



# Logistics – a key sector of the 21<sup>st</sup> century

Conference:  
Skills for the European Logistics Sector  
Brussels, 2008-09-24

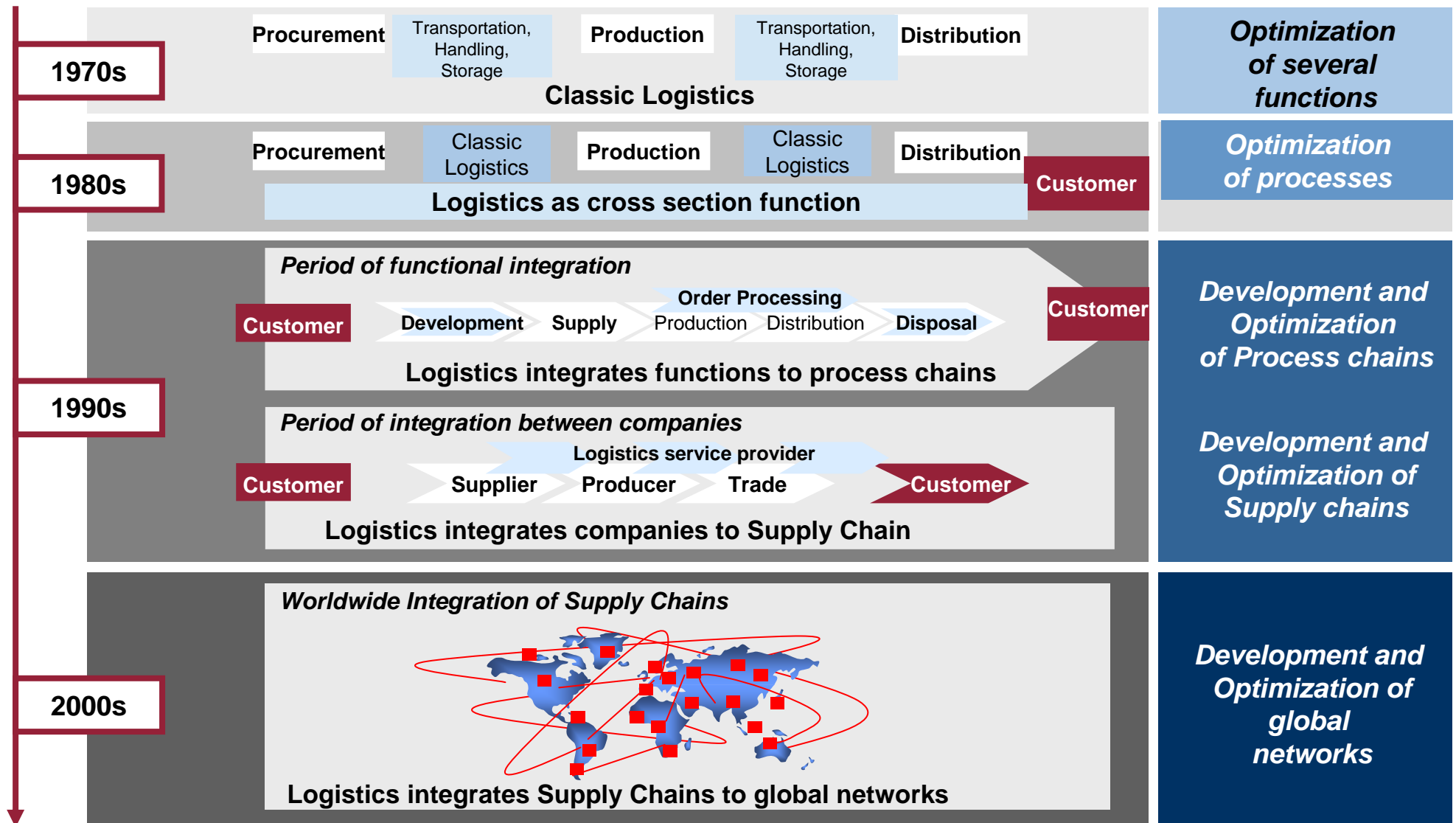


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# Development of Logistics



Source: Baumgarten, TU Berlin

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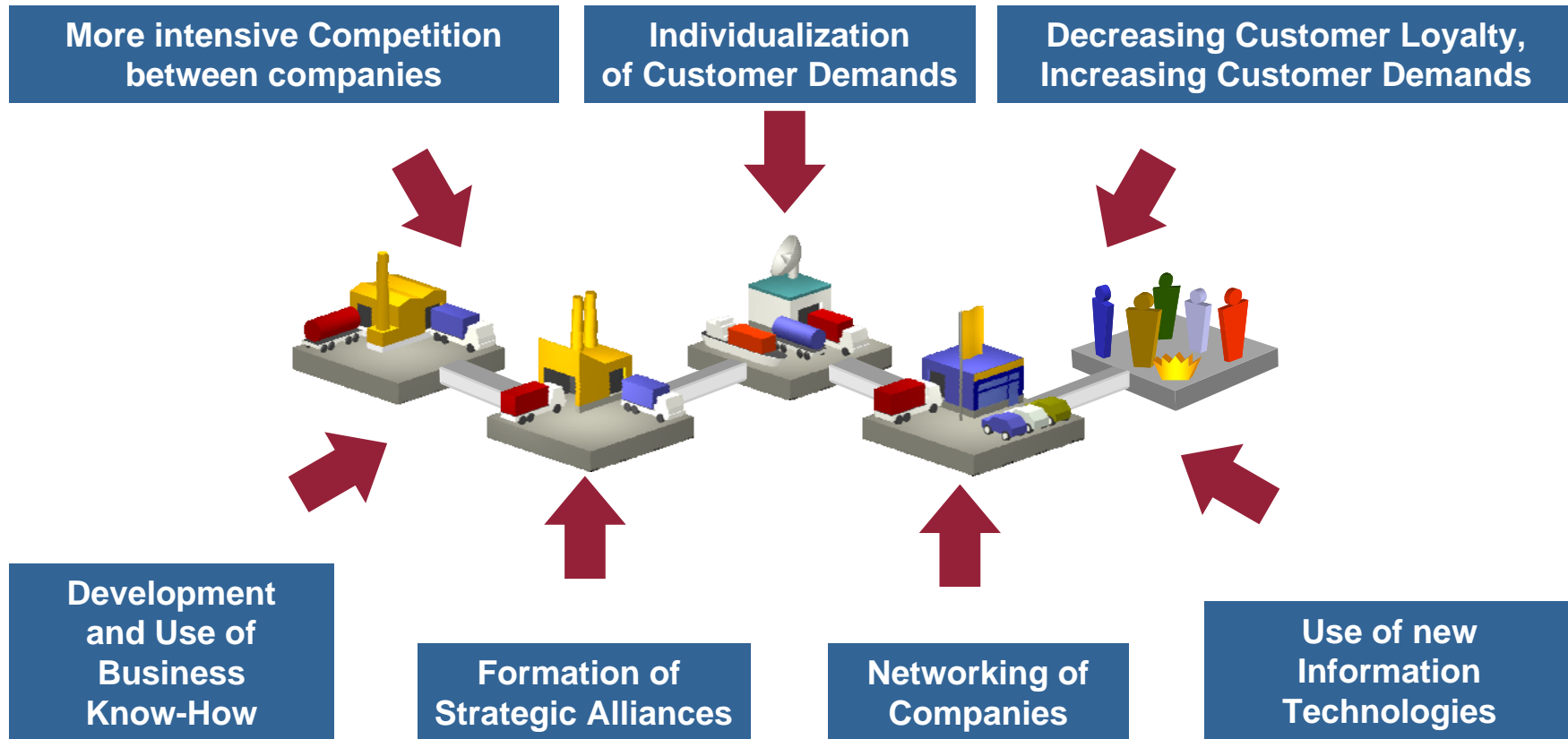
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# Challenges for Logistics



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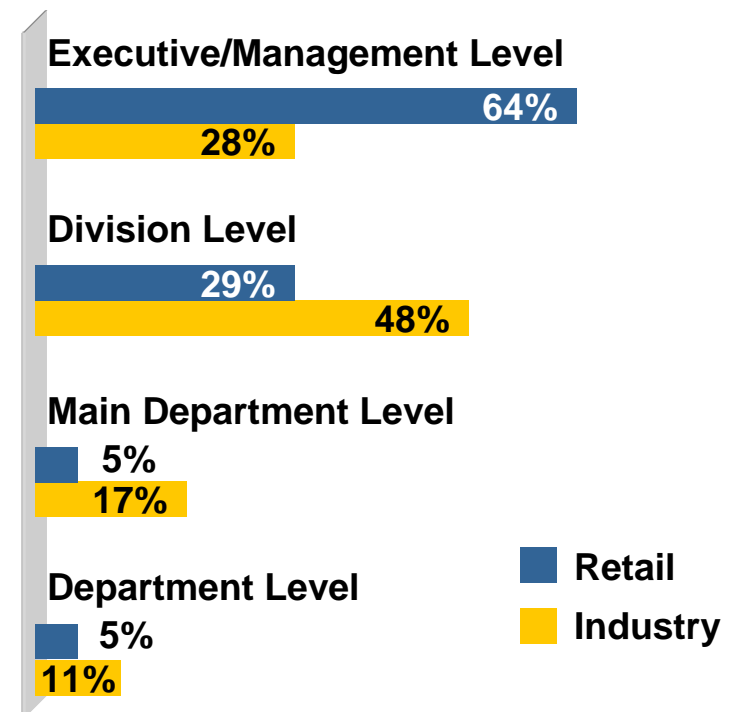
## Diversification and Importance of Logistics

- ▶ High-value tasks in logistics make it necessary to collaborate with other departments
- ▶ The increasing consideration of monetary aspects makes it possible to measure the success of logistics

### Important Complex Task Areas

- Supply Chain Management
- IT-Integration
- Order Processing
- Supply Chain Planning and Optimization
- Planning and Implementation of IT-Systems
- Supply Chain Monitoring

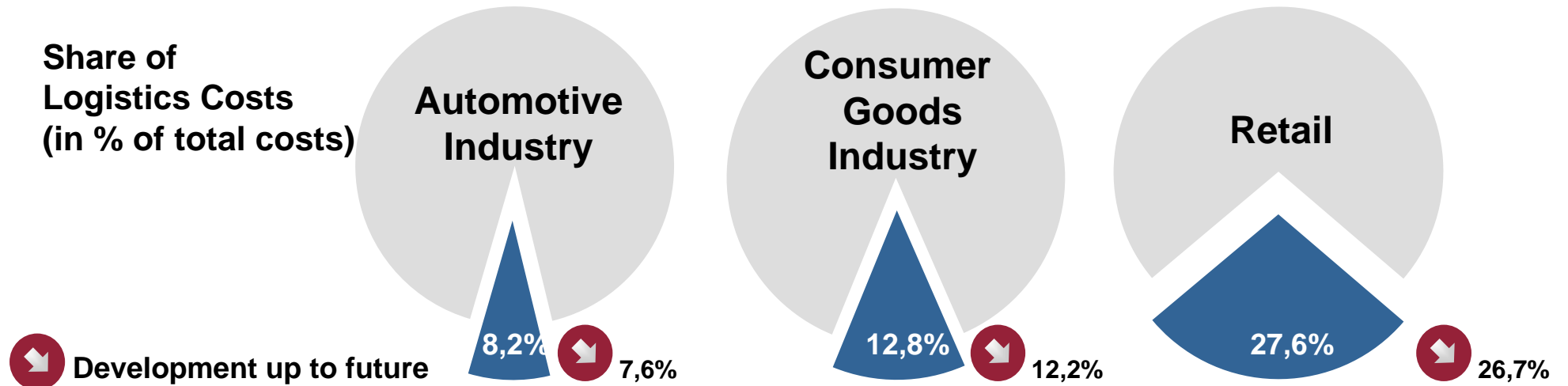
### Logistics as a Task of Top Management



