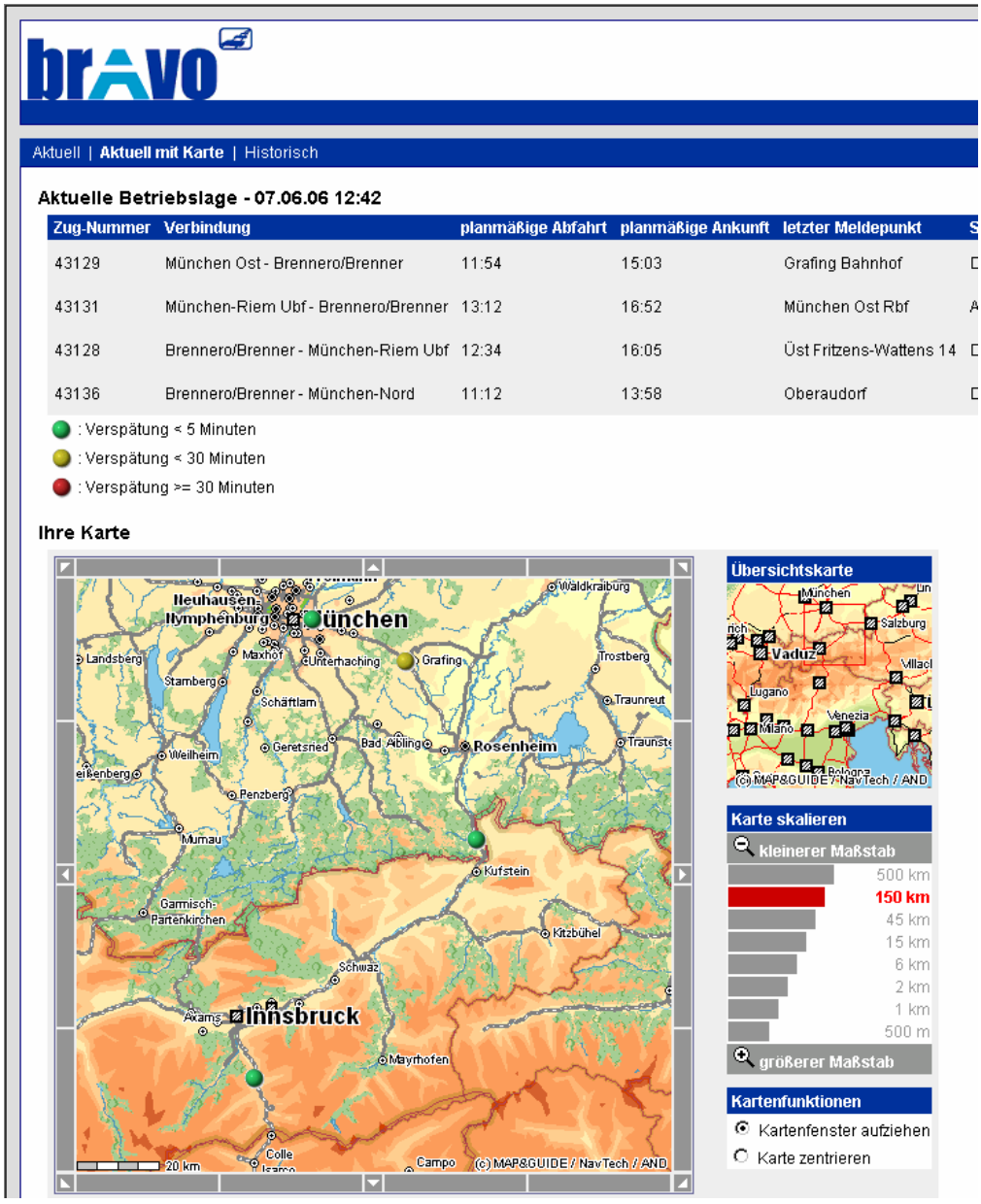
The BRAVO CIS provides a status of the trains: location, relative delay, reasons of delays and statistical analysis of past train runs.

Figure 11: Structure and data flow of BRAVO-Customer Information System



A tool to deliver the estimated time of availability (ETA) in consideration of train paths and terminal availability has been developed. Information for the customers is performed – as it is already the case today - by the established CESAR system (www.cesar-online.com).

