AlpInnoCT
Toolbox of Action

Solutions and approaches for
Combined Transport in the Alpine Space
Handbook with results
from the AlpInnoCT Project

Interreg
Alpine Space
EUROPEAN UNION
AlpInnoCT
EUROPEAN REGIONAL DEVELOPMENT FUND

RoLa–Rolling Highway.
Source: www.ralpin.com/media/

ModaLohr.
Source: www.txlogistik.eu/

Verona Quadrante Europa.
Source:www.ferpress.it/transport-logistic2015-interporto-quadrante-europa-presentazione-progetto-easyconnecting/

Nikrasa Transport Plattform.
Source: LKZ Prien / NiKRASA-Kompetenzteam

Reachstacker.
Source: www.hafen-hamburg.de/en/news/awt-completed-stage-iii-of-modernization-and-expansion-of-the-paskov-terminal---36357

Combined Transport in the Alpine Space — Results from the AlpInnoCT Project

The Alps are a sensitive ecosystem to be protected from pollutant emissions & climate change. Continued growth in freight traffic volume leads to environmental and social problems. These trends reinforce the need to review existing transport modes & develop innovative models to protect the Alpine Space.

Therefore, the project Alpine Innovation for Combined Transport (AlpInnoCT) tackled the main challenges to raise CT efficiency and productivity. This included new approaches like the application of production industry knowhow as well as the analysis of existing strategies, policies and processes.

This Toolbox of Action summarizes the main results and aims to provide information for political and economic decision makers and the civil society, on how Combined Transport can be fostered in Europe and the Alpine Space for a successful shift of freight traffic, from road to rail.

The AlpInnoCT project was carried out in the framework of the Alpine Space Programme – European Territorial Cooperation 2014–2020 (INTERREG VB), funded by the European Regional Development Fund (ERDF) and national co-funding. It does not necessarily reflect the opinion of the European Union.

PARTNERS

The people
behind the project

Table of contents

Note

The following symbols will appear throughout the handbook to point out additional material that was produced throughout the project.

Suggested video

Suggested document

Further information background

Suggested online link

Executive Summary

This section summarizes conclusions and recommendations on advancing Combined Transport (CT) and accelerating low-carbon transport particularly in the sensitive areas of the Alpine Space. The recommendations are based on the outcomes of activities and discussions carried out by the project partners of the AlpInnoCT project.

Almost all recommendations address the strategic/political level as well as the CT operators. The third field of action according to the figure above, i.e. other stakeholders with relevance to CT, was integral part of discussions among project partners as well as in the Dialogue Events. For the two other fields of action, recommendations were derived by identifying gaps in existing policy instruments and defining key elements, concepts and technologies that could be introduced in future on a larger scale to facilitate and improve the use of CT.

The recommendations from the AlpInnoCT pilot cases are focused on concrete activities and their (quantitative) results to raise CT efficiency and productivity; the application of production industry know-how in CT is a new approach and includes analysis of existing strategies, policies and processes focusing on CT:

Pilot Case 1: Wagons sharing concept
The management and optimization of trains and wagons' arrivals and departures, reinventing the logic of loading and unloading of intermodal freight trains, leads to a more efficient terminal performance.

Pilot Case 2: Train-related electronic data interchange
The use of a single standard in communication is crucial to achieve full interoperability of data exchange between all stakeholders and external platforms for the management of train-related processes.

Pilot Case 3: Feasibility tests of innovative technologies and digitalization in CT
A main challenge to advance CT is to overcome the reluctance of using innovative technologies, such as automatization of rail freight processes, autonomous trains, future wagons, future locomotives, future terminals, automatic train operations including moving block and coupling; it is fundamental to further learn from other productive sectors here to foster CT.

Pilot Case 4: Appliance of production know-how (standardization, First-in-First-out principle) on high frequent CT routes via the Brenner corridor
Not only innovative technical but also new operational transport concepts can improve the performance of trains and the use of infrastructure especially on frequently used transport routes.

Pilot Case 5: Fostering access to CT for small and medium-sized transport companies
It is important to simplify and foster access to CT for small and medium-sized transport companies without additional organizational and technical efforts to take part in CT.
A potential solution could be the creation of a cooperative which centrally organises CT. This cooperative unites members from

Strategic/ political level		CT-chain operators		Other stakeholders with relevance to CT
REGULATION ↓ Push (a.o. road tolling) and pull (e.g. financial incentives for CT) measures	⟷	INNOVATION ↓ Organisational (e.g. terminal organisation with optimisation of shippers time slots) ↓ Technical (e.g. Nikrasa, Future Trailer, tracking, IT, standards...)	⟷	"CHANGE THE WAY OF THINKING" of CT-operator customers (e.g. industry manufacturers with strict and limited time slots for loading and unloading) ↓ emphasize out and give hints for problem solution

Fields of action to make CT more competitive

transport companies, railway companies, politicians and all other participants in CT. It facilitates the participation in CT by centrally organizing all involved actors and work flows and provides support and advice.

In summary and to overcome the hurdles to improve the modal shift from road to rail with CT in and through the Alps, it is also necessary to implement these approaches on a larger scale in the Alpine Space between different terminals and to show and evaluate the efficiency on a larger geographical scale and between different railway undertakings and transport operators. Stronger attention to more entrepreneurial aspects, especially of SMEs (small and medium enterprises) in the sector, has been recognized as very important as well.
The following policy recommendations are addressing issues at stake or areas for improvements that have been tackled, such as the needs to:

- ➔ Improve and expand terminal infrastructure including the building of new terminals considering sustainability criteria and cooperation between stakeholders.
- ➔ Generally upgrade rail infrastructure connecting CT nodes as a priority.
- ➔ Improve the lobbying at European level, but also at national and regional levels to provide substantial direct measures such as subsidies and other financial incentives for CT to support an effective modal shift.
- ➔ Better harmonize freight and passenger transport and prioritize freight transport at certain non-peak times.
- ➔ Provide indirect measures to foster CT-related research and development to push smart IT-solutions and communication flows along the transport chain.

Policy-makers and stakeholders have been addressed by communication and awareness raising activities and through their participation in the Dialogue Events of AlpInnoCT. Thus, the project involved and took into consideration also the requirements of all levels of policy making through project partners and observers at European, national, regional and local level.
In conclusion, a continuous dialogue of different stakeholders on how to commonly foster CT in and through the Alps is important and should be exploited for policy making purposes and be capitalized in possible up-takes.

The Alps are crossroads for goods transport and they are essential for the economic development of the European Union and the Alpine Space. In 2018 223.5 million tons of goods have been transported through the Alps. More than two thirds of this amount was carried by road. Transport is a major source of pollutant emissions. The Alps as a sensitive ecosystem thus need further protection.

Rail net corridors in the European context

Source: www.rne.eu/rail-freight-corridors/rail-freight-corridors-general-information/

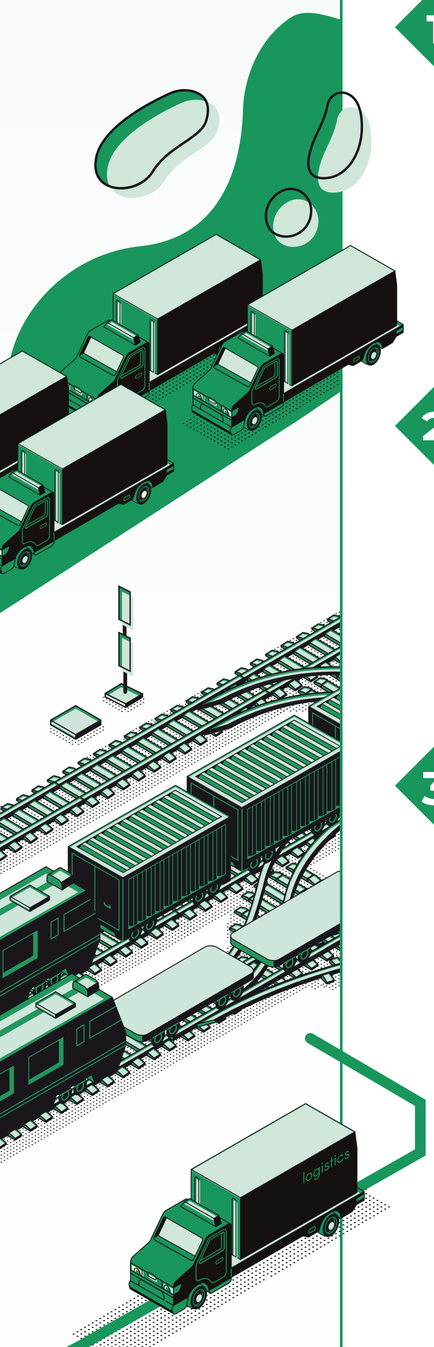
Why Combined Transport? Why AlpInnoCT?

To reconcile the volume of the goods transport with the protection of nature & people, it was decided in the EU White Paper 2011 to strengthen intermodal transport & to establish more efficient freight transport corridors in the Alps. Also, the EU Strategy for the Alpine Space (EUSALP) required a change towards an improved inter-modality for freight transport across the Alps to become more sustainable and to minimize the transports' negative impacts on the climate and the environment. In this context Combined Transport (CT) can be an ideal approach — by shifting the transport of goods from road to rail. Yet, currently CT is not able to compete with road transport due to various challenges: low sensitization, information deficit, lacking of internalization of external costs for road freight, minimal automation, lack of communication, rigid systems etc. Thus, the main challenge is to raise efficiency, competitiveness & productivity of CT compared to road freight transport together with all relevant stakeholders at transnational level. The AlpInnoCT (Alpine Innovation for Combined Transport) project contributes to the above mentioned goals by trying to achieve a more efficient CT in the short-, mid- and long-term and to elaborate scenarios for CT in the Alpine Space after 2030. It also plays into the EUSALP goal "Better overall transport system in terms of sustainability & quality/sustainable accessibility to the Alps by raising railway attractiveness & utilization". The project is supported by a wide number of stakeholders in the CT sector including 40 observers. The whole project consortium (comprising of 15 partners) has formulated recommendations for an ideal CT-model that takes into account expertise and guidelines from the industrial sector (based on benchmarks) for transferring innovative approaches to daily CT business and to increase CT productivity. The consortium also established Alpine-wide dialogue platforms and transnational cooperation between enterprises, political administration and the civil society to put forth the so called "toolbox of action" — which summarises political and technical recommendations on how to foster CT in the Alpine Space.

Hence, AlpInnoCT aimed at establishing a more efficient Alpine freight transport with focus on CT to be able to also contribute to EUSALP goals. This means CT processes shall be organised in a more productive and better coordinated way on an international level. By an enhanced cooperation between stakeholders, specific information, awareness, access and use of this low-carbon transport method is raised significantly. Finally, considerable freight volumes can be shifted to rail.

AlpInnoCT Project Video:

Combined Transport — a sustainable alternative to road freight transport



1

Transport is recognized as an opportunity for the economic development of contemporary society, but at the same time it is one of the main causes of social and environmental negative externalities (such as air pollution, noise, accidents, congestion), which have been estimated at 4% of the EU Gross Domestic Product. This is particularly valid for those areas – such as the Alpine Space – that are fragile from an environmental and social point of view. For this reason, the aim of EU policies is to encourage those vehicles that produce fewer negative impacts on the territories crossed.

2

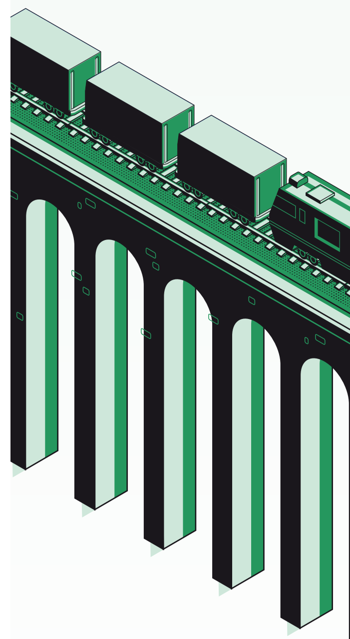
Most of the current transalpine freight (68% in 2017, see Figure p.16) is performed by Heavy Goods Vehicles, which run along the main **road infrastructures** without sufficient internalisation of external costs, instead producing negative impacts on the territories crossed. Only one third of freight is transported by rail (considered in all its forms: conventional, unaccompanied and accompanied combined transport). This condition constitutes a criticality for the entire society, which needs to be addressed.

3

Combined Transport (CT), i.e. the Combined Transport is by definition intermodal transport where the major part of the European journey is by rail, inland waterways or sea and any initial and/or final legs carried out by road are as short as possible. Intermodal transport is the movement of goods in one and the same loading unit or road vehicle, which uses successively two or more modes of transport without handling the goods themselves in changing modes. The combination of road-rail is the most relevant for the Alpine Space. Efficient infrastructural equipment, composed of linear infrastructures (road and rail) and intermodal terminals (nodes equipped for the transshipment and storage of goods), is the precondition for a proper function.

4

Given such premises, CT presents several **benefits**: it merges the strengths of road and rail transport, using the area-wide flexibility of the trucks combined with the reliability and the economies of the train on long journeys. Furthermore, CT is environmentally friendlier, with lower CO_2, PM_X and NO_2 emissions compared to roads. It also has a lower impact on society, as it reduces accidents, road congestion and dependency on energy reserves. Referring to the management of the service, CT allows a better use of capacity in existing infrastructures. In terms of spatial development, a limited number of linear and punctual infrastructures (concentrated in selected points) implies the need for fewer areas and consequently the preservation of more undeveloped land.

