# Transport system specification – case B

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Advanced, Efficient and Green Intermodal Systems

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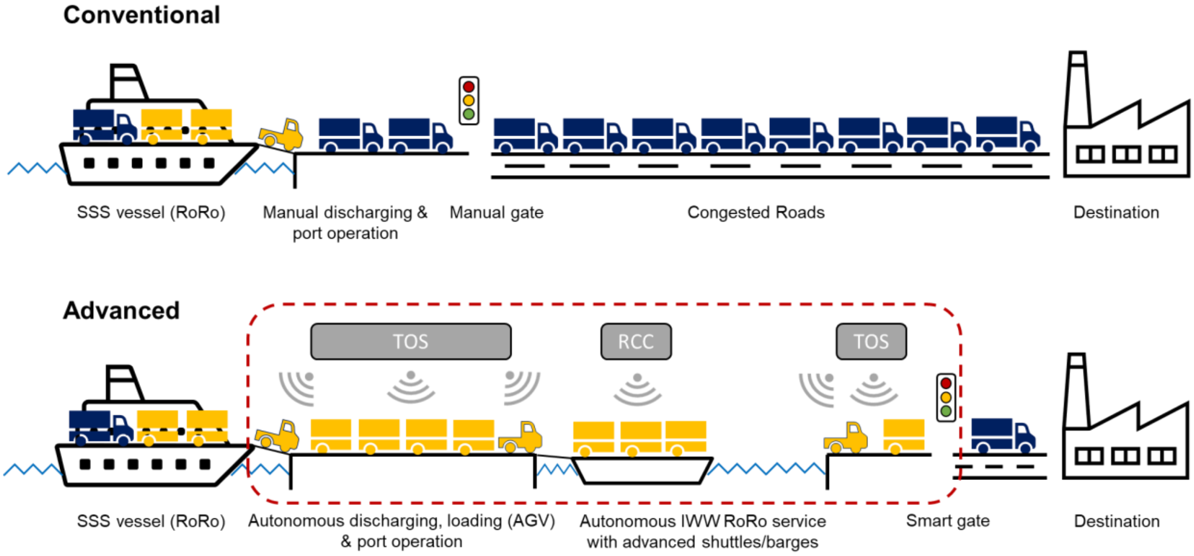
# Executive Summary

In this report, D9.2, the transport system for use case B was specified in a first approach, following the main objective of shifting cargo from road to an inland waterway barge service as illustrated in the figure below. With this goal in mind, the transport system for use case B was understood as an interaction of advanced IWW vessels, serving two specific flows in the region of Belgium and the Netherlands, of routes within these flows, of the ports along these routes, and of the transhipment from vessel to port.




To specify this transport system the following methodology was used:

- study of advanced RoRo approaches already existing, mainly in Europe
- describing autonomous RoRo operation in general on a high level
- introducing advanced vessel concepts developed in WP4, feasible for UC-B
- investigating ports of interest along the routes under consideration
- combining the above findings and information into two specific flows, building the sound basis for further detailing and verification of the transport system

The study of existing advanced RoRo or RoPax approaches revealed that vessel sizes, found to be suitable, are small to medium-sized (max. CEMT class IV) to reach far into the hinterland and to connect smaller IWW to the core network of TEN-T. Most studies focussed on container vessels, i.e. a containerized cargo flow. The only approaches with an advanced RoRo transportation were found for electric car ferries or for the advanced concept of ASKO, which is due to its short fjord crossing comparable to a ferry concept. Today there is little automation or even autonomy in IWT. But most studies found that autonomy will lever competitiveness of IWT with small or medium-sized barges. In general, a high potential for an advanced IWW transportation was found for the region of Belgium and the Netherlands due to its high density of IWW and its vicinity to North Sea ports.

