ViWaS – single wagonload freight traffic in Europe

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Conference paper STRC 2013

STRC **13th Swiss Transport Research Conference**
Monte Verità / Ascona, April 24-26,2013

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April 2013

Abstract

In several European countries the single wagonload networks are a major component of national and international logistics chains. Especially industrial sectors such as automotive, chemical and pharmaceutical industry as well as steel and scrap metals rely on the services of single wagonload transport. However, in most European countries single wagonload transport has faced decreasing demand, increasing market requirements and changing framework conditions. As a result railway companies have lost market share, mostly to competitors on the road. In a number of European countries single wagonload networks have been shut down completely.

ViWaS (Viable Wagonload Production Schemes) is a research project funded by the European Commission within the 7th European Framework Programme. The ViWaS project consortium consist of consulting companies (HaCon, New Opera), academic institutes (ETH Zürich, TU Berlin) and industrial partners (SBB Cargo, Wascosa, SNCF Fret, Bentheimer Eisenbahn, Interporto Bologna, Eureka Navigation Solutions). The project's aim is to find solutions for the problems the single wagonload network faces today.

Despite rising petrol prices and increasing road congestion, significant improvements in the quality and reliability are needed to make single wagonload transport more competitive. Therefore the ViWaS project aims to develop

- market driven business models and production systems to secure the critical mass needed for single wagonload operations.
- new ways for last mile infrastructure design and organisation to raise cost efficiency.
- adapted single wagonload technologies to improve flexibility, information flows and equipment utilisation.
- advanced single wagonload management procedures & ICT to raise quality, reliability and cost efficiency.

In order to increase transport volumes and use synergies in railway operations, intermodal transports are partly integrated into the single wagonload network. Under the brand name of *Swiss-Split* SBB Cargo delivers maritime containers to private sidings. Currently the containers are placed on flat wagons with a wooden deck (Rs, Res) allowing forklifts to drive onto the wagons to load and unload the containers. Those wagons are reaching the end of their life cycle and need to be replaced. Based on Wascosas *flex freight system* a deck will be developed for the use with standard intermodal flat wagons.

A detailed process analysis is necessary to understand the needs of current *Swiss-Split* customers and the operator. A catalogue of technical requirements will then be provided to the project partners for the development of the forklift deck. A feasibility study will be conducted to determine the expected costs for the *Swiss-Split 2* deck.

Keywords

single wagonload – rail freight – intermodal transport – wagon construction

1. Single wagonload traffic in Europe

1.1 Logistics Trends and Rail Freight

Since 1970s rail freight in Europe has faced decreasing demand despite growing overall transport volumes. Whereas the growing division of labour (effect of goods volume) and the creation of international free trade areas (effect of integration) have increased overall transport volumes, rail freight has been hit hard by the changing structure of goods and changing logistics systems. The effect of goods structure describes the shift away from bulk towards manufactured goods. The decrease in stock size, the growing vertical disintegration of production and other logistics effects have put the focus of transportation on flexibility, reliability and smaller but more frequent deliveries. Hence the transport affinity of goods has shifted from rail to road transport (Pfohl 2010, Vogt 2011).