Figure 12: Screenshot of the BRAVO-Customer Information System



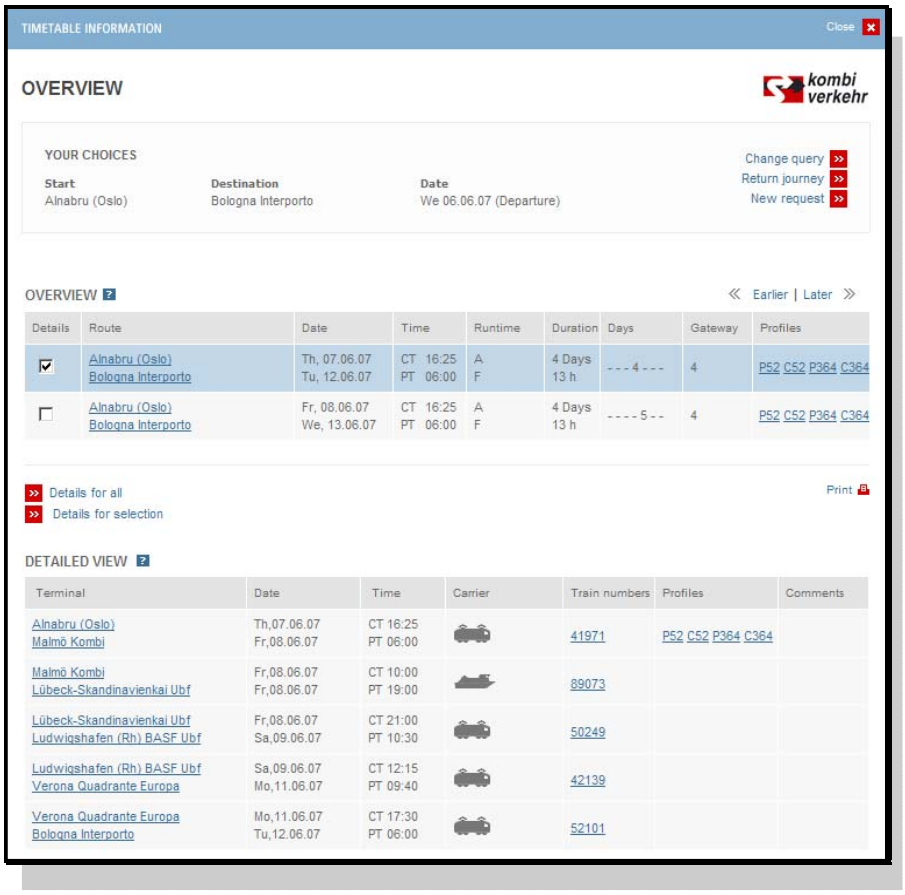
With these newly developed functions the system is targeting small and medium sized railway undertakings. These can monitor their trains on different infrastructures by means of only one uniform system, communicate with their customers in an efficient way and fulfil the requirements of the technical specifications on interoperability (TAF-TSI). But also for CT operators and other rail freight customers the system offers a unique transport control in cross border rail freight transport.

3.6 BRAVO timetable information

With the ever increasing number of direct trains and international GATEWAY-relations, the requirements on the CT timetable information have changed dramatically. Today, the services network of UIRR members offers about 15 000 terminal-to-terminal relations – theoretically. It is obvious that these can not be offered in printing. Kombiverkehr's printed time table includes about 200 direct trains and selected GATEWAY-relations, while any other relation has to be looked after manually. In order to reduce the manual search and fully exploit the potential of the current service network, CT-operators have been investigating a solution to provide access to all their relations.

In the framework of the BRAVO-project, Kombiverkehr has developed a concept that was realised by the Hanover based software company HaCon: the system basically works similar to the time table information system HAFAS, which is known from the public- and in particular the railway-passenger transport, and is accessible via the internet as a part of Kombiverkehr's new internet site. The system does not only provide a terminal-to-terminal but also a postal code search option. Therefore also non-frequent users of CT get to know which is the closest and most appropriate terminal for their recent transport demand. The timetable information system depicts a couple of routing possibilities on the basis of the recent direct train and ferry services that are included in the system in less than a second and displays the most relevant ones on the screen.

Figure 13: Screenshot of the Time Table Information System



It provides:

- Terminal of origin and destination
- Transport modes (road, rail, ferry)
- Transport days
- Date and time of departure and arrival for the entire journey
- Accepted loading profile

The system calculates also the road distance to the terminals.

Further optional features take into consideration particular requirements of the users such as a specific route, the use of named terminals or the use of direct trains only. The result of the query is a tailor-made time table information with detailed information.

The system also supports the creation of dedicated product information and, last but not least, helps to print the traditional timetable.

