Deliverable 9.3
Executive Summary

The integration of national systems into European grid

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This report deals with the integration of national systems into European grid. Seamless international rail transport (on a high quality level) is in many cases not standard today. The reasons are manifold; the most important obstacles are infrastructure gaps and insufficient interoperability. In some fields the European grid of 2015 is years behind, because RUs are not offering attractive connections due to the weak perspectives in terms of profitability. Legislative barriers like the complicated approval for multi-system passenger train sets are additional barriers that have to be overcome in order to realise a European grid.

Nodes play a pivotal role in the European grid (Figure 1) and in their function as co-modality enablers. They serve as integrators between different networks (rail network, public transport networks, industrial and commercial networks, etc.).

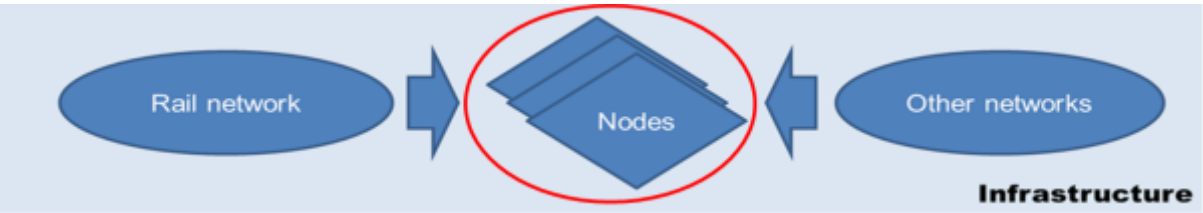

Figure 1: Nodes as pivotal integrators of different networks

In order to fulfil the objective of creating a uniform Rail Space in Europe at the citizens' disposal, allowing an effective free circulation of passengers and freight in a borderless environment, it is necessary to apply the principle of the "Network of the Networks". This is intended as by-passing the old geographical situation of individual countries which over the past decades developed their rail network according to given technical standards. Today the European rail network is constituted by the networks' combination of each country of the Union. A future integration of the network of the networks has to take place in the SPIDER PLUS action fields infrastructure, technology, rolling stock, governance and market uptake.

European grid for passenger services

The analysis of the current and the elaboration of a future European grid for passenger services are based on four dimensions (Figure 2):

- **European lines**: There already is a high number of border crossing lines for long distance (HSR, Intercity and Night train) services in operation. These lines are the backbone of the current European grid and serve as basis for future extensions.
- **Reachability**: The reachability dimension takes the travel time into account. The regional reachability (within 60 minutes) illustrates the first/last part of the travel chain. The long distance reachability indicates the degree of cross linking between main rail hot spots and possible destinations.
- **Air Rail cooperation**: HSR is predestined to replace "short" distance flights (below 600km). Today, this potential is not exhausted at all. The replacement of short flights (in many cases "feeder flights") can lead to a win-win situation for air and rail traffic.
- **Regional border crossing**: The European grid is also consisting of important regional connections linking centres near the border.

