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Latest developments in the design and operation of logistics and intermodal transport in the ports hinterland:

new challenges and new solutions

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Based on a short overview on the state of the art of **transport infrastructure** and related **bottlenecks** within this paper **intelligent solutions** for the design and operation of logistics and intermodal transport in the ports hinterland will be outlined.

They are mainly based on real examples and practical experiences of companies in Germany.

The solutions cover four present and future challenges, and focus essentially on the topics **security**, **climate and energy**, **meso-logistics and knowledge regions** as well as **control logic and autonomous control of cargo flows**.

For facing these challenges major tasks of the public and the private sector are mentioned.

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ISL – Institute of Shipping Economics and Logistics

1954 – 2008

more than 50 years of innovation in maritime economics and logistics

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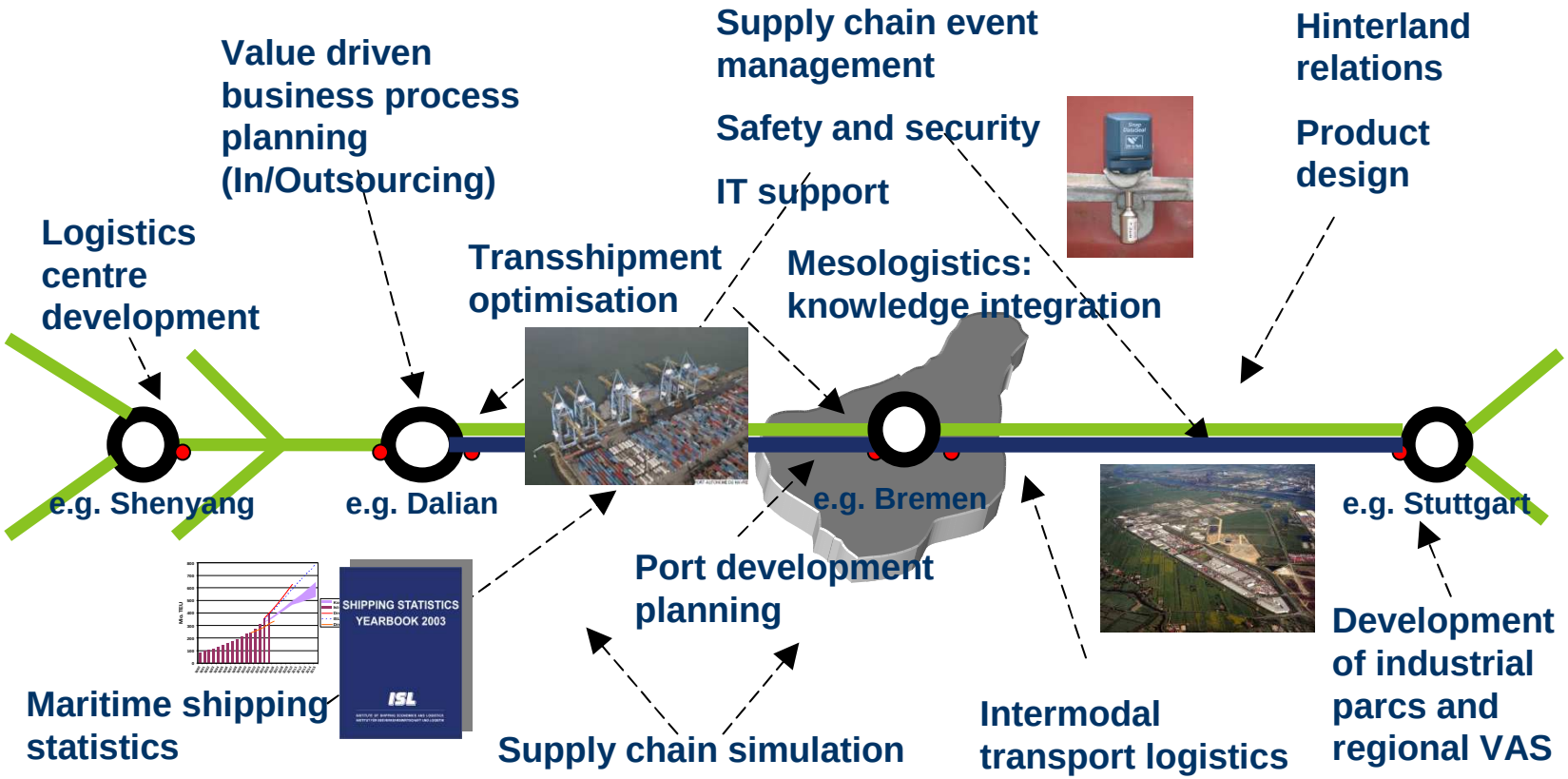

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EIA - Intermodal transport promotion centre, Bremen

since 2005

Promotion and dissemination of best practices

Networking and initiation of cooperations and strategic alliances

Business models development and controlling

Know-how transfer and knowledge management

Search for intermodal multiplicators

Supporting new products/services

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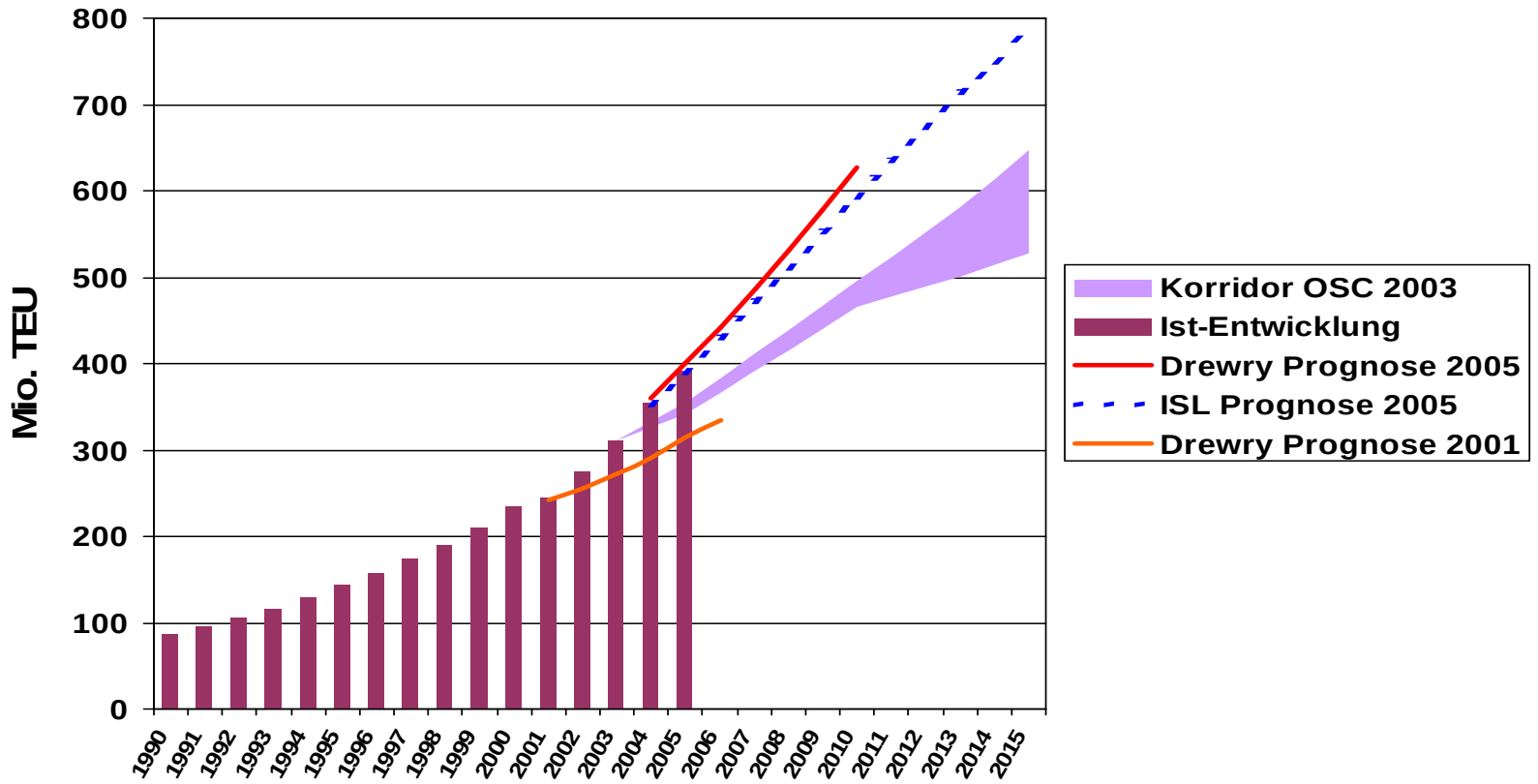
Source: GVZE Bremen