The description of autonomous RoRo operation, divided into vessel operation, transhipment, and port operation, showed benefits and obstacles of automation/autonomy. Increased safety, efficiency, and flexibility were found as main benefits. Especially efficiency and cost savings can make an inland RoRo barge service with small to medium-sized vessels become viable. Obstacles of autonomy to overcome are communication issues between the different systems and regulatory hinders. Technical wise, automated/autonomous equipment is needed, such as efficient and multiple sensors and algorithms to detect and control actions for all motions, e.g. during sailing or port operations. Berthing and mooring needs to become autonomous, the same as loading and unloading the vessel. Highly integrated TOS are needed for effective cargo handling and storage at the port side. Restricted areas need to be assigned for autonomous vehicles only and for manned operations as well as smart gates to achieve a smooth and safe operation in port and a connection to public roads.

Advanced vessel concepts in a draft state were developed in WP4 and presented in detail in the report D4.2. For use case B, IWW vessel concepts of CEMT class II – IV+ were introduced. By studying the port, routes, and flows it was found that the CEMT class IV+ vessel concept might be the most feasible concept – not only because of its highest capacity, but also due to its flexible loading and unloading capabilities by offering a transversal stowage and lifting device for each double decker trailer slot. This allows especially the A-B-C routes to be served in a highly flexible way. Transversal stowage also enables the vessel to moor on queys with no port-side ramps, therefore, accessing small ports or operating in big ports without disturbing the “standard” RoRo operations.

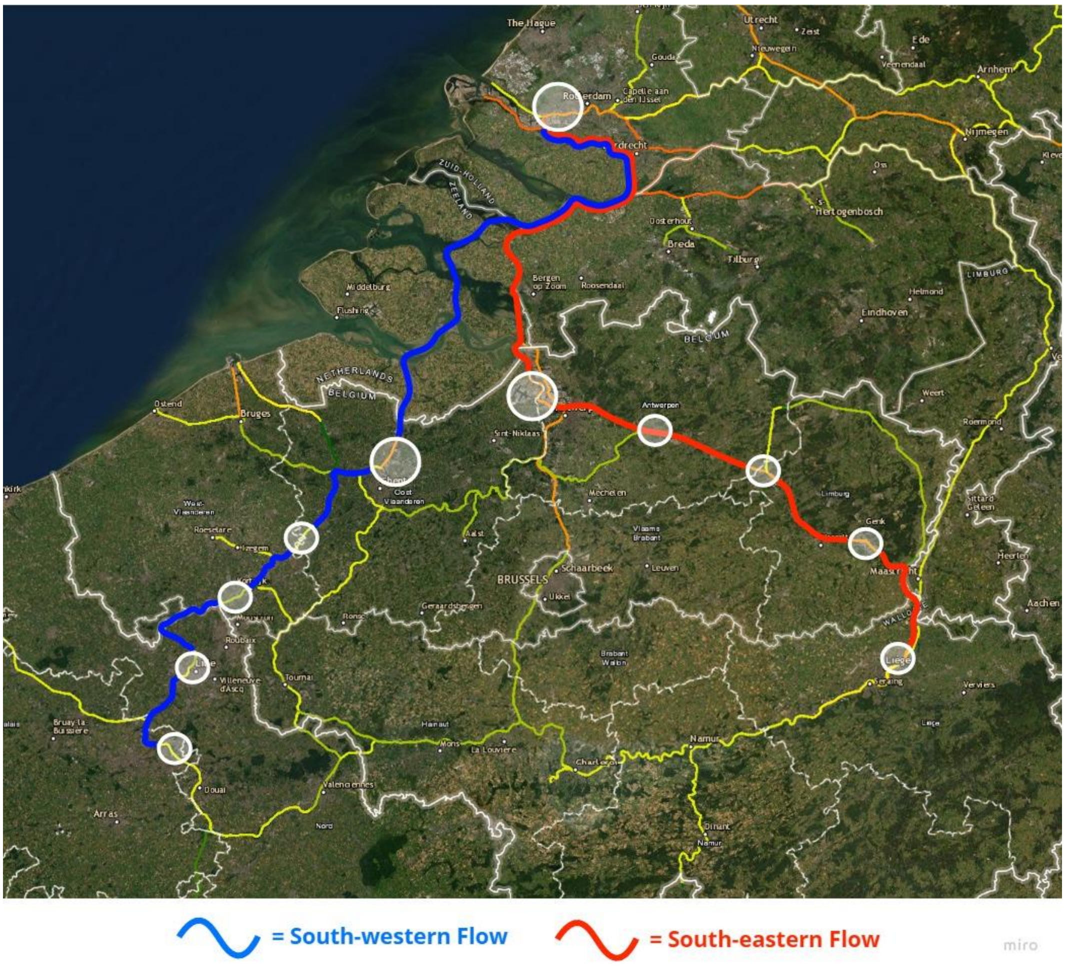
An extensive study of ports in the region of interest was conducted. Not only the ports itself with their possibilities in terms of accommodating the IWW RoRo barge but also interesting points in the vicinity of the ports were investigated, such as logistics centres, warehouses, factories, rail connections, or free spaces for future expansions. Where available, cargo inflows and outflows were listed – which especially counted for the DFDS owned terminals in the ports of Rotterdam and Ghent. High potentials were found for the main route between Rotterdam and Ghent as well as Rotterdam and Antwerp. But also for the further connections into the hinterland, e.g. following the Albert Canal lots of smaller to medium-sized ports were found with high potentials for an IWW RoRo barge service, which need to be further explored.

