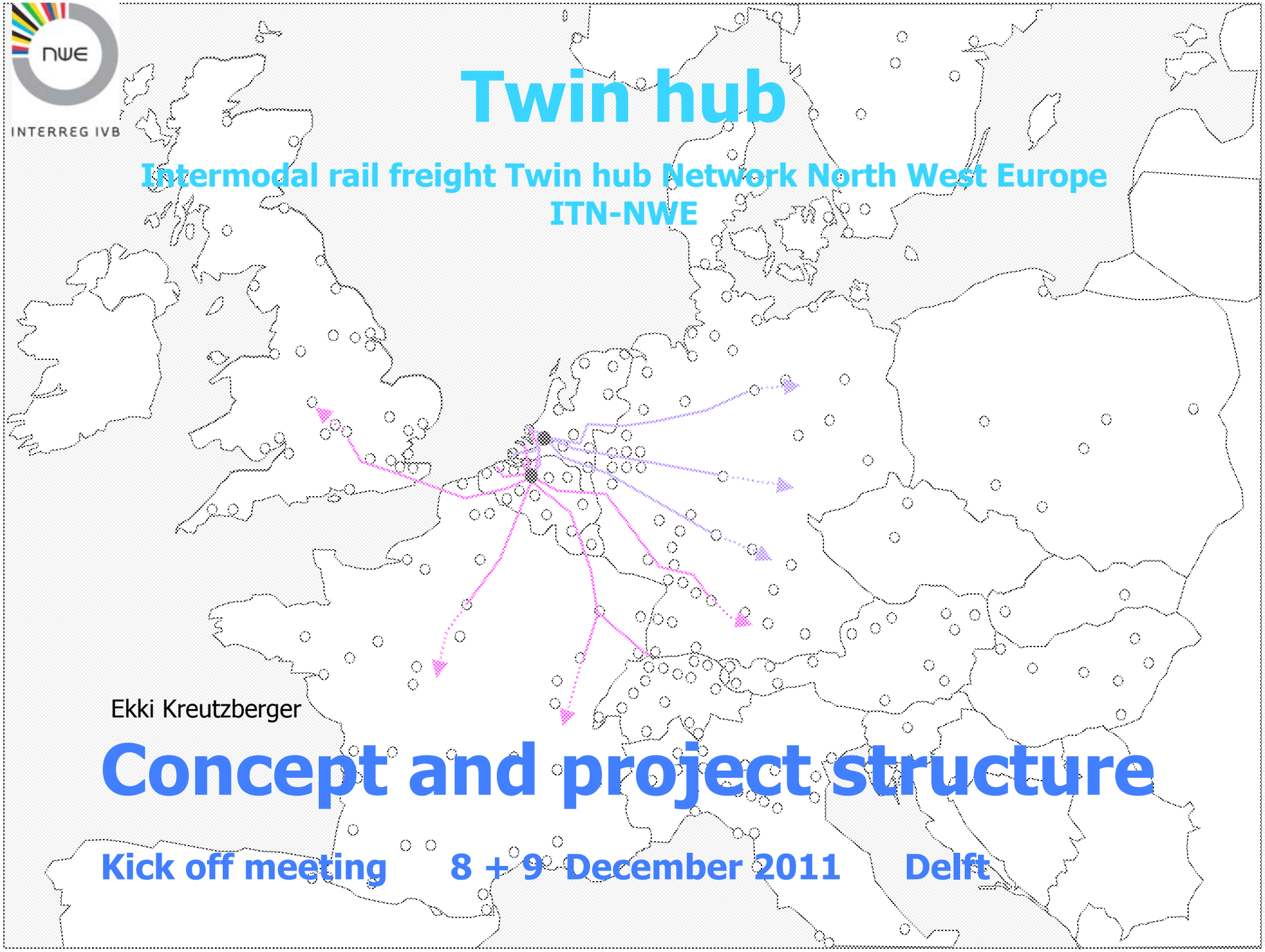
# Twin hub

## Intermodal rail freight Twin hub Network North West Europe
## ITN-NWE

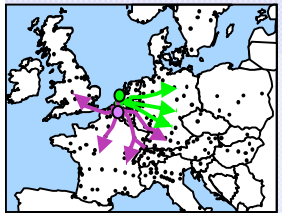


Ekki Kreutzberger

# Concept and project structure

**Kick off meeting 8 + 9 December 2011 Delft**

# Twin hub. The conceptual framework





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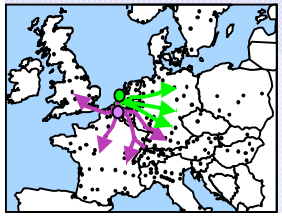
# Starting notions for the project

- Rail transport is important for sustainable transport and competitive Europe
- Classical rail products are loosing market shares
- Intermodal rail transport is spearhead of rail sector
- But its growth is smaller than needed
- Due to intermodal quality
- And due to cost performance
- Also, rail capacity problems in large nodes