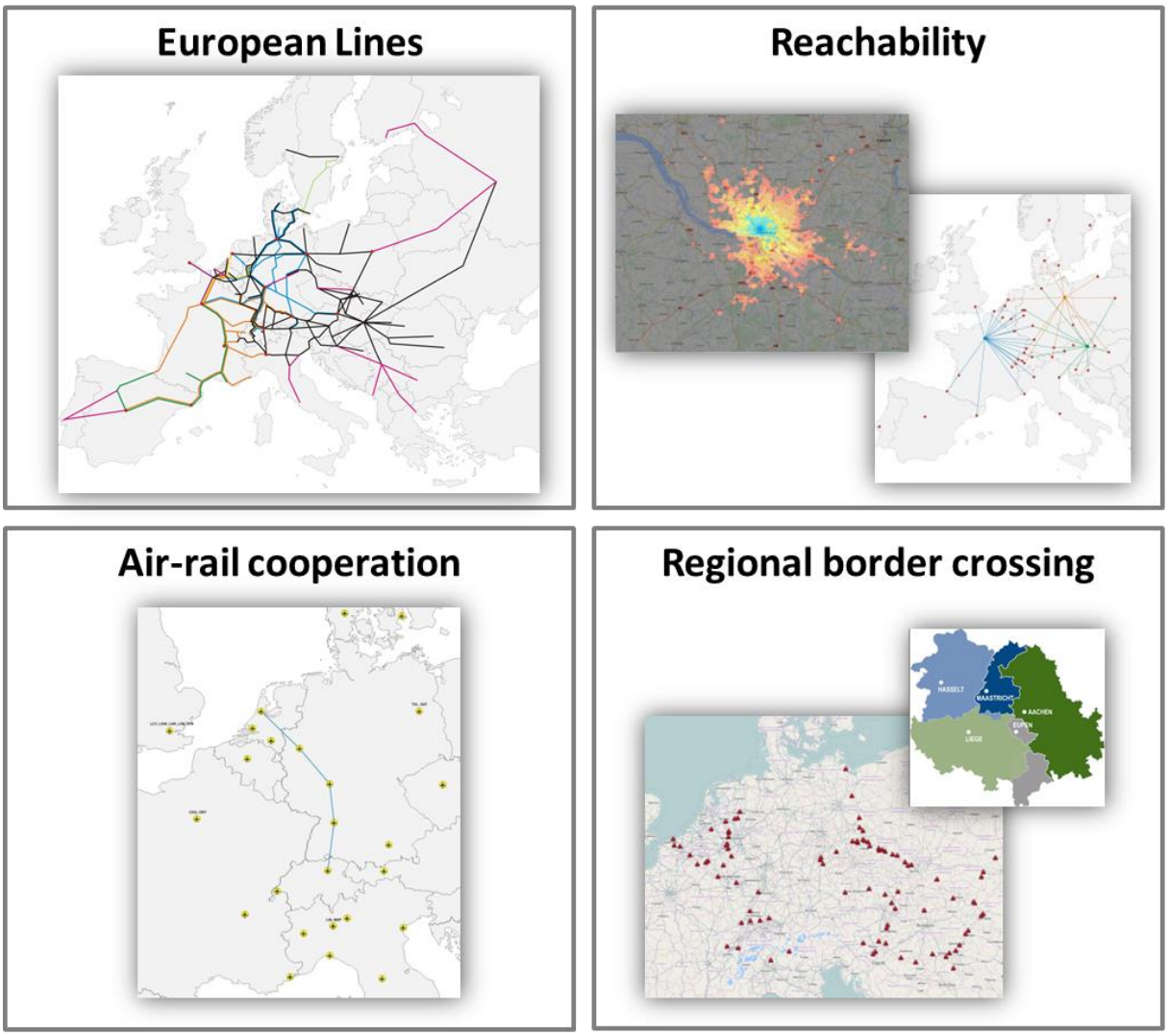

Figure 2: Four dimensions of the European grid for passenger services

European grid for freight services

Freight services on European level are mainly intermodal services. Therefore a resilient network of terminals is mandatory, considering the traffic attraction zones and the (TEN-T) corridors. The implementation of Megahubs has a high significance for the development of the European grid for freight services. Firstly, the Megahub concept contributes to the connection of areas that have been more or less uncovered so far. Secondly, the Megahubs have an important function as corridor integrators. For this reason their location is most beneficially at the intersections of different corridors. A good example in this respect is the Megahub Lehrte which is located at the junction of the North Sea Baltic, the Scandinavian Mediterranean and the Orient/East-Med corridor lines. It thus will have high connectivity and fulfil an important corridor integration function.

Besides the network infrastructure and the network of handling facilities, the management of capacities is equally important. In order to strengthen a fully integrated transport solution which offers "door-to-door" mobility in the European grid, it is necessary to amend the approach of prearranged train paths (not taking terminal capacities into account). This would allow more flexibility and a coherent capacity allocation on the line (corridor) and the network nodes (terminal/hub). The pre-arranged

path booking system has to be modified to arrive at a flexible booking system which aligns the capacity on the corridor and in the terminal.

The desired overall development of the European grid until 2050 is summarised in the following table:

Table 1: Mind map European grid development

	Passenger	Freight
2015	• Service offers are mainly national oriented. • Few border crossing lines are in operation but mainly dedicated to national purposes.	• Huge challenges for border crossing transport (Interoperability, Train path management, etc.).
2030	• Growing together on the basis of improved infrastructure and bi-/trilateral cooperation. • Plans and analysis for the implementation of an integrated timetable connecting main European cities ("hot spots"). • Increasing importance of regional border crossing connections. • Main airports with HSR access.	• Hub and spoke concept established (considering traffic attraction zones and connecting of so far uncovered areas). • Serious interoperability conflicts (train length, gauge 4C, axle load, etc.) are solved.
2050	• Realisation of European grid with frequent services and seamless border crossing transport for passengers. • Convenient and seamless ticketing	• Sufficient number of mega hubs located at strategic important junctions of corridors. • Holistic and coordinated management of train paths and handling capacities.

The growing together of the national systems into a European grid will take a long time and its' introduction requires support by several actors. Infrastructure managers have to provide a resilient basis with consistent high standards especially for freight. A special focus is also on the border crossing infrastructure which is in some fields missing or improved too slowly. Railway Undertakings have to develop a coordinated European timetable accompanied by a passenger friendly ticketing concept. It is finally up to European and national authorities to support the process by financial aid and suitable legislative conditions.