[in percent of the surveyed companies, multiple citings possible]

## Logistics Costs and Investments – Branch-related Evaluation

- ▶ Retail catches up in the development of logistics systems
- ▶ High share of IT-Investments reflects the change in tasks of logistics



Investments in Logistics (% of total investments)	6,2%	10,4%	29,4%
Share of IT-Investments (% of logistics investments)	20,7%	25,7%	26,7%



**Global Supply Chain Management**

**Logistics Competence Management**

**Sustainable Logistics**



## Actual Challenges in Supply Networks

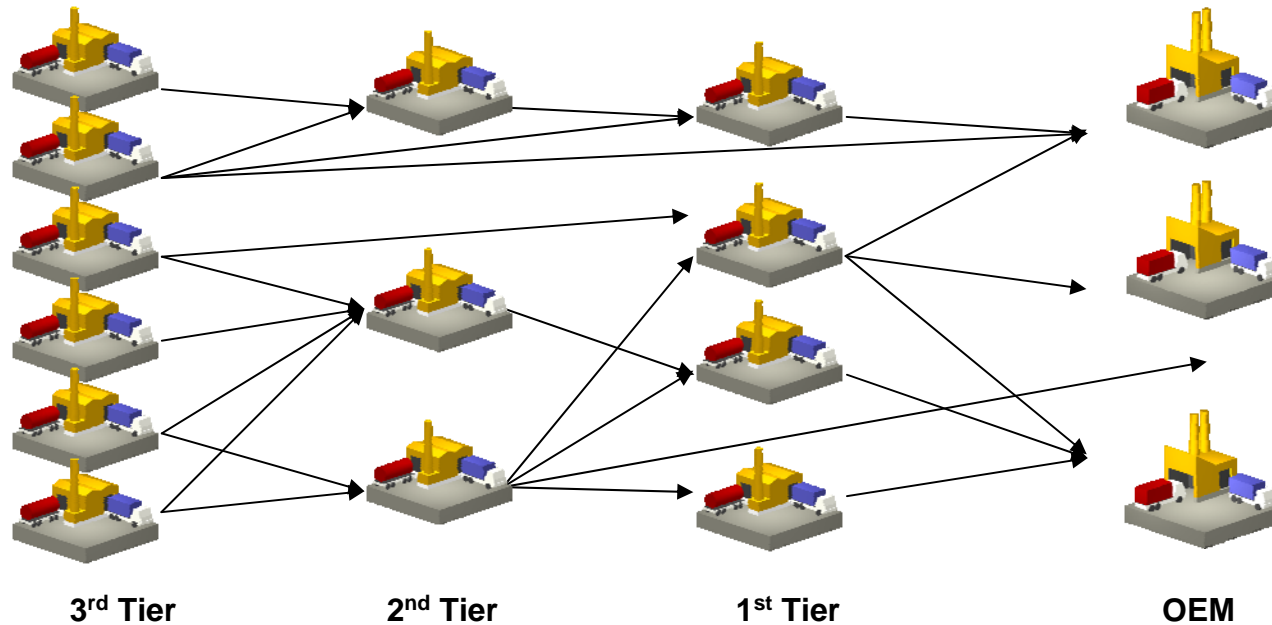
### ► Supply networks possess highly complex structures

Entry to new markets and resulting creation of new supply networks

Increasing procurement lead time in global supply chain networks

Lack of information in the tiers of the network

Poor transparency of the supply chain



Increasing complexity in planning and controlling

Durability and sustainability of supplier relationships

Individual optimisation is predominant

Example: A supply network with 4 levels and 15 partners possesses 54,241 logistic relations for each echelon.

Source: Visality

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## Concepts for Standard Procurement

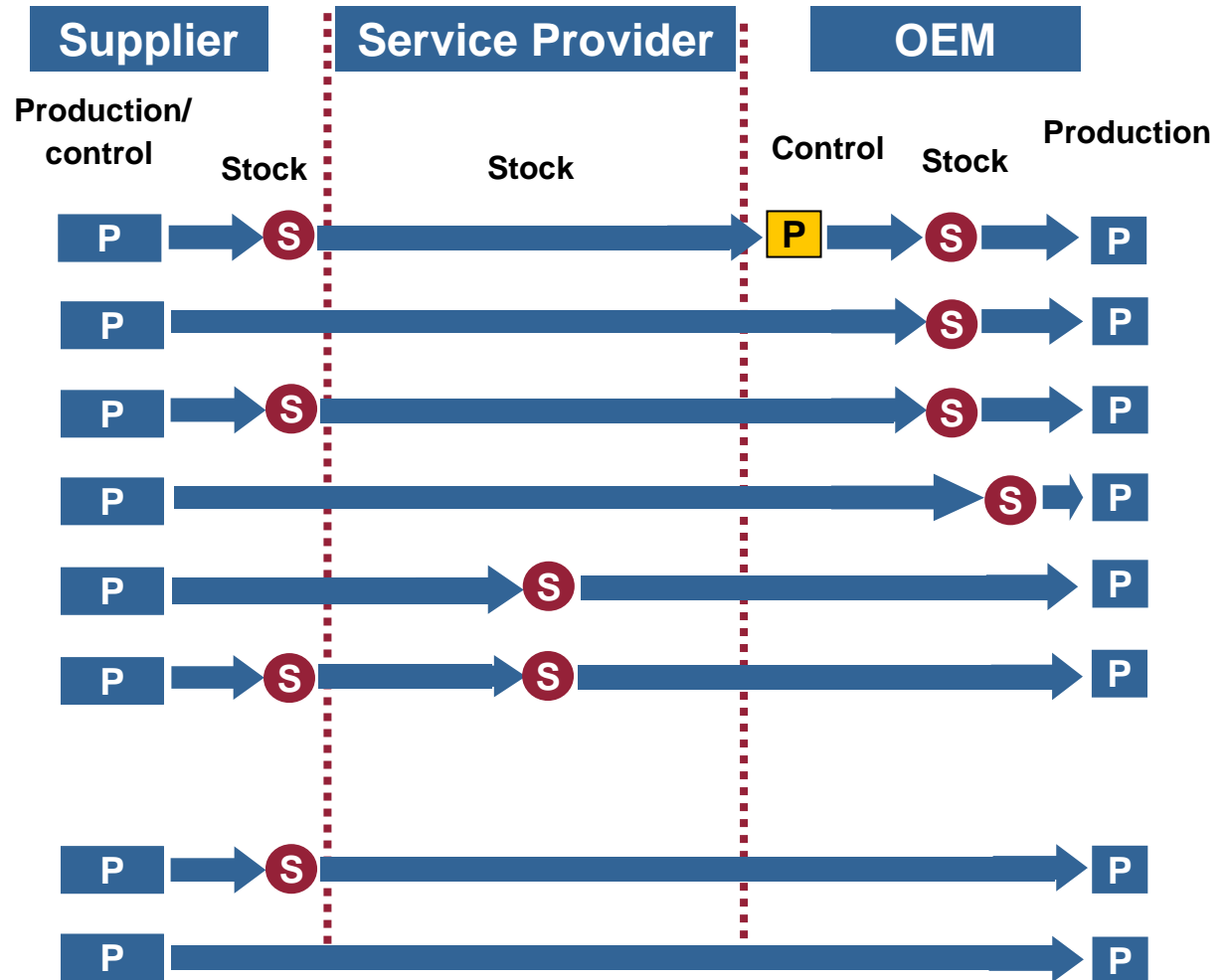
- ▶ Concepts for standard procurement allow the implementation of logistics strategies according to the classification of material

### Classic & consolidated concepts

- classic
- Consignment stock (1 level)
- Consignment stock (2 levels)
- Consignment stock close to production
- Contract stock (1 level)
- Contract stock (2 levels)

