The project

The Intermodal rail freight Twin hub Network North West Europe is a 4-year project running from 2012 to the end of 2015, which is partly funded by the INTERREG IVB North West Europe programme.

Objectives

The Twin hub network project aims at making intermodal rail transport within, to and from North West Europe more competitive, in particular between the Dutch and the Belgian seaports and European inland terminals. Improving rail competitiveness enables to shift freight flows from road to rail, providing a more sustainable and robust transport network and increasing the network connectivity and territorial cohesion within North West Europe.

The project pursues improvements in the performance of rail services by bundling the intermodal rail flows of different seaports in the Dunkirk-Amsterdam range, in particular the flows of Antwerp and Rotterdam. Such bundling increases the scale of transport in terms of larger trainloads, higher service frequencies and/or serving more inland terminals and seaports, including inland terminals and seaport terminals with smaller flows. In case of larger trainloads the bundling also supports the more efficient utilisation of track infrastructure.

The bundling comes down to the following devices: let Dutch load units lift along on Antwerp trains wherever these have or could have a strong market position. The smaller seaports should get attached by rail to the train services of the two large seaports. The inland terminals move load units to different seaports in the mentioned range by joint trains instead of separate ones.

Hub-and-spoke bundling

The bundling of port flows is to take place by means of hub-and-spoke networks. In general, a hub-and-spoke network has fewer trains in the network than a direct rail network with a comparable network connectivity (Figure 1).

**FIGURE 1**

Twin hub network a transnational rail service network to improve intermodal performances
This smaller number is the fundament for the expectation that the size of trainloads, frequencies, number of terminals accessed and the utilisation of tracks can be increased.

A hub-and-spoke network in comparison to other types of complex bundling networks (e.g. line networks) has the advantage that
- it only employs trunk trains, hence trains with a full train load. This implies lower train costs per load unit;
- it allows to integrate the flows of a larger number of seaport or inland terminals. The increasing number of rail terminals in large seaports makes it increasingly difficult to bundle the flows to trainloads by other types of complex bundling.

**The Twin hub concept**

Twin hub is a title for a set of hub-and-spoke networks. Each of these consists of trains which meet at the hub to mutually exchange load units. The trains of a hub-and-spoke network start at different seaports, meet at the hub to exchange load units and continue their journeys to different inland terminals v.v. Ideally the trains visit the hub simultaneously.

The Twin hub network has two hubs, located at the gravity points of the flows: one in the region of Rotterdam, the other in the region of Antwerp. Which hub is used primarily depends on its geographical orientation. Trains to the south are likely to use the Antwerp hub, ones to the northeast the Rotterdam hub (Figure 2).

A central feature of the Twin hub network is that the service area of a hub is not restricted to its own seaport. The Rotterdam hub will also serve the Antwerp region and the Antwerp hub also the Rotterdam region, both hubs also the smaller seaports. In awareness of the presence of seaport competition such cooperation is likely to take place on complementary corridors.

In this configuration each seaport and inland terminal represents a spoke (Figure 3), i.e. each train and load unit only visits one hub during a journey to limit the exchange costs, train costs and shippers’ time costs of hub exchange. The difference with a network with a single hub is not the number of hubs visited, but the size of the service area.

**Project structure**

The Twin hub project consists of four work packages (WPs):
- **WP 1 (Identification of promising Twin hub networks)** has the aim to identify regions which could be served by the Twin hub network. The analysis consists of mapping transport flows,
designing hub-and-spoke networks and operations, analysing their performances and analysing their competitiveness towards reference modes, such as road and short sea. The envisaged performances relate to transport costs, transit time and transport frequency, all on a door-to-door basis.

**WP 2 (European pilot Twin hub service network)** is to prove the advantages of the Twin hub network (train loads, frequency, network connectivity) by means of a pilot, and experience the network in practice. The business plan describes the pilot services, taking account of the results of WP 1 and of the ideas of the involved rail operators. Within this work package also an interactive booking information system is being developed, to improve the load planning and matching of transport demand and train capacity in the train services of the different operators.