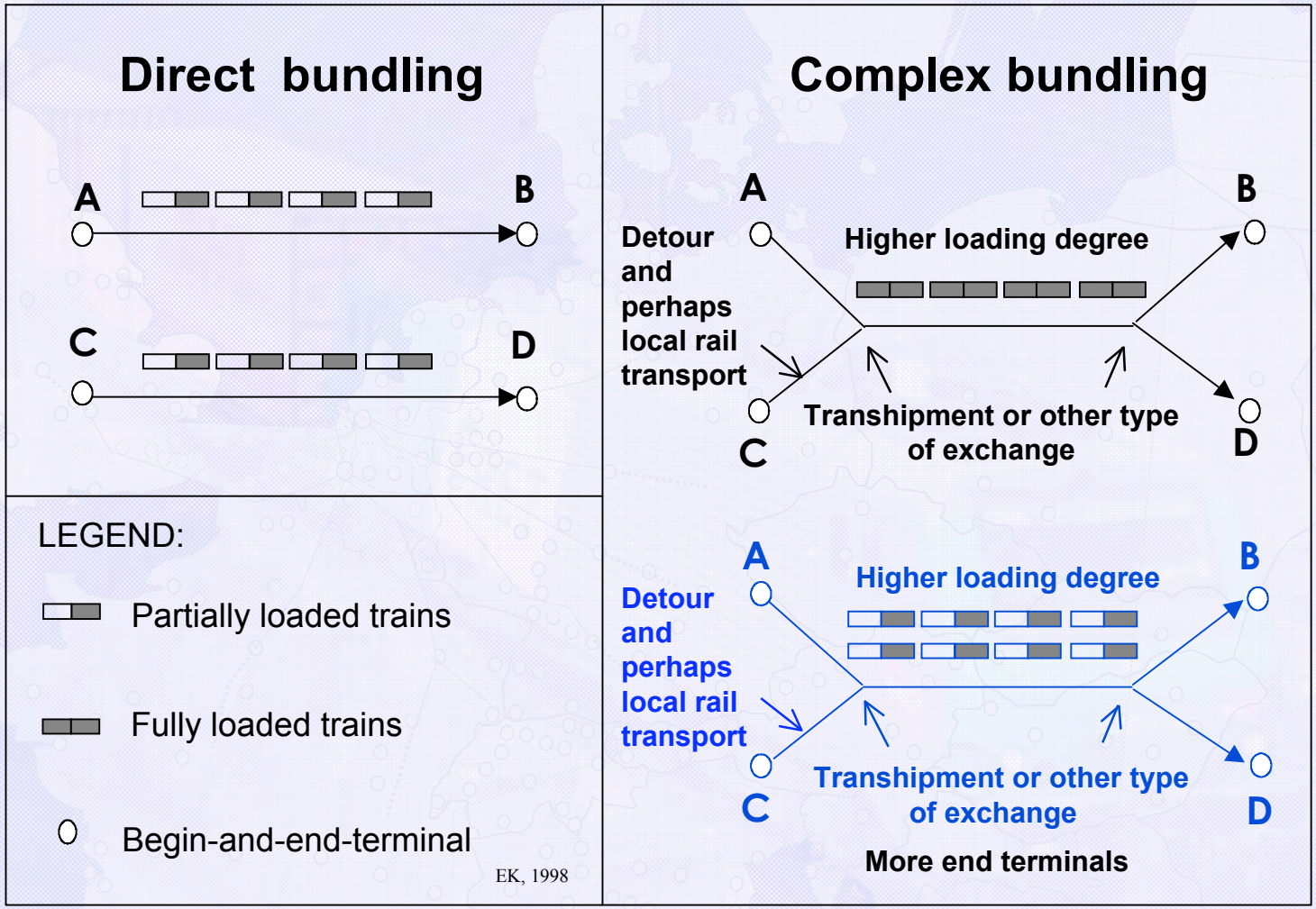
- CONCLUSION:
  - Search for innovative rail concepts
  - Search for innovative collaborations between service providers

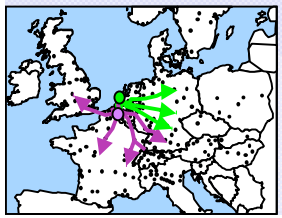
TWIN HUB is one answer to this challenge



# Starting notions for the concept

- Many intermodal rail flows are too small for direct train services …
- … also from and to large nodes
- "Complex bundling" is required for many relations





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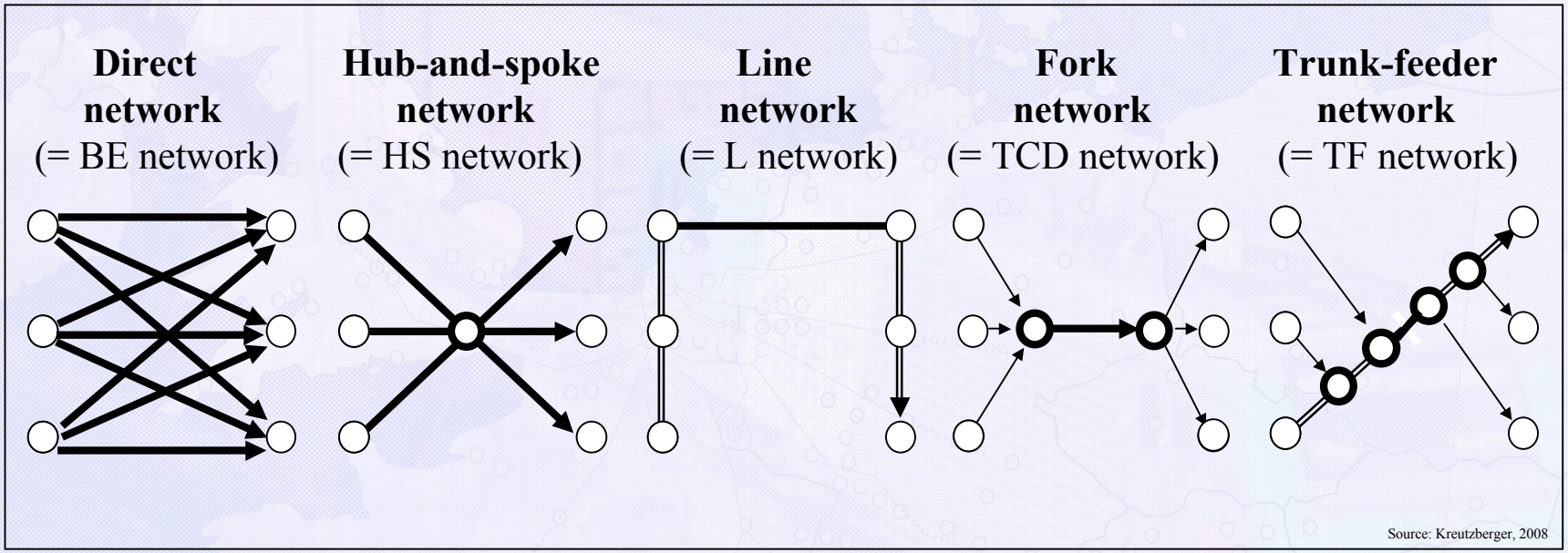
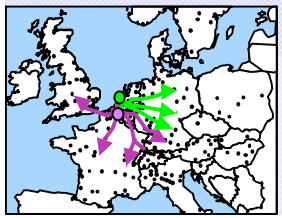
# Starting notions for the concept (2)

Alternative basic bundling concepts




Only trunk rail network (with full trainloads)

Trunk rail and local rail network (with full and small trainloads)





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# Reflection on hub-and-spoke bundling

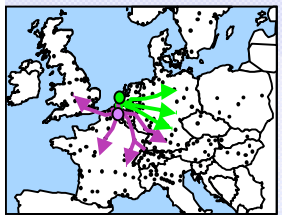
## in comparison to direct bundling

- If flows are sufficiently large for direct trains, ride direct trains

- Otherwise HS networks have the following potential advantages:
  - Larger trainloads
  - Higher frequencies
  - Smaller network transport volumes required
  - More efficient use of infrastructure
  - Higher network connectivity