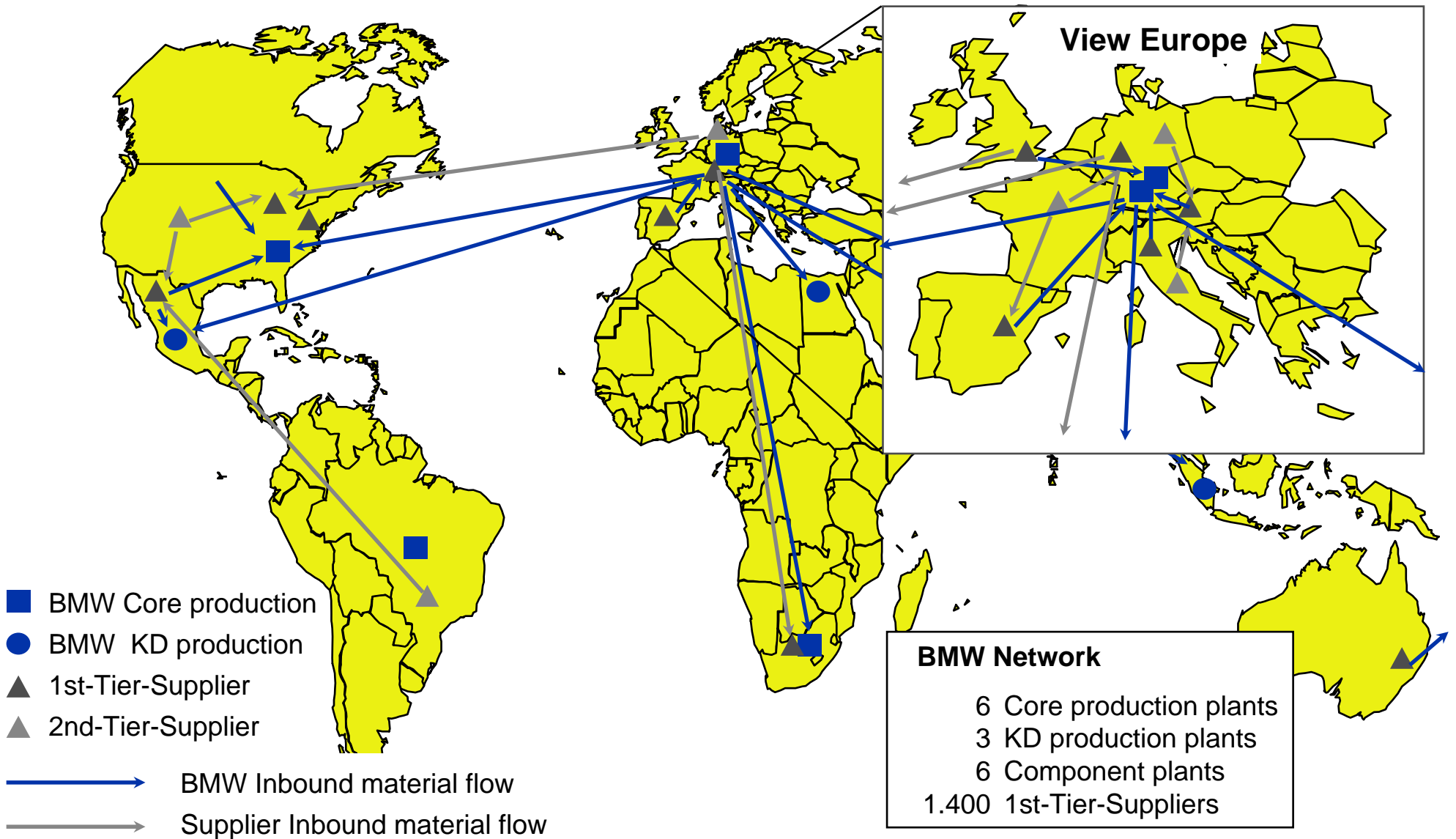
### Synchronized concepts

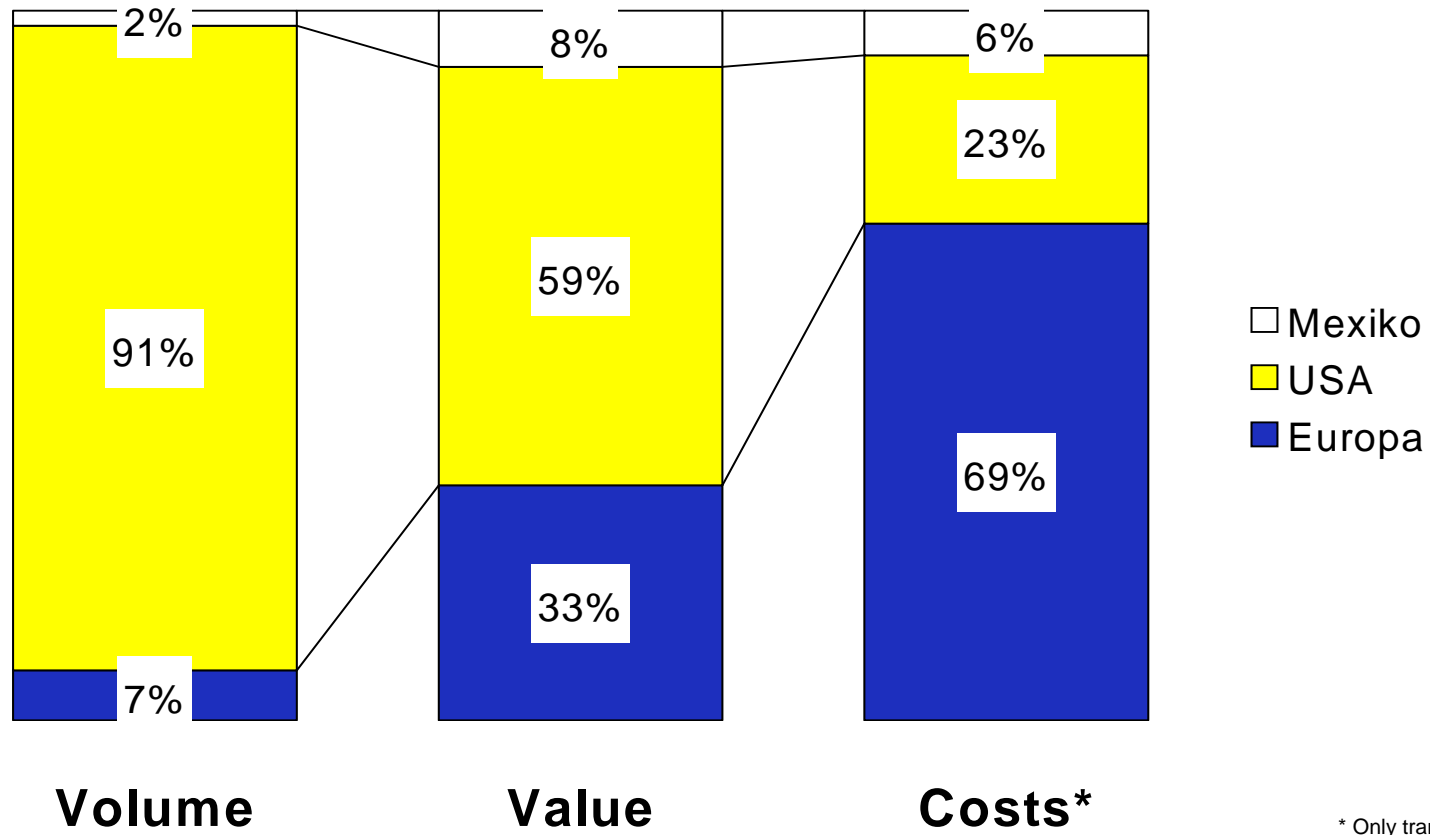
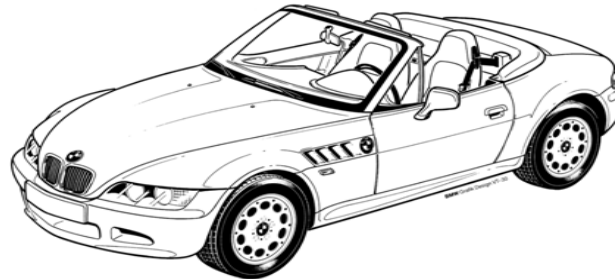
- Just-in-time supply
- synchronized production



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\* Only transport and handling costs

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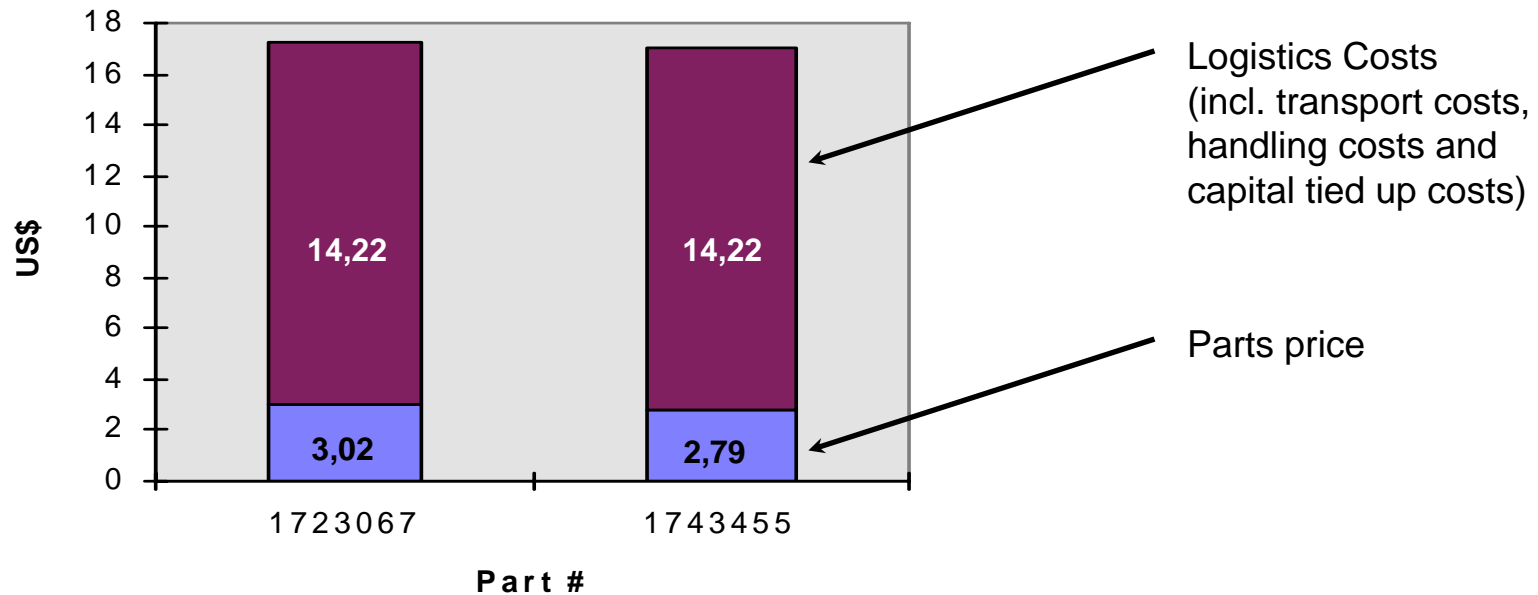
► **80% of total parts costs for the fan shroud are logistics costs, only 20% are caused by the parts price**

**Ratio between parts price and logistics costs for two selected part numbers:**

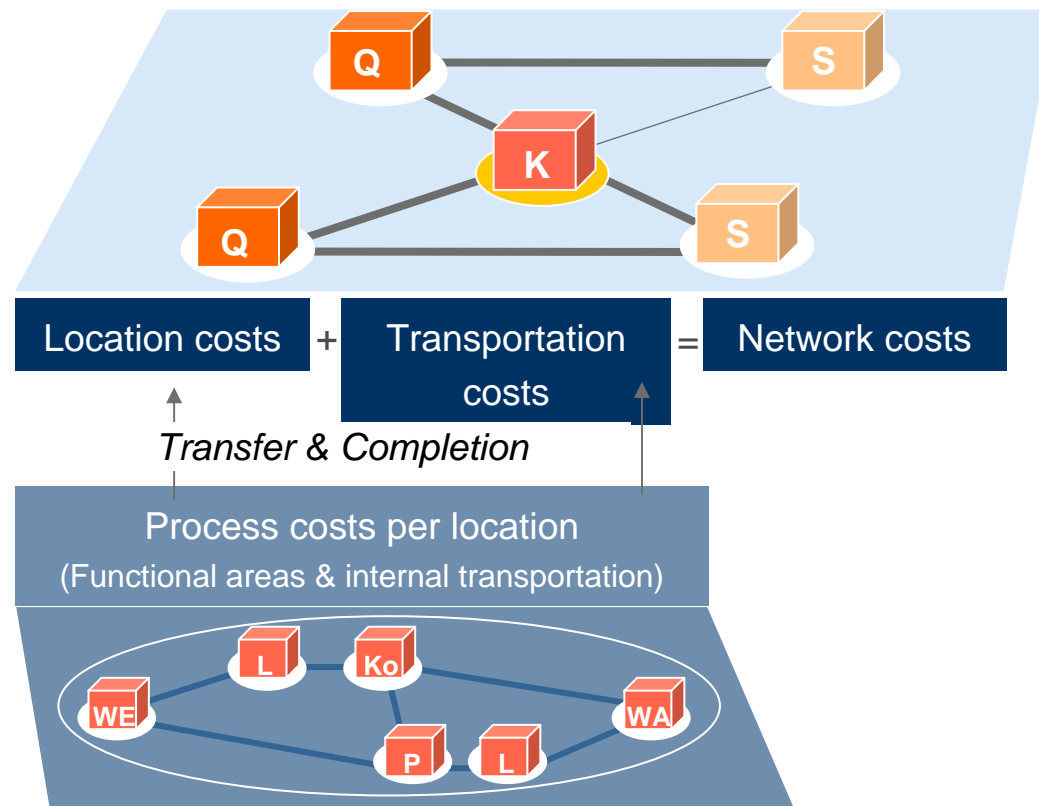
- Supplier: Seeber GmbH, Italy
- Part description: Fan shroud
- Standard supply chain: EU3



**E 36/7 (1998)**



## Network



## Location

## Variables of optimization

### Transportation:

- Frequency of delivery
- Way of transportation

### Allocations:

- Allocation material/processes
- Classification of locations
- Inventory level

### Location:

- Number of locations per level
- Geographic position
- Number of levels within network