Finally, it was found to describe the transport system better in terms of flows instead of routes. Port of Rotterdam, and herein the DFDS terminal in Vlaardingen, was found to be most suitable as main port and “starting point” (or ending point) for two possible flows (see figure below):

- a south-eastern flow (red line) and
- a south-western flow (blue line).

The south-eastern flow can be divided into two routes: an A-B route from Rotterdam to Antwerp and an A-B-C route from Antwerp down to Liège (and vice versa). The first route having no intermediate stops and, hence, offering a fast transportation with a maximum capacity. The second route in this south-eastern flow is a kind of milk run with several stops in-between – either on a scheduled basis or partially as on-demand tramp trade. For this kind of transportation, a highly flexibly loading and unloading is needed for trailers to “jump on/jump off” at the different ports. The vessel concept of CEMT class IV+ with transversal stowage seems to be most suitable for this kind of route.

The south-western flow can, again, be divided into two routes: an A-B route from Rotterdam to Ghent and an A-B-C route from Ghent to Lille/Lens (or even further down to Paris after the Seine–Scheldt project is finish with planned expansions in canal size, bridges, and locks). For the first route the same applies as for route 1 in the south-eastern flow (Rotterdam – Antwerp). For the second route from Ghent to Lille/Lens, again, the transversal stowage with its highly flexible loading and unloading would be the most beneficial concept. But the characteristics of the inland waterways allow only for the use of CEMT class IV+ down to Kortrijk. Further down to Lille/Lens only CEMT class IV is available which limits especially the breadth of the vessel to max. 9.5 meters which is too short for transversal stowage of trailers.




For the future work to be done in WP9, the transport system of use case B must be specified more in detail. This includes:

- the identification of bottlenecks and other obstacles in T9.3,
- the detailing and validation of the AEGIS solution in T9.4, and
- finally, public recommendations in T9.5.

Besides this general WP9 schedule, special emphasis needs to be put on the decision towards concrete “micro scenarios” on which the KPIs in WP7 can be calculated (including vessel specifics, emissions, cargo volumes, costs, etc.). The presented data in this report provide a sound basis for the definition of these micro scenarios.

Once established, the Logistics Analysis (LA) Tool, developed in WP2, can be used to compare different modes of transportation and other subjects, such as economics and emissions of different vessel types.

Commercial aspects must be included in next deliverables as they will give DFDS the option to engage with customers in the regions adjacent to the routes to see if these shipping flows would be interesting to use and if they would do so with the above barge concepts.