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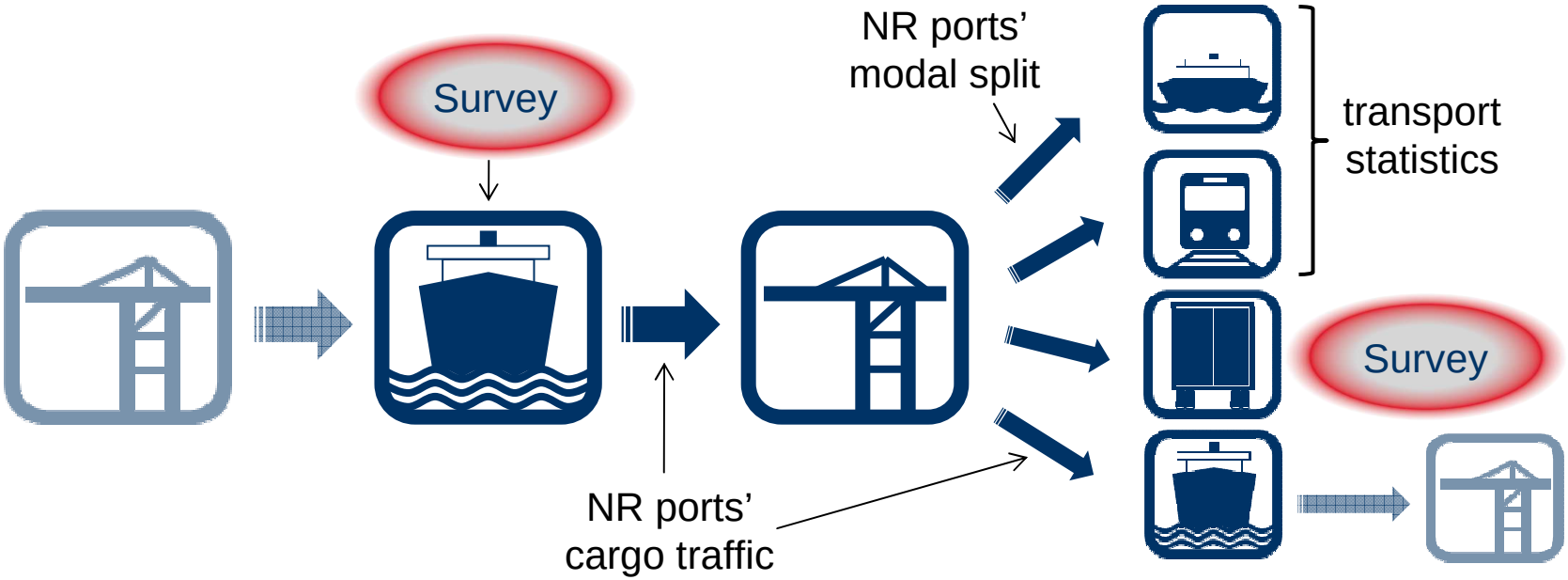
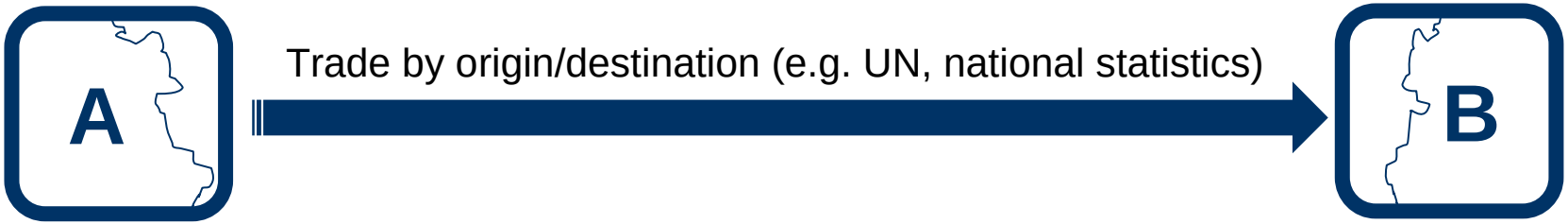
Transport statistics



Trade statistics



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Introducing the Container Traffic Model

The North European Container Traffic Model developed by ISL and Global Insight:

- Differentiates transhipment volumes from hinterland traffic,
- Identifies the volumes and modal split of container traffic with the various corresponding hinterland regions of the North range ports,
- Assesses the container traffic volumes between the North range ports and corresponding shortsea destinations,
- Provides the basis for forecasts of port traffic and hinterland transport volumes.

The Modell was implemented successfully for the years 2003 and 2005 so far!

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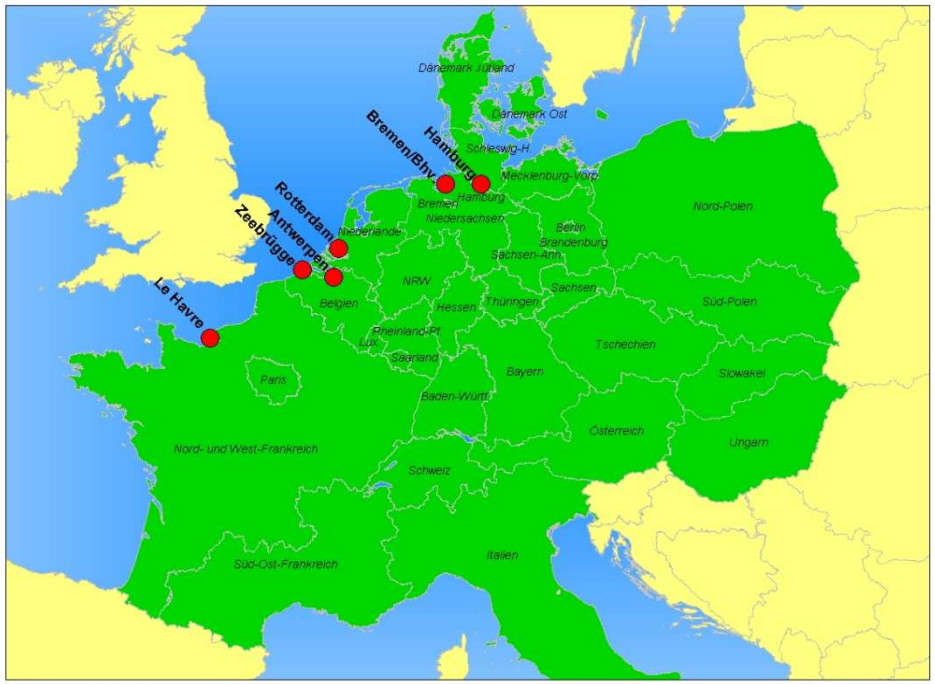
Container Traffic Model

Featured Ports and regions



- 6 Ports within the Hamburg-Le Havre Range
- 32 Hinterland regions:
  - 13 European Staates
    - Germandy (by federal districts)
    - Poland (two regions)
    - Denmark (two regions)
    - France (three regions)

- For all Regions Volumes are identified and split into mode of transport (road/rail/river)

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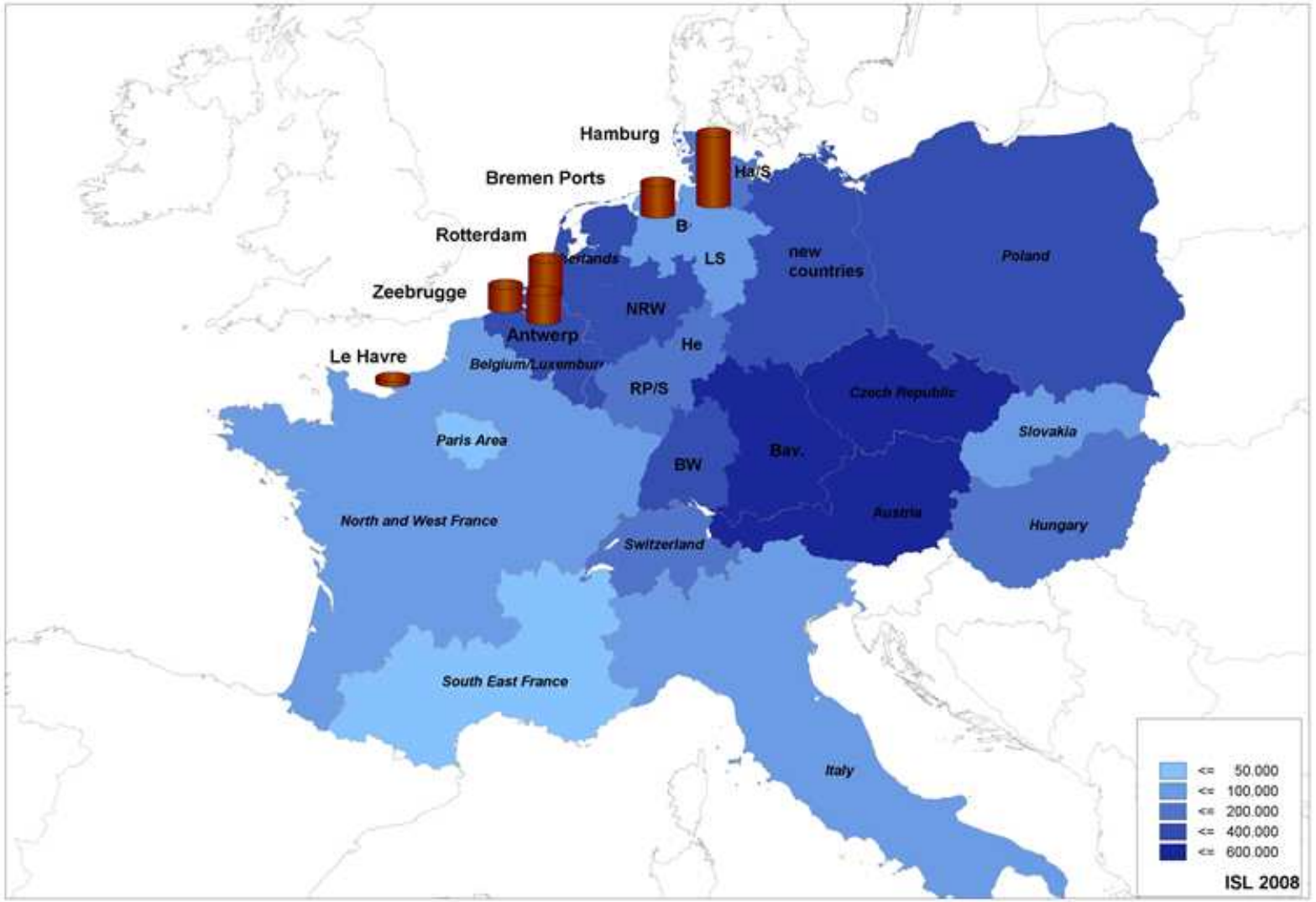
Railway Container Hinterland Transport Volumes 2006