**Global Supply Chain Management**

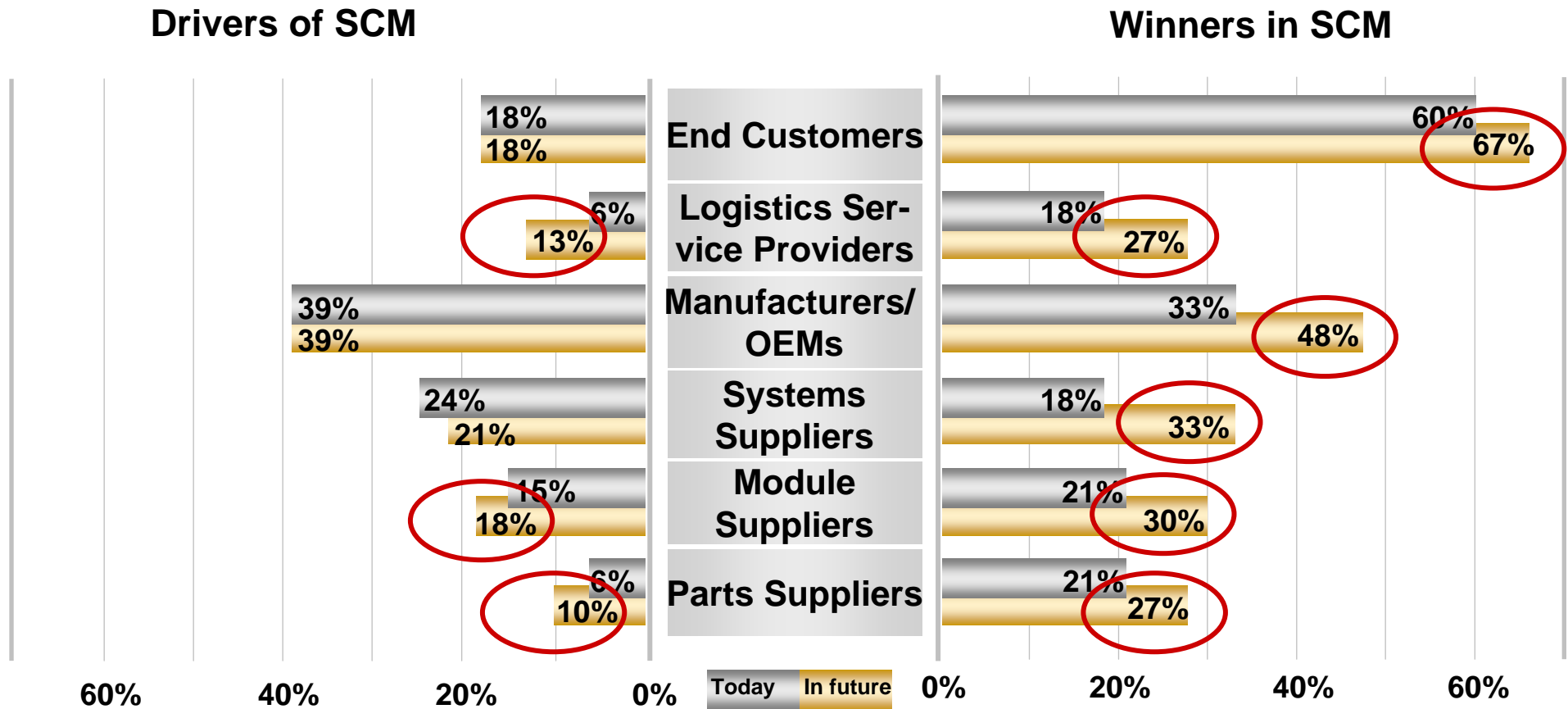
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## Drivers and Winners in the Supply Chain – Industry Perspective

- ▶ Expectations of partners in the supply chain: participation in the success of inter-company concepts
- ▶ Logistics service providers and sub-suppliers are becoming drivers of SCM



[in per cent of the surveyed companies, multiple citings possible]

Source: Baumgarten, TU Berlin

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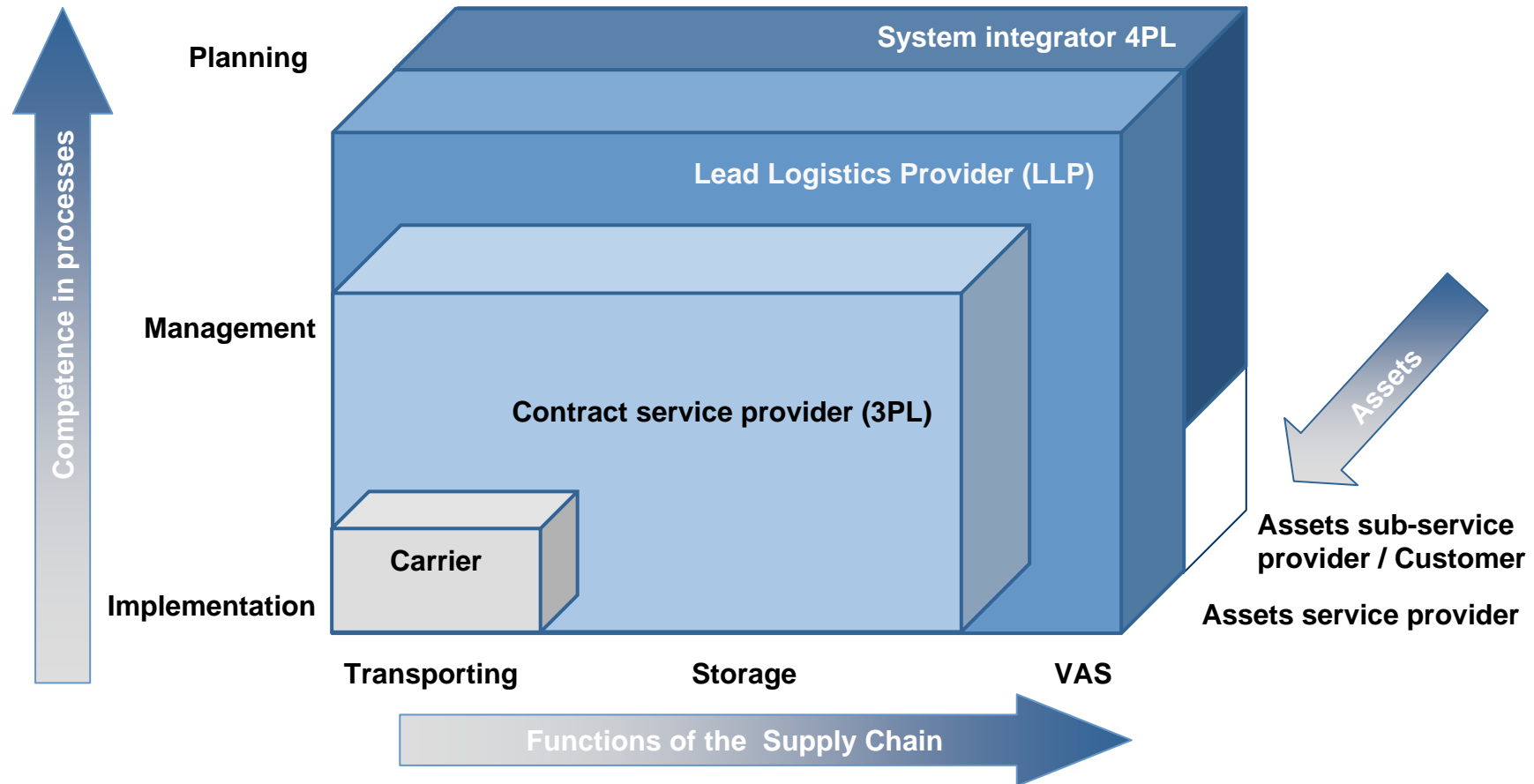
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## Classification of features and examples for 4PL and LLP

- The different business models can be distinguished with the help of three dimensions



Source: Jobst, DHL

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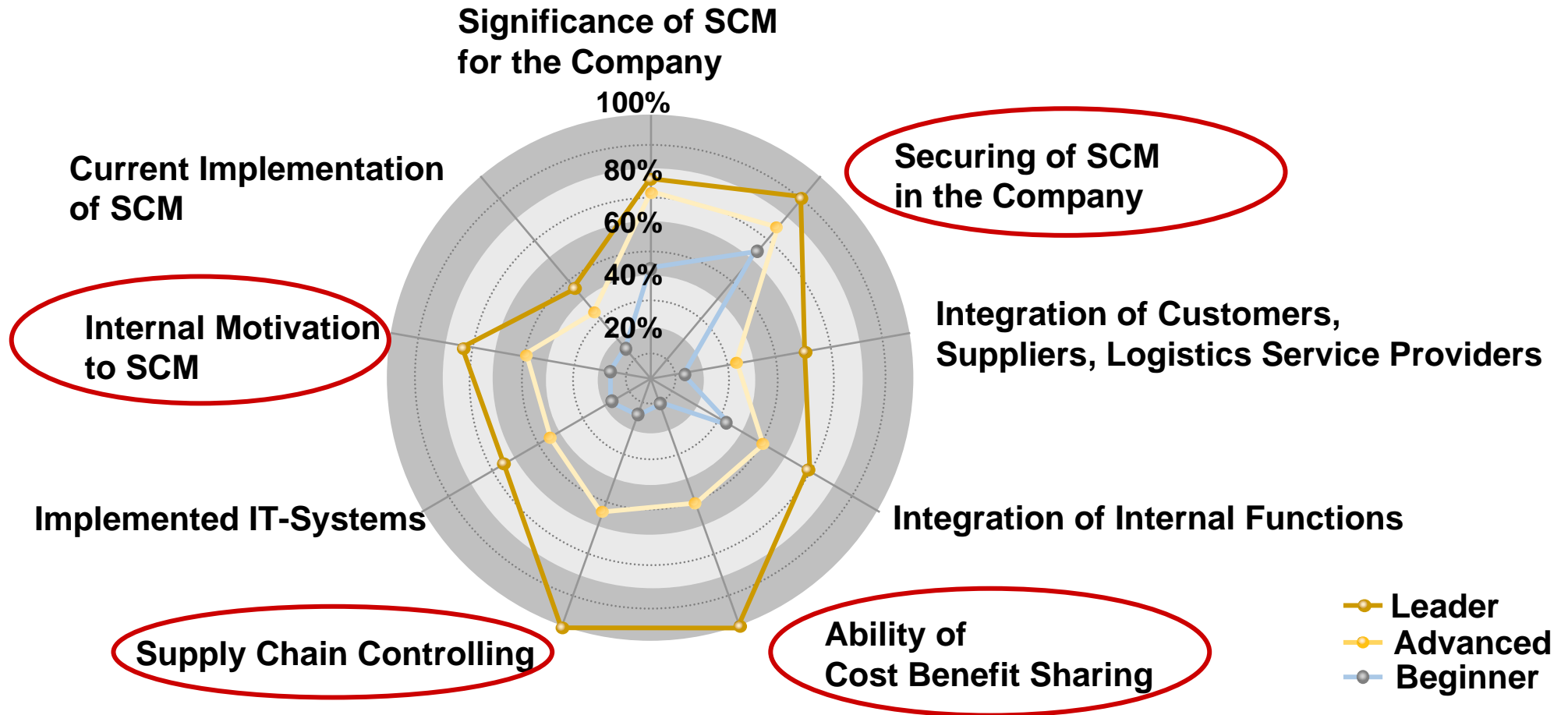
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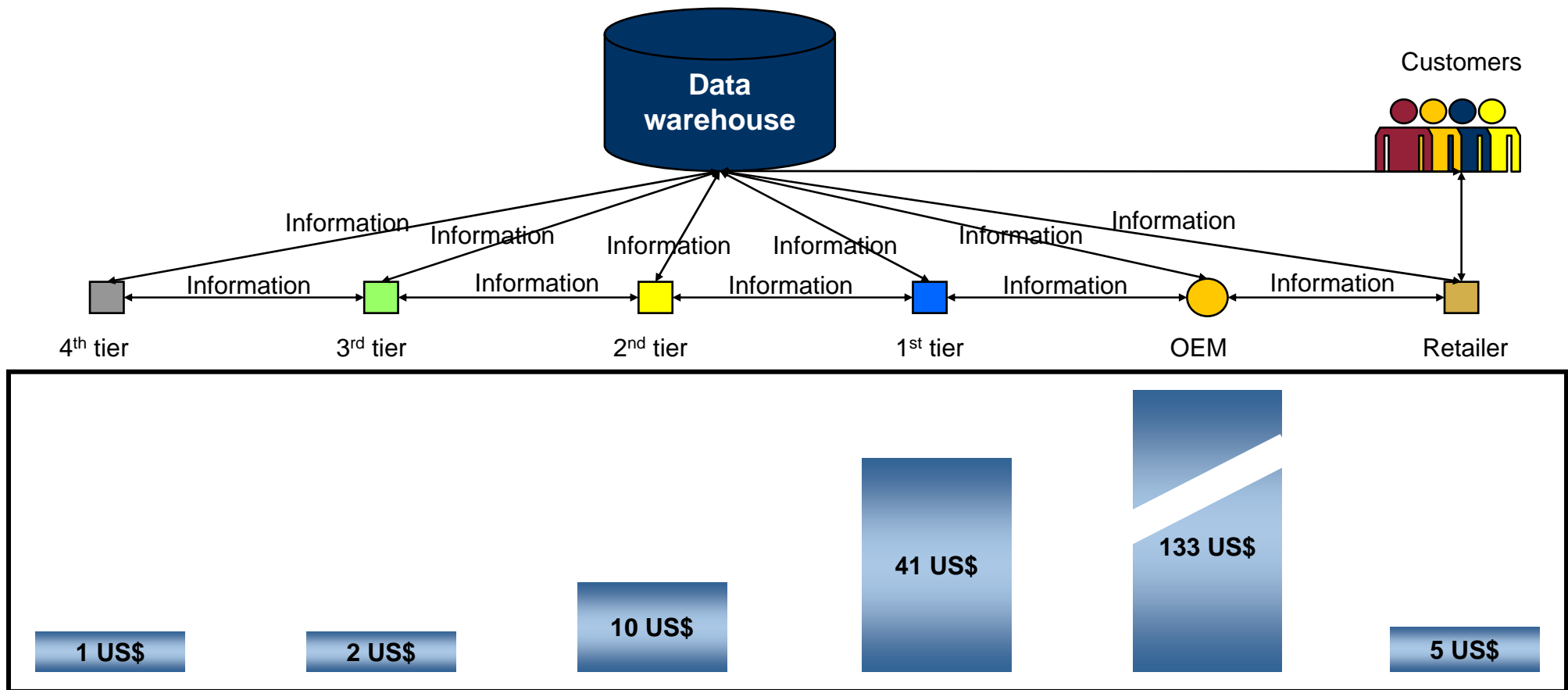
► **Collaboration Fit: ability of a company to work quickly and efficiently in a network**