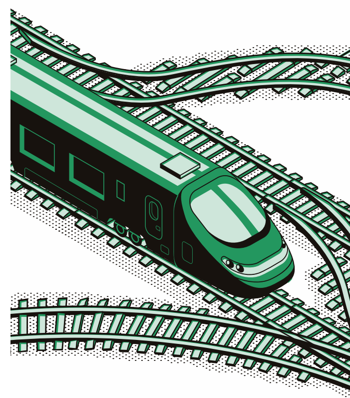


5

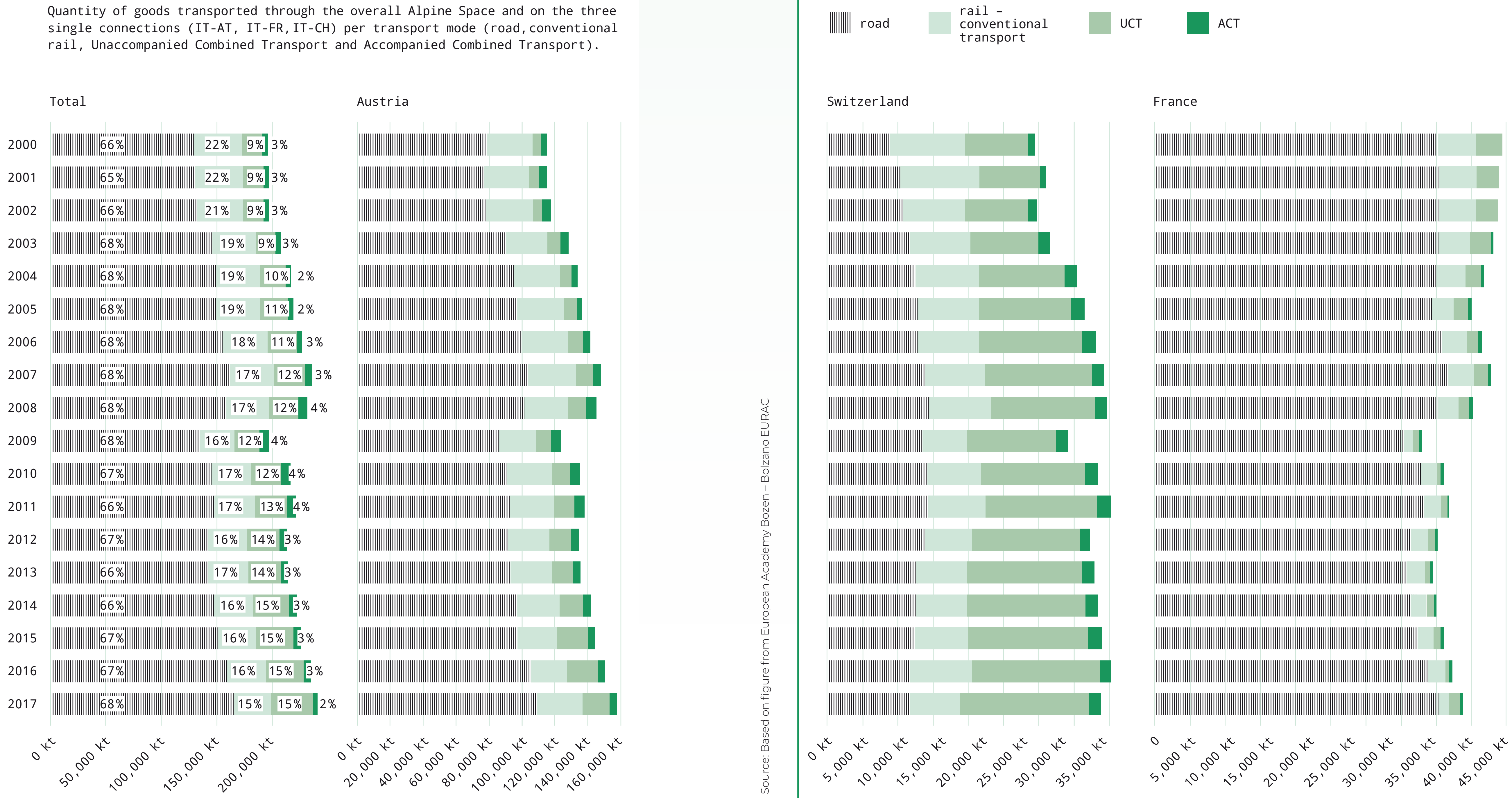
On the other hand, CT has certain **weaknesses** that prevent its wider diffusion (see the next section for further details): it may be more expensive than road transport (especially in the first- and last-mile legs), the average times required to provide the service can be higher and the difficulties in the harmonization of the service between countries are numerous.

6

There are many possibilities for the **improvement** of CT, thus making it more competitive and more likely to be used in the Alpine context. However, even if not all freight transported by road may be transferred to rail, reducing the road pressure along transalpine axes represents a target that has to be reached in order to guarantee more balanced modal distribution and, ultimately, more sustainable transport in Europe.



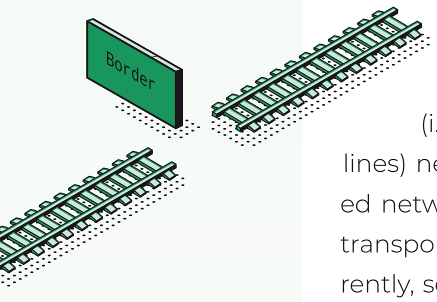
Quantity of goods transported through the overall Alpine Space and on the three single connections (IT-AT, IT-FR, IT-CH) per transport mode (road, conventional rail, Unaccompanied Combined Transport and Accompanied Combined Transport).



Source: Based on figure from European Academy Bozen – Bolzano EURAC

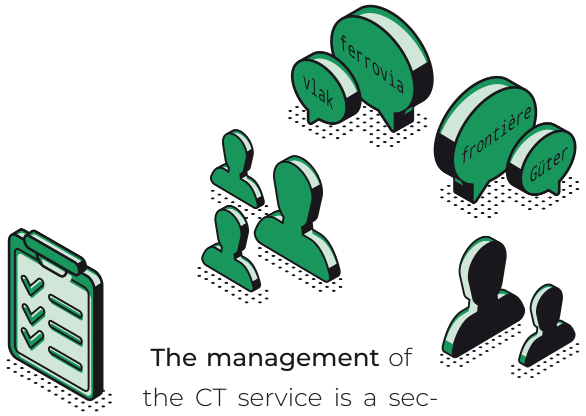
Challenges —
for Combined Transport in the Alps

Despite the positive aspects highlighted in the previous paragraph, in 2017 Combined Transport (CT) constituted only 17% of total freight transported in the Alps (15% for unaccompanied and 2% for accompanied CT). The reasons for this situation are multiple. They may be divided into three main groups:



The infrastructural equipment is the main aspect related to this situation. Linear infrastructures (i.e. high-speed/high-capacity railway lines) need to be conceived as an integrated network, able to guarantee competitive transport between the main nodes. Currently, several initiatives are under development (e.g. the construction of the Brenner Base Tunnel along the Brenner corridor) to make transalpine railway transport more appealing, but in some cases existing lines are inadequate (with constraints related to the loading gauge, the weights that can be transported and the commercial speed of trains). As regards the commercial speed, along some international routes this is close to 20 km/h; along the Brenner line, the maximum speed between some stretches between Bolzano and the Brenner Pass is 60 km/h. There are conflicts between passenger and freight transport in that passenger transport in most cases has priority. This also influences the performance of freight trains. Moreover, the differences in energy and signalling systems in the EU represent two other relevant infrastructural elements. As regards the former, the 15 kV system used in Austria, Germany and Switzerland is different from the 3 kV system used in Italy or Slovenia or the 1.5 kV system in France: these differences imply in most cases a change of the locomotive, which contributes to an increase in transportation times. Secondly, the signalling systems: any locomotive entering a country must be equipped with the national signalling system on board. ERTMS is able to overcome this condition, but its development is slow. Punctual infrastructures such as intermodal terminals also represent critical aspects. The low density of CT terminals may determine high costs for pre- and on-carriage by road, handling costs, deficits in service quality and cost efficiency. On the other hand, some main intermodal terminals are close to saturation, which makes operational aspects (transshipment, storage) more complicated and subject to unexpected events that may generate delays in the departure/arrival of freight.

D.T1.1.1 “Guideline for integration of innovative intermodal solutions and approaches into daily CT business”
D.T1.2.1 “Data base and comparative analysis of CT and transhipment technologies for CT”
D.T1.3.1 “Report of industry (production) development trends relevant for CT in the Alpine region”



The management of the CT service is a second main challenge. Since CT involves a plurality of actors, the coordination between infrastructure managers and carriers for railway undertakings and service providers is essential, but often complicated because of the lack of standardization of the technical aspects and administrative procedures. This results in delays or higher costs for the final users. The lack of harmonization in rail service constitutes another main issue. It may be related to numerous aspects such as train numbering, train path definition, handover procedures at borders, exchange of operational data, or train monitoring.
In Italy, for instance, two locomotive drivers are required, whereas in most European countries just one is sufficient. Since transalpine transport includes trips where Italy is either the origin or destination of the journey, this aspect has a direct impact on transalpine CT. Besides that, in contrast to aviation where English is the official language, locomotive drivers need to be able to communicate in the language of the country in which the train is travelling. This may be a challenging condition, when transnational journeys (like the transalpine ones) are considered.

Finally, several challenges related to the **service** must be recalled. The cost of road first and last mile is high, as well as the cost for short-distance transport. CT is usually considered economically more competitive with road transport for distances over 300km. The access to rail markets is different in each country: this makes the liberalization of the service (which contributes to the increase of competitiveness) more complicated. Further, the CT rail/road sector lacks an open data ICT platform (Information and communication technology) for exchanging booking, operational, tracking and tracing data between relevant companies involved in the CT supply chain, which would make the service more easily manageable.

These and other aspects, about which interested readers may discover more in reports of AlpInnoCT, help explain the main challenges that CT has to face to become more competitive and reduce the road pressure along the main transalpine axes.

Future Outlook — Initiatives promoting Combined Transport (CT)

To improve CT, several activities are needed. A review of past and current operational and technical initiatives was elaborated. The analysis to foster CT showed the following items:

Digitalization of logistic information of all actors, supported by several legislation frameworks. On operational level a focus is put on sharing estimated arrival time and real time information for intelligent (smart) planning, management, monitoring and maintenance of transport assets and communication technologies in order to provide better CT service also to the end users.

Automatization of rail freight (autonomous trains, future wagons, future locomotives, future terminals, automatic train operations including moving block, and coupling).

Integrated corridor approach with synergic interventions of design of CT infrastructure, innovative technologies, activities to advance digitalization and integrated timetable planning.

Reorganization of freight logistic structures (also for implementation of innovative technologies).

End user view implementing "just in time" concepts, cash-to-cash cycle models and synchro-modality.

D.T2.5.1 "Description of the state of the art of the European transport system with focus on CT"
D.T3.3.1 "Vision of Alpine Combined Transport after 2030"

Education of and knowledge transfer between trainees, teachers and decision makers with regard to different instruments in CT management.

Central project management for operation and infrastructure with clear responsibilities for freight network, reasonable allocation of port resources, sharing local business and operational innovative solutions as well as integrated view of risks and threats for different assets in CT.

Lean Management of CT assets through Conditionbased Monitoring, Predictive Maintenance, BIM (Building Information Modelling) and selection of lightweight and noise abatement material, and CT operation through industry optimization methods.

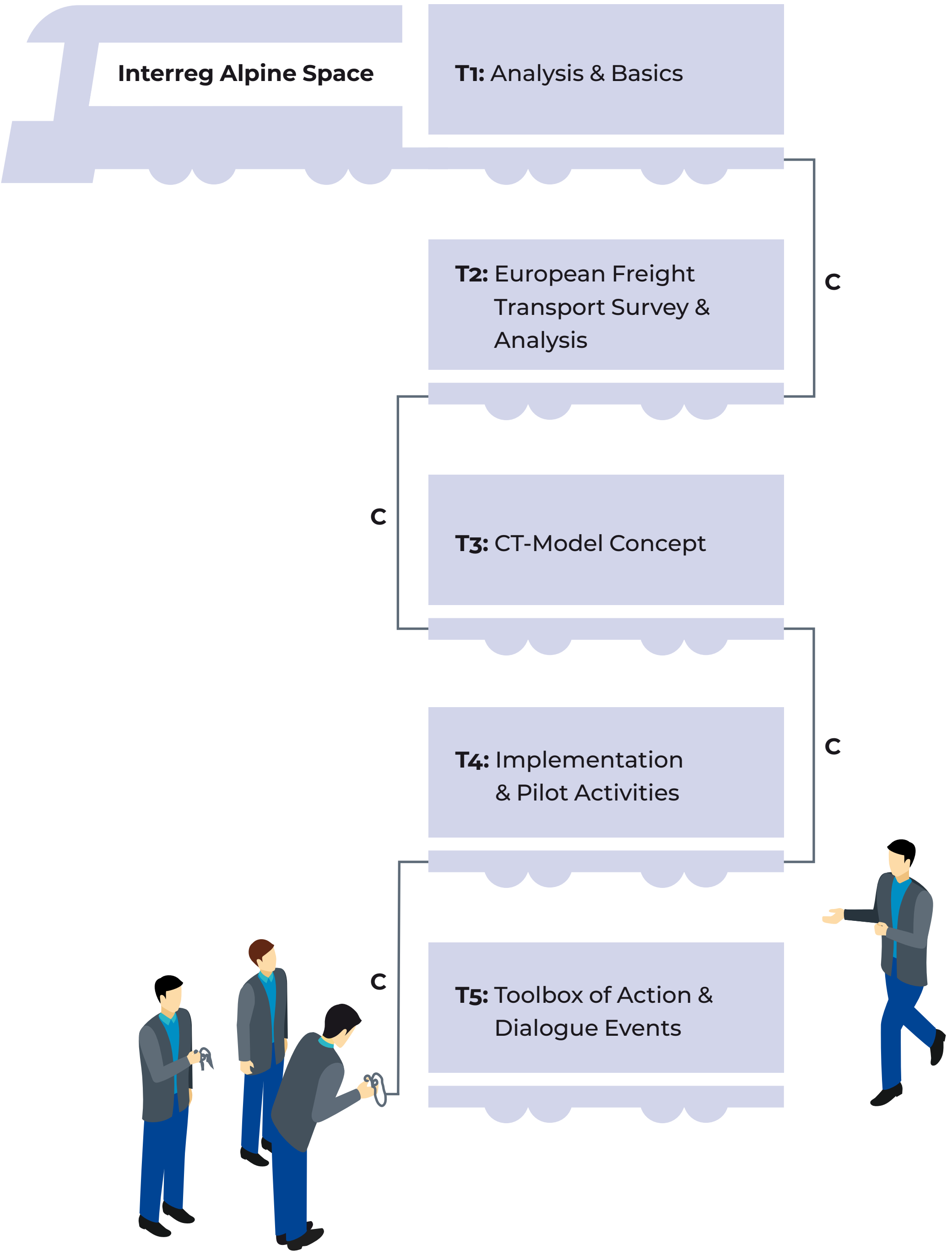
Long-term measures increasing CT supply allowing to operate a 4 m gauge corridor, 1500 m long trains and higher frequency of CT trains.