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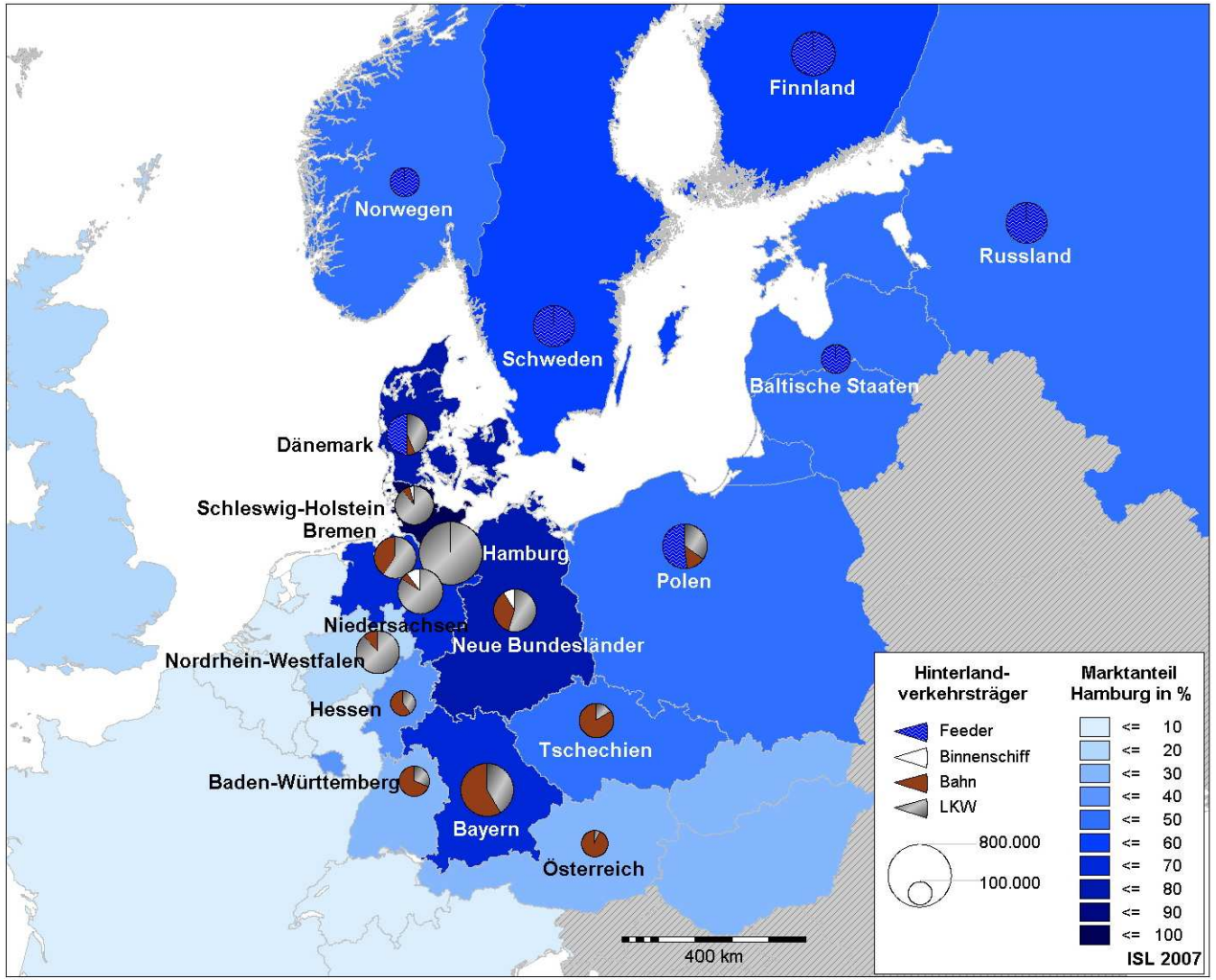
Market shares by hinterland regions and modal split (ex.: Hamburg)



Source: ISL/Global Insight, *Containerverkehrsmodell zur Bestimmung der Marktposition des Hafens Hamburg in europäischen Hinterland- und Transhipmentregionen*, study for the Hamburg Port Authority, Bremen 2007

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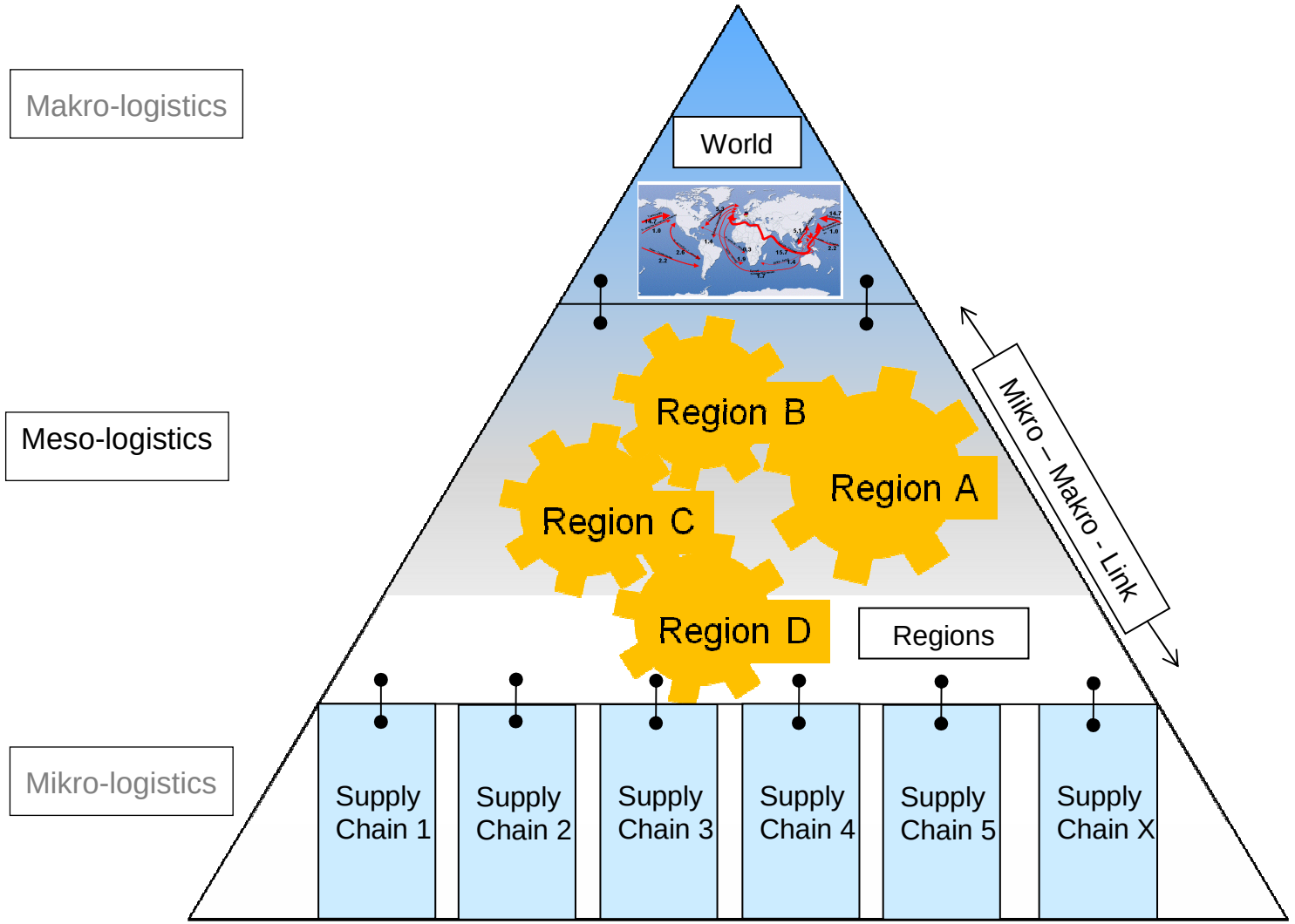
Mesologistics: Mikro-Makro-Link