3.7 Improvement and extension of Combined Transport services

During the BRAVO project the intermodal operators and railways involved in the project have considerably improved their service network by:

- linking new terminals to the Brenner corridor such as Lübeck, Duisburg, Herne, Wuppertal, Schkopau, Leipzig, Beiseförth, Kornwestheim, Cervignano, Segrate, Nola (Napoli);
- increasing the frequency of departures on existing shuttle train relations to multiple departures by week;
- offering departures during the day on highly frequented relations such as Köln or München to/from Verona;
- increasing the robustness of the services by levelling out transport velocity and reliability;
- “through booking” features for GATEWAY connections;

The services are accessible to customers through the companies’ websites e.g. www.cemat.it or www.kombiverkehr.de and business contacts.

3.8 Implementation of multifret wagon

One of the obstacles in further developing CT in Italy is the traditional structure gauge of the rail infrastructure that allows only small loading profiles. CEMAT therefore investigated into implementation an own fleet of multifret wagons to facilitate pre- and on-carriage of international consignments also south of the GATEWAY terminals in Verona, Bologna and Milano. The new type of wagon with a lower deck height allows to gain 23 coding points which practically means that containers and swap bodies can be 230 mm higher than on conventional wagon.

Figure 14: Loading of swap bodies onto CEMAT's multifret wagon

3.9 Mega semi-trailers in Combined Transport

The logistics industry is currently investing into "mega" semi-trailers with 100 cubic metres volume and 3 metres interior height which is declared the "standard vehicle" of the future.

Further advantages of Mega-Trailer are:

- 96 (instead of 64) box places (3 levels);
- 25 t load (comparable to standard-trailer);
- Universal use for volume and weight goods;
- Large disk brakes / tyres dimension 455/40 R22,5;
- Positive price development by series production.

In order to broaden the market potential of combined transport, these trailers shall be loaded in pocket wagon. The new mega-trailer pocket wagon has been developed by the Swiss wagon manufacturer Ferriere Cattaneo in collaboration with Kombiverkehr and Cemat. After performing extensive running-,

braking and loading tests the German „Eisenbahn-Bundesamt" (Federal Railway Office) has certified the wagon to be operated on public railway networks.

Investigation of technical-operational framework conditions of terminals and railway lines and intensive talks to customers have resulted in the selection of pilot relations for demonstration purposes.

Kombiverkehr has introduced the articulated „double" wagon since May 2006 on their relations Lübeck–Kornwestheim and Stuttgart–Bremen. In the ferry ports cut-off and disposal times are optimally synchronised with the ferry schedules in the Baltic Sea towards Scandinavia and Baltic States. Newly planned relations started in June 2007 are:

- Verona – Rostock
- Ludwigshafen – Lübeck
- Karlsruhe – Lübeck
- Duisburg – Lübeck.

Designed as an articulated wagon, the enormous pockets are capable to carry mega-trailers of the most modern generation with fixed underrun protection devices, but also conventional trailers, swap bodies and containers up to a length of 7.82 m.

Loading tests with different makes of semi-trailers and loading units as well as Reach Stackers and gantry cranes have proven the capabilities of the wagon.

Figure 15: Loading of mega semi-trailer in Kombiverkehr's pocket wagon

Thanks to a specific safety concept the trailers are fixed by means of their king-pin, only, which eases the transhipment in the terminals.

Technical data of the new mega-trailer pocket wagon:

- Articulated wagon with 3 bogies
- Total length: 34.03 m
- Pocket Length: 12.5 m
- Pocket Width: 2.7 m
- For Tyres 455/40 R22.5, max. 2040 mm track
- Loading length: 2 x 16.1 m
- Support for king-pin at three different heights (1130, 980 and 880 mm)
- Safety Concept with „crash elements“ avoid longitudinal adjustment of supporting jack

3.10 Unaccompanied combined transport of conventional semi-trailers

It is still one of the technical burdens of CT chains that semi-trailers have to be equipped with particular devices – gripping edges being the most obvious ones – in order to be transported in unaccompanied CT. Not only since the enlargement of the European Union but also in relation to specific markets like pre- and on-carriage of ferry services, large quantities of “non-cranable” semi-trailers are to be attracted to CT-services. In order to step into these markets, a team of BRAVO partners analysed the commercial, technical and operational possibilities of new technologies in this field. As a result of a system analysis, the “Innovativer Sattelanhängerumschlag” (ISU-)-System scored best and Rail Cargo Austria decided to improve and develop the system further in order to demonstrate the technical feasibility. On May 16, 2007 the key components of the system were presented successfully in RCA’s terminal Wien Nordwest.