Future initiatives should tackle solutions for alternative routes and 24/7 opening times of shippers/warehouses, depots and workshops as well as more reliable slots for freight trains and political solutions for faster customs clearance, stimulations for lower prices of rail and for developing standards for ILU check (trains and truck check-in) with standardized documents.

Additionally, the review showed the need for developing a platform providing a comprehensive overview of initiatives fostering Combined Transport through research and development projects, implementations, innovative technologies, theoretical concepts, NGO's and legal frameworks with push and pull measures per country and region.

AlpInnoCT applied production industry know-how, analysed existing strategies, policies and processes to foster CT, resulting in Political Action Sheets and Technical Action Sheets, ready for implementation.

Approach
for Alpine Innovation in Combined Transport



How?

The AlpInnoCT project is divided into five action areas that were channelled into six working packages.

C: The communication work package consisted of efforts from the project consortium with the goal of collecting information from and increasing the awareness of relevant stakeholders throughout the project while disseminating the model of an improved transalpine approach of CT through media attention.

T1: The first action area comprises basic research through an analysis of the current European transport system with a focus on CT. The analysis provides an overview of push and pull measures implemented in the regions and Countries of AS, a review of innovative transshipment technologies and possible lean priciples and methods to be implemented in CT.

T2: The second action area included the conduct of a wide-ranging documentation on the expectations of the CT sector in the long-term. This elaboration was based on two pilot corridors where the status quo of current transalpine freight transport was described and documented from origin to destination.

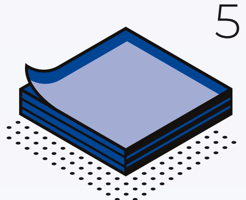
T3: In the AlpInnoCT project this step was then complemented by conducting 11 expert interviews that facilitated the formulation of a wish-list filled with “hopes and dreams” of an ideal CT-model concept and the formulation of three future scenarios. The results arising from this process were then directly used for the analysis of threats and opportunities into daily CT business.

T4: Action area four focused on the derivation of measures in consideration of production know-how for the ideal model concept of CT. Five pilot cases on two pilot relations were implemented in this process.

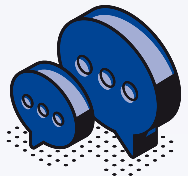
T5: By that point a vast amount of information had been produced such that a common consolidation process was undertaken to allow a structured course of action to be able to focus on appropriate content for the final action area. This was achieved by various feedback loops in the entire project consortium and by implementing seven dialogue events with a participatory approach across the Alpine Space where information between stakeholders of all target groups involving economy, political authorities and civil society was exchanged on round tables. The array of inputs led to the formulation of recommendations and ultimately to the drafting of this handbook.

www.alpine-space.eu/projects/alpinnoct/en/home

MAIN RESULTS



5 Pilot Cases

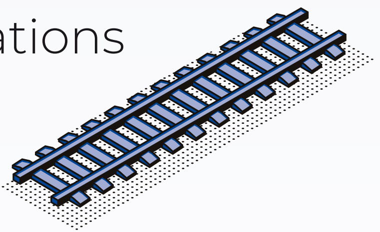


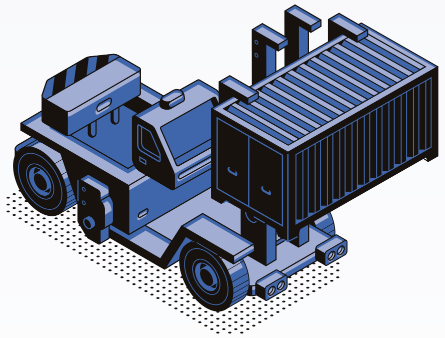
7 Dialogue Events

6 Political Action Sheets

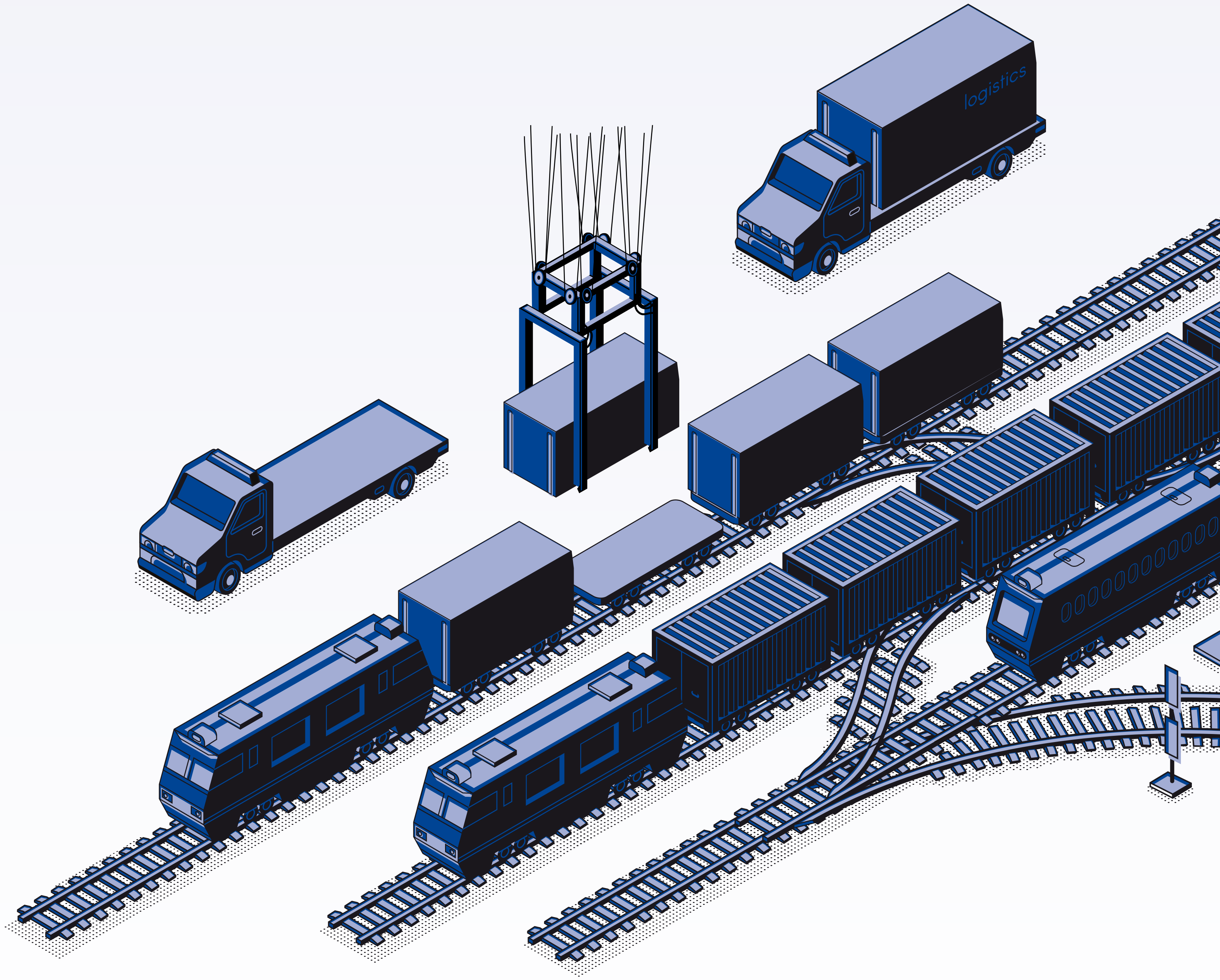
5 Technical Actions Sheets

2 Pilot Relations





Output O.T4.1 “Guideline for integration of innovative intermodal solutions & approaches into daily CT businesses”
D.T5.1.1 “Guideline for Dialogue Events”
D.T5.4.1 “Dialogue Event Report”



Pilot Relations
AlpInnoCT implemented five Pilot Cases on two Pilot Relations

Transport Corridor Verona-Nuremberg-Rostock

The Verona/IT-Rostock/DE route runs from Verona via Brenner, Hall in Tyrol and Kufstein to Munich. From Munich it continues via Pressig, Steinbach am Wald to Merseburg, Birkenwerder to Rostock. This railway line is one of the most important Alpine crossings between central and southern Europe. The logistical chain can be divided into ten sub-sequences.

1. Entrance of the loading unit in the Verona terminal (first leg by road or rail)
2. Handover of the loading unit to the terminal operator company
3. Administrative and physical processes in the Verona terminal (moving the loading unit to the carrying wagons)
4. Administrative and physical processes for train dispatch (security check of cargo and wagons)
5. Rail transport (section Verona-Nuremberg)
6. Handover of the loading unit to the terminal operator company
7. Administrative and physical processes in the TriCon Container Terminal in Nuremberg (moving the loading unit to the carrying wagons)
8. Administrative and physical processes for train dispatch
9. Rail transport (section Nuremberg-Rostock
10. Handover of the loading unit to the terminal operator company

Transport Corridor Trieste-Villach-Bettembourg

The Trieste/IT-Bettembourg/LU route runs from Trieste via Tarvisio, Villach, Bischofshofen and Salzburg to Munich and continues via Saarbrücken to Bettembourg. The logistical chain between Trieste and Bettembourg can be divided into ten sub-sequences.

1. Entrance of the loading unit in the port of Trieste
2. Handover of the loading unit to the terminal operator company
3. Administrative and physical processes in the port of Trieste (moving the loading unit to the carrying wagon)
4. Administrative and physical processes for train dispatch (security check of cargo and wagons)
5. Rail transport (section Trieste-Villach)
6. Handover of the loading unit to the terminal operator company
7. Administrative and physical processes in the Villach terminal
8. Administrative and physical processes for train dispatch
9. Rail transport (section Villach-Bettembourg)
10. Handover of the loading unit to the terminal operator company

Pilot Cases

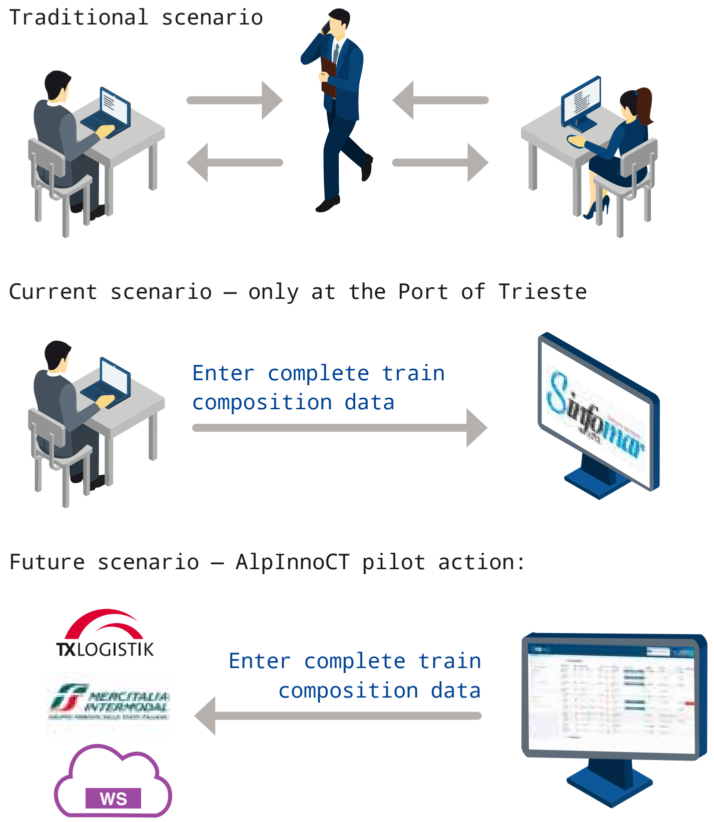
A total number of five innovative Pilot Cases was implemented during the project. Their set-up is mostly either based in one of the two or both pilot relations or they were recognized as technically important or process-oriented.

Pilot Case 1:
Wagons sharing concept

The pilot relation of Verona-Rostock was implemented by the Consorzio ZAI in collaboration with Verona Quadrante Europa. They identified a new operating model related to the management and optimization processes of the "InterTerminal", an intermodal terminal. This model reinvents the logic of production of the loading/unloading activities of intermodal freight trains, utilizing innovative policies. The relevant terminal is the Verona Interport where the following operational objectives were set: Schedule of train loading/unloading in 12 hours, Wagon Sharing, Planning of terminal activity and a New approach to check-in/out phase of goods by road. Implemented in Feb. 2019.

Pilot Case 2:
Train-related electronic data interchange

The Port of Trieste upgraded its ICT platform so as to better manage railway traffic and exchange data with TX Logistik concerning the train composition and reduce the time needed to check in trains. Two communication systems were combined, one before crossing the Italian border and one after crossing the Italian border. Implemented in Sep. 2019.

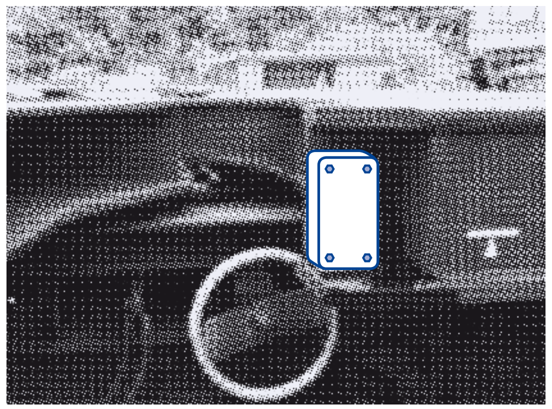


Thanks to systems interoperability, logistics data is automatically communicated with the train ETA

Pilot Case 3:
Feasibility tests of innovative technologies and digitalization in Combined Transport

With the lack of digitalization as well as insufficient usage of innovative technologies, selected feasibility tests of potential processes were performed by TX Logistik with a number of stakeholders. By using state-of-the-art GPS trackers with cellular interfaces and standard sensors such as temperature and acceleration, the power consumption in a typical transport use-case can be determined to specify and outline a fully self-powered tracking system for railway application. Field tests on the trains provided information about the proper functionality and related power consumption. It is expected that installing the IT interface will provide improved data exchange, resulting in more cost-efficient, reliable and faster communication between both parties.