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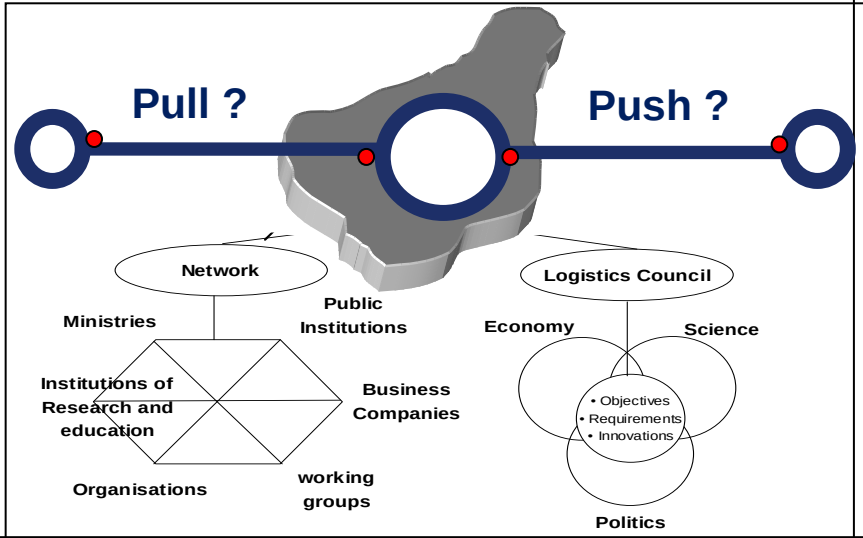
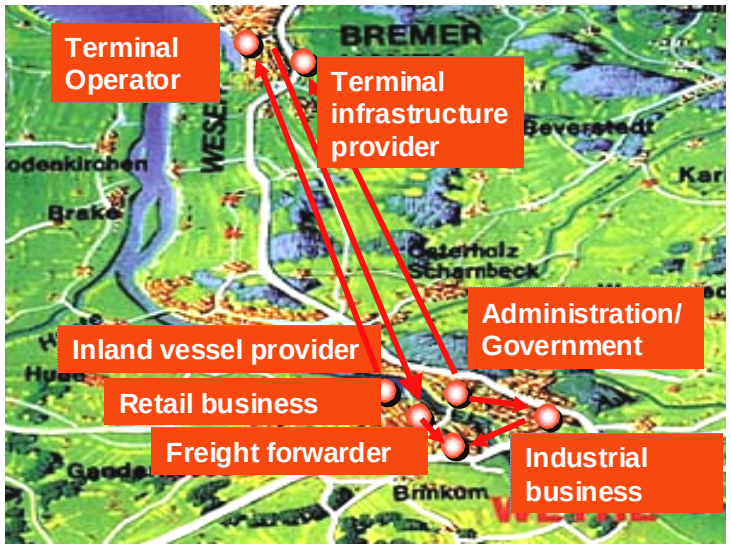
Meso-logistics



Meso Logistics

The performance of supply chains can be improved through co-operation and communication between various supply chain partners on a regional level. Meso Logistics analysis operative and strategic business processes between companies and institutions in a supply chain region. By this, amongst others a regional knowledge management is obtained.



References:

- Bremen – The „Logistics Family“
- MAREDFlow: Regions of Knowledge Pilot Action.
- LOGALL: Strategic Logistics Alliance Hanse-Passage
- Start up of new intermodal solutions

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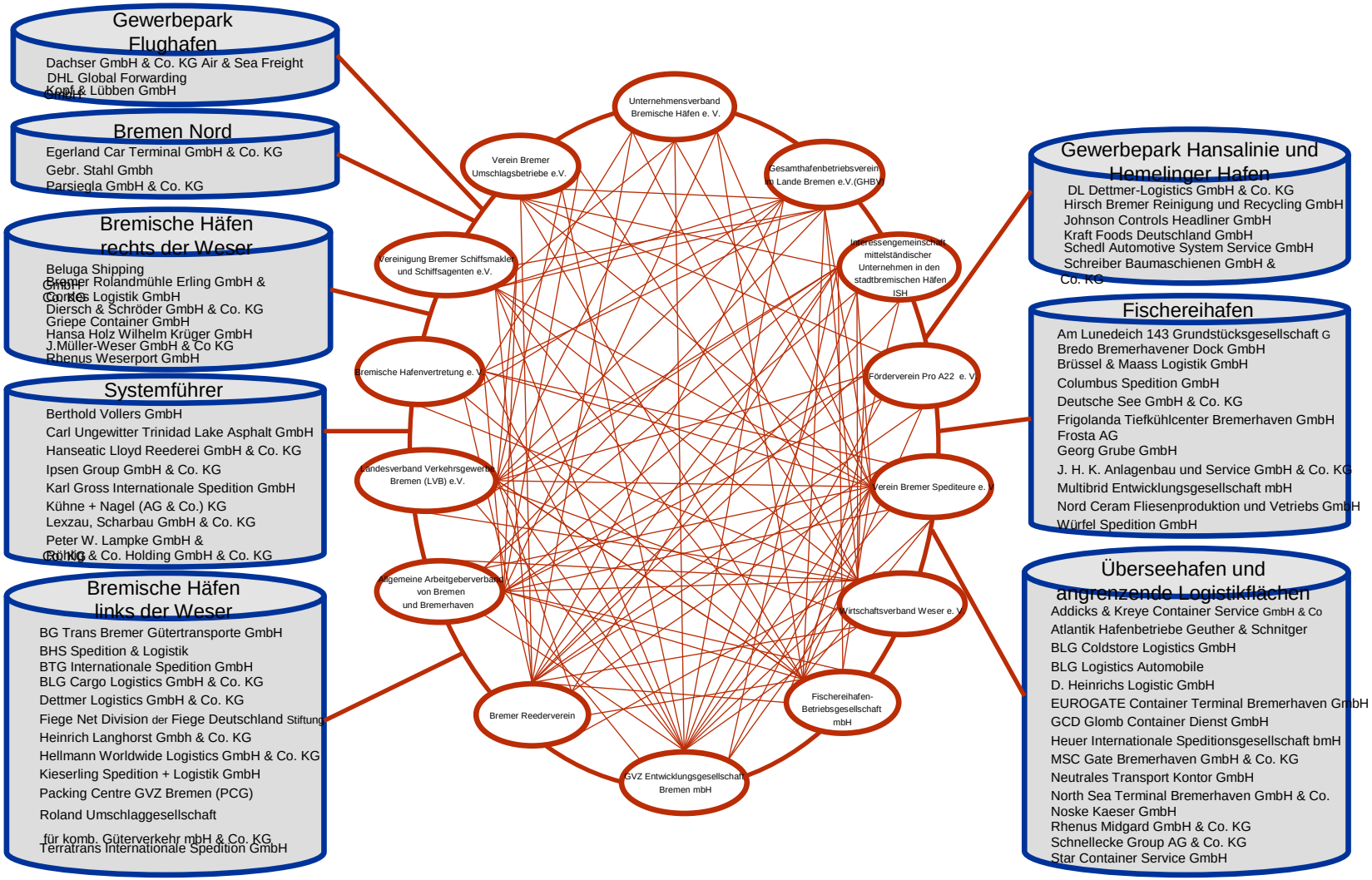
Communications



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Structure and process modelling are not enough: Knowledge Management

Interface problems within heterogeneous IT-Infrastructure

Missing insight in business processes of partners within the supply chain

Missing exchange of information between partners and inside a company

Know-how of relevant key actors is not documented

No incentive system to think beyond the existing solutions

shipping companies
terminal operators
port operators
forwarders
warehousing companies
logistics service providers
services
regional authorities
railway companies
industry, commerce