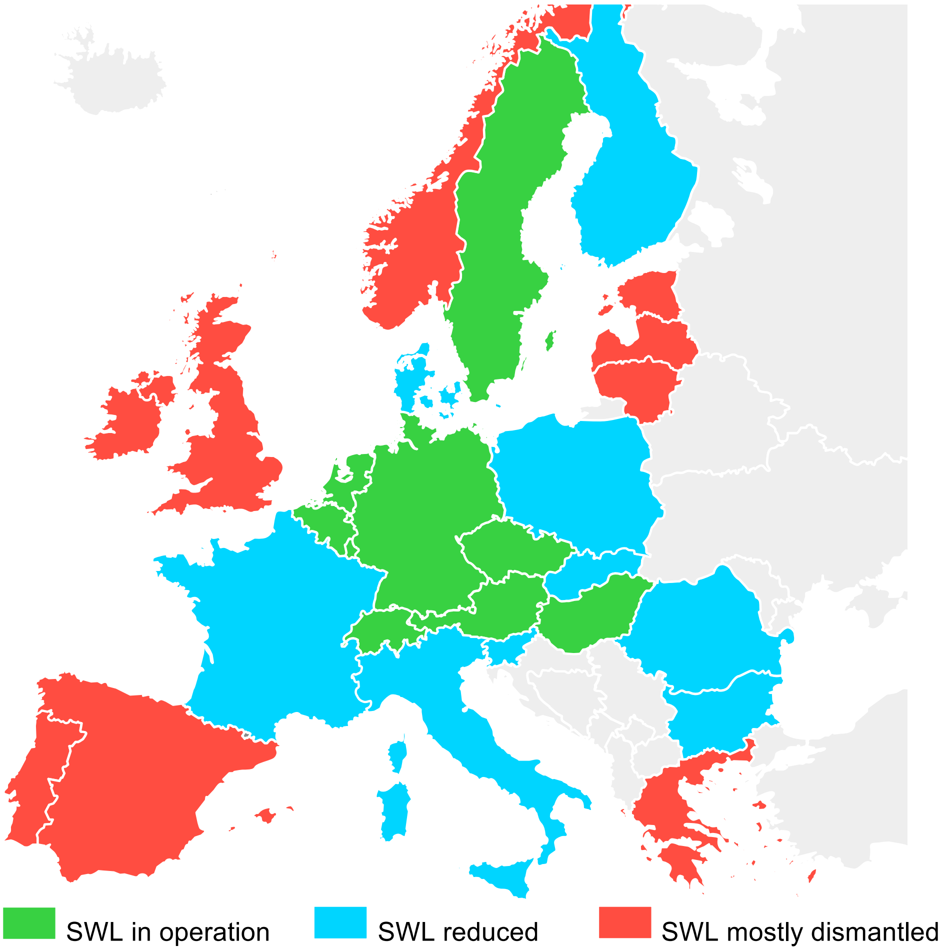
Additionally railway undertakings have faced liberalisation of the rail freight markets in Europe to a large extent. This has forced rail freight operators to increase efficiency by increasing the bundling of transports and decreasing last-mile operations. As a consequence, railway operators had to focus on the operation of block trains and intermodal transport. The operation of short last-mile trains is labour-intensive and requires a lot of shunting and has thus mostly been minimised.

As a consequence the trends in freight railway operations do not correspond to the growing transport markets in Europe. While markets call for small and flexible shipments railways have to focus on bulk transport. Only increasing road congestion and growing ecological awareness makes some shippers reconsider rail transport.

1.2 Single Wagonload Systems in Europe

The rationalisation of rail freight operations has mainly affected single wagonload transport. Reasons for this are high fixed and operational costs for marshalling yards, low profitability due to slow and labour-intensive last-mile operations and the poor utilisation of rolling stock. Additionally the single wagonload business suffered from factors like the extra costs for shippers for the wagon-handling in private sidings, insufficient service quality, the decrease of transport volumes in relevant markets, the lack of competition within the single wagonload segment and increasingly limited possibilities to cross-subsidise from the full trainload business. In many European countries this led to the reduction or even the discontinuation of single wagonload systems (Figure 1).

Figure 1 Single wagonload networks in Europe



Source: CER (2012)

1.3 Approaches to improve Single Wagonload Transport

In order to re-establish single wagonload systems in the transport market for sub-trainload volumes significant improvements have to be made. Adapting to the market requirements requires a raise of service quality of single wagonload transports. Reliability, flexibility, frequency and price are the key issues for single wagonload customers, especially on international transport relations. Additionally customer value should be increased by improving customer information (tracking & tracing) as well as booking procedures.

To reduce operational costs production processes need to be optimised further. Respective approaches include extended containerisation or raising efficiency and capacity in shunting yards by innovative IT tools. Increased bundling of freight traffic flows promises economies of scale and includes approaches like the integration of other rail freight production systems (i. e. intermodal), building networks of logistics service points (“railports”) or new production systems like train-coupling and -sharing.