## Savings per vehicle by information networks

- ▶ Different saving amounts on different levels of the Supply Chain require Cost-Benefit-Sharing for total optimization



Source: Baumgarten, TU Berlin

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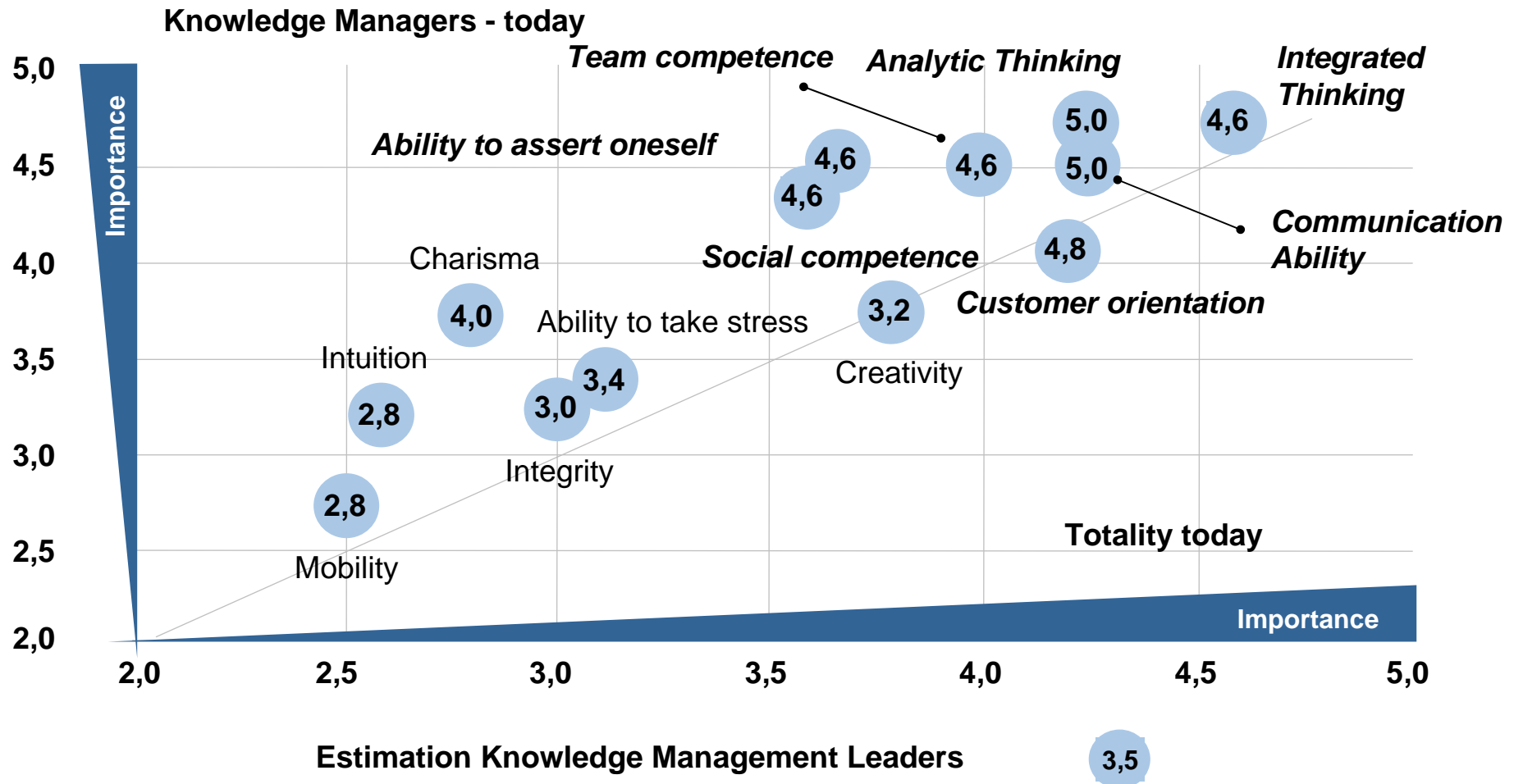
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## Characteristics of Knowledge Managers

- ▶ Especially analytic and integrated way of thinking as well as social competence are important characteristics of Knowledge Managers



Source: Baumgarten/ Zadek, TU Berlin

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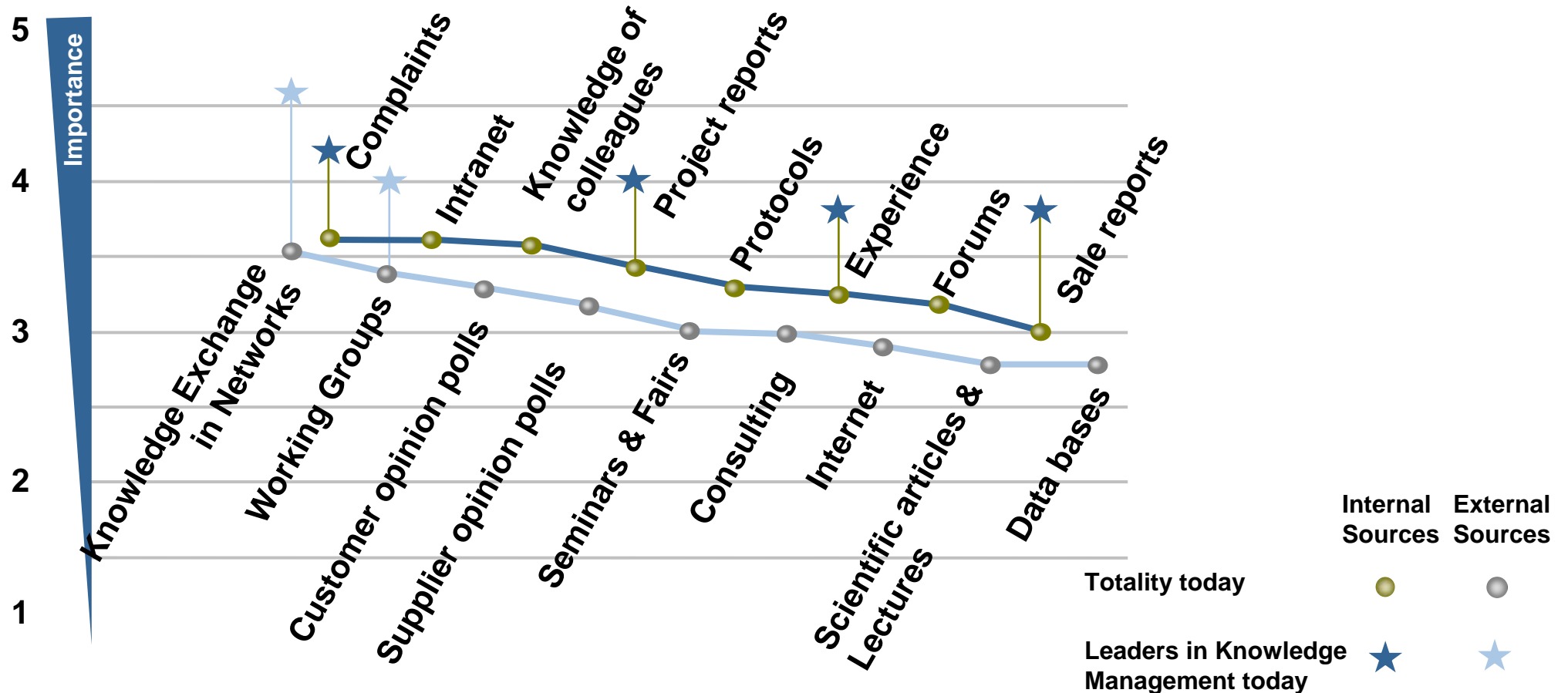
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## Sources of Logistics Knowledge and their importance

- ▶ Leaders in Knowledge Management replace already today internal sources for Knowledge by external network-oriented sources



Source: Baumgarten/ Zadek, TU Berlin

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**Global Supply Chain Management**

**Logistics Competence Management**

**Sustainable Logistics**



# Global Challenges

## use of resources



[www.we.tu-clausthal.de]

## world population



[www.dsw-online.de]

## natural disasters



[www.wdr.de/online/news/klimaschutz]

## emissions



[www.spiegel.de]

## climate change



[www.infokrieg.tv]



[www.uni-bremen.de]

## globalization



[www.bwi2006.com]

## traffic performance



[www.apfel-herz.de]