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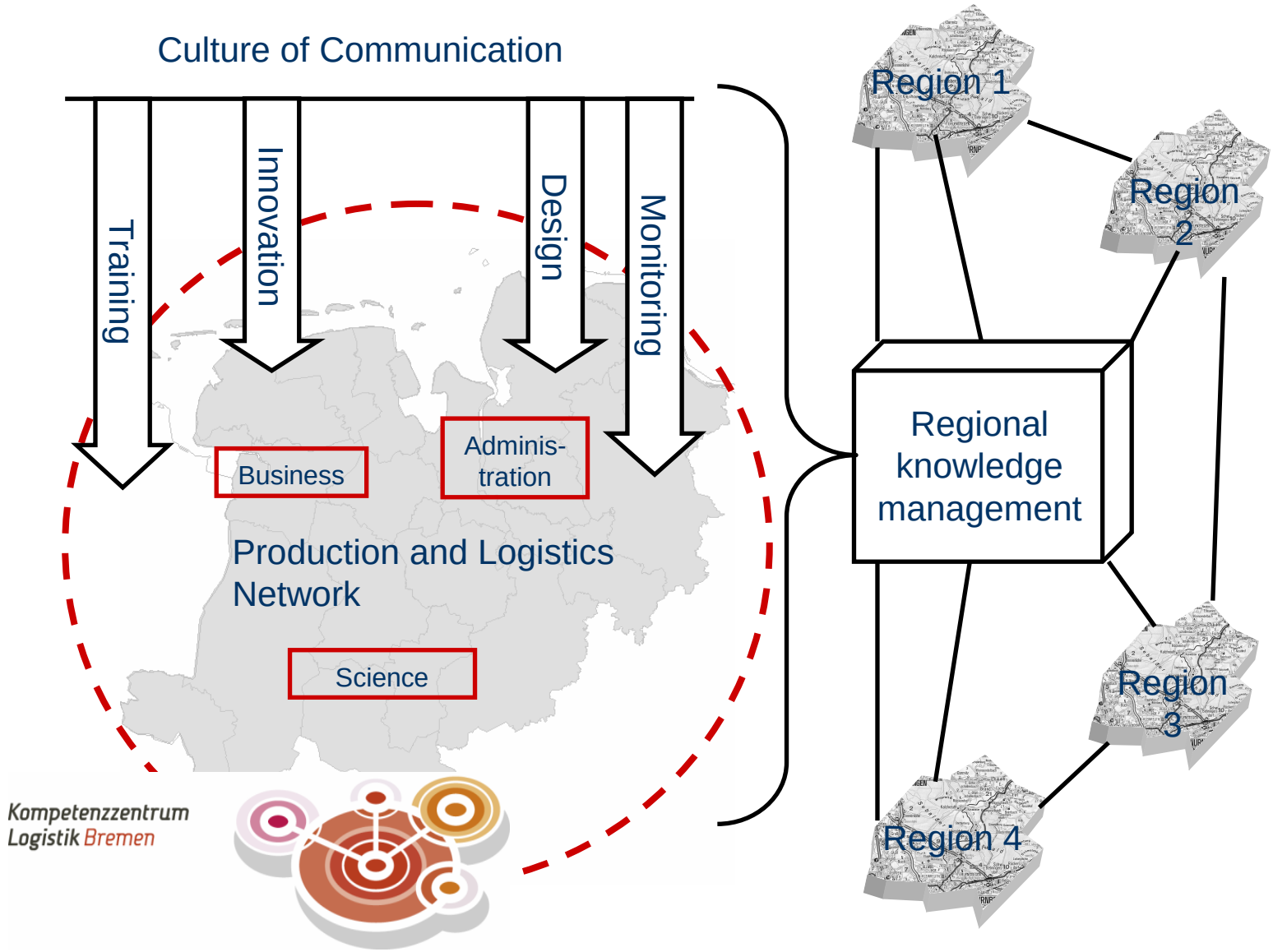

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How to secure the chain?

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Certification

- **C-TPAT (Customs Trade Partnership Against Terrorism)**
  - **voluntary certification in the US trade**
  - **US Customs promised to offer accelerated procedures for those parties being certified**
- **Part of the new Customs Code of the European Union, this approach can be found as “Authorised Economic Operator” (AEO)**
  - **This status can be achieved from beginning 2008**
  - **Although also the AEO certification is voluntary, it is expected that is will become de-facto mandatory in such a way that it is quite likely that shippers will use only AEOs as their partners**
  - **A mutual recognition of AEO and C-TPAT is actually in discussion.**
  - **Freight forwarders, inland transport operators, etc. are still quite reluctant because the benefits are not obviously at this point of time.**

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Technologies

- **Electronic seals**
  - combining the strengths of a high security seal with an RFID transponder
  - allowing to check the number and status of that seal automatically e.g. when passing a container terminal gate
- **CSDs (Container Security Devices)**
  - More sophisticated
  - allowing to register the opening of doors, light falling into the container, detection of special substances, obtaining the actual position, communicating via GSM or satellite
- **Challenges**
  - Standardisation required!
  - Who is willing to pay for?
  - Making the use of technologies mandatory?

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Advance data reporting

- **CSI (Container Security initiative)**
  - **Customs Cooperation between the US and the rest of the world since 2002**
  - **presence of US Customs forces in all major ports exporting cargo to the US who together with their local colleagues assess the risk of containers and jointly decide on further measures e.g. on X-ray scanning or even opening and cargo inspection**
  - **Basis for this risk assessment are IT systems analysing data – primarily from shipping manifests. Data must be provided well before the container is to be loaded**
  - **The Advance Manifest System and the related 24-hour-rule require exporters and shipping agents to provide the vessel manifest 24 hours before loading in electronic form**
- **From 2009, this method will be also applied for all transports heading to the EU**
- **For the exporting companies their flexibility of re-scheduling cargo containers, will be quite limited**

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Technologies

- **Project CHINOS**
  - **funded by European Commission DG Research**
  - **using RFIDs and damage documentation along container transport chains**
  - **trials in Bremerhaven, Thessaloniki, Graz Freight village and Warsaw railway station**

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INTEGRITY

- **Intermodal Global Door-to-door Container Supply Chain Visibility**
- **Funded by the European Commission, DG Research**
- **Duration: 06/2008 – 05/2011**

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INTEGRITY Partners

Terminal and Transport Operators	Logistics Providers & Shippers	Customs Authorities	Academia & Technology Providers
HPH	DHL		ISL Coordinator
Port of Felixstowe	SEACON LOGISTICS		
ect	UNIPART EXPERT PRACTICES		RSM Erasmus University
Yantian International Container Terminals	xerox		
tct Trimodal Container Terminal Venlo	A.S. Watson Group		
DeCeTe Duisburger Container-Terminalgesellschaft Multimodal Container Network			OHB TELEDATA

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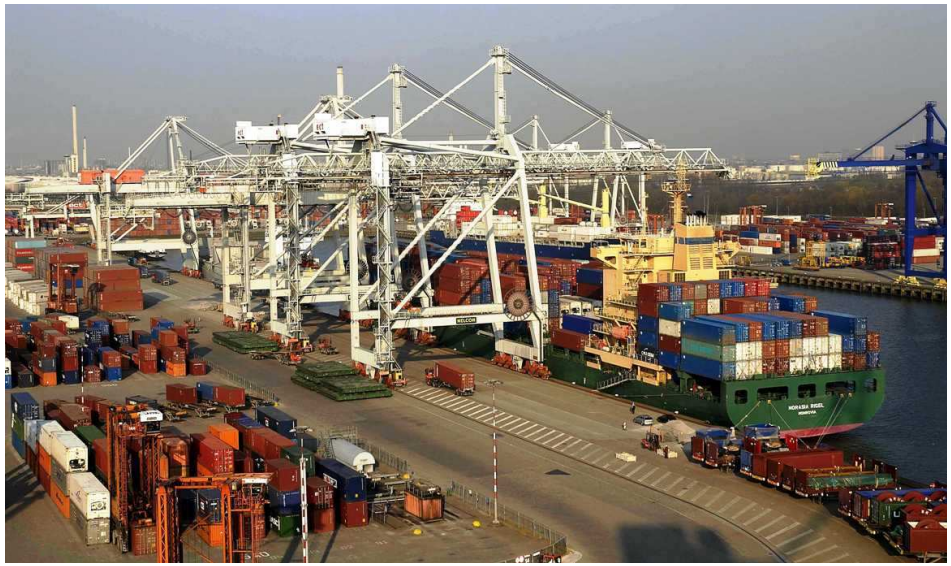
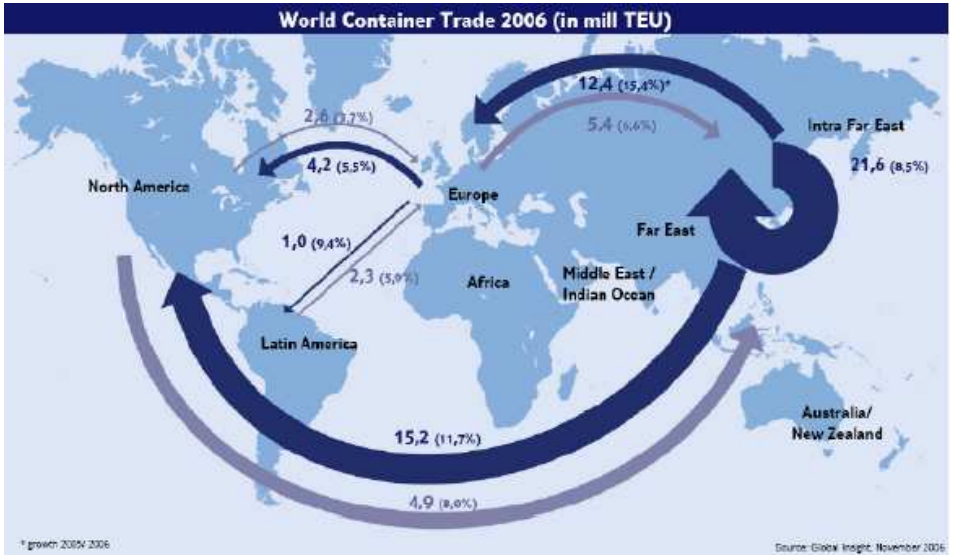
Motivation