There is also the aim of increasing customer value and reducing operational costs by introducing improved technology to single wagonload systems. Solutions studied include (semi-)automatic coupling, self-propelled freight wagons (e. g. FlexCargoRail), telematics equipment or flexible rolling stock (e. g. flexfreight).

The development of specialised branch-specific single wagonload operators has already started but could be intensified. Especially the chemical and pharmaceutical industries are already served by niche players (e. g. ChemOil Logistics).

2. Project ViWaS

2.1 Structure and Objectives of Project ViWaS

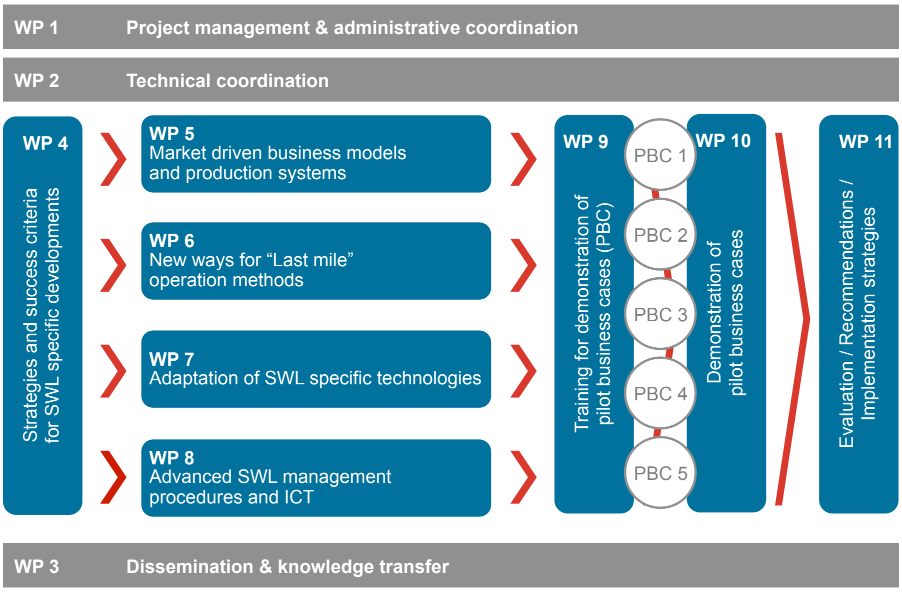
ViWaS (**vi**able **wa**gonload production **s**chemes) is a research project funded by the European Commission within the 7th European Framework Programme. The ViWaS project consortium consists of consulting companies (HaCon, New Opera), academic institutes (ETH Zürich, TU Berlin) and industrial partners (SBB Cargo, Wascosa, SNCF Fret, Bentheimer Eisenbahn, Interporto Bologna, Eureka Navigation Solutions).

The project's aim is to strengthen the competitiveness of single wagonload transport by

- streamlining last-mile operations,
- improving flexibility and efficiency of equipment usage,
- raising transport quality and reliability and
- capturing new markets.

The project consists of eleven work packages, four of which build the core of the work (Figure 2). Additionally, 5 pilot business cases will be conducted.