The ISU-system is made of an auxiliary spreader frame with gripping arms (target design) or ropes (prototype), a supporting beam for the king-pin and a wheel loading equipment as well as a loading ramp in the terminal. After the semi-trailers are placed on the ramp, the ISU beam and the wheel loading equipment is lifted by means of the spreader. The spreader can be mounted to a reach stacker or gantry crane with sufficient loading strength. Than the transhipment process is quite similar to the normal handling procedure despite the groundsman who has to unlock the spreader manually.

The ISU-system’s key features and decisive advantages are:

- Use of conventional semi-trailers without specific CT-equipment
- Possible use of multiple common pocket wagon types with only minor adaptations

-> Technology in the terminal not in the loading unit or wagon

- Simple construction of additional handling equipment, which is retrofitable to any existing terminal
- No additional large scale infrastructure investment in the terminal

- Work processes in terminals comparable to existing workflow

-> Integration into existing CT-processes

Rail Cargo Austria is committed to continue developing and implementing ISU in real operational conditions in the framework of the CREAM-Project, www.cream-project.eu.

Figure 16: Loading of non craneable semi-trailer with ISU

4 Closing Remarks

The BRAVO-project which is supported by the European Commission and the Swiss Secretariat for Education and Research lasted from May 2004 to May 2007, but Rainer Mertel, Managing Director of KombiConsult GmbH, announced on the Consortium's behalf that joint activities for improving transport via Brenner will be continued in the "Brenner Improvement Group (BIG)" after the Project is finished. Therefore the operational use of the innovative components and their transferability will be further taken into account of by the Consortium Partners.

Contacts

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Section 2. Dissemination and Use

Section 2 of the Final Report for Publication contains publishable results of the final plan for using and disseminating the knowledge following a format provided by the European Commission:

A Use of multi-system locomotives (MSL)

Result description (product(s) envisaged, functional description, main advantages, innovations)
Use of multi-system locomotives (MSL) in interoperable traction patterns
Possible market applications (sectors, type of use ..) or how they might be used in further research (including expected timings)
Cross border rail transport
Stage of development (laboratory prototype, demonstrator, industrial product...)
Industrial product
Collaboration sought or offered (manufacturing agreement, financial support or investment, information exchange, training, consultancy, other)
BRAVO Partners Lokomotion, RTC, Railion, RCA, Trenitalia are seeking to use their MSL in international rail freight services and looking for customers ordering such trains.
Collaborator details (type of partner sought and task to be performed)
Typical customers of these kind of services are shippers, forwarders, Intermodal operators which are ordering such services, or other railway undertakings that are subcontracting it.
Intellectual property rights granted or published
None by the Partners
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B Radio-remote controlled pushing locomotive

Result description (product(s) envisaged, functional description, main advantages, innovations)
Double traction with radio-remote controlled pushing locomotive and only one train driver in an operational environment, incl. deployment of trained drivers and equipped locomotives
Possible market applications (sectors, type of use ..) or how they might be used in further research (including expected timings)
Rail freight transport of heavy trains on railway lines with steep gradients requiring pushing engines.
Stage of development (laboratory prototype, demonstrator, industrial product...)
Operational Demonstrator (authorisation for regular use expected soon).
Collaboration sought or offered (manufacturing agreement, financial support or investment, information exchange, training, consultancy, other)
ÖBB Traktions GmbH is seeking for customers that are requiring pushing services on he Brenner line and elsewhere.
Collaborator details (type of partner sought and task to be performed)
Railway undertakings and their customers requiring traction on railway lines with steep gradients that want to subcontract the services of radio-controlled pushing engines.
Intellectual property rights granted or published
All IPR at the system provider.
Contact details
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C BRAVO Quality Manual

Result description (product(s) envisaged, functional description, main advantages, innovations)
The BRAVO Quality Manual was finalized, applicable for the Brenner route and designed also as a blueprint applicable to other pan-European freight corridors. It describes the processes and activities, which are necessary for the achievement of a high level of quality and thus for meeting the demands of the customer to drive both quality assurance and improvement.
Possible market applications (sectors, type of use ..) or how they might be used in further research (including expected timings)
Cross border rail freight transport, in particular terminal-to-terminal haulage.
Stage of development (laboratory prototype, demonstrator, industrial product...)
Operational Demonstrator
Collaboration sought or offered (manufacturing agreement, financial support or investment, information exchange, training, consultancy, other)
Qualitative international Intermodal and rail freight services offered by the operational BRAVO partners. Consultancy on the development and implementation of Quality Management Systems offered by KombiConsult.
Collaborator details (type of partner sought and task to be performed)
Intermodal operators and / or railway undertakings active in international rail freight transport that intend to improve their quality of the service, and want to implement a Quality Management System.
Intellectual property rights granted or published
Confidentiality Agreement between BRAVO Partners
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D Train Monitoring and Customer Information System