- Strong continuing growth in global container transport
- Increased bottlenecks in European deep sea ports and hinterland connections
- Complex logistics chains with multiple actors
- Information gaps along the chain
- New security regulations (ISPS, EU-COM 2003-0229, 2004-0076, US CSI, US C-TPAT)





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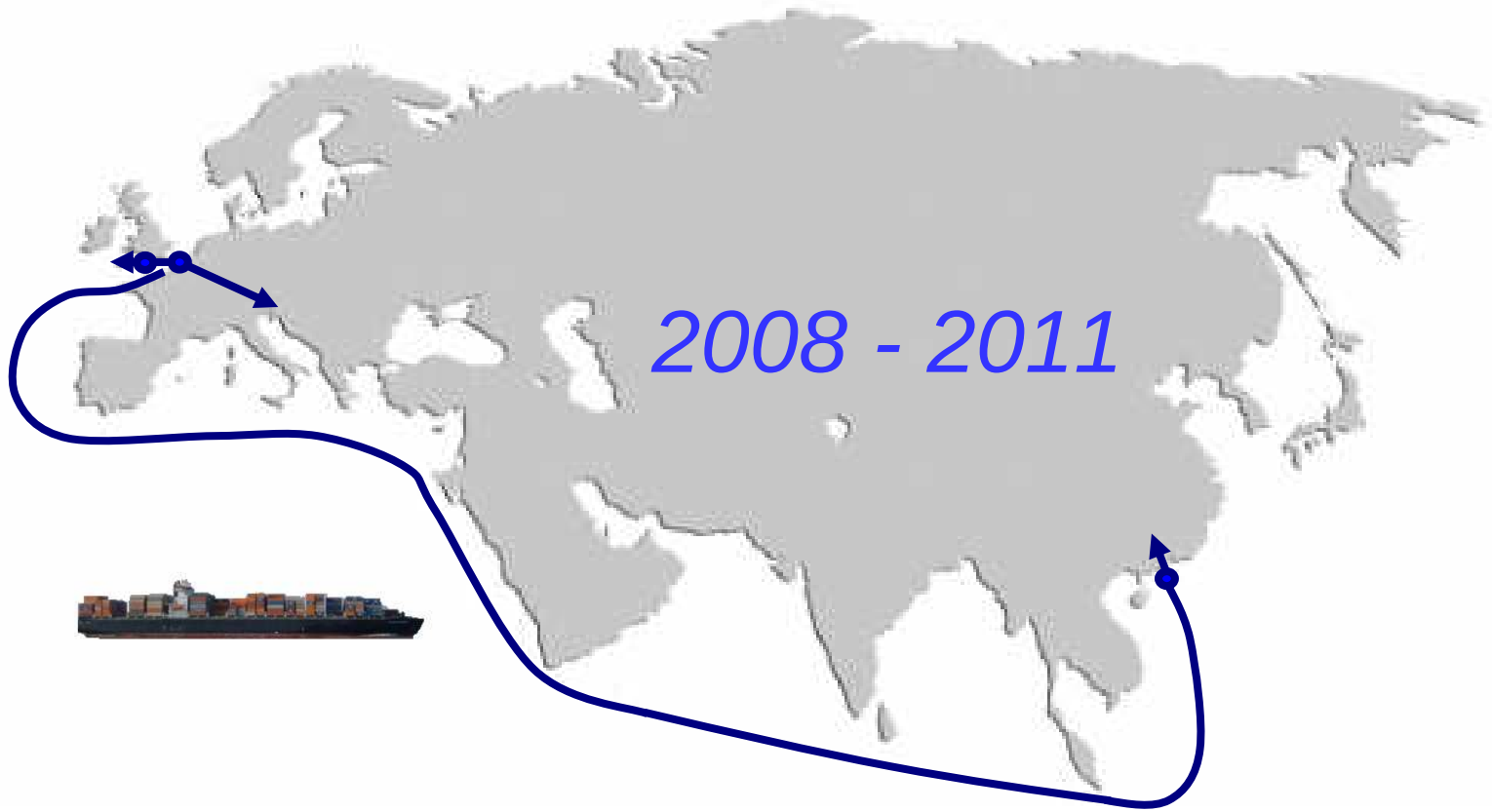
INTEGRITY Corridor



- Door-to-door: China - Shenzhen – Rotterdam/Felixstowe – European Hinterland
- Monitoring of 5,000 containers
- Cooperation with EU/China Customs Project (SSTL)

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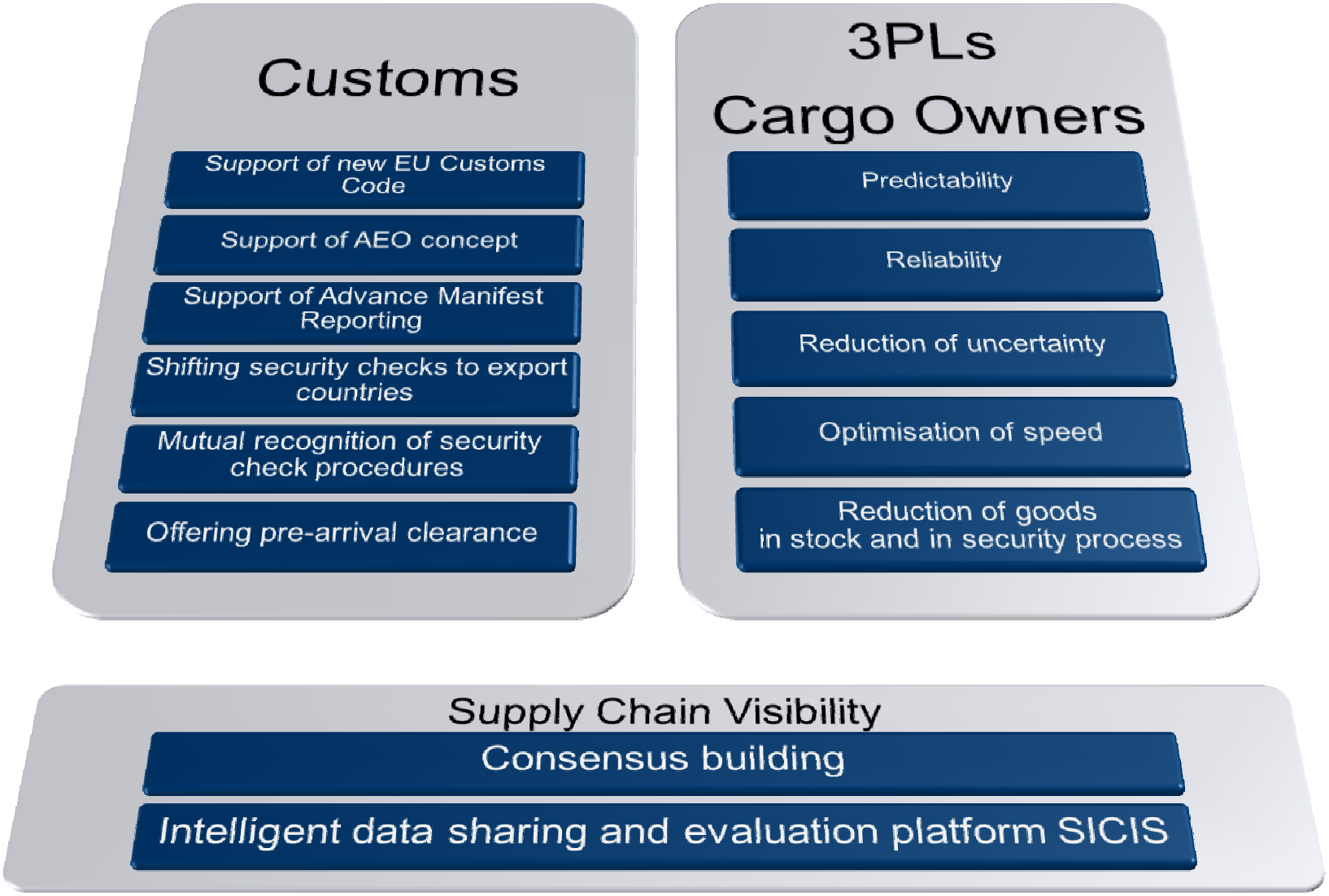
INTEGRITY = Supply Chain Visibility