Figure 2 Work Package Structure of ViWaS



Source: ViWaS

2.2 Main Work Packages of ViWaS

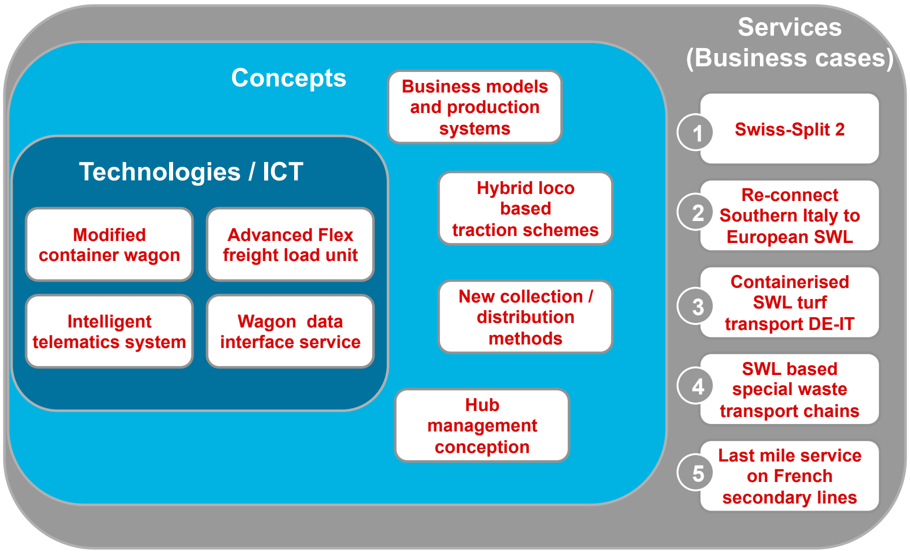
The core of ViWaS are work packages 5 to 8. They will provide new findings and are the basis for new developments.

- WP 5: Market-driven business models and production systems
  New business and cooperation models for SWL operators will be elaborated with respect to generating cargo volumes, sharing risks, asset ownership/usage and operating models. The focus will be on the cooperation between road hauliers and rail companies for operating joint transhipment facilities (e.g. railports, service logistics centres) including advanced services like storage, goods processing and transport administrative services. Aspects to be considered are risk sharing with respect to train utilisation and cost sharing for transport, transhipment and facility operation. The respective production systems will be specified, e. g. multi-functional hubs for SWL and intermodal transport or the growing containerization of SWL transport.
- WP 6: New ways for last mile operation methods
  Possibilities to optimise the last mile operations, which are considered crucial to reduce overall SWL production costs are examined. Especially the containerization of SWL transport, respectively the integration of combined and SWL transport is analysed. New traction schemes using hybrid (or dual power) locomotives are elaborated as well as the operation of bimodal (road/rail) vehicles.
- WP 7: Adaptation of SWL specific technologies
  Developing new technologies for single wagonload transport and adapting existing standard equipment to new uses is the subject of WP7. The developments include of a modified container wagon to enable loading and unloading of ISO containers in industrial railway sidings, a modified stackable log wood load unit for the Wascosa flex freight system and an intelligent wagon telematics system.
- WP 8: Advanced SWL management procedures and ICT
  Hub management concepts enabling rail logistics centres and terminals to serve as hubs for both intermodal and SWL traffic will be developed. The objectives are to lay foundations for joint and cost-efficient SWL/intermodal production. The main focus is on limiting unproductive processes and reducing hub dwell times of wagons. Additionally wagon based telematics systems, e. g. for tracking and tracing or mileage counting information, will be improved to raise the service quality and reduce management and maintenance costs.

2.3 The ViWaS Business Cases

In order to establish realistic and feasible solutions, the developments of the abovementioned work packages will be tested or demonstrated in five business cases: Swiss-Split 2, SWL in southern Italy, containerised turf transport, SWL-based special waste transport and innovative last mile services. Geographically, the five foreseen business cases cover Germany, The Netherlands, France, Switzerland and Italy.

Figure 3 ViWaS Business Cases



Source: ViWaS

- Business case 1: Swiss-Split 2
  Due to increasing maritime container transports it is intended to further extend the utilisation of the Swiss domestic SWL network for distributing maritime containers within Switzerland. Under the name of *Swiss-Split*, SBB Cargo already offers the delivery of maritime containers to railway sidings of the SWL network as an alternative to road transport. In order to extend availability and to acquire new customers, SBB Cargo and partners will develop, test and demonstrate new production methods, traction schemes and adapted technologies, called *Swiss-Split 2.*
- Business case 2: Re-connect Southern Italy to European SWL
  Resulting from a radical restructuring process, Trenitalia has abandoned most of its single wagonload business and stopped the transportation of hazardous goods by rail completely. While in Northern Italy part of the SWL system has been taken over by other railway operators, Southern Italy now lacks a SWL system. Therefore the Italian railway operator *Linea* jointly with *Interporto Bologna* aim at developing a combined

SWL/conventional rail transport service concept for Southern Italy, reconnecting this region with Northern Italy and international SWL networks.