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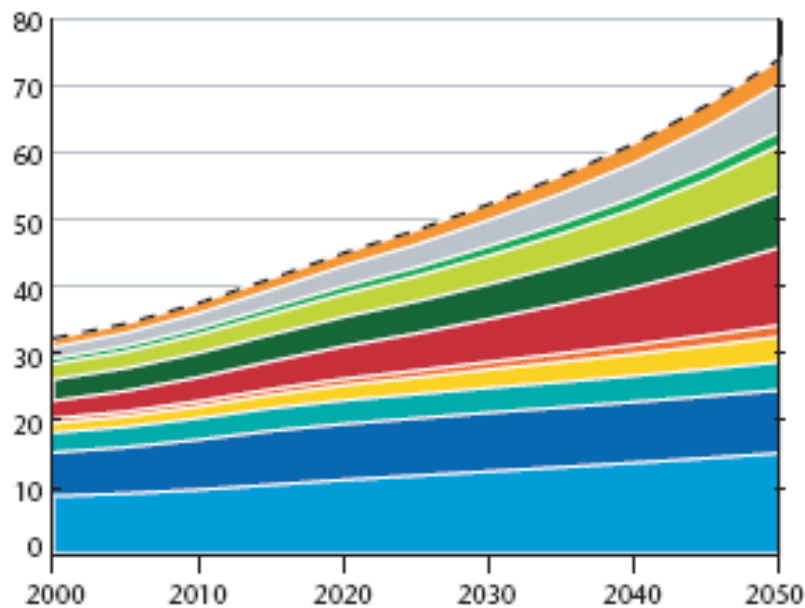
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- ▶ The globalization leads to an increase in passenger traffic and even more in goods traffic

## Development in passenger traffic

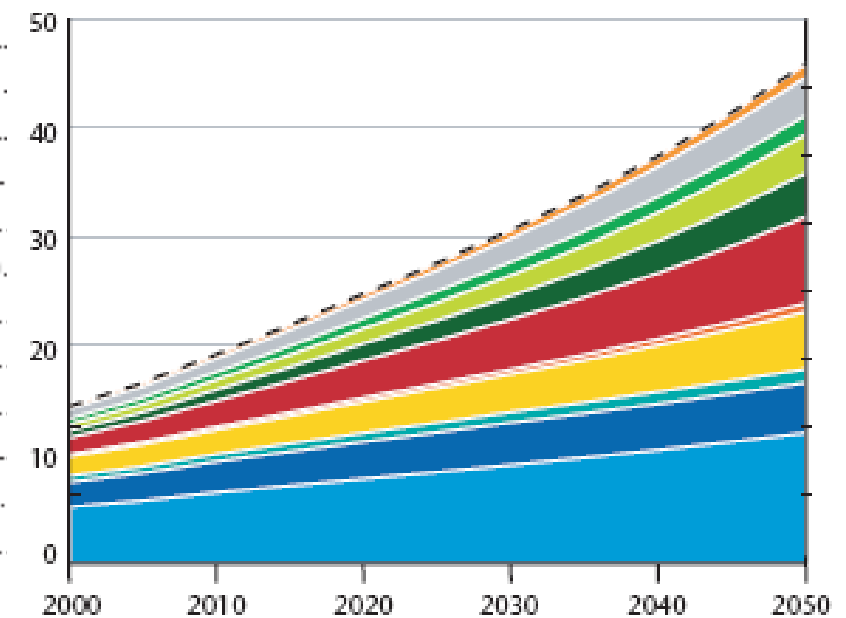
Personenkilometer/Jahr in Billionen ( $10^{12}$ )



+ 130%

## Development in goods traffic

Tonnenkilometer/Jahr in Billionen ( $10^{12}$ )



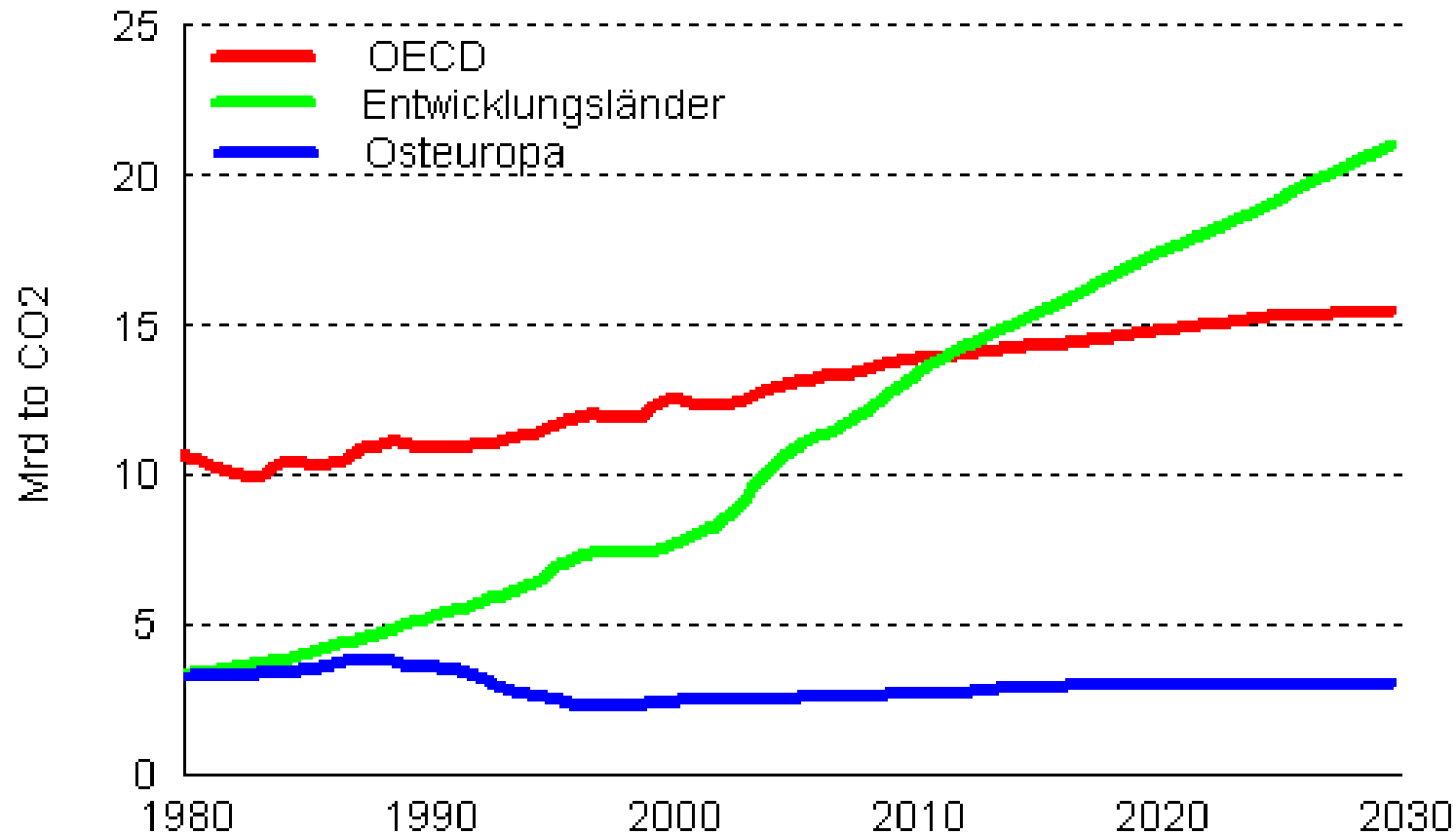
+ 200%

[Quelle: World Business Council for Sustainable Development (WBCSD): Mobilität 2030: Die Herausforderungen der Nachhaltigkeit meistern, Conches-Geneva: WBCSD, Juli 2004]

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## Energy-CO2-Emissions Clustered by Countries

- ▶ Above average emission increase in the upcoming countries due to population and prosperity growth and increasing globalization



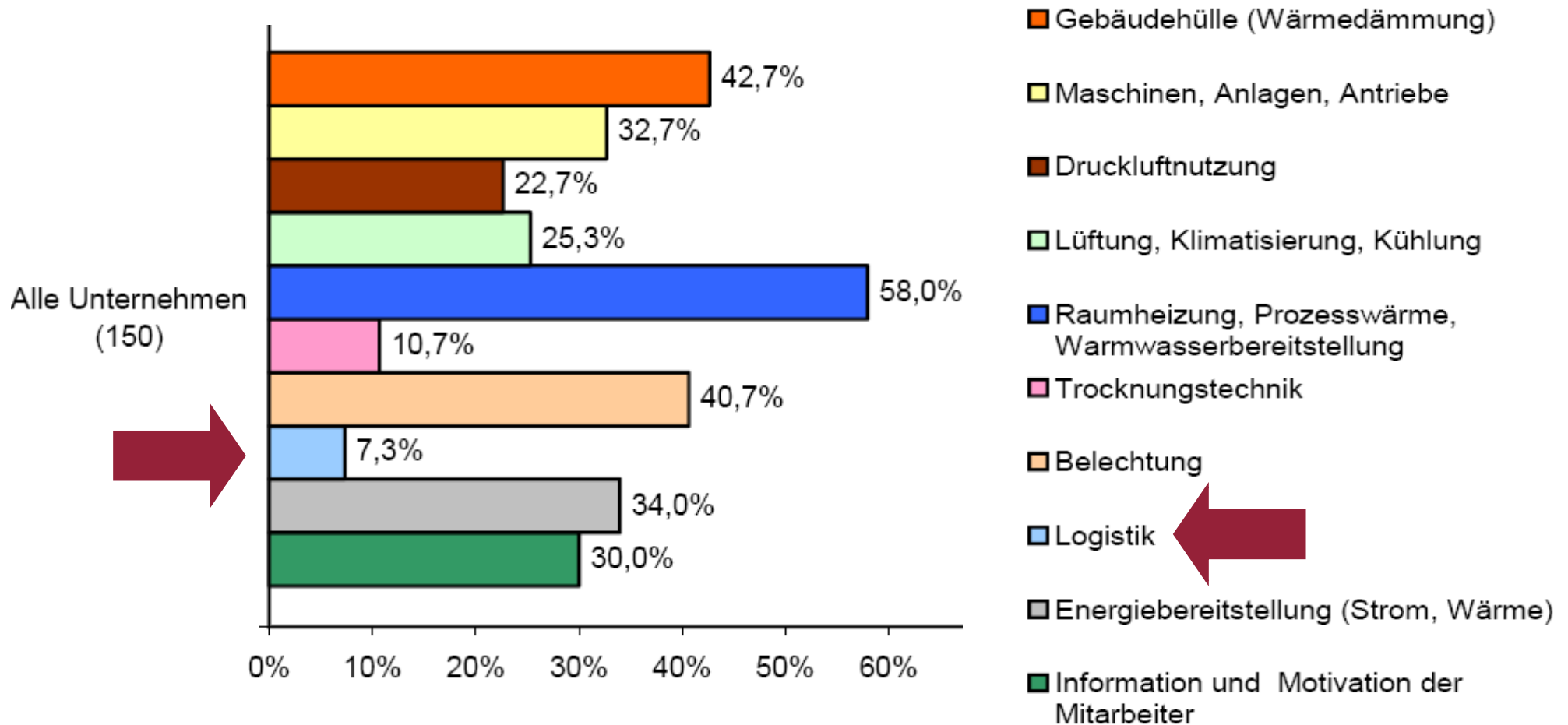
Quelle: OECD, Energie-Ausblick 2006.