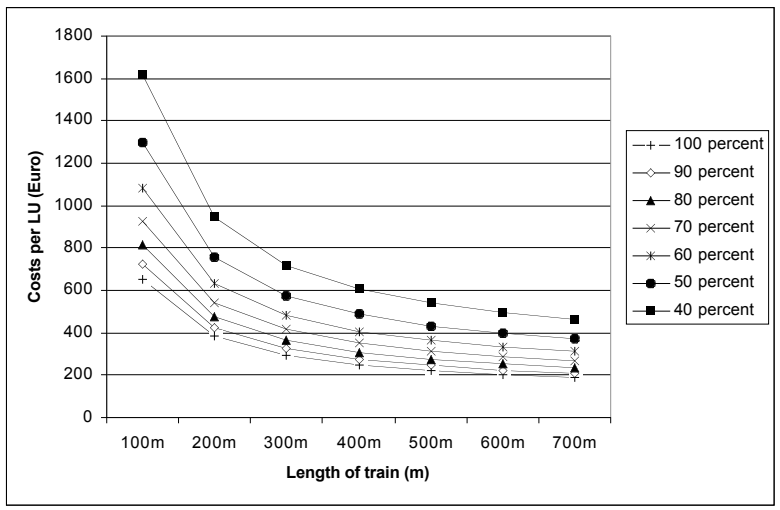
HS transport can be carried out by block trains or shuttles (without shunting, just like in direct networks

- To be balanced with potential disadvantages:
  - Detours
  - Additional exchange at the hub

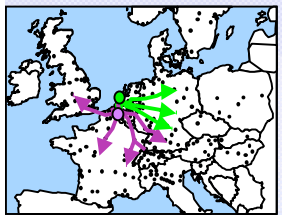


# Relevance of the performances

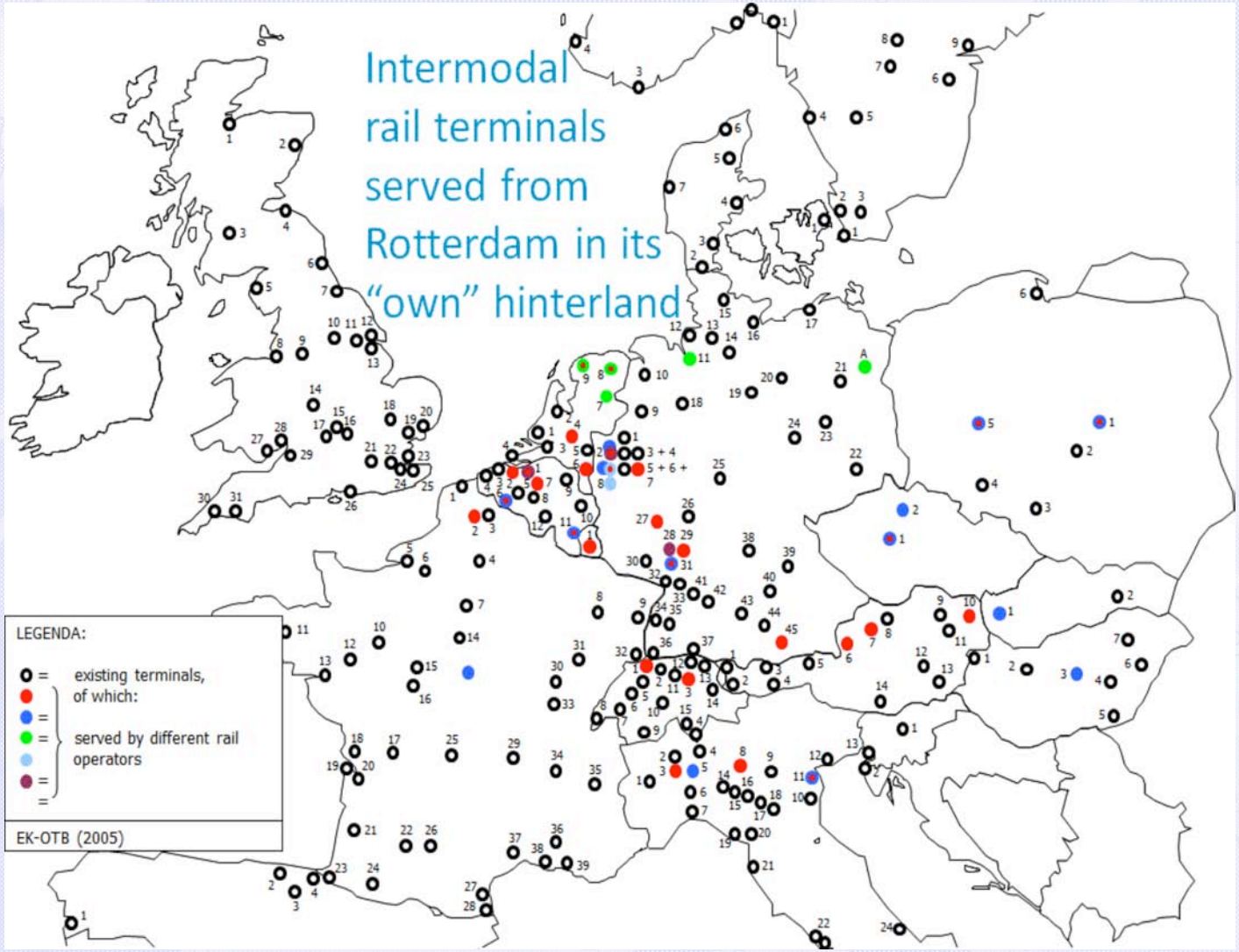
- Larger trainloads
  -> lower costs per load unit (most important for train costs)

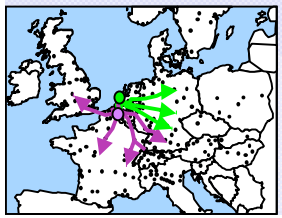



- Higher frequencies -> lower costs of shipper:
  - E.g. interest costs for goods in circulation
  - Storage costs at the shippers' locations
- Higher network connectivity -> shorter distances pre- and post-haulage -> lower door-to-door costs
- More efficient use of infrastructure -> less land use and lower infrastructure and hence transport costs per load unit