- Business case 3: Regional network of rail logistics centres
  Within project ViWaS *Bentheimer Eisenbahn AG* will develop a network of rail logistics centres in northwestern Germany. The focus will be on improved last-mile operations using hybrid traction, streamlining transhipment in the logistics centres and extend the logistics service profile.
- Business case 4: SWL based special waste transport chains
  The transport of hazardous waste from a landfill remediation in Bonfol (CH) to several different waste treatment sites spread across Germany and the Netherlands by rail is very challenging. Due to fluctuations in the remediation progress, the range of destinations, limited on-site buffer capacities and limited track lengths block train operation is not possible and SWL needs to be applied. Because the disposal facilities require just-in-time delivery and authorities and/or customers often request a continuous monitoring project ViWaS will enhance telematics for hazardous waste transport by SWL.
- Business case 5: Last mile service on French secondary freight rail lines
  In SWL transport last mile operation accounts for 25 % to 40 % of the costs and of the overall transit time. Process analyses have shown that the main reasons are an overlap of resources between the railway operator and the shipper and a loss of time due to shunting manoeuvres in the private sidings. Project ViWaS will develop and test last mile operation concepts with road-rail vehicles.

3. Business Case: Swiss-Split 2

3.1 Swiss-Split today

Under the name of *Swiss-Split*, SBB Cargo offers the delivery of maritime containers to railway sidings of the SWL network as an alternative to road transport. Currently SBB Cargo delivers on average 160 containers (or 120 wagons) daily in the Swiss-Split network to overall 160 different customers. Commodities range from furniture, to beverages and food. Swiss-Split is only offered for international, especially intercontinental transports.

For the transport of containers in the Swiss-Split network, standard flat wagons with a wooden deck (*Rs*- and *Ks*-wagons) are currently used. In intermodal terminals, the containers are moved from the international intermodal trains to the Swiss-Split wagons. To prevent the container from sliding, a timber batten is nailed to the wagon floor.

Figure 4 ISO container on standard flat wagon (*Rs*-wagon)

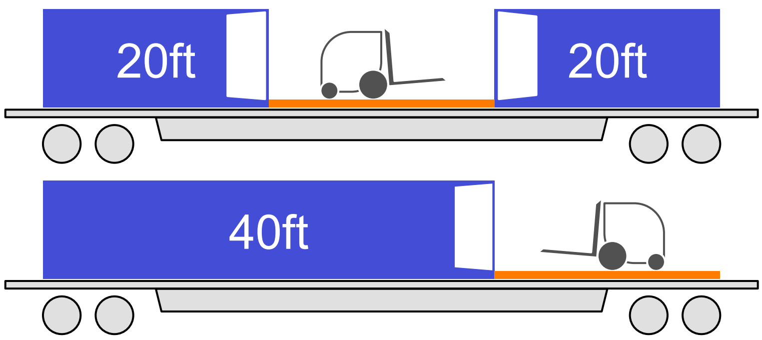
The Swiss-Split wagons are then moved to the nearest shunting yard from where they are distributed to the customers' sidings. The customer loads or unloads the container by driving onto the wagon and into the container using ramps. The loading and unloading are done by forklift, hand pallet trucks or rolling bins.

The currently used flat wagons (*Rs, Ks*) are reaching the end of their life cycle and need to be replaced. Additionally, SBB Cargo plans to extend the Swiss-Split network and therefore requires more rolling stock suited to transport and load/unload ISO containers.

3.2 Development of the Swiss-Split platform

Instead of replacing the rolling stock for Swiss-Split by new wagons with wooden decks, the use of standard (e. g. *Sgns*) container wagons is considered. Since *Sgns* are much more common than *Rs* SBB Cargo profits from a larger pool of rolling stock and more flexibility. Also, the manual placement of timber battens for the fixation of the containers can be avoided. Container wagons though have a skeleton construction rather than a deck and hence need to be equipped with a drive-on platform (Figure 5).