[www.jjanke.net]

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## Accomplished Energy Saving Actions in Questioned Companies

► In the field of logistics few actions have been undertaken up to now



[Quelle: KfW Bankengruppe, Befragung, Dez. 2005]

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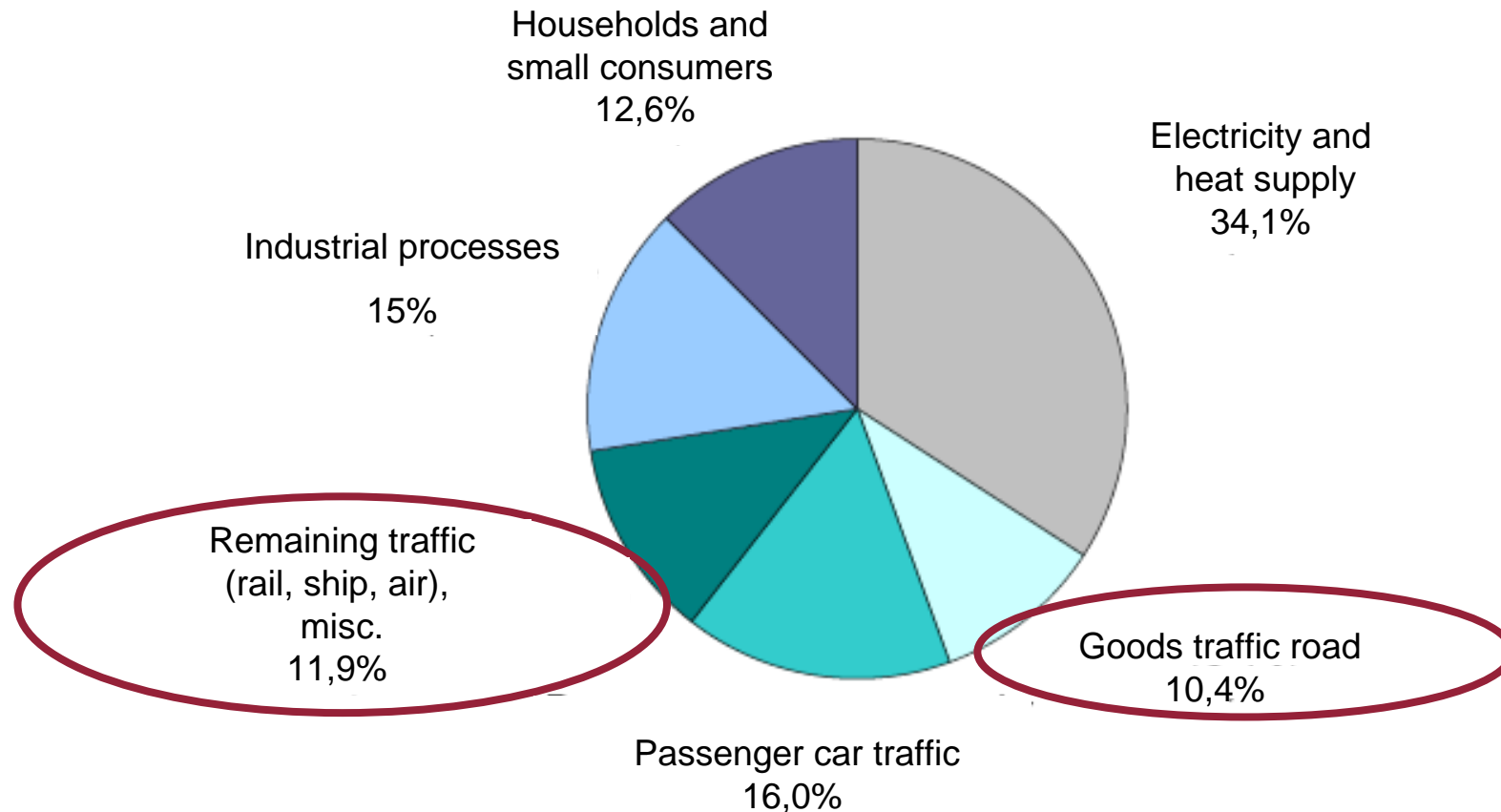
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## CO2-Emissions displayed by originator in Germany

### ► Traffic and industry are causing more than 50% of the emissions

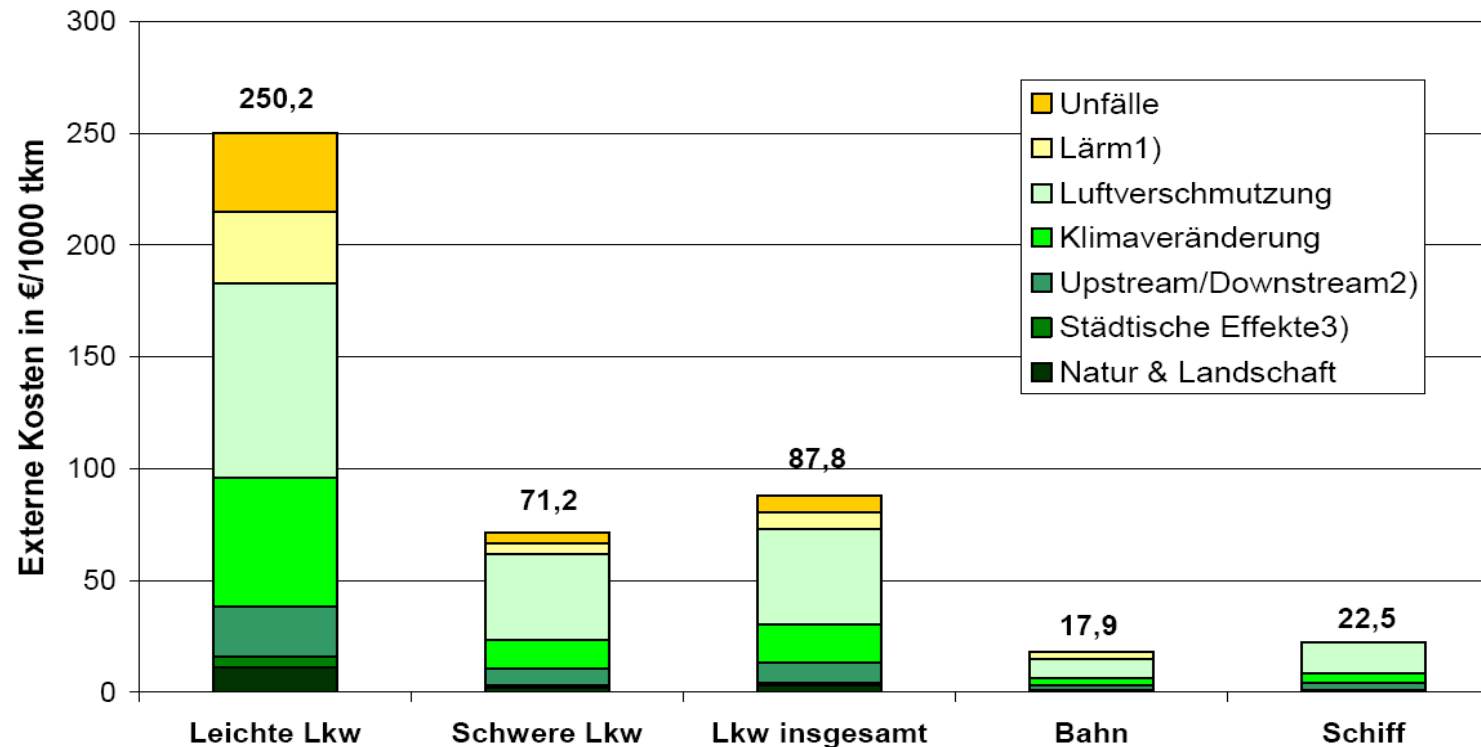


Quelle: CAFE, 2003; TREMOVE, 2004.

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## Example: Goods Traffic

- ▶ Regarding external costs trains and ships are considerably more favorable than trucks



<sup>1)</sup> Lärmkosten der Güterzüge wurden möglicherweise unterschätzt. - <sup>2)</sup> Kosten der Klimaveränderung für die Upstream-/Downstream-Prozesse (indirekte Emissionen). - <sup>3)</sup> Zusätzliche Kosten in städtischen Gebieten.

### Average external costs (ex traffic holdups) of goods traffic in EU-15 including Switzerland and Norway in 2000

[Quelle: Ökoinstitut, Uni Do, FhG IML: BMU Forschungsvorhaben]

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Vision

SKYSAILS

## Sea freight gets a second wind

A new type of kite sail will save captains and shipping companies considerable amounts of fuel on the high seas.

[Text] Hanning Sletz

The combination of low rates for freight and high prices for fuel spells adversity for shipping companies and threatens the bottom line. A necessity is the mother of invention, shipbuilders and engineers are thinking intensively about every conceivable potential for cutting fuel costs. Yet some ideas are so simple that on first hearing them we wonder why they weren't realized ages ago. The kite sail is one such idea.

Stephan Wraga wasn't an inventor until he took a vacation in Spiekeroog, where he had his inspiration while flying a kite. It was not an entirely new idea; after all, windsails have been propelling boats ever since they were first used by the ancient Chinese. But Wraga's idea was more than just a sail standing fixed on a mast at a ship's prow. His kite sail concept draws large figures of eight, the stronger the

wind, the higher its speed in flight, the greater the force that the parachute develops. The force is expressed as the square of the speed. Each kilometer per hour that the kite picks up manifests as an enormous output in drag.

To realize his idea, Wraga founded a new company, SkySails, in Hamburg, and managed to attract Beluga Shipping of Reemsen as a partner. A first kite sail measuring eight by twenty meters is being used on the heavy merchant freighter Beluga SkySails, a ship of 182 meters length and 10,000 tons of displacement.

Captain Lutz Heidt let the kite fly during a test on the estuary of the river Weser. The parachute sail is placed at the prow, suspended from a telescope mast that extends up to 15 meters in length. The wind fills the sail through two openings, blowing it out into a flat arc. The press of a button releases the kite's anchor, and it floats straight up on a plastic rope, maintaining its form

thanks to numerous lines. In cross section its shape mimics the wings of a plane. The wind flows more quickly over the concave upper side, creating a lower pressure beneath the kite to provide the propulsion.

The thing that's new about this technology is the steering unit, which sits in a suitcase-sized box below the sail. Computers regulate the motions of the kite, the size of the figures of eight, and whether they run horizontally or vertically. The rule of thumb is that if the wind comes from aft, the kite can fly larger figures of eight and develop its greatest force. If the wind comes from the side, the possible radius of action is smaller; then the kite can only fly smaller, oval-shaped figures of eight, and the drag that it produces is accordingly reduced.

The tests have demonstrated that the 160-square-meter sail can produce an effective drag of about eight tons, of



which the true usable force amounts to a total of four tons. The Beluga SkySails requires a force of 20 tons to achieve its cruising speed of 12 knots (22.2 kilometers per hour), meaning that the kite sail can replace up to 20 percent of the energy. The ship's officers can put the main engine into a lower gear – much to the joy of the ship owner.

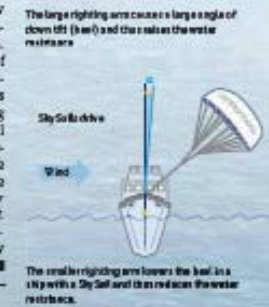
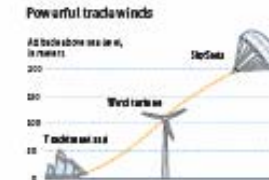
There are almost no applicable regulations for this technology. "We are not allowed to fly over 300 meters, and we cannot use the sail in traffic separation zones or too near to the coast," says Captain Heidt. In his four decades at sea the captain had never used a windmill before, but he picked up all the knowledge he needed to use the SkySails system in a special course. "If anything goes wrong you only need hit the emergency button and the line to the sail is cut."

SkySails is currently receiving orders and reservations from around the world. The 160-square-meter kite will reach series maturity in the summer of this year, and larger models will follow. Stephan Brabeck, a managing director at SkySails, estimates that kites of up to 1,250 square meters in size will one day be used. They are especially suitable for smaller tankers and freighters, but not for the largest container ships.