# Relevance of the performances





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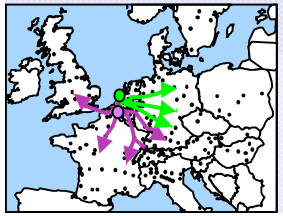
# Reflection on hub-and-spoke bundling

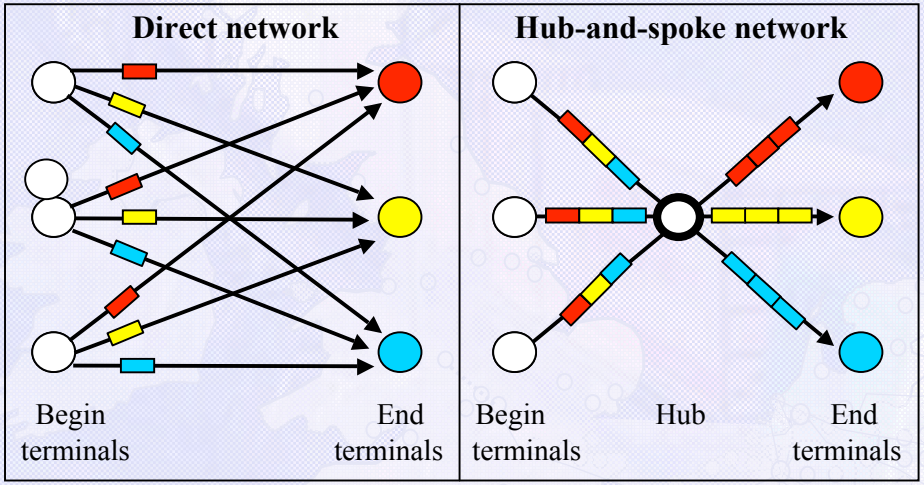
## in comparison to other types of complex bundling

- Only trunk trains (no local = shorter trains)
- = Advantage for efficient use of tracks in the seaport
- Easy to integrate the flows of many seaport rail terminals without large detours and efforts