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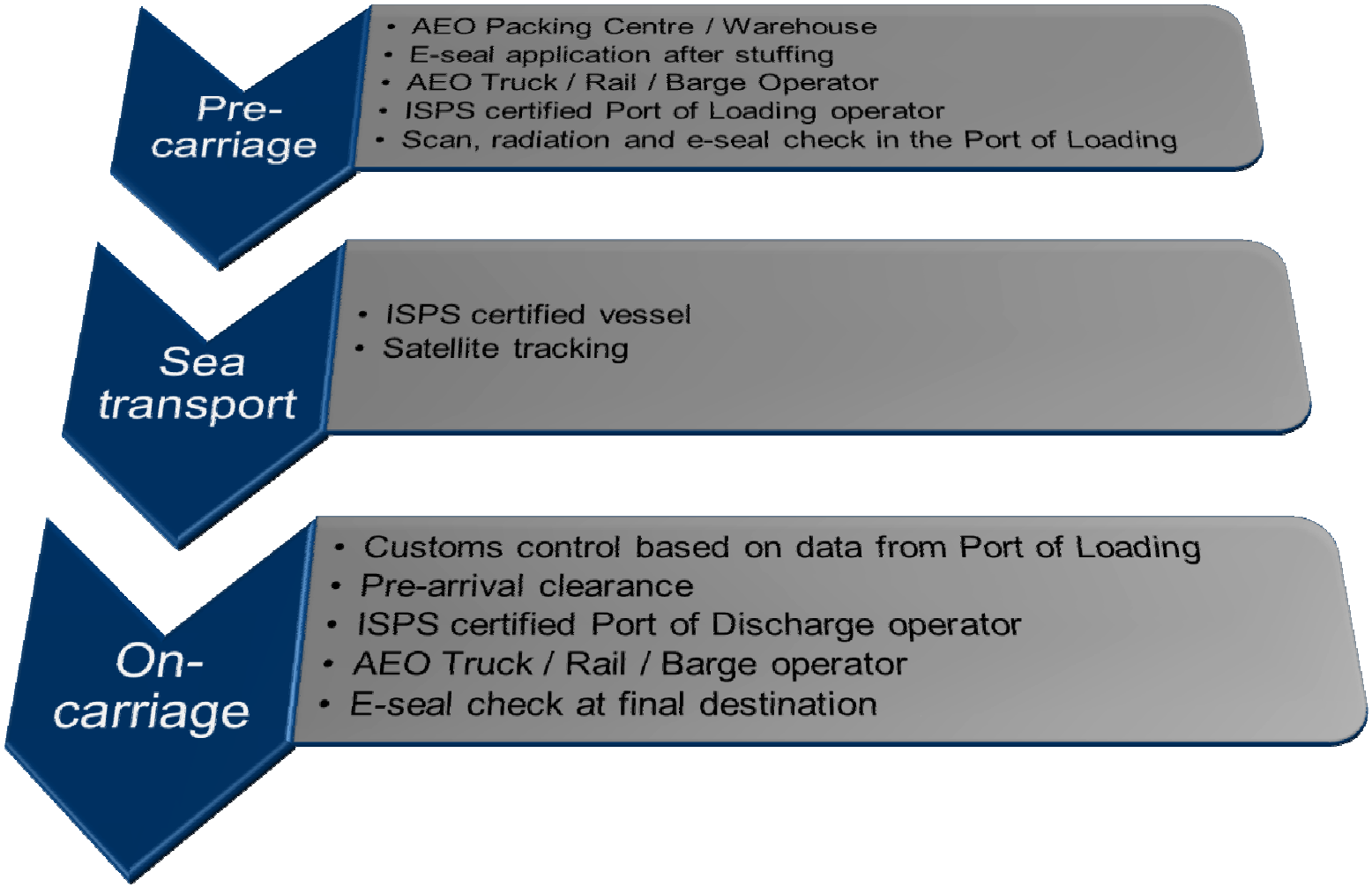
INTEGRITY – Example security pipeline



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Energy consumption in transport and logistics

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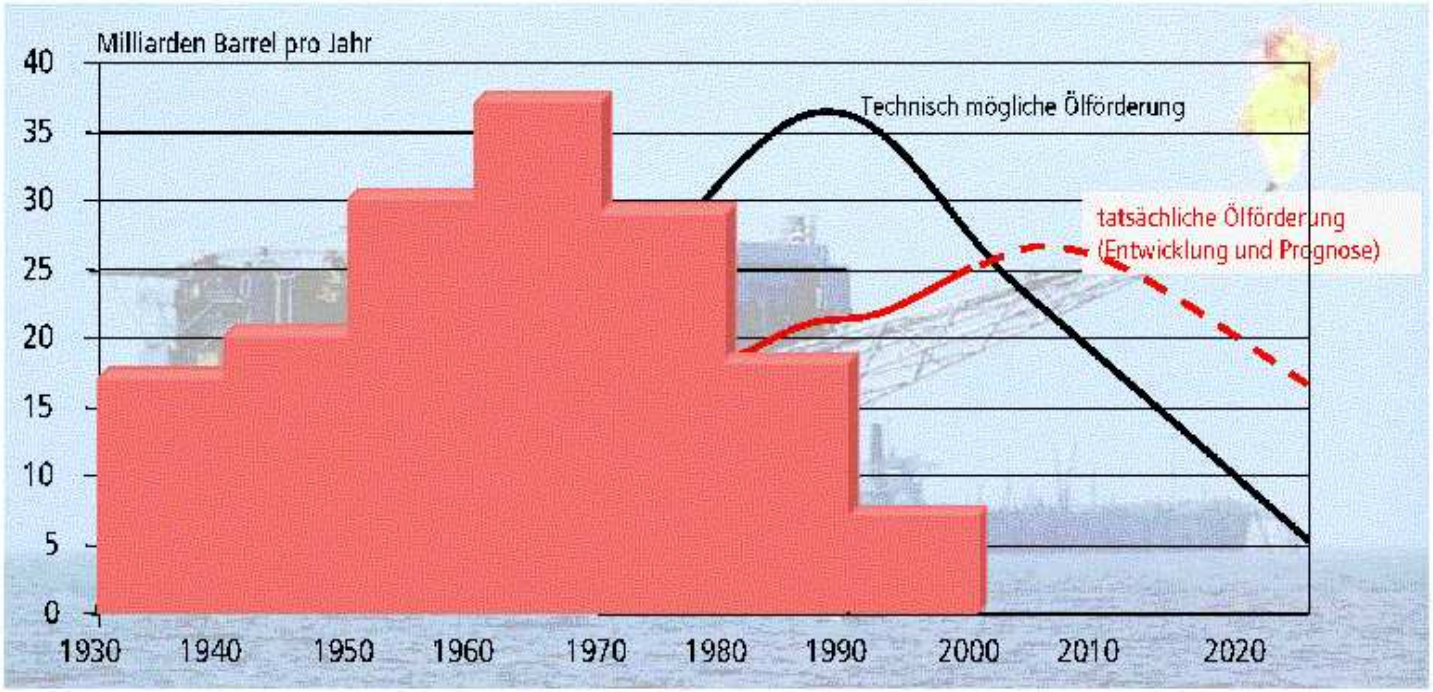
MOIN-Group