State-of-the-art GPS tracker

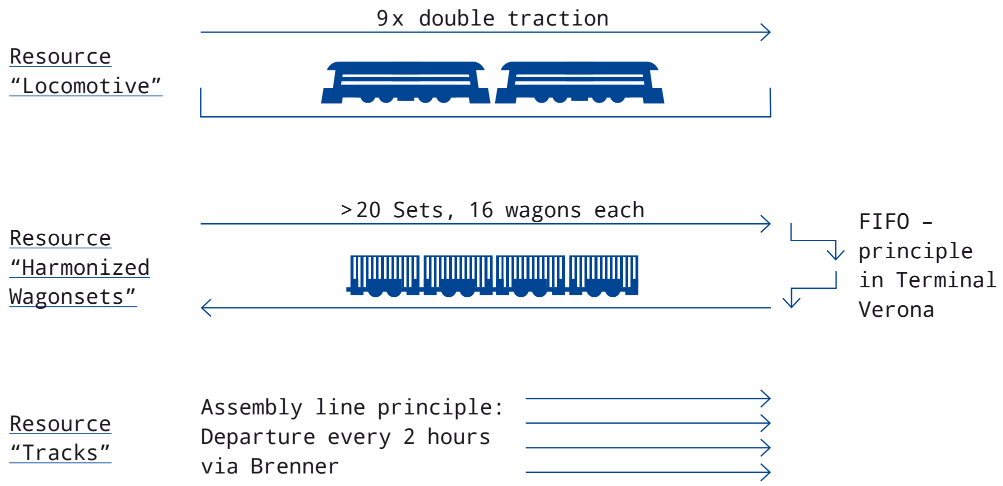


Pilot Case 4:
Appliance of production know-how (standardisation, First-in-First-out principle) on to high frequent CT routes via the Brenner corridor

An improved transport concept will be applied to the Brenner as it is a frequently used transport route with 20–25 trains per day. It was shown how the appliance of know-how from production industry affects efficiency, reliability and the use of resources within intermodal transportation, as with the current setup only minor dependencies between trains are taken into account. The focus is on the following 4 resources:

1. Wagon:
   A harmonized, standardized wagon park for all Brenner lanes makes it more easy to interlink traffic models
2. Locomotive:
   Locomotives are polled in Kufstein/AT without expensive software for /GE
3. Track:
   Booked train path every 2 hours can be used which also minimizes waiting times
4. Train driver:
   Interoperable drivers from South Tyrol/IT who are able to operate a train from Verona/IT to Kufstein/AT

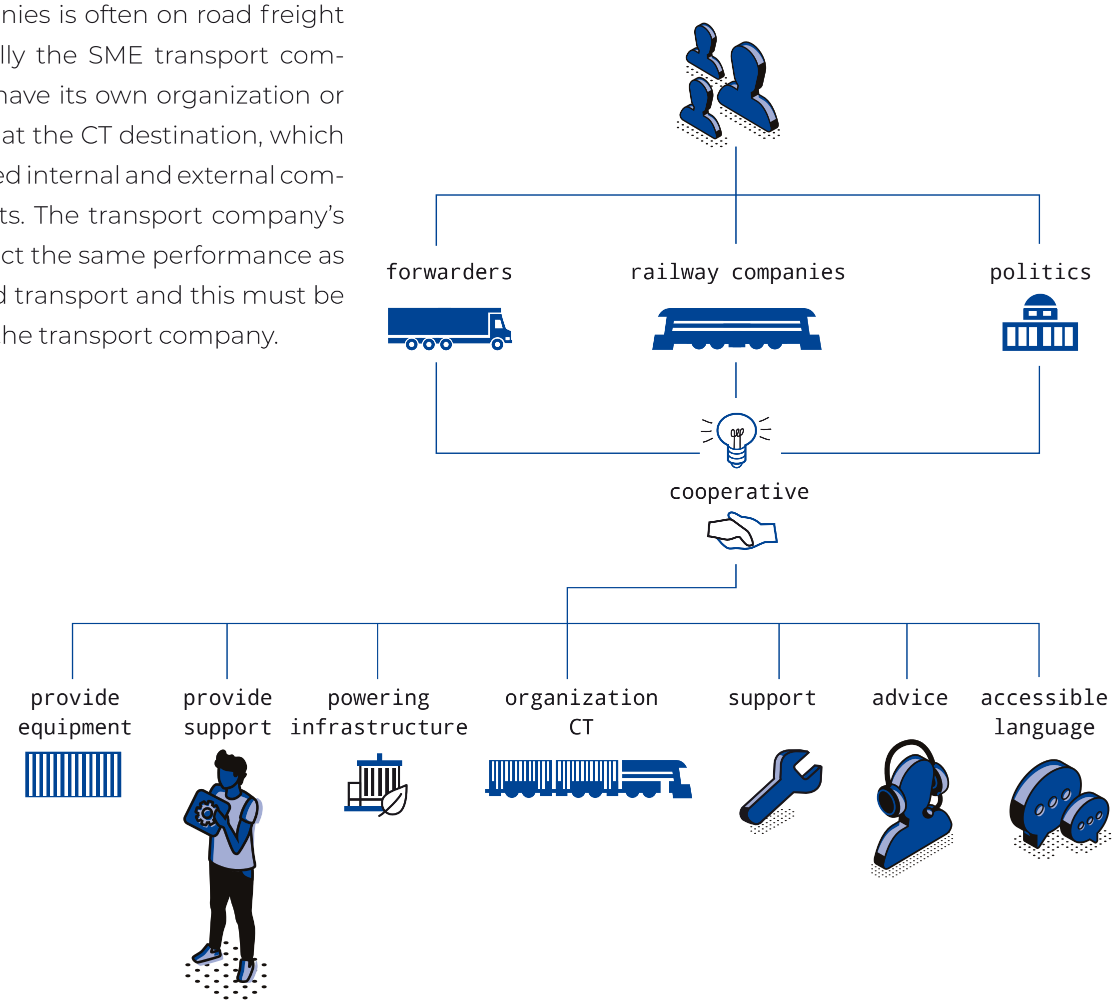
Brenner-Shuttle-Concept:
20-25 trains/day via Brenner, from Kufstein to Verona QE



Pilot Case 5:
Fostering access to Combined Transport for small- and medium-sized transport companies

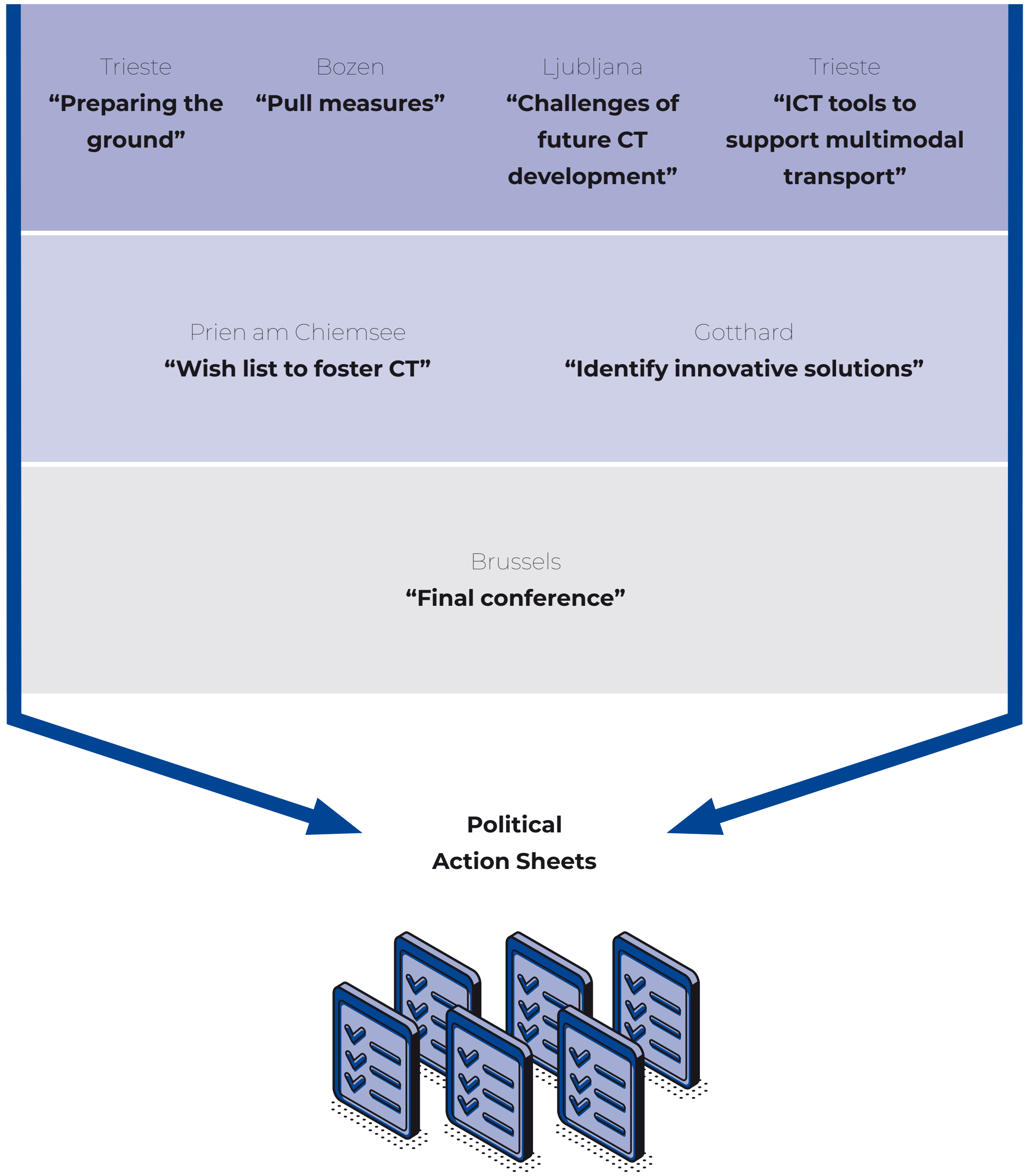
This case discusses general challenges and impediments facing combined transport such as work processes in SME transport companies which are usually optimized for their own use and thus represent isolated solutions. Here, these processes are optimized for internal efficiency by Spedition Eberl. CT in contrast to road transport involves increased organizational and personnel costs, which is why the focus of SME transport haulage companies is often on road freight transport. Usually the SME transport company does not have its own organization or special vehicles at the CT destination, which leads to increased internal and external communication costs. The transport company's customers expect the same performance as continuous road transport and this must be guaranteed by the transport company.

In addition, the necessary amount of cargo required for the realization of a block train to facilitate economic transport is critical. Since it is seldom possible for most SME transport companies to fill a complete train with their own loading units, these are highly dependent on third party operators. After a workshop the conclusion was that a cooperative which could centrally organize combined transport could serve as a solution and transportation would be organized optimally and all SMEs would be given access to CT. Finalised in June 2019.



Dialogue Events —
Why and how?

The process towards the six Political Action Sheets: Starting from a very general level the political recommendations have been developed Dialogue Event by Dialogue Event in a common consolidation process.



The approach of dialogue events is rooted in the idea of overcoming rigid positions and the lack of communication between key actors. Thus, it is about getting various stakeholders: from freight transport, logistics, regional and local authorities, politics, economy and civil society together on one table. The concept was to establish a common understanding and possibly develop solutions for sustainable combined transport (CT) including road and rail through the Alps in a participatory way.

The AlpInnoCT project had a wide range of different stakeholders that at first glance have very different interests. What do these stakeholders have in common? They want to foster the modal shift for the transportation of goods from road to rail.

Seven dialogue events took place, splitting them into themed, corridor and final event. For every event, the results were condensed step by step and narrowed down to the core issues. The final products of this process are the "Political Action Sheets" which are formulated and signed by all stakeholders.

Deliverable
D.T5.1.1 und D.T5.2.1

AlpInnoCT Midterm
conference video:

Interreg Alpine Space
AlpInnoCT

Political Action Sheet No. 1

General upgrade of rail infrastructure connecting Combined Transport nodes with the main corridors and a special focus on relevant feeder lines

General recommendation

According to the EU white paper 2011 ('Roadmap to a Single European Transport Area'), 30% of road freight over 300 km should be shifted to rail or waterborne by 2030 and more than 50% by 2050. Therefore, the linear infrastructures must be developed, including the main corridors and feeder lines (i.e., those parts of the line that connect Combined Transport nodes with the main corridors).[1] A focus should be put on closing the remaining gaps in the network of EU Rail Freight Corridors' substitution routes.
The feeder lines with their respective CT terminals must be upgraded concerning:

A continuous electrification
B at least 4m loading gauge (P400)
C handling of 740 m train length
D rail parking areas for overtaking

Another focus should lie on peripheral railway infrastructure relevant for freight transport. This infrastructure often lacks equipment such as modern electronic interlocking systems, electrified tracks or the European Train Control System (ETCS). Furthermore, a lack of passing tracks persists. The reactivation and building of new railway sidings is crucial. A wide-ranging infrastructure harmonization (including tunnels, railway tracks, and terminals) on the general level but also on most promising feeder lines guarantees smooth operation and is thus able to make this mode of transport more attractive. International cooperation for sustainable infrastructure projects (particularly financing) must be provided.

Stakeholders addressed

Members of the EU Alpine states with their ministries of transport / infrastructure, infrastructure managers, operators and private railway and terminal operators.

Barriers / Challenges

Financing and convincing decision-makers and investors regarding rail infrastructure perseveres. Feeder lines are (usually) not part of the Trans-European Transport Network (TEN-T). Risk of undermining desired effects without upgrading peripheral railway infrastructure (which is a prerequisite for competitive railway freight transport).

Short-term goals

- To increase the awareness of decision-makers for the need of consistent railway management operational plans from a single source (especially in the case of network incidents) with a focus on increasing the capacity for rail freight.
- To identify the most promising feeder lines of the rail freight corridors.

Mid-term goals

- To implement concrete regional infrastructure projects for feeder lines that are accepted by all involved stakeholders and have a secure financing.
- To increase the maximum train lengths and weights.
- To implement rail parking areas (e.g. in a second railway) to allow parking of or overtaking with freight trains.