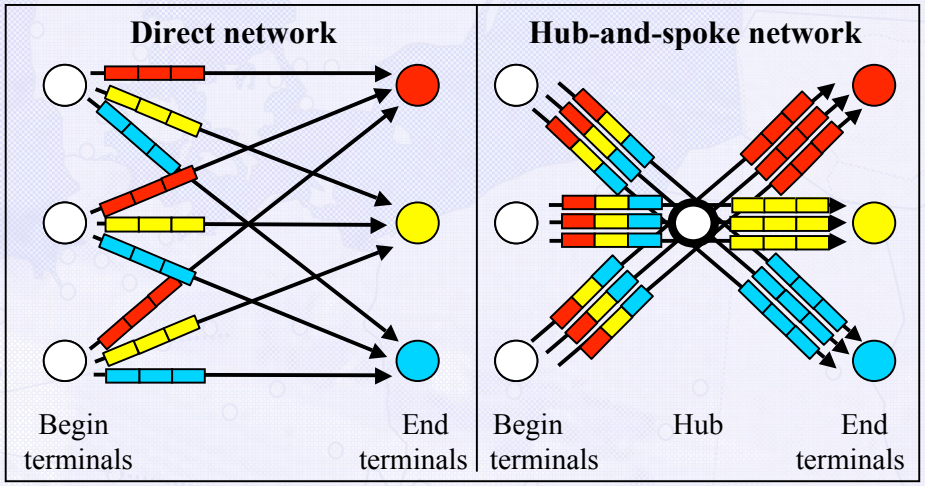


# The advantages of HS bundling

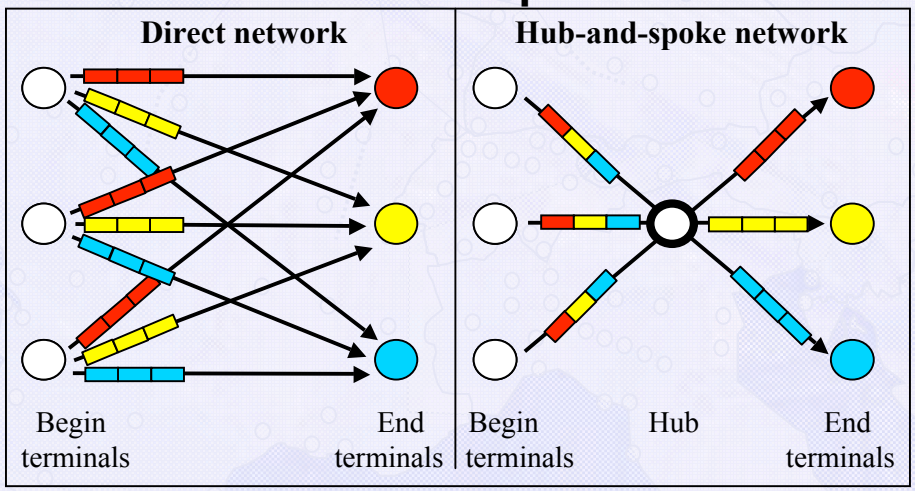
**HS network: larger trainloads**

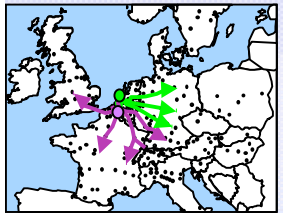



**HS network: higher transport frequencies**

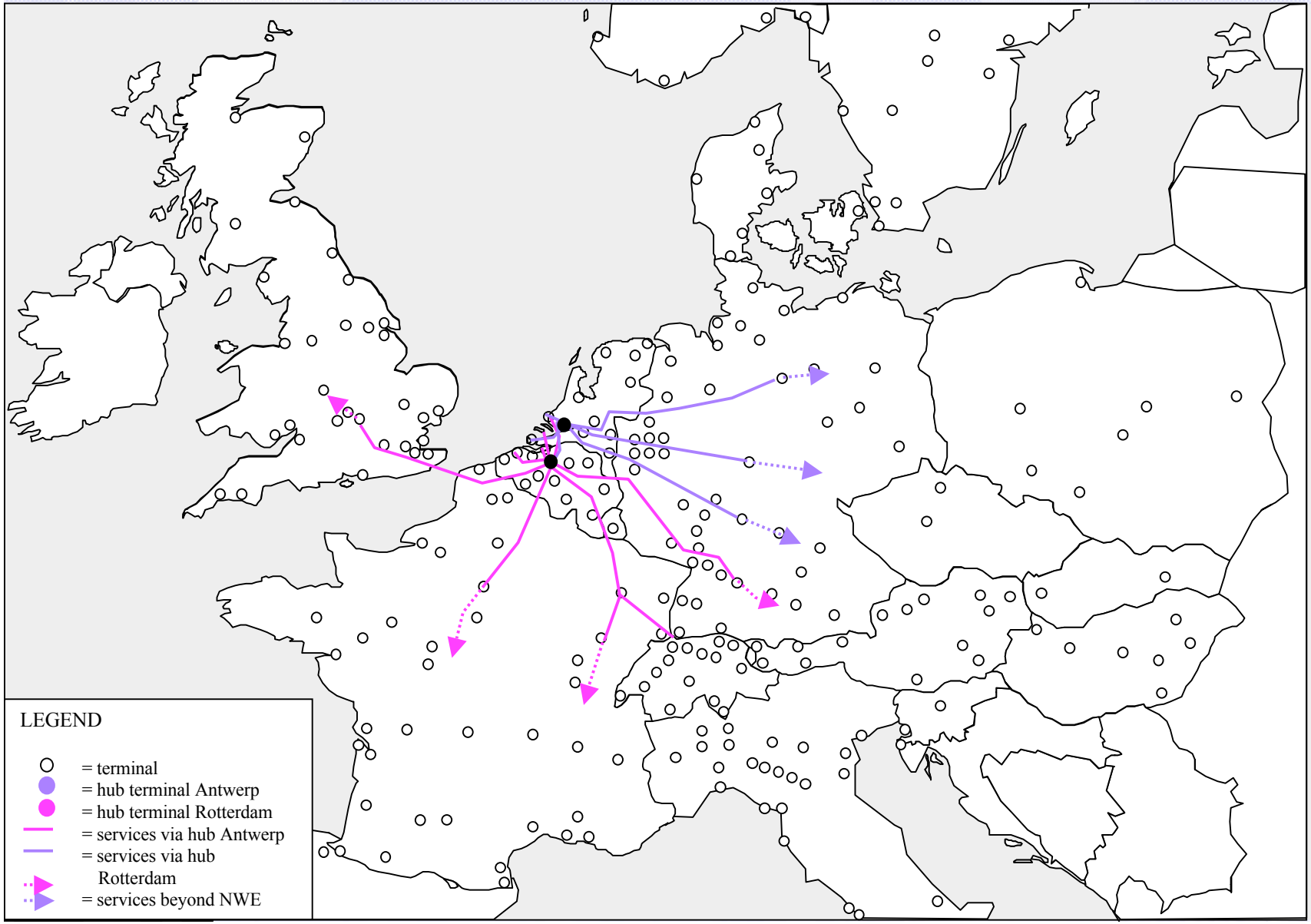



**HS network: smaller transport network volumes required**



# The Twin hub concept

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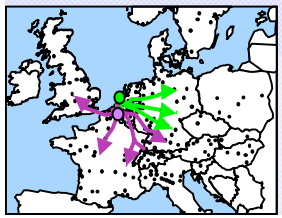
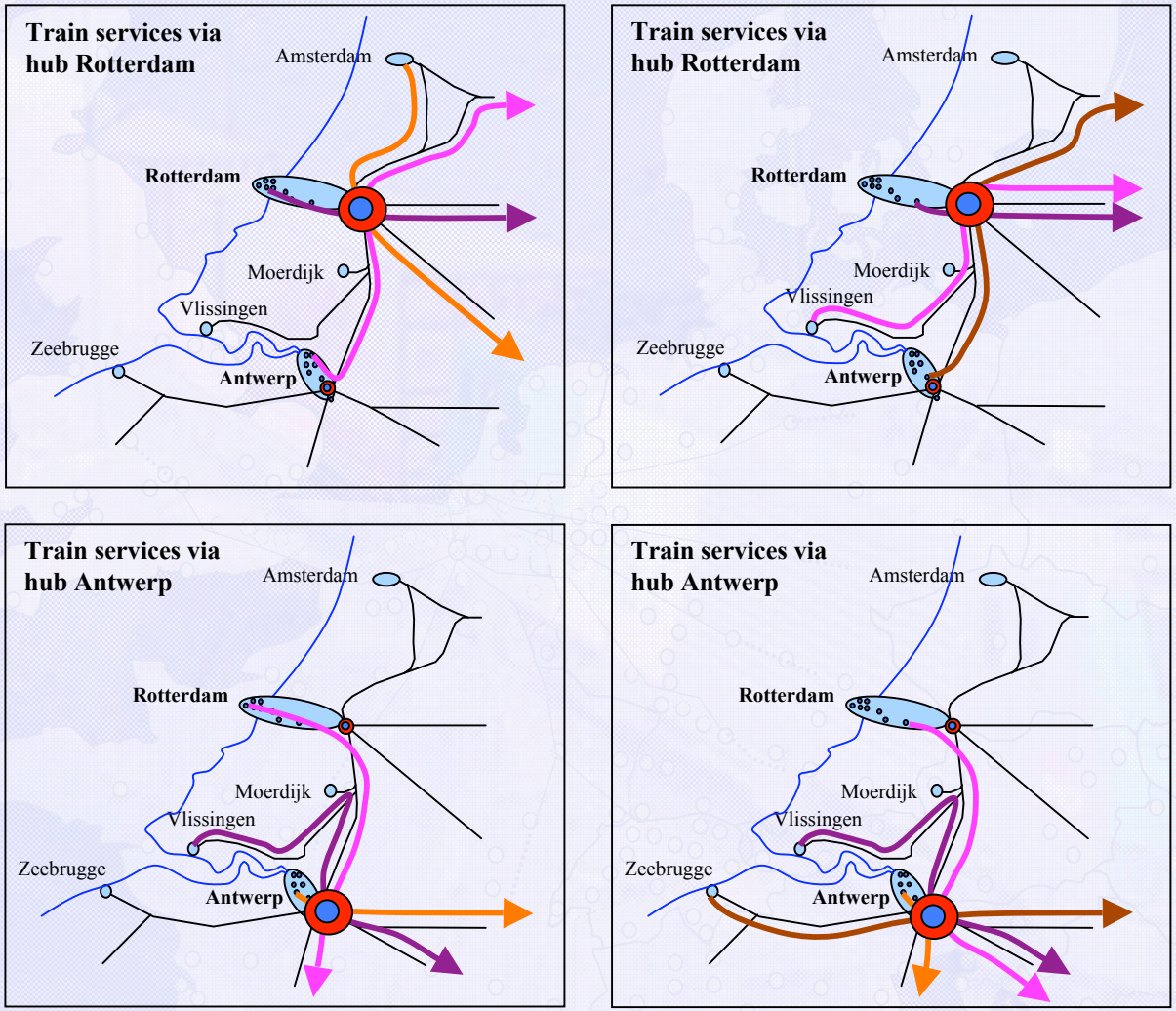
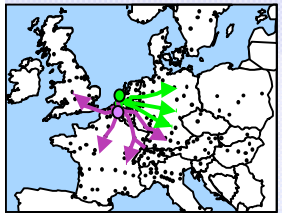
# The Twin hub concept