**FIGURE 3 Train services via hub Rotterdam and hub Antwerp**

**WP 3 (Towards programming and planning required infrastructure)** addresses rail infrastructure to be realised on the long term. Its objective is to clarify what rail infrastructure is required to make the Twin hub network, when expanded to a substantial scale, ultimately successful. For instance, Rotterdam has no suitable hub infrastructure for intermodal trains yet. The WP activities include raising the interest of key decision-makers in the field of infrastructure and spatial planning to program such infrastructure.

**WP 4 (Societal benefits)** analyses the societal costs and benefits for different stakeholders, in particular the 1) intermodal rail sector, 2) the regions (large ports, small ports, inland terminals and their regions), 3) European policy makers (territorial and economic cohesion; technology, employment and sustainability policies). The results are to be used to increase the interest and commitment of key stakeholders for the Twin hub network and to derive recommendations on how European transport and infrastructure policies could support initiatives such as the Twin hub network more appropriately.

**Transnational cooperation: project partners**

In the project transnational cooperation between seaports and intermodal operators belonging to different countries plays an important role. The partners in the Twin hub project are:
- The rail operators IMS Cargo Belgium (B), IMS Rail (CH), HUSA (NL) and Russell (UK);
- The port authorities Rotterdam (NL) and Zeeland (NL);
- The universities of Delft (NL), Rotterdam (NL), Brussels (B), Karlsruhe (D);
- The consultants Panteia (NL), Nieuwenhuis Rail Expertise (NL) and Ab-Ovo (NL).

**Achievements**

**Promising regions**

A first result of the project was the mapping of promising regions for Twin hub rail services. The map shows combined road container flows to and from Rotterdam and Antwerp (and optionally UK) and hinterland regions (at NUTS3 level). It visualises the regions that thanks to bundling flows have potentially sufficient large flows to establish new rail services, and hence suggests which rail services could be promising to include in a Twin hub network. Most promising regions on the continent were found in Northern France and Western Germany (potentially A/B-services) and also regions lying further away, like in Poland or Southern France.

**Complementary costs analyses**

In order to validate the indications for promising regions two different complementary costs analyses have been performed. Delft University of Technology used their rail cost model (to compare rail transport with road transport in different
scenarios) and Free University Brussels applied their *Euro Terminal Model*, that is rather based on prices instead of costs, and capable to identify the best terminal to use in a rail service into a promising region.

**Bundling tool**

For the purpose of proposing a promising pilot network these approaches are satisfactory. However, to enable an exhaustive approach for the identification of promising Twin hub networks a bundling tool has been developed by Delft University of Technology. This is an optimisation model to identify the best combination of hub-and-spoke or direct rail services and road services. As it enables to evaluate many sets of Twin hub network its results are most valuable for the analysis of societal benefits in WP 4. The tool is currently being tested on plausibility.

**Work progress**

The project activities currently concentrate on the evaluation of the proposed pilot network as a stepping stone to finalise a global business plan for the pilot (WP 2). In this project phase the rail operators have a leading role. The activities consist of detailed calculations of the costs of the pilot operations, evaluating the competitiveness of the train services to road-only transport and existing intermodal transport (rail, barge, short sea) chains regarding rates, transit times and frequencies. Exploring the commercial interest of customers to use the planned rail services is of crucial importance in this evaluation. In other words, the top-down approach in WP1 regarding the identification of potential flows and a possible pilot network is now mirrored to a bottom-up approach to confirm the viability of the proposed pilot network. After that the next step is the actual preparation of the pilot, i.e. the organisation of resources and arranging infrastructure paths and time slots at terminals.

Members of the partners in the Twin Hub project

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The Twin hub network project is partly funded by the INTERREG IVB North West Europe programme.

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