Long-term goals

- To renew existing infrastructures (e.g. electrification of railway lines, removal of bottlenecks).
- To construct and upgrade feeder lines.

Short-term actions

- Use synergies with EUSALP Action Group 4 (to promote intermodality and interoperability in passenger and freight transport).
- Research the most promising feeder lines and missing links of backup routes.
- Start creating international railway management plans with a focus on infrastructure, increasing capacities, contingency plans with predefined backup routings, improved traffic management and a clear responsibility of infrastructure managers.

Mid-term actions

- Develop concrete regional infrastructure projects for feeder lines, including rail-passing and parking areas.
- Prepare for the infrastructural realization.

Long-term actions

- Enforce infrastructural measures by renewing existing infrastructure.
- Connect the feeder line projects with the main railway corridors and projects.

Good practice example(s)

Germany: A 'Memorandum of Understanding' (MoU) was signed in June 2017 by the infrastructure managers of the Rhine-Alpine Corridor, including an additional agreement between the Swiss Federal Railways (SBB) and the German Railway (DB Netz), which signed an agreement on the Rhine-Alpine Corridor regarding capacity increase, timetables, construction site coordination, operations and crisis management.[2]
Italy: An agreement between the Port Network Authority of the Eastern Adriatic Sea (Trieste), the Austrian Railway (ÖBB INFRA) and Italian National Rail Infrastructure Group-Department in Trieste (RFI S.p.A.) was signed on June 10, 2019, which will significantly increase the railway capacity of the Port of Trieste.[3]

1 Main corridors are already under construction or planned and are not part of this action sheet
2 www.corridor-rhine-alpine.eu/
3 https://portoftrieste300.com/wp-content/uploads/2019/03/201901_THE-PORT-OF-TRIESTE-SIGNS-TWO-MEMORANDUMS-OF-UNDERSTANDING-FOR-DEVELOPING-RAIL-LINKS-TO-EAST-CENTRAL-EUROPE.pdf

Political Action Sheet No. 2

Improvements and expansion of terminal infrastructure with new terminals, cooperation and networking

General recommendation

Successful cooperation and networking between terminals in the Alpine Space and beyond are crucial. This can be done by making intermodal terminals and transshipment nodes more efficient and sustainable for intermodal transport units (ITUs). Many existing freight terminals are not adapted to the current requirements or the new EU standards for Combined Transport (CT), such as rail modules with a length of 740 metres, a PC80/P400 railway gauge or an axial weight of 22,5 tons. They also need a high degree of flexibility in their operations (management of railway delays and guaranteed punctual departure of trains) and shall constantly be improved and adapted to their respective needs (e.g. providing more storage spaces for transport units and provide infrastructural equipment for loading and unloading of trains).
Additionally, new terminals must be constructed under sustainability criteria to achieve the modal shift from road to rail. This also implies an expansion or creation of shunting yards in front of terminals with easy access to the railway.

Stakeholders addressed

There are 100 intermodal terminals in the Alpine Space (AT/18, CH/11, DE/37, FR/9, IT/21 SLO/4), all Alpine states and their concerned ministries, infrastructure managers, transport operators, Rail Net Europe (RNE), stakeholders from the TEN-T Corridor as well as the political bodies of the EU.

Barriers/Challenges

There is a lack of common Alpine-wide or European-wide operational standards even at TEN-T Corridor level. Spatially constricted areas in the Alpine Space hinder the development, expansion and creation of new terminals. Furthermore, the lack of exchanges between operators due to trade secrets is a challenge as well as the lack of a common control room for terminals and terminal lines, especially at corridor level.

Short-term goals

To improve the management of terminals with short-term innovations in logistical processes by: **1.** Making better use of ICT-solutions (information and communication technology) and automatization to improve the efficiency **2.** transshipment and reduce waiting times (e.g. e-paperwork, automatic registration by photo gate). **3.** Using platform solutions and freight matching (e.g. wagon-sharing and empty container handling). **4.** To create a holistic plan for terminal development. It should include a map of existing terminals, a market analysis to verify infrastructural gaps, and research into new traffic potentials.

Mid-term goals

- To reduce storage times in storage areas (particularly for trailers).
- To have ready-to-implement plans for new terminals that are accepted by all stakeholders (entrepreneurial and political-decision makers, civil society).
- To implement successful cooperation of terminals using network synergies of regional nodes (e.g. establishment of integrated information platforms).

Long-term goals

- To constitute an efficient network of terminals in the Alpine Space and beyond.
- To facilitate administration of terminals that operates effectively according to current state-of-the-art procedures.
- To construct new terminals under sustainability aspects that are accepted by all stakeholders.

Short-term actions

- Use synergies with EUSALP Action Group 4 as well as the TEN-T Corridors project list and other corridor action plans.
- Develop a blueprint for short-term innovations of logistical processes (better use of information and communication technologies, automatization, freight matching).
- Develop a blueprint for terminal development in the Alpine Space (and beyond) including new terminals.
- Realize an Alpine Space terminal master plan.

Mid-term actions

- Develop innovative solutions to reduce storage times, such as the bonus-malus systems[1].
- Assemble a cooperation agreement among terminal managers (e.g. establishing integrated information platforms).
- Establish a partnership agreement between port authorities and inland terminal operators for the empowerment of coordinated spatial and infrastructure planning at regional, national and transnational levels (e.g. for participation in capital stock).
- Carry out feasibility assessments (such as cost-benefit analyses, etc.) on new terminals.

Long-term actions

- Create an efficient terminal network by constantly reviewing measures that were implemented in short- and mid-term actions.
- Execute plans for the construction of new terminals including the shunting areas.

Good Practice Example(s)

Germany: The TriCon Container Terminal in Nurnberg uses the LogOn customer portal which is the central interface between operators, rail infrastructure companies, logistic service providers and freight forwarders. This portal gives the latest and updated information about trains and charging units[2].
Italy: The wagon-sharing concept was included in Case[1] of the AlpInnoCT Project in Verona QE[3]; The project 'Verona 750' aims at improving the Verona Quadrante Europa with a 740m module in the terminal[4].
Austria: The port of Vienna has introduced a video gate for faster clearance of trucks[5]; The 'Terminal 4.0' project aims at increasing automated processes and communication between cargo[6].

1 An example of that is the wagon sharing concept in Case 1 of AlpInnoCT project
2 www.tricon-terminal.de/
3 www.quadranteeuropa.it/en/news-qe/384-premio-logistico-dell-anno-2018.html
4 www.ship2shore.it/en/logistics/new-investments-to-upgrade-infrastructures-at-interporto-verona_63973.htm
5 www.hafen-wien.com/de/home/aktuell/news/142/Hafen-Wien-Tochter-WienCont-staerkt-sich-in-der-LKW-Abfertigung
6 https://projekte.ffg.at/projekt/1828239

Political Action Sheet No. 3

Higher prioritization of rail freight transport

General recommendation

The prioritization of rail freight transport outside passenger peak hours and on transnational levels can lead to increased capacity with limited impacts on passenger transport (e.g. through the construction of bypasses such as railway lines for overtaking).

Stakeholders addressed

European Union, Alpine States and their respective ministries, railway operators and infrastructure managers.

Barriers/Challenges

Due to the limited amount of disposable, attractive slots on trans-Alpine rail freight corridors, there is a natural conflict between passenger and rail freight in reserving slots. Although international freight trains are entitled to prioritized slots on the main corridors, this is not satisfactory in practice. Furthermore, a common definition of the term peak hours in all Alpine countries (or in all European countries) must be agreed, taking into account of the differences between urban and rural areas.

Short-term goals

- To develop a common understanding of capacity limits of rail freight and passenger traffic between all stakeholders.
- To determine a common definition of peak hours, accepted by all stakeholders.

Mid-term goals

- To prioritize rail freight transport at the main corridors in certain non-peak times compared to passenger transport.

Long-term goals

- To implement the smooth operation of freight and passenger rail that satisfies all stakeholders' needs.

Short-term actions

- Bring together all relevant stakeholders such as railway operators, infrastructure managers and national ministries to reach agreement on the possibilities and limits of rail infrastructure.
- Virtually test capacity limits along the main corridors.
- Determine a common definition of peak hours, together with all stakeholders.

Mid-term actions

- Lobby for prioritized time slots for rail freight transport at European and Alpine level.
- Fix prioritized time slots for rail freight outside passenger transport peak hours.
- Harmonize interval timetables of European Railway operators for freight transport.
- Monitor and evaluate the operational process of freight and passenger rail.

Long-term actions

- Make adjustments to timetables based on continuous monitoring and evaluation.

Good practice example(s)

EU: Regulation (EU) No. 913/2010 concerning a European rail network for competitive freight requires Member States to establish international market-oriented Rail Freight Corridors (RFCs)[1].

1 https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:276:0022:0032:EN:PDF

Interreg Alpine Space
AlpInnoCT

Political Action Sheet No.4

Financial support for Combined Transport

General recommendation

Existing support mechanisms for Combined Transport (CT) currently differ throughout the Alpine Space[1]. A review of the *Community guidelines on State aid for railway undertakings (2008/C 184/07)* would promote a more flexible framework for a modal shift through the Alpine Space. The new approach should include:

- **A** Short- and mid-term proposals that identify adjustments in the EU framework and lobbying at EU level to enable their implementation (e.g. full potential of external costs, notification procedures).
- **B** References to accompanying measures that enable a coherent policy mix (e.g. regarding enforcement of technological and working standards of road freight transport).
- **C** Provide financial support at national and EU level to improve the competitiveness of CT. To ensure ideal development in the Alpine Space, subsidies should be granted to integrated solutions that include innovation of transport infrastructures (such as rail and terminal infrastructures), vehicles, technological systems, equipment and CT operations and services.

Stakeholders addressed

European Union, Alpine States and their respective ministries, regional authorities, CT Initiatives, EUSALP AG4, iMONITRAF! Network, Working Group Transport of the Alpine Convention.

Barriers/Challenges

Alpine countries and regions prioritize CT differently because there is no common understanding of the role of accompanied and unaccompanied CT. Several Alpine countries currently do not use the full potential of the EU framework. As a result, there is still considerable potential to promote technological innovations of CT and enhance research and development, which needs to be organized in a more coherent and integrated way.
The absence of transparent, easily accessible incentives and the inadequacy or even absence of subsidies in some countries and/or regions discourages rail freight transport, which is already weakened by the lack of internalization of external costs for road freight traffic.

Short-term goals

- To develop a new approach regarding CT support mechanisms for the Alpine Space.
- To build a common understanding of the necessary support elements of CT (e.g. terminal infrastructures, operation/services, technological innovation, research and development projects).
- To support the discussion of the necessary accompanying measures that are crucial to support an effective modal shift (e.g. enforcement of technological and working standards for road freight) that has now started among the stakeholders involved.

Mid-term goals

To harmonize and develop CT support mechanisms through a joint approach by all Alpine countries. It should include:

- A proposal for actions based in part on the current Community guidelines for State aid for railway undertakings (e.g. agreeing on a common approach to calculate financial support for CT infrastructures and services, considering financial support for technological innovations, research and development).
- A proposal for future action, including adjustments of the relevant EU framework from an Alpine perspective (e.g. regarding the amount of State aid for operation/services/investments based on external cost calculations and regarding the notification procedures).
- A proposal for the necessary accompanying measures taking account of specific national circumstances.

Long-term goals

- To bring in proposals for adjusting the EU framework to the attention of decision-makers at EU level through a common lobbying approach.

Short-term actions

- Find a consensus on support mechanisms that should be included in CT (infrastructure, operation/services, implementation of new technologies, support for research and development).
- Agree on necessary accompanying measures to support effective pull-measures (e.g. stricter enforcement mechanisms for road transport)..

Mid-term actions

Lobby for a common proposal for the review of the EU framework and for flexibility needs in the Alpine Space.

Long-term actions

- Continuously review the effectiveness of CT support mechanisms.
- Identify needs for further adjustment needs of the EU framework.
- Identify streamlining needs with other EU policies (e.g. road pricing/ Eurovignette).
- Review of technological innovations to fully use the potential of new technologies within CT operations in the Alpine Space.

Good practice example(s)

Germany:

- The Federal Transport Infrastructure Plan supports the construction of the national rail infrastructure with €114 billion until 2030. It includes important railway and terminal projects that influence trans-Alpine CT[2]. The German subsidy guideline supports CT and intermodal transport systems by financing up to 80% of the eligible investment for the construction and extension of private transshipment facilities for CT[3].
- In Bavaria there are funding opportunities for pilot and demonstration projects that promote innovative logistics concepts for new propulsion technologies and rail freight transport. In addition, subsidies amounting to € 0.54 million / year are available to municipalities and administrative bodies for the construction of inland ports.

Austria:

The Austrian Ministry for Transport, Innovation and Technology (BMVIT) grants a yearly investment for the financial support of CT of some € 80 million. The financial support for the operation of unaccompanied CT, the implementation of innovative technologies and for CT equipment, as well as the financial support of transshipment facilities for CT (road/rail/ship) are part of the support.[4]

Switzerland:

The Swiss Ministry of Transport supported CT with CHF 140 million in 2018 (equal to about €128.7 million) with terminal investments, a rolling highway and CT operations throughout Switzerland.[5]

Italy:

National Law No. 208/2015 gives financial support to intermodal services to compensate for the higher external road transport costs to and from Italian transport nodes (through the so-called *Ferro Bonus*[6] amounting to max. € 2.5 per train-km. This is according to EU law applicable provided the financial support does not exceed 30% of rail costs. A budget of € 20 million was available for the period 2016 – 2019.

- A support system for CT in the Autonomous Province of Trento[6] and the Autonomous Province of Bolzano[7] was established with each making available € 9 million for the period 2016 – 2019.
- Regional Laws no. 1/2003 and 7/2004 have been introduced by the Autonomous Region of Friuli-Venezia Giulia. They provide financial support for intermodal transport services to/from regional transport nodes (unit of measurement: € 33/load unit) and the development of intermodal nodes for infrastructure and investments in technical equipment (in 2017 about € 2 million were financed).