- Transport Dutch containers (load units) in Antwerp trains wherever these have or could have a strong market position
- Transport Belgian containers (load units) in Rotterdam trains wherever these have or could have a strong market position
- Complementary markets in acknowledgement of seaport competition
- Transport containers (load units) between inland terminals and west seaports in the same train
- Organise such transport by means of HS networks
- Two HS networks, centred around hub Antwerp and hub Rotterdam
- Enlargement of service area of Belgian hub to NL and Dutch hub to B increases the advantages of HS bundling (trainloads, frequencies, network connectivity, infrastructure efficiency)



# The Twin hub concept



LEGEND= train services to/from European inland terminals



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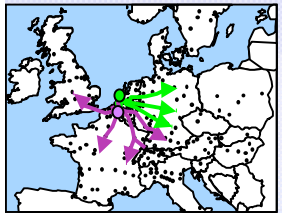
# Alternative physical means for rail-rail exchange at hubs

Shunting of wagons (formerly including containers)

Crane transhipment of containers at a terminal



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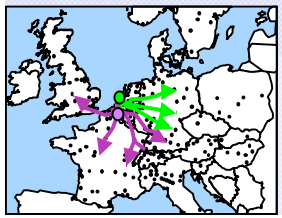
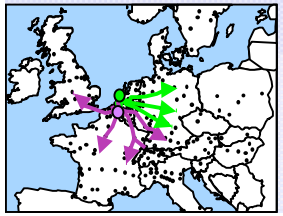
# Reflection on physical means in HS networks

- Shunting single wagons:
  - Requires gravity shunting yard
  - Long operational times and high costs for hub exchange ( - )
  - Also suitable for very small flow markets ( + )
- Shunting wagon groups (e.g. 3 – 4 directions per train):
  - Possible on any shunting yard including flat ones
  - Competitive exchange times and costs for hub exchange ( + )
  - Only suitable for markets wagon group market ( - )
- Transhipment of containers at terminals
  - Preferably at rail-rail terminal, otherwise at rail-road terminals
  - Competitive exchange times and costs for hub exchange ( + )
  - Suitable for all markets ( + )
  - Shuttles or block trains. No shunting ( + ). More empty wagons ( - )



# Location hub terminals, long term

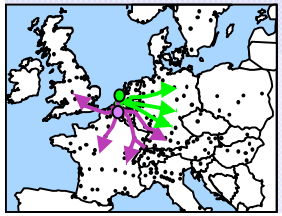
- Antwerp has the Mainhub terminal, designed for rail-rail exchange.
- Rotterdam:
  - Has no hub terminal (current complex bundling = line bundling)
  - There are hubs across the border (Duisburg, Cologne, Neuss, Antwerp), but each of them is only useful for one corridor
  - Twin hub perception:
    - Many new rail terminals in the seaport
    - Integration of flows: HS bundling = very promising
    - Maasvlakte: own bundling, possibly via own hub
    - Hub location Twin hub at east side of the seaport:
      - good for integration Rotterdam flows
      - good for integration of flows of other seaports
    - There is functional space for more more than 1 one hub in Rotterdam
    - Micro-location to be searched



# Location hubs, short term. Options for the pilot

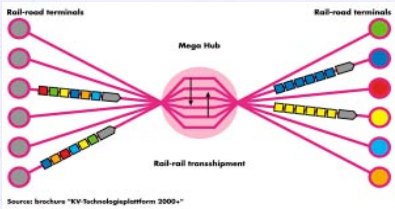
- Antwerp:
  - Mainhub terminal (rail-rail and rail-road terminals; IFB)
  - HUPAC terminal (rail-road terminal)
  - Maybe: flat shunting yards (for wagon group exchange)

- Rotterdam:
  - Rail Service Centre Waal-/Eemhaven (rail-road terminal)
  - Shunting yard Kijfhoek (for wagon group exchange)
  - Maybe: flat shunting yards (for wagon group exchange)

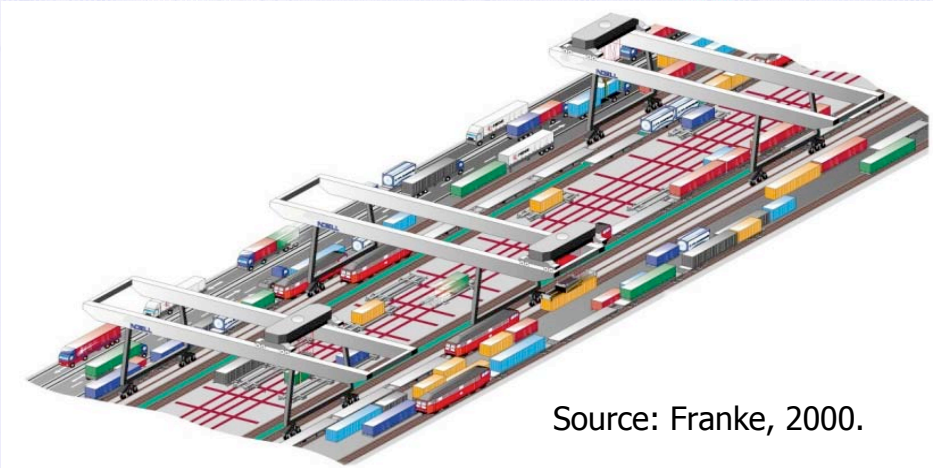


# The high-performance hub

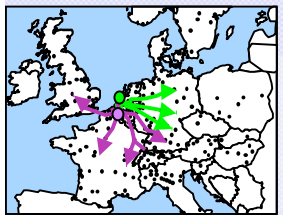
- Mainhub Antwerp = pioneer for true rail hub
  - Terminal layout
  - Operations
- Not in terms of high performance or high-tech hub terminals
- Different proposals in the 1990s
- Some still relevant today. Example NOELL




**Integrated System for Maximum Throughput in Intermodal Traffic**



Source: Franke, 2000.