Die weltweite Ölförderung nähert sich ihrem Maximum

In 5-10 Jahren werden die weltweiten Ölreserven zur Hälfte verbraucht sein

Dann wird die weltweite Ölförderung zurückgehen



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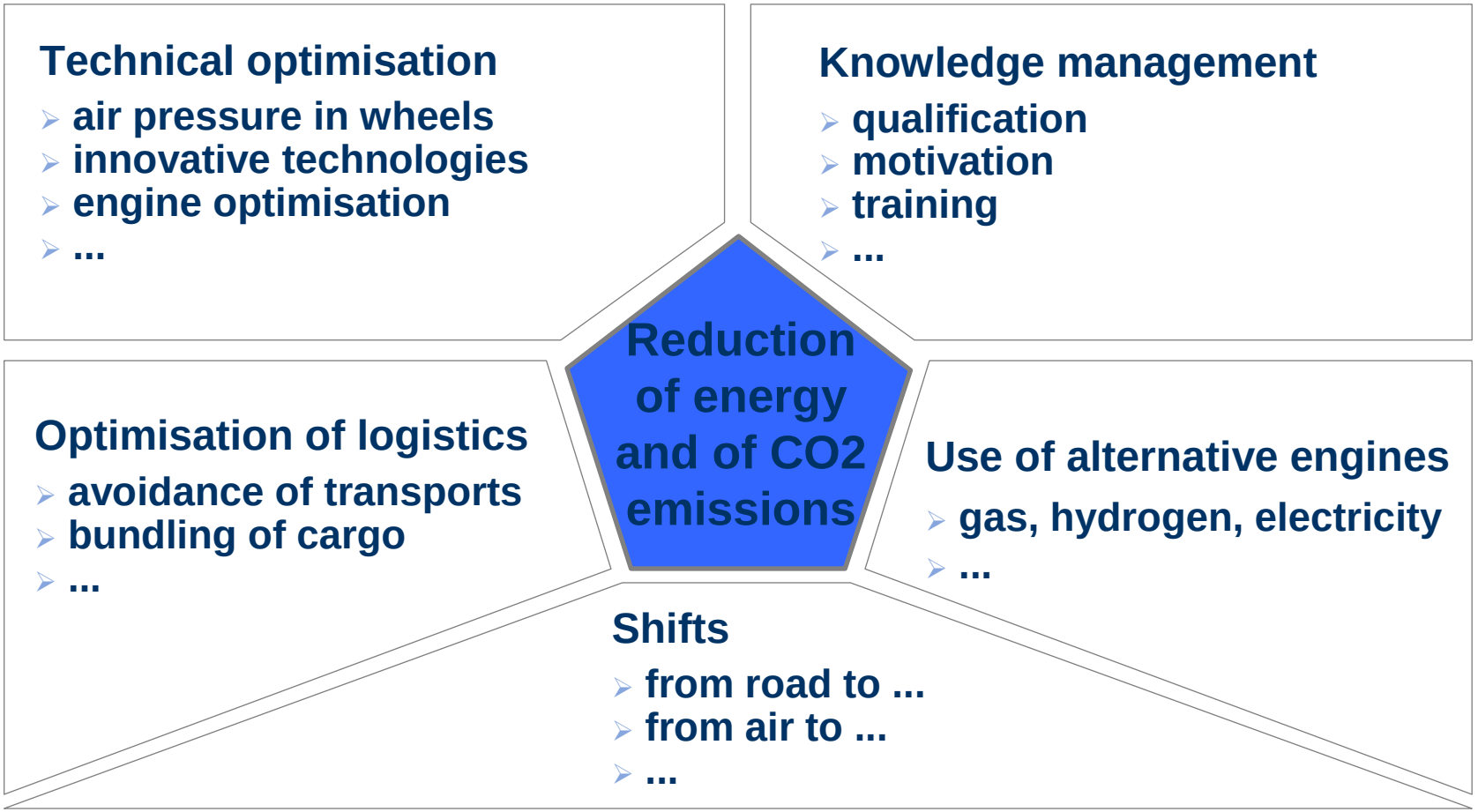

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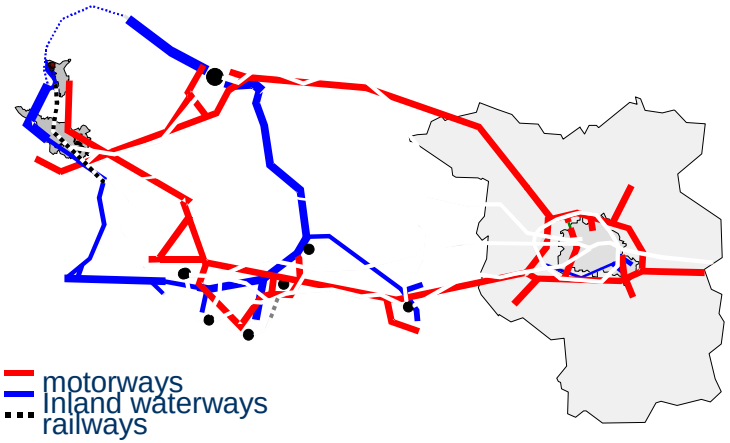
Intermodal Supply Chains

- Design of cooperative intermodal solutions
- Location planning and process optimisation
- Promotion of intermodal transport
- Controlling of intermodal interfaces
- Simulation and software support
- Networking between partners
- Communication of best practices



- **Elaboration of value adding activities and chain design**
- **Developing of business models**
- **Performance management for intermodal SC**
- **Knowledge management within the SC**
- **Consultancy in mass customisation for SC**

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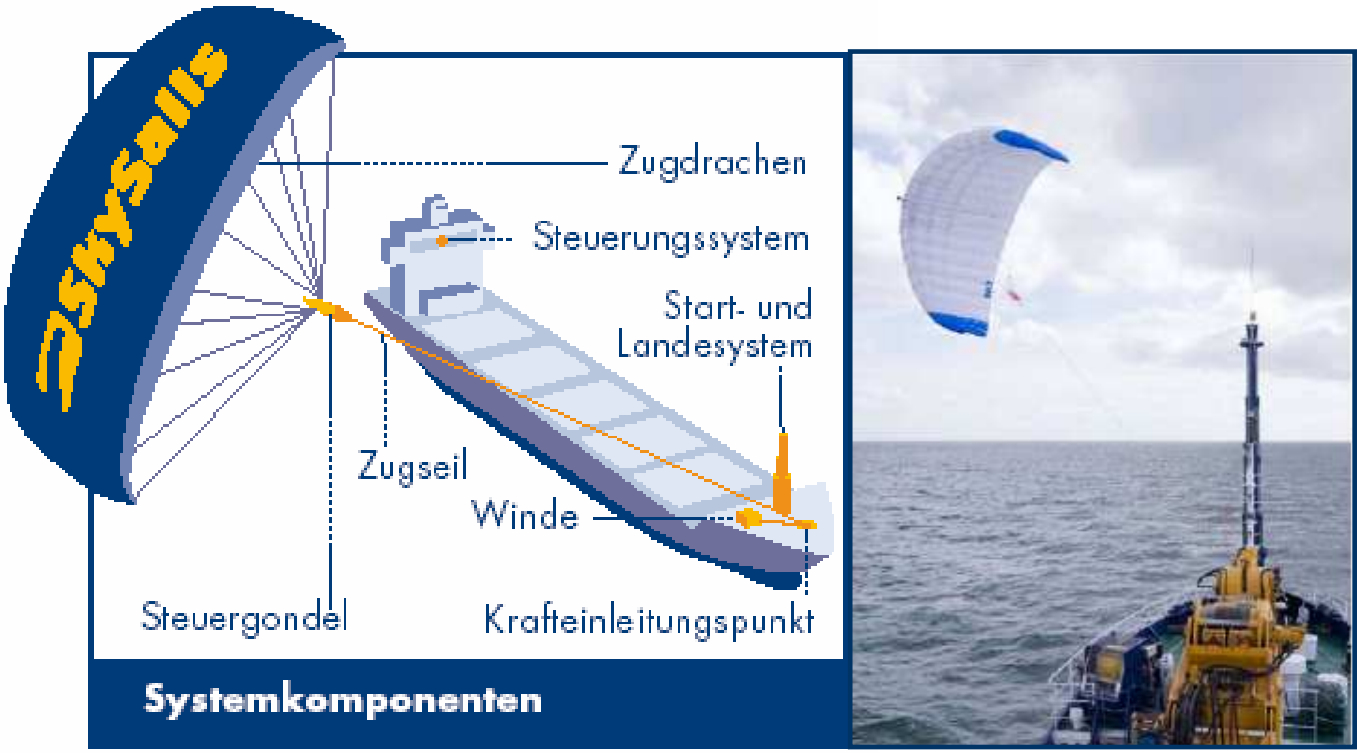

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CRC University Bremen

Conventional control

- Hierarchical structure
- Global information
- Central planning and control

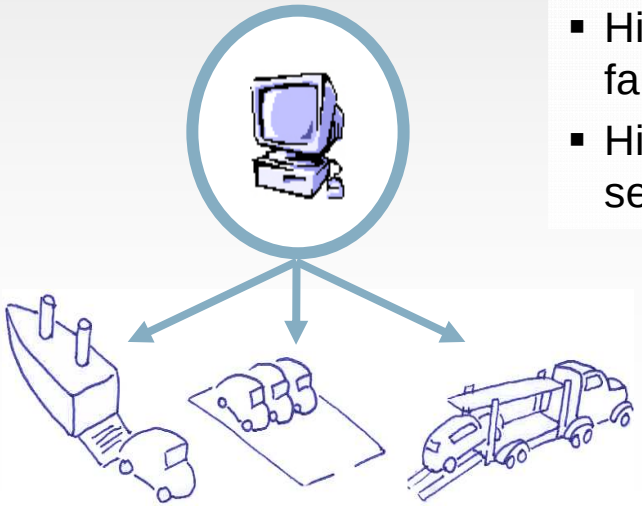
Multi Agent Technology

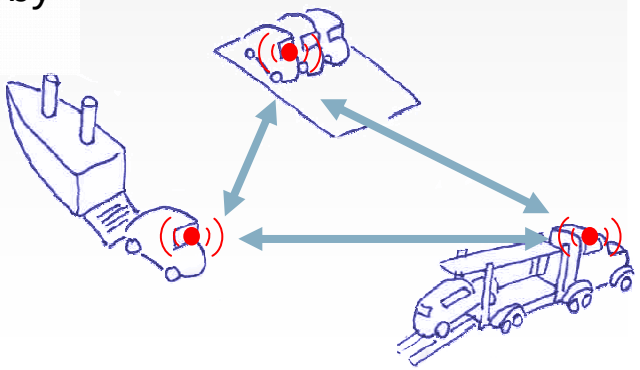
Advantages / Benefits

- Higher flexibility by higher and faster adaptability
- Higher robustness and fault tolerance
- Higher performance by self-optimisation

Autonomous control

- Heterarchical structure
- Local information
- Decentralised control
- Intelligent objects





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