1 www.alpine-space.eu/projects/alpinnoct/outputs/alpinnoct_dt1.1.1.pdf
2 www.bmvi.de/SharedDocs/EN/Documents/G/ftip-2030.pdf?__blob=publicationFile
3 www.bmvi.de/SharedDocs/EN/Documents/G/guidelines-combined-transport.pdf?__blob=publicationFile
4 www.bmvit.gv.at/verkehr/eisenbahn/foerderung/sgv2018/index.html
5 https://europa.eu/rapid/press-release_IP-16-4461_en.htm
6 http://ec.europa.eu/competition/state_aid/cases/266882/266882_1931637_96_2.pdf
7 https://europa.eu/rapid/press-release_IP-17-5145_en.htm

Interreg Alpine Space
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Political Action Sheet No.5

Fostering harmonization of data and data exchange

General recommendation

There is an urgent need to harmonize existing standards for data exchange for Combined Transport (CT) in the European Union and beyond, which requires an approach from the numerous stakeholders who currently remain unable to collaborate across borders in an efficient and coherent manner. It is abundantly clear that there is a need for networking platforms as well as smart technologies to accelerate rail freight transport. This can be done by defining a new state-of-the-art of data exchange among all stakeholders, providing funds for the development of new technologies and investing in their cross-border harmonization.

Stakeholders addressed

European Union, Alpine States and their respective ministries, railway companies, wagon operators, infrastructure operators, universities (as research, advisory, consultant and educational institutions) as well as other research institutes.

Barriers/Challenges

Data exchange between countries (both EU and non-EU) is not yet harmonized. The different technical standards along the transport chain hinder free data exchange between stakeholders (terminals, forwarders, etc.). Most documentation, especially in rail freight traffic, is still paper-based. The willingness to share data between different stakeholders is relatively low. At present, no Alpine-wide platform exists that allows stakeholders from science and industry to openly share information and knowledge.

Short-term goals

- To implement harmonized standards for data exchange and communication flows in Alpine rail freight transport.
- To provide public funds to establish and harmonize standards.
- To launch several meetings to be able to network with all relevant stakeholders.

Mid-term goals

- To test IT solutions for data exchange and communication flows along the transport chain.
- To develop one common tool for data exchange (interface) that is accepted by all stakeholders.
- To grant easy access to the tools for small-and-medium-sized enterprises (SMEs) [1].

Long-term goals

- To implement standards for IT solutions and communication flows along the transport chain, based on interfaces that are already in use or have the potential to succeed across the Alpine Space.
- To install a one-market platform with a sound basis and the ability to adapt to individual needs.
- To further work on technical solutions for smoother handling of CT-processes.

Short-term actions

- Define and collect standards for data exchange with IT solutions based on the evaluation of existing ones.
- Public authorities to offer funds for the development of logistic processes (harmonized standards, digitalization, etc.) for CT.
- Develop solutions to standardize CT processes like transshipment technologies.
- Set up a conference for networking and exchanging information (e.g. in the framework of EUSALP).

Mid-term actions

- Choose IT solutions and communication flows that have proved most effective.
- Test and collect experiences as well as data in an environment of trust, including evaluation to produce a pilot tool for data exchange.
- Bear in mind the difficulties faced by SMEs in accessing data exchange and IT-solutions.

Long-term actions

- Financially support the implementation of IT standards.
- Establish a one-market platform with representatives from industry through political support.
- Deploy technical solutions to e.g. minimize or even eliminate shunting.

Good practice example(s)

EU:

- The 'Neptune' web platform by Geodis [2] exists at EU level.
- The collected recommendations in the EU Railway Agency's report '*Facilitation of Combined Transport*' (FCT) (2018) [3] also provides a good basis.
- AlpInnoCT Research Database on 'Analysis of Initiatives and Studies' [4]

Italy:

- Verona QE is implementing the project 'Datex II Node' within the CEF Project Ursa Major Neo: it aims at a better exchange of information between rail and road transport in the freight village and is being implemented together with two motorways (A4 and A22) [5].

1 Specific goals for SMEs can be found in the Technical Action Sheet "Fostering access to Combined Transport for small and medium-sized transport companies"
2 https://geodis.com/fr/en/activity/overland-transport/transport-flow-management/digitized-services
3 www.era.europa.eu/sites/default/files/events-news/docs/fct_overall_final_report_en.pdf
4 www.alpine-space.eu/projects/alpinnoct/outputs/output_ot2.1_21052019.pdf
5 https://datex2.eu/implementations/nodes_directory

Political Action Sheet No. 6

Support communication to raise awareness of Combined Transport and empower local capability for Combined Transport problem-solving

General recommendation

A so-called 'communication hub' must be established at an Alpine-wide level to increase awareness and foster communication of the potentials of Combined Transport (CT) for decision-makers in politics, industry and civil society. Furthermore, multi-stakeholder partnerships must be established at regional level to analyse specific technical, operational and organizational problems and commit to potential solutions through a bottom-up approach. These partnerships should also provide an overview of funding possibilities at regional, national and trans-national level.

Stakeholders addressed

Universities, public and private research institutions, industry representatives, practitioners in CT, local and regional public administration, political representatives and NGOs at local level.

Barriers / Challenges

There is a lack of awareness and finance for communication and awareness raising on the advantages of CT solutions at regional, national and transnational level. There is currently no institution or individual – a caretaker – to foster communication and raise awareness of CT, who can establish a communication hub, operate such a communication hub and gain the acceptance of all stakeholders.

Short-term goals

- To install a pilot communication hub at an Alpine-wide level with basic instruments such as a web portal, common strategies etc. (to serve as an umbrella organization for the multi-stakeholder partnerships).
- To carry out an analysis of existing funding opportunities, shortages and opportunities at regional, national and trans-national level.

Mid-term goals

- To initiate campaigns on Social Media and other communication channels that show the advantages of Combined Transport to all involved stakeholders and the general public.
- To establish an official multi-stakeholder partnership at regional level, consisting of transport operators, local public authorities and representatives of civil society.
- To integrate the CT framework into the educational curriculum at a general level (e.g. in schools and in logistic programmes at universities).

Long-term goals

- To establish a harmonized study programme for CT at universities in the Alpine Space.

Short-term actions

- Identify relevant stakeholders that can establish a pilot communication hub (e.g. in the framework of EUSALP).
- Establishment of a pilot communication hub at an Alpine-wide level.
- Introduce basic communication campaigns (on- and offline).
- Provide an overview of funding possibilities based on existing documents (e.g. the outcome of the AlpInnoCT project).

Mid-term actions

- Initiate campaigns that demonstrate the advantages of Combined Transport.
- Foster the establishment of multi-stakeholder partnerships based on existing structures and networks.
- Identify universities and schools for a CT study program and establish a scientific network.

Long-term actions

- Develop a curriculum for a new study programme.
- Implement the new study programme for CT.

Good practice example(s)

Austria:

- University of Applied Sciences in Steyr: focus on CT in university programme[1] with the aim of developing of awareness of sustainable transport systems.

Italy:

The Verona Quadrante Europa focuses on two courses on logistics:

- The first course is dedicated to students who have completed secondary school with practical aims. The focus lies on intermodality operators.
- The second course is called 'Logimaster' and aims at graduated students[2].

1 www.logistikum.at/en/areas-of-expertise/transport-logistics-mobility-en/sustainable-transport-systems-en/overview-sustainable-transport-systems-en.html
2 www.logimaster.it

Technical Action Sheet No. 1

Pilot Case 1 — Wagons sharing concept

Short description of Action

Wagons sharing identifies a new operating model of management and optimization of trains and wagons' arrivals and departures, reinventing the logic of loading and unloading of intermodal freight trains, and ensuring the competitiveness of the railway transport modality. It focuses on flexible management of the railway tracks and terminal slots, not strictly linked to the scheduling of inbound trains, but always respecting the departure time of outbound trains, with wagons taken over by the terminal operator anonymously.

Fields of optimisation

Transshipment terminals and ports: Organization and process.

Production know-how

Two methods were taken into consideration for the wagon sharing solution:

- Plan Do Check Act – PDCA: Process monitoring is followed in PDCA logic, through continuous improvement to production, separating the phases in four key points and working separately at each stage. Also called Deming Cycle, it pursues highest quality with interaction between research, design, testing, and production (intended as the number of trains). PLAN phase identified costs, expectations, inefficiencies and evaluation of possible variants. DO phase applied chosen decisions and tested their validity. CHECK phase controlled and compared PLAN and DO stages, and standardized the final management model. ACTION phase codified and applied the model.
- First In First Out – FIFO: Process where the first wagon that entered the railway terminal, is the first to exit. The exit order is the same as the entry one, with the first train arrived being the first unloaded and then reloaded, to guarantee the planned departure and thus avoid delays.

Objectives of the action

- Improve Railway terminal production process;
- Increase the rotation of the wagons in time of permanence in terminal / decrease time spent in storage of the intermodal units;
- Increase terminal capacity and therefore greater availability of empty slots for the reception of new trains;
- Optimize railway asset (wagon availability);
- Reduce waste time and delays along the entire intermodal chain;
- Respect scheduled departure times (especially useful for railway undertakings).

Obstacles

The involvement of the multimodal transport operator, MTO KombiVerkehr and the wagon owners. In InterTeminal, MTO is the only customer of the terminal operator (Quadrante Services), thus easily persuaded, while the wagon owner, perceiving changes in its business model (for ex. the traceability of the wagons is not yet timely and precise as it should be) even though part of the pilot, had still some reservation. A great leverage in this case is the major production when using wagons sharing: with wagons sharing applied in a terminal, MTO processes higher number of trains and optimizes the production time, achieving higher efficiency, thus MTO itself convinces the owner of wagons to use this model in the first place, followed by railway undertaking, in view of greater traffic volumes.

Target group

- In first place terminal operators (Hupac, VTG, Terminali Italia, DUSS), stakeholders of the railway transport (e.g. railway undertaking, shunting companies), maritime ports that could replicate the model.

Responsible actors

Consorzio ZAI, Quadrante Servizi and KombiVerkehr

Involved stakeholders

Interporto Quadrante Europa of Verona (QEVR)

Evaluation (Key Performance Indicators or estimates)

✓ "InterTerminal" performance results 34% higher than the performance of the other two intermodal terminals inside Interporto, measuring it through loading and unloading services of a train, with related auxiliary activities (in absolute terms calculated by the number of trains processed on a single track per day);

✓ From the literature, given E = terminal efficiency that in theoretical terms can reach the maximum optimal value equal to 3, "InterTerminal" efficiency is calculated just above 2, considering the time needed to process a train, it equals to two trains per day;

✓ The medium term target set by Quadrante Europa is to process a train in 12-hour timeframe. "InterTerminal" currently is already above the target set, with 8-hour timeframe from the train arrival to its departure. Thus, the train rotation coefficient exceeds positively the operational target per cycle;

✓ The numbers (and the model) reached by "InterTerminal" prove even more how Verona Interporto has a margin of growth in terminals capacity still of + 50% compared to current traffic.

Not achieved: Application of the model at Terminali Italia (equivalent to Quadrante Servizi), manager of the second railway terminal in QEVR, which manages higher railway traffic than "InterTerminal". The same model applied in all terminals of QEVR would be a big success.

Timeline of implementation

Short-term (< 2 years)

Estimation of shift from road to CT / rail

Short-term (< 2 years):

"With crane lifts in 2018, 90.921 ITU (Intermodal Transport Units) (equivalent 161.621 TEU moved from road to rail), with higher performance, 9.3 hrs to process a train in "InterTerminal" instead of 16.43 hrs (average time in terminal), +45.5 % performance. Although this increased efficiency is important, nevertheless this is just one part of the whole transport chain. In total, small amount of direct shift from road to CT/rail can be expected by this measure.

Detailed description of the action

Slot Management analysed the "InterTerminal", located in Verona and of European relevance, improving operational plan and optimizing railway tracks management. The terminal capacity intended as working railway tracks, allows only some infrastructural improvement, while a reorganization of human resources along the railway tracks and technological tools, can significantly increase the productivity with in/outbound trains. The introduction of Wagons Sharing in the organizational model was the real strength, with the concepts of dynamism and flexibility of resources applied to management of railway tracks and terminal slots: the wagons are taken over by the terminal operator anonymously without reference to arrival destination, e.g. inbound train (from Rostock) can become outbound train with different destination (to Bremen), trivializing railway shuttles. The composition of a freight train finds the reference of intermodal transport unit in a semi-trailer, and the railway wagons respond to flexibility. The use of Wagons Sharing cuts the railway queues, managing the wagons independently from the origin, composing trains for different destinations and cutting the inefficiencies of the railway system at the station.

Good Practice / Others

No specific reference to other initiatives/pilots. What could be outlined is the need to develop and implement a railway wagon database, where available information are all aligned with the existing software that monitors the terminal process. The implementation of this database would guarantee the removal of the constraint of the non-traceability of wagons, which for wagon sharing constitutes quite an obstacle.

Recommendations for implementation and dissemination

It would be of great importance to get the model implemented on a larger scale in Verona intermodal terminal, as the next step. To do this, wagon sharing should be discussed and eventually implemented also in other terminals in QEVR, managed by Terminali Italia. If applied also by Terminali Italia, the entire QEVR would have the same management policy for arrivals and departures. The next step could be Terminal Italia applying wagon sharing also to all the other terminals it currently manages.

Technical Action Sheet No. 2

Pilot Case 2 — Train-related electronic data interchange

Short description of Action

In order to accommodate increasing maritime and rail cargo flows, in the last five years the Port of Trieste has been steadily investing in ICT measures able to smooth communications and data exchange along the entire supply chain to decrease congestion and enhance CT efficiency. The main goal is to develop new extensions and modules based on interoperability standards of the ICT platform currently in use, the Port Community System (PCS) of the Port of Trieste, Sinfomar. Public and private actors that manage the processes and documentation related to rail traffic are important stakeholders involved in the current layout and future developments of the Sinfomar PCS. It is of utmost importance that electronic data are exchanged in a consistent and harmonized way and to this purpose, the Port of Trieste is willing to test such data exchange on the Trieste-Bettembourg corridor operated by TX Logistik.

Fields of optimisation

Transport corridor related: IT

Production know-how

The main process to be applied is the supply chain.

Too often the transport of goods is seen as an initial and final part of the product added value. As a matter of fact, one of the main components of the added value is the time and cost of transport and logistics from production site to the market of destination. Especially in railway transportation, a real Track &Trace system (interoperable with different railway operators) does not exist. Therefore, the pilot action focuses on integrating processes and data along the overall supply chain, trying to cover the entire door-to-door chain.