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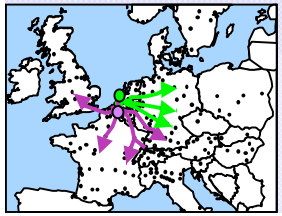
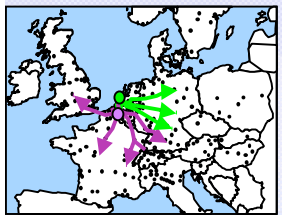
# The high-performance hub

- High-performance generates the productivity required in high welfare society and European competitiveness (Lisbon agenda)
- Reference to robotised container handling (internal transport, stack) of ECT on the Maasvlakte
- Comparable breakthrough almost absent for hub.
  Different factors
- Addressed in Twin hub project, although not main subject



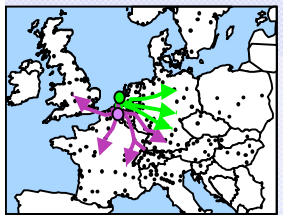
# Twin hub. Main features



# Twin Hub. Main features

- Transnational: the benefits of Twin hub operations are for all accessed regions
- Transnational and innovative: the cooperation in the project is one between competitors:
  - Rail operators (including SMEs). HS bundling now typically within a rail family (e.g. DB, SNCF, SNCB).

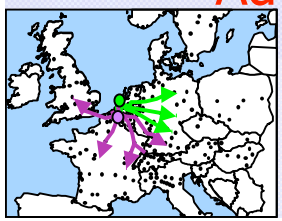
    Cooperation refers to joint business plan, pilot, later operations, ICT
  - Seaports in different countries. HS bundling now typically within one country (e.g. Germany, France)
- Innovative: ICT (booking system)
- Promoting true rail hub bundling (operations, infrastructure, high performance technology development)



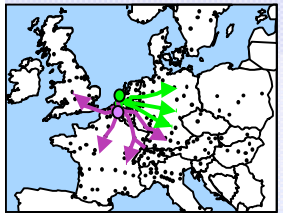
# Twin Hub. Benefits

- Improved performances lead to:
  - Growth intermodal transport:
    -> Modal shift -> more sustainable transport (Gothenburg agenda)
    -> Better positioning rail operators in competitive market
  - Transport from and to accessed regions is more robust
  - Increasing territorial, economic and social coherence
  - Declining regional disparities (also smaller seaports and inland terminals accessed)
  - All together increase of European competitiveness and welfare

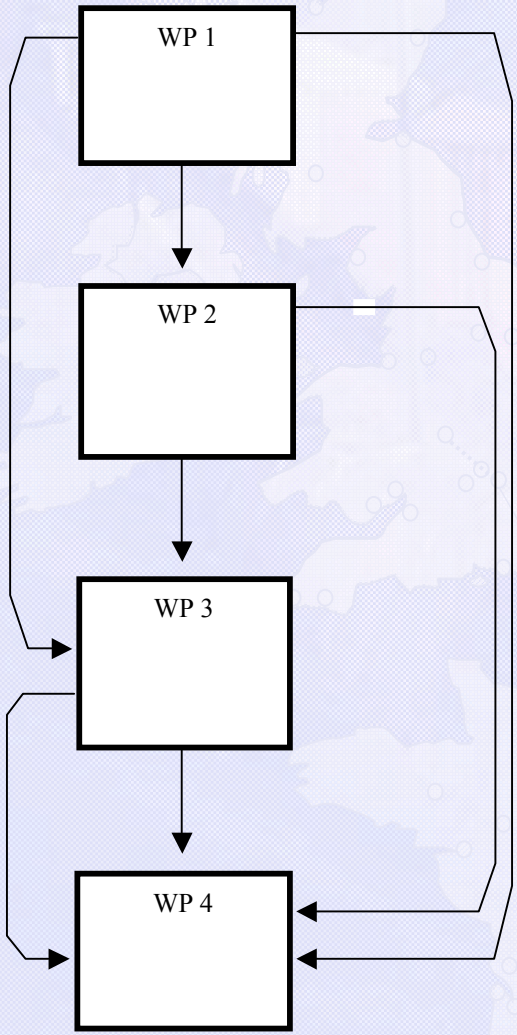
- Success pilot:
  - Twin hub network becomes more attractive to other operators
  - Advocates need of long-term HS infrastructure



# Twin hub. Project structure

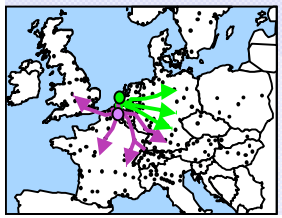


# Four work packages




- WP 1: identify promising Twin hub networks
  - Flows
  - Promising networks
  - Modal shift
- WP 2: carry out pilot
  - Joint business plan
  - Pilot
  - Monitoring pilot
  - Booking system

  = CENTRE OF THE PROJECT
- WP 3: long-term Twin hub infrastructure
  - Rotterdam
  - Antwerp
- WP 4: societal benefits
  - Intermodal rail sector and sustainability transport
  - Regions
  - European policies
  - Total





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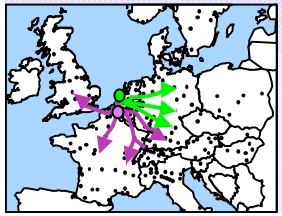
# Time planning
## (December 2011 – September 2015)

- WP 1: identify promising Twin hub networks
  (December 2011 – December 2012)
- WP 2: carry out pilot
  - Joint business plan (September 2012 – December 2012)
  - Pilot (December 2012 – end of project)
  - Monitoring pilot (December 2012 – end of project)
  - Booking system (December 2012 – July 2013)
- WP 3: long-term Twin hub infrastructure
  (July 2013 – June 2014)
- WP 4: societal benefits
  June 2014 – September 2015)





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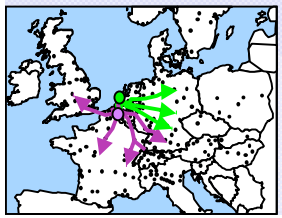
# Project partners (from 5 countries)