Result description (product(s) envisaged, functional description, main advantages, innovations)
Train Monitoring and Customer Information System for international train runs and terminal-to-terminal transports involving different data sources and providing actual status information on train runs, location, delay and Estimated time of Availability (ETA) of loading units in the terminals concerned.
Possible market applications (sectors, type of use ..) or how they might be used in further research (including expected timings)
Domestic and international rail transport (freight and passenger).
Stage of development (laboratory prototype, demonstrator, industrial product...)
Demonstrator
Collaboration sought or offered (manufacturing agreement, financial support or investment, information exchange, training, consultancy, other)
Application agreement as regards data sourcing, application and use in international rail freight services.
Collaborator details (type of partner sought and task to be performed)
Shipper, Intermodal operator or railway undertaking with multiple operation sites and international rail transports that want to apply the BRAVO Train Monitoring and Customer Information System.
Intellectual property rights granted or published
All IPR owned by HaCon GmbH
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E Gateway production system

Result description (product(s) envisaged, functional description, main advantages, innovations)
Gateway production system offering multiple origin-destination relations in international combined transport by exploiting both domestic and international trains.
Possible market applications (sectors, type of use ..) or how they might be used in further research (including expected timings)
International Intermodal freight transport.
Stage of development (laboratory prototype, demonstrator, industrial product...)
Industrial product in commercial use
Collaboration sought or offered (manufacturing agreement, financial support or investment, information exchange, training, consultancy, other)
Use of Intermodal terminal-to-terminal services offered via gateway terminals by CEMAT and Kombiverkehr
Collaborator details (type of partner sought and task to be performed)
Shippers or forwarders or road transport operators ordering full trains or consignments on the intermodal services offered by the BRAVO partners.
Intellectual property rights granted or published
None.
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F Internet Time Table information tool for Intermodal transport

Result description (product(s) envisaged, functional description, main advantages, innovations)
Internet Time Table information tool for Intermodal transport
Possible market applications (sectors, type of use ..) or how they might be used in further research (including expected timings)
Intermodal transport rail-road-waterway
Stage of development (laboratory prototype, demonstrator, industrial product...)
Industrial Product in commercial use
Collaboration sought or offered (manufacturing agreement, financial support or investment, information exchange, training, consultancy, other)
Customer that wants to purchase the product.
Collaborator details (type of partner sought and task to be performed)
Combined transport operator, port or shipping line operating with schedules (time tabled) services that need to display their network of service via the internet.
Intellectual property rights granted or published
All IPR owned by HaCon GmbH
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G Mega semi-trailer pocket wagon

Result description (product(s) envisaged, functional description, main advantages, innovations)
Mega semi-trailer pocket wagon
Possible market applications (sectors, type of use ..) or how they might be used in further research (including expected timings)
Transport of mega semi-trailers in combined transport rail-road
Stage of development (laboratory prototype, demonstrator, industrial product...)
Industrial product in commercial use
Collaboration sought or offered (manufacturing agreement, financial support or investment, information exchange, training, consultancy, other)
Selling of mega semi-trailer pocket wagon
Collaborator details (type of partner sought and task to be performed)
Intermodal operators, railway undertakings or leasing companies investing in new Intermodal wagon
Intellectual property rights granted or published
All IPR owned by Ferriere Cattaneo SA, in particular EP 1 321 242 A1
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H Transhipment Technology to capture “non-craneable” semi-trailers

Result description (product(s) envisaged, functional description, main advantages, innovations)
Transhipment Technology to capture “non-craneable” semi-trailers to unaccompanied combined transport (“Innovativer Sattelanhänger Umschlag – ISU”).
Possible market applications (sectors, type of use ..) or how they might be used in further research (including expected timings)
Combined transport rail-road, or waterway-rail
Stage of development (laboratory prototype, demonstrator, industrial product...)
Demonstrator of transhipment technology.
Collaboration sought or offered (manufacturing agreement, financial support or investment, information exchange, training, consultancy, other)
Road transport operators, in particular active in south-east Europe, to develop an unaccompanied Intermodal service rail-road for “non-craneable” semi-trailers.
Collaborator details (type of partner sought and task to be performed)
Intermodal and terminal operators in particular in south-east Europe to develop an intermodal service and one terminal to implement the transhipment technology.
Intellectual property rights granted or published
Patent applied for.
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