Thus, the whole transport chain should be seen as a function of the overall supply chain, whereby each component of the transport chain needs to be optimised, as to reduce time and costs for the shipment of the goods.

Objectives of the action

Improved planning of CT/rail services

Obstacles

Absence of common shared standards: the joint technical analysis carried out by the Port of Trieste, TX Logistik and Mercitalia Rail revealed that in order to automatically exchange waybills the same standards need to be used (e.g. H30 Hermes for the data included in the waybill and TARIC/HS or NHM to classify goods).

Target group

- Railway undertakings, Terminal operators

Responsible actors

- Port of Trieste – Port Network Authority of the Eastern Adriatic Sea
- TX Logistik AG
- Friuli Venezia Giulia Region (evaluation of the action)

Involved stakeholders

- Mercitalia Rail S.r.l. – railway undertaking providing the traction on the Italian territory
- RFI S.p.A. – Italian railway infrastructure manager
- Adriafer S.r.l. – railway company 100% owned by the Port Network Authority, sole licensee to carry out shunting within the port railway network

Evaluation/Key Performance Indicators or estimates

- Time to automatically create the train-related documentation (e.g. waybill);
- Percentage of reduction of errors in train-related documentation.

Based on the results obtained through the implementation of a similar IT solution with another RU (Rail Cargo Austria), it can be estimated that the time needed for the automatic creation of the train-related documentation will dramatically decrease – of about 90%. Final figures will be available after a long-term run of the developed solution.

Timeline of implementation

- September 2019 (implementation/realization on the Port of Trieste side)

Estimation of shift from road to CT/rail

Final figures will be available once the impact of the IT solution is evaluated against the baseline scenario, however the action is expected to significantly contribute to shifting traffic flows to CT/rail.

The table below contains preliminary data useful to compare the rail traffic on the Trieste-Bettembourg relation as observed in the first semester of 2017 and the first semester of 2019:

	Jan – Jun 2017	Jan – Jun 2019
No. of trains	260	363
Vehicles transported by train	7,542	10,265
% of full wagons	95 %	97 %

In the periods taken as reference, this relation marked an increase of about 40% in the number of trains and of about 36% in the number of vehicles transported by train. For the reasons illustrated above, it is not possible to isolate, at this stage, the results directly linked to the implementation of the pilot action from those derived from other, further developments in the management of train-related processes.

Detailed description of the action

The pilot action carried out by the Port of Trieste focuses on the implementation of the interoperability with TX Logistik to reach a complete automatization of all procedures related to the rail services on the Trieste-Bettembourg corridor. The action aims at enabling the electronic exchange of data concerning the train composition. For information exchange to be effective, data need to be shared from the Port of Trieste PCS, Sinfomar to railway undertakings and vice versa, by using the SOAP (Simple Object Access Protocol) protocol. The exchanged data represent the basis to automatically create the waybill and completely dematerialise the management of train-related processes. For this reason, the use of a single standard in the communications is crucial. The interoperability of Sinfomar with external IT platforms allows the train-related data interchange, specifically on the rail services programming, the transport execution phase and train operations management. Furthermore, taking into consideration security regulations applicable to railway transportation, real-time data is collected (automatically through SOAP-based interoperability) to know exactly the actual position of the train for each timeframe. By automatically associating the train, wagon and goods (through the several modules of the Sinfomar), an innovative service of Track & Tracing for cargo using combined transport is realised. All these data are automatically collected and presented in a newly, ad hoc created dashboard to monitor combined transport traffic in the area of the Port of Trieste. This dashboard communicates via web services to external platforms, presenting the actual data concerning rail services operations status and thus allowing better planning of future actions.

Good Practice / Others

A good practice concerning the management of train-related processes and documentation is currently in place between the Port of Trieste and Rail Cargo Austria. Within this cooperation framework, the so-called train module of the Sinfomar is being further developed to achieve the complete dematerialization of the train-related documentation by automatically generating the CH30 document, which contains data such as the train number, wagons line and goods transported (including type and weight). This module has been active since 2017, thus reducing the time needed to handle all train-related processes from 6/7 hours to 30/40 minutes. In addition, the data included in the electronic CH30 document are considered as certified by competent authorities, i.e. Customs.

Recommendations for implementation and dissemination

The ultimate goal of the Port of Trieste, once the interoperability with TX Logistik/Mercitalia Rail will be realised, is to reach out to other rail undertakings in order to achieve full interoperability of the Sinfomar PCS with external platforms for the management of train-related processes.

In view of further development, it is of utmost importance to take into consideration the use of a single standard in order to smooth the communication with external stakeholders.

Technical Action Sheet No.3

Pilot Case 3 — Feasibility tests of innovative technologies and digitalization in CT

Short description of Action

The pilot case addresses the lack of digitalization as well as a lack of usage of innovative technologies in CT. Currently many GPS trackers used for railway freight transport do not work autarchic. Instead, they are operated with an attached solar panel or with a "classic" battery. This modus operando leads to the need to change the equipment close to every two years and this only by trained personnel.
Therefore, selected feasibility tests with GPS trackers containing an energy harvesting device have been accomplished in this pilot case. The aim was to create an autarchic GPS tracker which operates at least for 6 years (wagon revision life cycle) without the need to change any equipment such as batteries etc. In addition, the combination of wobbling motions and energy harvesting enables to derive further innovative solutions that can lead to a higher efficiency and reliability for freight railway (e.g. predictive maintenance, automated wagon order assignment). All in all, three different applications were defined and elaborated. Given a number of stakeholders involved and due to the fact that processes in CT are highly regulated, this pilot was solely done from the perspective of the railway undertaking TX Logistik.

Fields of optimisation

All three applications described below have been elaborated during the project of AlpInnoCT. In fact, Application 1 represents the basis of an autarchic working GPS tracker. The other two applications have been set up as a further innovative solution to enhance the usage of such an GPS tracker in daily operations and to cover further potentials such as predictive maintenance of wagons or an automatic wagon order assignment (e.g. in the terminal).

Application 1: Maintenance-free track & trace GPS tracker
With the implementation of an energy harvesting device which recovers energy through wobbling motions while the train is driving, the tracker is able to daily operate up to 6 years (wagon life cycle).
Application 1 entails the following steps:

- Parameter analysis and feasibility tests for self-powered GPS trackers.
- Configuration of prototype and laboratory tests.
- Field test demonstration.

In order to prepare Application 1, certain parameters have been defined within the project team. In fact, three different processes (Terminal, Track, Service) have been derived from daily operations, where the tracker should adapt different modes in terms of tracking and communication to fulfil its use and at the same time be as efficient as possible:

Process	Tracking	Communication
Terminal	Every 5 min (in motion)	Every 5 min optimal; alternative tbd. (in motion)
Track	Every 5 min; alternatively, 60 min (in motion)	Every 60 min. (in motion)
Service / maintenance	Every 5 min (in motion)	Every 5 min optimal (in motion)

Application 2: Early stage detection of wheel flats through vibration sensors
The idea behind this case is the assumption that wheel flats cause higher concussions on track and therefore the advanced GPS trackers are able to predict wheel flats (predictive maintenance).
Application 2 entails the following steps:

- Data capture in field.
- Data analysis, feasibility test.
- Potential test appliance in field.

Application 3: Automatic wagon order assignment
With the support of near field communication and the adaption of multi hop connection, the tracker shall be able to set up the train composition as soon as the wagons are shunted together (e.g. in the terminal).
Application 3 entails the following steps:

- Feasibility Analysis.
- Potential test appliance in field.

During the lifetime of the project AlpInnoCT, Applications 1 and 2 were tested positively in field. This functions as a basis for further testing and implementation.

Production know-how

Based on the findings related to production know-how which have been made in the prior Work-packages within AlpInnoCT, the following output can be derived for the Application 3:

Robust and maintenance-free GPS tracker for railway wagons

→ A self-powered tracking solution will enable new applications since no maintenance and no access to the tracker is required. A cost reduction is a further benefit of the energy harvesting power supply, due to the fact that no maintenance is required. Tracking becomes more robust, flexible and reliable. In addition, a potential direct supply of information from the tracker into the operations management system via an interface or a software increases the usability of the data generated.

→ On top, predictive maintenance is a key subject of production know-how. Nowadays, the detection of damaged rail wagons mainly relies on manual effort of the wagon inspector during the preparational work carried out in the terminal. With the support of a tracker installed on every wagon, a pre-alert in case of a damaged wagon leads to an increased efficiency and availability of trains. In the end, this leads to an improved service quality.

➔ Currently the wagon order assignment of a train in the terminal is a pretty manual effort and lacks digitalisation. One approach to overcome this issue is the implementation of a GPS based multi hop communication. Here, the trackers are equipped with a near field communication device and through the multi hop communication the trackers are able to define their position in the wagon park and also able to communicate this. With that, the operation speed in terminals will be increased through less paper work and the potential to assign the wagon order automatically.

Objectives of the action

Robust and maintenance-free GPS tracker for railway wagons.
Predictive maintenance (e.g. early stage detection of wheel flats while on track).
Automatic wagon order assignment via GPS based multi hop communication.
Optimization of the processes in the terminal and on track.

Obstacles

Many processes in CT are currently not (fully) digitized and still mainly paper-based with a low degree in automatic transmission (e.g. interfaces). At the same time a certain reluctance in using innovative technologies in CT can be observed. This leads to additional effort in operations, inflexibility, delays and overall competitive disadvantage.
In addition, many players are involved in the CT chain. (e.g. terminal, different infrastructure managers for each country etc.). Therefore, it is hardly feasible to change processes in daily operations without the permission of one of the above-mentioned players.

Target group

- Railway undertakings, operators, infrastructure managers, terminals, wagon producers

Responsible actors

TX Logistik AG, Fraunhofer IIS Nuremberg, Axel Bagszas Industrials

Involved stakeholders

Terminals, railway undertakings, IT-service providers, research institutions

Evaluation/Key Performance Indicators or estimates

➔ Maintenance Time and cost of Track & Trace devices.
➔ Pre-notification time / alert time of wheel flat while on tracks.
➔ Disruptions in railway operations due to damaged wheel flats.
➔ Wagon inspection efficiency in terms of time savings (operational costs).
➔ Power potential wobbling tracker.

Timeline of implementation

➔ Application 1: Q1 / Q2 2019
➔ Application 2: Q3 / Q4 2019
➔ Application 3: 2020 / tbd

Estimation of shift from road to CT/rail

No direct impact in CT attractiveness, but mid- to long-term effects due to higher reliability and efficiency in CT can be expected. Therefore, at this point in time an exact estimation of a potential shift from road to rail is not easy to quantify.

Detailed description of the action

It was examined how innovative technologies and digitalization could enhance selected processes in CT. This encompasses:

Background: Self-powered and maintenance-free GPS tracker for railway wagons

GPS trackers are working battery-powered and have limited operation times. The batteries have to be recharged or replaced. Additional sensors to monitor the condition of the trains or the goods increase the power consumption, and thus reduce the operation times of the system. Since typical railway wagons are on tracks for a very long time (up to a couple of years), batteries are not able to power the tracker for the whole duration. Furthermore, extreme low or high temperatures limit the capacity and lifetime of batteries.
Within this pilot case a state-of-the-art GPS tracker with cellular interface and standard sensors like temperature and acceleration have been used to determine the power consumption in a typical transport use-case. The system control of the tracker is adapted to fulfil the requirements of the target use-case. Field tests on the trains provide information about the proper functionality and the related power consumption. Additional measurements of the accelerations during typical transport scenarios are used to characterize the vibrations available, which can be used for energy harvesting.
The goal of this pilot case was to specify and outline a fully self-powered, autarchic tracking system for railway application. Such a solution will provide much higher functionality in terms of sensors and transmission rate than state-of-the-art trackers.

Recommendations for implementation and dissemination

Positive results that should be communicated to stakeholders, especially to railway undertakers, wagon fleet operators etc. Further validation in practice is recommended. Cost benefit assessment is expected to be positive.

Technical Action Sheet No.4

Pilot Case 4 — Appliance of production know-how (standardisation, First-in-First-out principle) on high frequent CT routes via the Brenner corridor

Short description of Action

Within this pilot case an improved transport concept has been applied to TX Logistik's most frequently used transport route (via Brenner). In addition to that, it was demonstrated how the appliance of know-how from production industry affects efficiency, reliability and use of resources within intermodal transportation.

Fields of optimisation

Given that 20-25 trains per day are being operated on this route, the Brenner corridor plays a major role in the overall transport network of TX Logistik and can be regarded as a bottleneck. Any disruptions, blockage or delays affect the overall performance of the trains operated. With the implementation of the Brenner-Shuttle-Concept started in January 2019, TX raises the efficiencies on that line for six different traffic lines, all arriving in and departing from the Terminal Quadrante Europe Verona, Italy. The prior setup took only minor dependencies between these different traffic lines into account.
In fact, focus was laid on aspects such as standardisation and harmonisation of used equipment/resources, especially wagons, locomotives & track. Moreover, a First in - First out (FiFo) principle regarding the efficient use of wagon parks has been introduced in the terminal of Verona.

Production know-how

- ➔ First-in First-out principle assessed in the Terminal of Verona.
- ➔ Standardisation/Harmonisation of more than 20 wagon parks on six different traffic lines.
- ➔ Standardisation/Harmonisation of locomotives used.
- ➔ Assembly line principle for tracks on the Brenner Corridor.

Objectives of the action

- ➔ Increased wagon availability & reliability.
- ➔ Increased loco kilometres.
- ➔ Increased tons of loading.
- ➔ Decreased cancelation of trains.
- ➔ Increased punctuality of trains in Verona.
- ➔ Increased reliability and flexibility of the system.

Obstacles

The main obstacle is TX Logistik's limited control of the full process as several other stakeholders are involved in the process of operating a train through the alps such as several infrastructure managers, other railway undertakings, terminals as well as construction works on track.

Target group

- Freight Forwarders (customers)
- Terminals
- Infrastructure managers
- Alpine Region
- Railway undertakings

Responsible actors

TX Logistik AG, Infrastructure managers, Terminal Quadrante Europa

Involved stakeholders

Terminals, infrastructure managers

Evaluation/Key Performance Indicators or estimates

Wagon availability

The wagon availability remains 99% (compared to 2018). However, now with the same number of wagons, there is an entire wagon park for quality buffer available. This leads to an increased flexibility and resilience of the whole system.