1. TU Delft
2. VUB (Brussels)
3. EUR (Rotterdam)
4. TU Karlsruhe
5. Panteia (former NEA)
6. Nieuwenhuis
7. Ab-Ovo
8. Rail operator Russell (participating in the pilot)
9. Rail operator … (participating in the pilot)
10. Rail operator ACTS (participating in the pilot)
11. Rail operator IMS Rail Switzerland
12. Port of Rotterdam
13. Port of Zeeland





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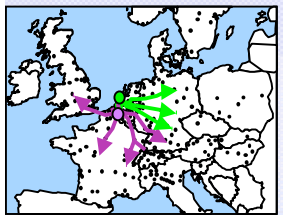
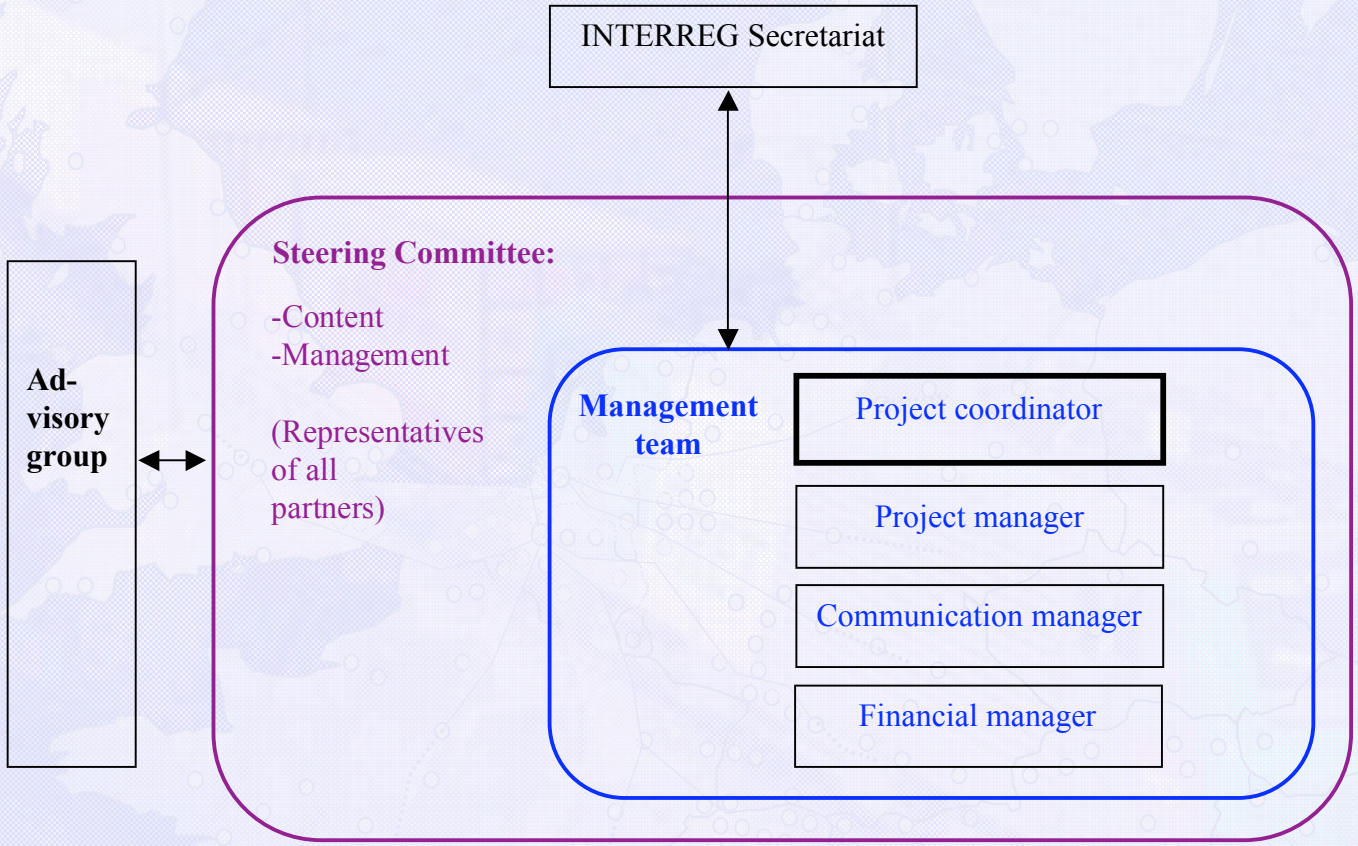
# Advisors (from 6 countries)

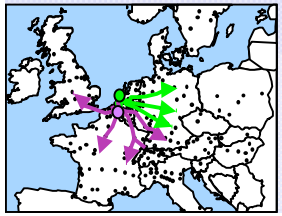
1. Rhine-Scheldt Delta co-operation (NL, B)
2. Cluster for Logistics (L)
3. Industrie- und Handelskammer Würzburg-Schweinfurt (D)
4. West Midlands Freight Quality Partnership (UK)
5. ECT (NL)
6. PSA/HNN (B)
7. Ambrogio Intermodal (B, I)
8. INRETS/SPLOTT (F)
9. Newcastle University, Freight and Logistics Research Group (UK)
10. University of Antwerp (B)



# Management structure




- 2 plenary meetings per year
- Each one with time for Steering Committee
- Each second one also with time for advisors





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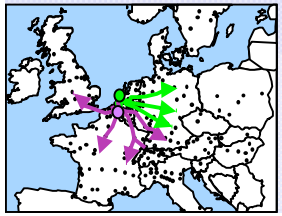
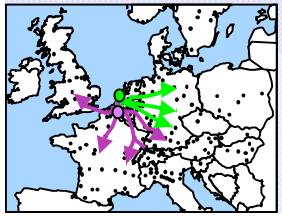
# Budget

- Total = 5,7 million Euros
- Of which 3,9 million for pilot to cover potential gap between revenues and costs in the initial phase
- Hence 1,8 million for research, development and publicity
- European Commission has approved state aid to rail operators (5 October 2011)

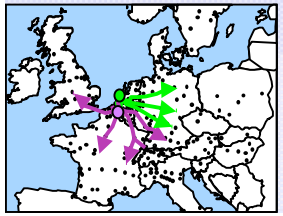


# Input and output

- Project builds on previously EU-funded initiatives
- Network is open one
- Project contributes to a more cohesive EU society and is based on the cooperation of people from different countries to work in a common topic that touches the lives of EU-citizens
- Large efforts for publicity
- Results public except for sensitive information



# Questions ?





INTERREG IVB