Figure 5 Technical concept of the Swiss-Split platform on a 60 ft container wagon



For the development of the Swiss-Split platform a detailed process analysis is conducted to determine operational, regulatory and customer requirements. Enquiries at a number of rail freight customers, railway operators and interest groups have produced a number of requirements (Table 1). After the collection of requirements from operators, regulators and customers, technical parameters need to be specified in order to build a prototype of the platform.

Simultaneously the business model and an operational concept for the new Swiss-Split have to be found. Key questions are

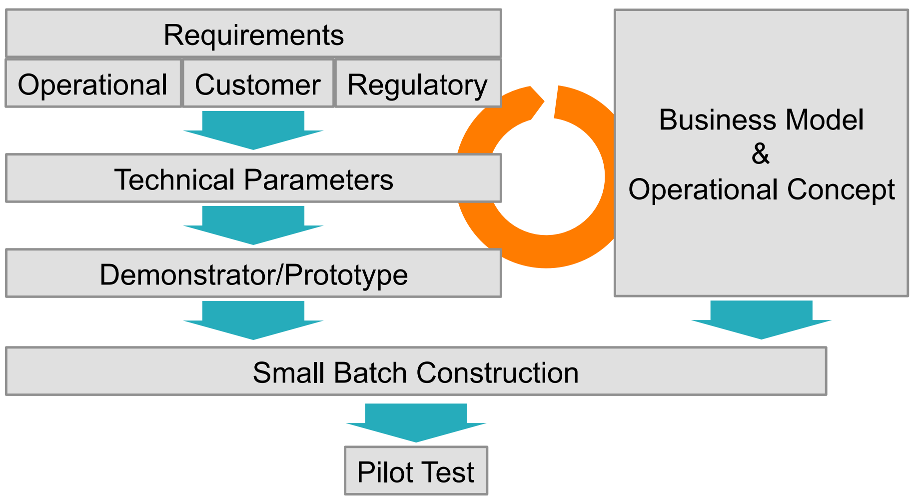
- The optimal number of platforms in the production system.
- Ownership of the platform.
- Dispatching and recirculation to intermodal terminals.

Table 1 Requirements for the development of the Swiss-Split platform

	Requirements
Operational	Platform can be used on standard container wagons, using one 40 ft as well as two 20 ft-containers.
	Platform can be handled with common container lifting equipment.
	Platform can be stacked as well as transported and handled as a stack.
Regulatory	Platform fulfils technical regulations of authorities, the railway operators and infrastructure managers.
	Platform fulfils European regulations concerning safety at work.
Customer	Platform allows containers to be opened and closed in the siding.
	Platform can be used with all common types of forklifts, hand pallet trucks and rolling bins.
	Platform does not require any additional device for bridging the gap between wagon and container.

The platforms can be owned by the railway operator, the customer, the wagon owner or even the terminal operator. Additionally there also exist models with wagon keepers leasing the platforms. The elaboration of the business model and operational concepts is currently on-going and several iterations will be needed to obtain a solution which is technically and economically feasible.

Figure 6 Approach to the development of the Swiss-Split platform



4. Conclusion

In order to regain market share rail freight needs to adapt better to the current transport market. This includes an improvement of single wagonload systems to re-establish rail freight in the currently growing market of truckload sized shippings. Project ViWaS, funded by the European Community within the Seventh Framework Programme, brings together industrial, academic and consulting partners to find solutions for single wagonload traffic in Europe.

Within *Swiss-Split* SBB Cargo enriches its single wagonload system with the delivery of maritime containers and therefore preserves the current number of private sidings. With the currently on-going development of new technologies the Swiss ViWaS partners (wascosa AG, SBB Cargo and ETH Zürich) aim to reduce the operational costs, gain new customers and promote the integration of single wagonload and combined traffic.

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