Increased loco kilometres

Since the implementation of the Brenner-Shuttle-Concept, the average loco kilometres have been increased by 4,2% which relates to a more frequent utilisation rate.

Increased tons of loading

Due to the harmonized wagon park TX is able to transport one additional unit per train. The weight has been increased by 2% in average.

Decreased cancelation of trains.

The cancelation has been decreased by 3 percentage points compared to 2018.

Increased punctuality of trains in Verona

The overall punctuality of trains has been increased by 4 percentage points compared to 2018.

Timeline of implementation

Start: Q1 2019

Estimation of shift from road to CT/rail

Based on the assumption that the resources track, locomotive and train driver are available on the Brenner line, the extra wagon park saved through this Brenner Shuttle concept, would be able to transport additional >90 units / week via the Brenner. This would lead to at least 4320 shifted loading units per year based on 48 calendar weeks where the "additional" train is operated. However, this a pretty theoretical assumption as not only resources mentioned above need to be in place, but also the market conditions. Due to that, it is not easy to quantify such a shift from road to rail.

Detailed description of the action

Within this pilot case an overall analysis of TX Logistik's transport network via the Brenner has been executed. Based on that, the second step was a simulation of this concept, followed by a demonstration in field. The concrete implementation in field and daily operation started in January 2019. As described above, the following figure shows all aspects of improvement:

Resource "wagon":

As-IS Situation (2018):

Due to different wagon sets and individual wagon types it was hardly feasible to interlink different traffic models. Moreover, different relations have different requirements regarding customer needs. Therefore, some wagon sets have a mix of container wagons and double-pocket wagons, and others only consist of double-pocket wagons and T3000 (wagons for loading mega trailers). Wagons with multiple transport functions exist, but they are more expensive.

To-BE Situation (Start 01/19):

Due to the flexibility of certain relations and their customer needs, not all relations can be considered in such a Hub and Spoke Concept. However, after a first analysis it became clear that all relations from and to Verona could be aligned regarding their wagon set as customer needs for wagon set composition are similar. Moreover, a FiFo-System could help the Verona traffic to be more robust in terms of punctuality and reliability. The aim is to harmonize all wagon sets in order to offer a flexible system to all customers on this route.

Resource "locomotive":

As-IS Situation (2018):

Same as with wagons, there is a variety of locomotive types and models in the market available. Moreover, specific country requirements including software packages do make locomotives expensive and unique. Due to different destinations in different countries, it is not easy to harmonize all locos in a hub and spoke system. Again, all relations from and to Verona via the Brenner are of interest, as they all face Germany, Austria and Italy.

To-BE Situation (Start 01/19):

After a first analysis it became clear, that not all locos on this traffic need all three expensive country software packages (Germany, Austria, Italy). Especially the second loco required for the ascent of the mountains (banking) does not need the entire software package. Therefore, the loco's will be changed in Kufstein (German/Austrian border). This should increase efficiency due to lower costs etc.

Resource "track":

As-IS Situation (2018):

Every single train has its determined train path (schedule) from its start in e.g. Germany to its destination in e.g. Italy. A train path is valid for 24 hours. If the train is late, a new train path needs to be ordered. This leads to increased costs as well as manual operation effort on TX side.

To-BE Situation (Start 01/2019):

As with all relations to and from Verona, TX basically have a train northbound and southbound on the Brenner axis (Kufstein – Brenner – Verona) roughly every two hours. The idea behind this shuttle concept regarding the tracks is the following: If one train is e.g. four hours late, another train which arrives earlier than expected e.g. at Kufstein can use the train path of the delayed train. This available train path can be used by the delayed train. In this way, the system can be optimized and allows to minimize waste in terms of waiting times. Again, this leads to a more robust and flexible setup.

Recommendations for implementation and dissemination

As this approach shows several efficiencies by using production know-how, it is key to further validate and monitor this concept on the Brenner corridor to see its benefit on mid and long term. Beside this, TX would like to extend this concept to different corridors of its network.
In general, a pre-requisite for such an implementation is to start with the most frequently used routes in one's network, because here many synergies can interact with each other to raise efficiencies.

Technical Action Sheet No. 5

Pilot Case 5 — Fostering access to Combined Transport for small and medium-sized transport companies

Short description of Action

The current Action Sheet describes measures and actions which enable small and medium-sized transport and forwarding agency companies to take part in Combined Transport. The focus of this action sheet is put on specific recommendations aiming at the reduction of entrance barriers from the perspective of the above-mentioned companies.
These actions can be clustered according to the following categories:

A Business processes
B Technology and equipment
C Quality requirements
D Know-how

The basis for these categories of actions are results available from previous projects and practical input from the stakeholders and the work accomplished during the AlpInnoCT project. The action intends to emphasize the need for a stronger cooperation – e.g. in companies or cooperatives – to develop a critical mass, come to constant transport volumes and thus to industrial processes. In order to have a long lasting and constant transport service by rail, the train itself must have a utilisation level of 100%. One transport company (as an SME-sized) cannot guarantee this 100% utilisation. Thus, a higher number of transport companies and forwarding agencies must cooperate.

Fields of optimisation

- Transport corridor-related: Organisation and process.
- Transshipment terminals and ports: Organisation and process.
- Transport corridor-related: Technology

Production know-how

Affected production know-how:

- Standards (in transport units and processes).
- Definition of quality & service requirements (along the whole transport chain).
- Definition of a customer.
- Transparency and information

Objectives of the action

Simplify and fostering access to Combined Transport for small and medium-sized transport companies and forwarding agencies.

Obstacles

Barriers for transport companies and forwarding agencies

1. Punctuality and reliability
2. No guarantee of performance
3. Quality requirements
4. Infrastructure and politics
5. Lack of consulting and advice

Barriers for RU

1. "Critical mass"
2. Complex transport systems
3. Special equipment & know-how is required
4. Balanced transport streams
5. International administration
6. Preparation time of CT

Target group

- Forwarders
- Transport companies
- Railway companies
- Transshipment Centres
- Government

Responsible actors

- Forwarders
- Transport companies
- Railway companies
- Transshipment Centres

Involved stakeholders

- Politics
- NGOs

Evaluation (Key Performance Indicators or estimates)

The actions can be evaluated and measured by following, selected indicators:

Operation performance:
Lead time = time from start of the CT until the end (> benchmark = road transport time)

Service quality performance:
Timeliness = reliability of transport times for customers

Financial performance:
Costs and pricing = no (significant) additional costs for CT compared to road transport

Environmental performance:
Emissions > saving of e.g. CO_2-emissions of CT compared to road transport

Projects of the past have shown that scientific and at the same technical approaches can lead to measurable improvements of rail transport quality e.g.
> www.iml.fraunhofer.de › iml › documents › IS_Tauernachse_Prien

Timeline of implementation

Short-term:
Establishment of working groups (esp. transport companies, railway undertakings, shippers).

Medium-term:
Development of competitive railway offers based on the workshop results.

Long-term:
Use of established cooperation of short- and medium-term actions to institutionalise this cooperation on a formal basis.

Estimation of shift from road to CT/rail

A practical example of requirements for a marketable railway connection is the following example. These are the requirements for solutions which meet the requirements of railway companies, transport companies, forwarding companies and the industry:

- 3 Alpine crossing trains departures per week along the pilot corridor.
- Each direction has 30 trailers per train.
- This leads to 90 (3x30) trailers per week in each direction.
- One year has round about 50 weeks.
- 50 weeks x 90 trailers lead to 4.500 trailers per year.
- This leads to 9000 trailers in both directions.

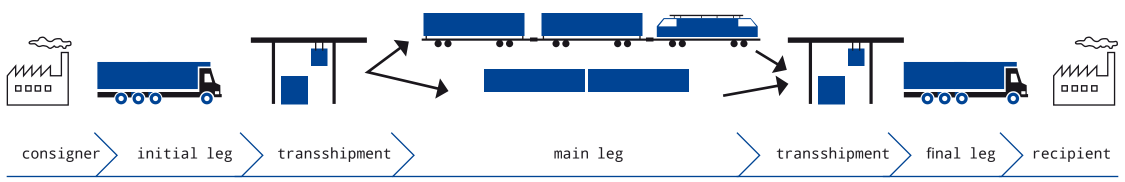
(This calculation is just an example and thus a conservative estimation based on practical input.)

Detailed description of the action

Work processes in SME transport companies are usually designed for their own optimal operation and thus represent isolated solutions. These processes are optimized for internal efficiency. The CT in contrast to the road transport has increased organizational and personal efforts. Because of this, the focus of SME transport haulage companies is often on the road freight transport.

The increasing complexity of CT is based on the increasing number of participants in CT (one carrier in road transport vs. three carriers in CT). This number of participants is necessary to guarantee a successful process flow. The interfaces between the individual transport chain links in CT must be optimally coordinated with each other (for example: punctual arrival times of trucks at a transshipment centre usually lead to long waiting times). Usually the SME transport company does not have its own organization or special vehicles at the destination of the CT.

Combined Transport Chain



Source: LKZ Prien GmbH

This additional coordination effort in CT leads to an increased internal and external communication effort. Language and cultural barriers can also lead to obstacles in the whole process chain. Furthermore, SME transport companies are no longer able to coordinate the whole transport chain. The transport companies outsource their main business to external service providers in CT and is thus depended on their price, performance and punctuality. The customer of the transport company expects the same performance as continuous road transport and this must be guaranteed by the transport company, even though it has no longer direct access.

An additional obstacle is also the necessary amount of cargo required for the realization of a block train to facilitate an economic transport. Since it is seldom possible for most SME transport companies to fill a complete train with its own loading units, they are highly dependent on third party operators.

How can these barriers be solved?

One high potential solution is the creation of a cooperative which centrally organises combined transport. This cooperative unites members from transport companies, politicians, railway companies and all other participants which will take part in CT. This cooperative can facilitate participation in CT by a central organisation of all involved actors and work flows. It also can provide help, support and advice.

Actions to be taken in the future:

1. Development of a blue-print for cooperatives.
2. Umbrella organization with regional organizations.
3. Invitation and establishing of regional working groups which consist at least of transport companies and forwarding agencies (SMEs), railway companies and further stakeholders like infrastructure operators etc.
4. Signature of LOI (Letter of Intent) for the establishment of such a cooperative.
5. Establishment of the cooperative and start of the daily business as well as continuous business development.

Good Practice / Others

- Transporters that already use CT (for example Dettendorfer).
- TX “Pure Green Pioneers”.

Flexible transshipment technology offering short-term solutions for shifting freight from road to rail (e.g. NiKRASA).

Recommendations for implementation and dissemination

- Further projects
- Financial support by law
- Neutral coordination
- Involvement of political institutions

Facts and project partner's opinion on the AlpInnoCT results in a nutshell.

Facts & Figures

Project Duration:
November 2016
– January 2020

7 Dialogue
Events

40 Observers

Total project budget:
€ 3,088,271.93
(ERDF € 2,548,531.13)

5 Pilot Cases

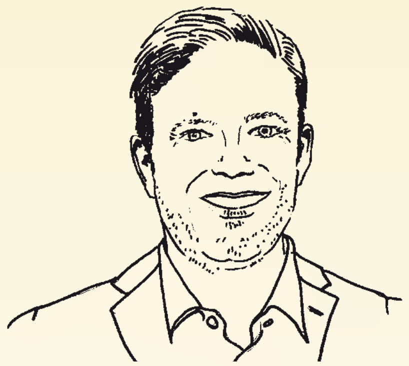
15 Project
Partners

2 pilot relations
Bettembourg-Trieste
& Rostock-Verona QE

Quotes

"The AlpInnoCT project has shown that cooperation between various stakeholders can overcome technical and political hurdles and produce solutions. We are convinced that the AlpinnoCT project results will contribute to the modal shift in favour of rail."

Dr Karin Jäntschi-Haucke, Deputy Head of Transportation Department, Bavarian State Ministry of Housing, Building and Transport



"Switzerland is already successfully demonstrating how an effective policy of a shift to rail can succeed. We have now contributed this knowledge to the AlpInnoCT project. In our view a consistent implementation of effective push and pull measures is needed at a European level to ensure holistic European combined transport."

Jon Pult, President of the Alpine Initiative

"AlpInnoCT has in our view contributed a small step towards creating a borderless Europe. Combined transport remains highly complex, but solutions are being developed every day that we regard as positive."

Bernd Weisweiler, Director of Department Business Development, Innovation and Funding, TX Logistics

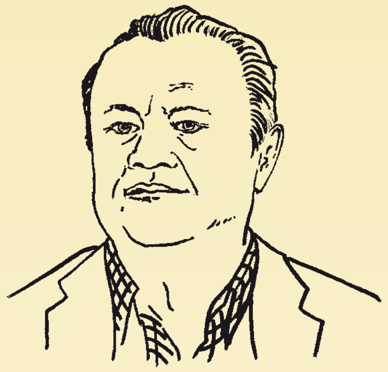
"The seamless transportation of goods is essential for us as port authority. With the pilot action on the Trieste-Bettembourg relation realized in the AlpInnoCT project, we have shown how electronic data interchange can foster sustainable multimodal transport."

Alberto Cozzi, Project Manager, Port of Trieste

Bundesministerium Verkehr, Innovation und Technologie

"For us the project AlpInnoCT showed again, that transport policy can make substantial contributions to the competiveness of rail freight transport. When the Alpine countries join forces, the market share of CT can increase significantly."

Mag. Claudia Nemeth, Head of Department Combined Transport, Austrian Ministry for Transport, Innovation and Technology



"Research prepares the ground for changes that can be implemented in the future. Still more research is needed in the field of combined transport, but the knowledge must also be integrated into university curricula."

Prof. Stane Božičnik, Centre of Transport Economics, University of Maribor

"The AlpInnoCT project has identified obstacles for small- and medium-sized transport companies to take part in combined transport. The development of high potential business models or cooperatives between all actors for bundling contracts must be supported by the public authorities."

Thomas Eberl, Director, Spedition Eberl

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More information about AlpInnoCT results can be found on the website.
www.alpine-space.eu/projects/alpinnoct/

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