A team installing a SkySail requires special training, and the ship's crew must first be windproofed. The investment amounts to about €500,000. On the basis of the maiden voyage of its test freighter, Beluga Shipping expects the sails to save about four tons of ship diesel per day, representing 10 to 15 percent of the average fuel consumption. With fuel prices currently exceeding \$600 per ton, the savings will be considerable. The shipping company intends to pay 20 percent of those savings to the crew. Even the cook will be getting a share – after all, it's up to him to keep the crew in good spirits.

www.skysails.com

Vision



**Still on the drawing board**

Ideas for saving fuel are a abundance; the point is to try them out. Researchers are working on an extremely slippery ship hull, trying out on hull development the same technology that is used for super-fast torpedoes. Clouds of air bubbles flow along the surface to reduce friction. Reducing friction means that ships can either travel at a higher speed or else carry more freight, all while maintaining the same fuel consumption. Also in development is a ship with Flettner rotors, an idea dating back to the 1920s. Standing upright, rotating columns create their own propulsion. Various other hull designs are being tested for their flow properties. Engines are another focus; computer-aided fuel injection may prove effective in cutting consumption.

- ▶ **Utilization profit due to high handling costs limited**
- ▶ **Probability of success/profit increases with increasing energy and transportation costs and also accessory actions from the public enterprise are required**

### Known Solutions

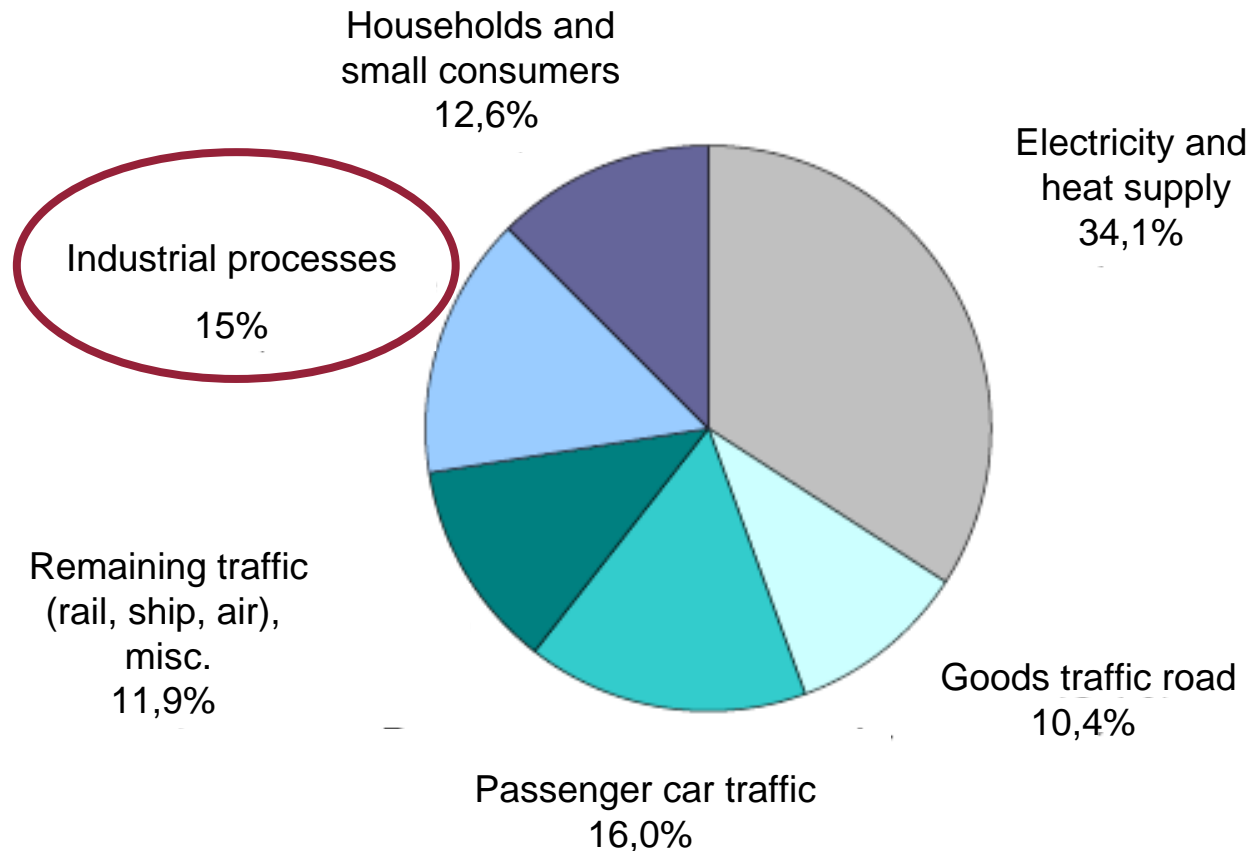
- Last-mile concepts (Letzte-Meile) road
- Route- and transport optimization
- Fleet management systems
- Telematics / traffic management
- City-Logistics
- Cargo transport center (distribution center) / trimodal sites
- Intermodal transport
- Roll-on-roll-off-transport/ piggyback transport
- Emission certificates
- Road charge depending on emissions
- Use of biofuel
- ...

### New Concepts

- Fast handling techniques, container traffic – road-rail-water (e.g. CargoBeamer, Krupp-Schnellumschlagsanlage)
- Low tide transport barge (Binnenschiff)
- Synchronized system traffic net rail
- Two-storey loading rail
- Unaccompanied piggyback transport (ro-ro-transport) using shuttles
- Sails for seagoing vessels (e.g. SkySails)
- Use of 2. generation biofuel and industrial production of biomass
- ...

## CO2-emissions displayed by originator in Germany

### ► Traffic and industry are causing more than 50% of the emissions



Quelle: CAFE, 2003; TREMOVE, 2004.

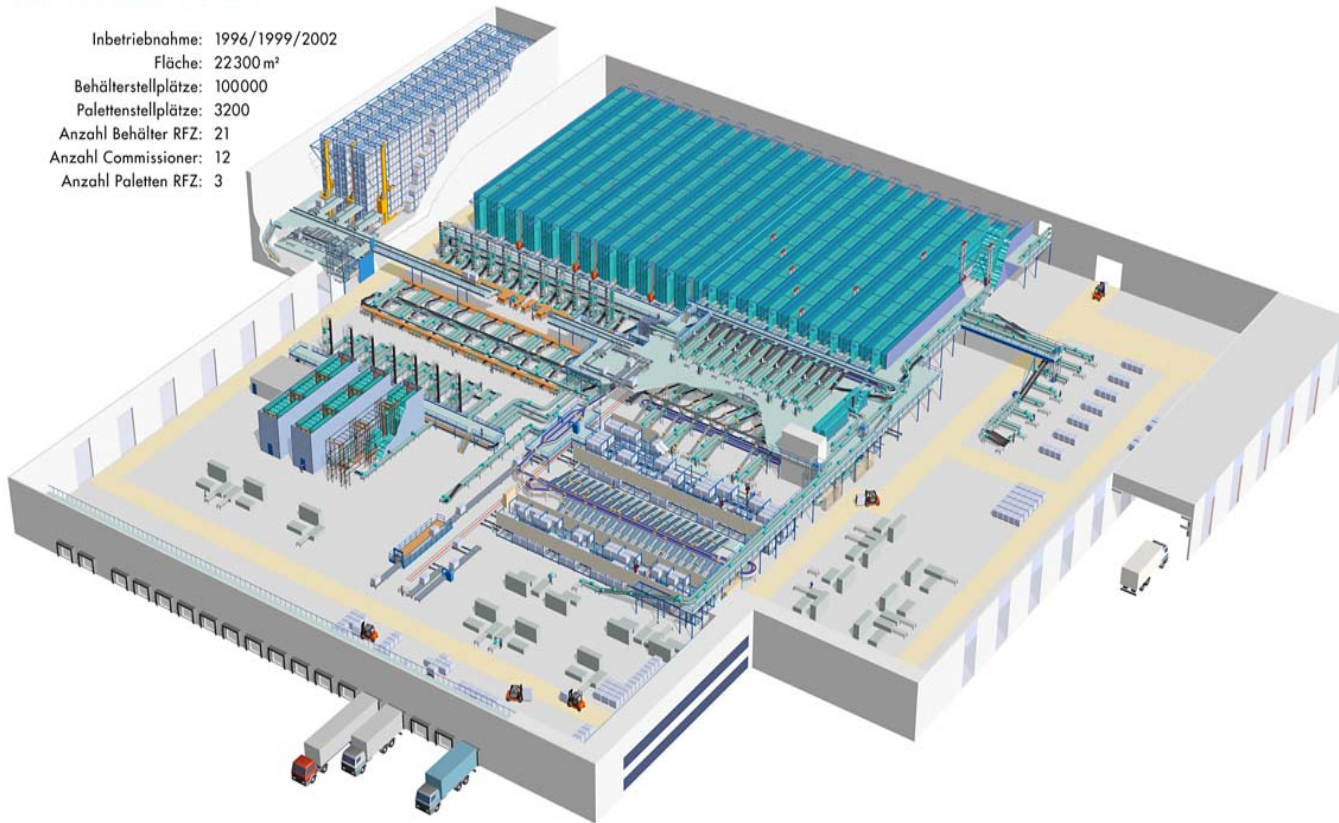
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## Example: Intralogistics

- ▶ The savings potentials are by far not reached yet
- ▶ Objective: Optimization of drive- and control engineering as well as energy recovery

### FESTO CUSTOMER SERVICE CENTER

Inbetriebnahme: 1996/1999/2002  
Fläche: 22300 m<sup>2</sup>  
Behälterstellplätze: 100000  
Palettenstellplätze: 3200  
Anzahl Behälter RFZ: 21  
Anzahl Kommissionier: 12  
Anzahl Paletten RFZ: 3



- **Electronic drives** in industry areas are responsible for 70% of the whole power consumption [1]
- **Saving potentials by efficiency improvements** of the electronic drives are estimated by the ZVEE of about 15% [2]
- The **energy costs** for electronic drives of conveyor technique elements represent the by far largest cost factor during their lifetime, the acquisition costs of the logistic systems amount to about 10-15% [3]

[1]: Bundesministerium für Umwelt und Naturschutz  
[2]: Zentralverband Elektrotechnik- und Elektroindustrie e.V.  
[3]: VDI-Nachrichten

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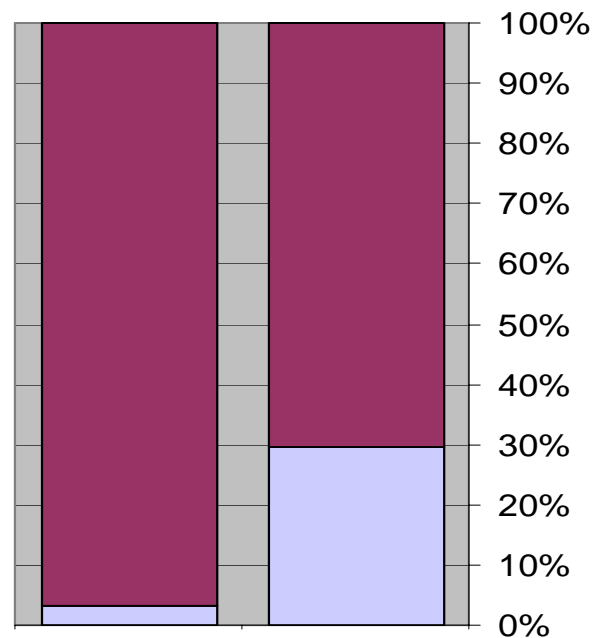
## ► Storage Rack Technology Innovations



Dematic SR-M50/1

[www.dematic.com]

effective load/dead  
load -ratio

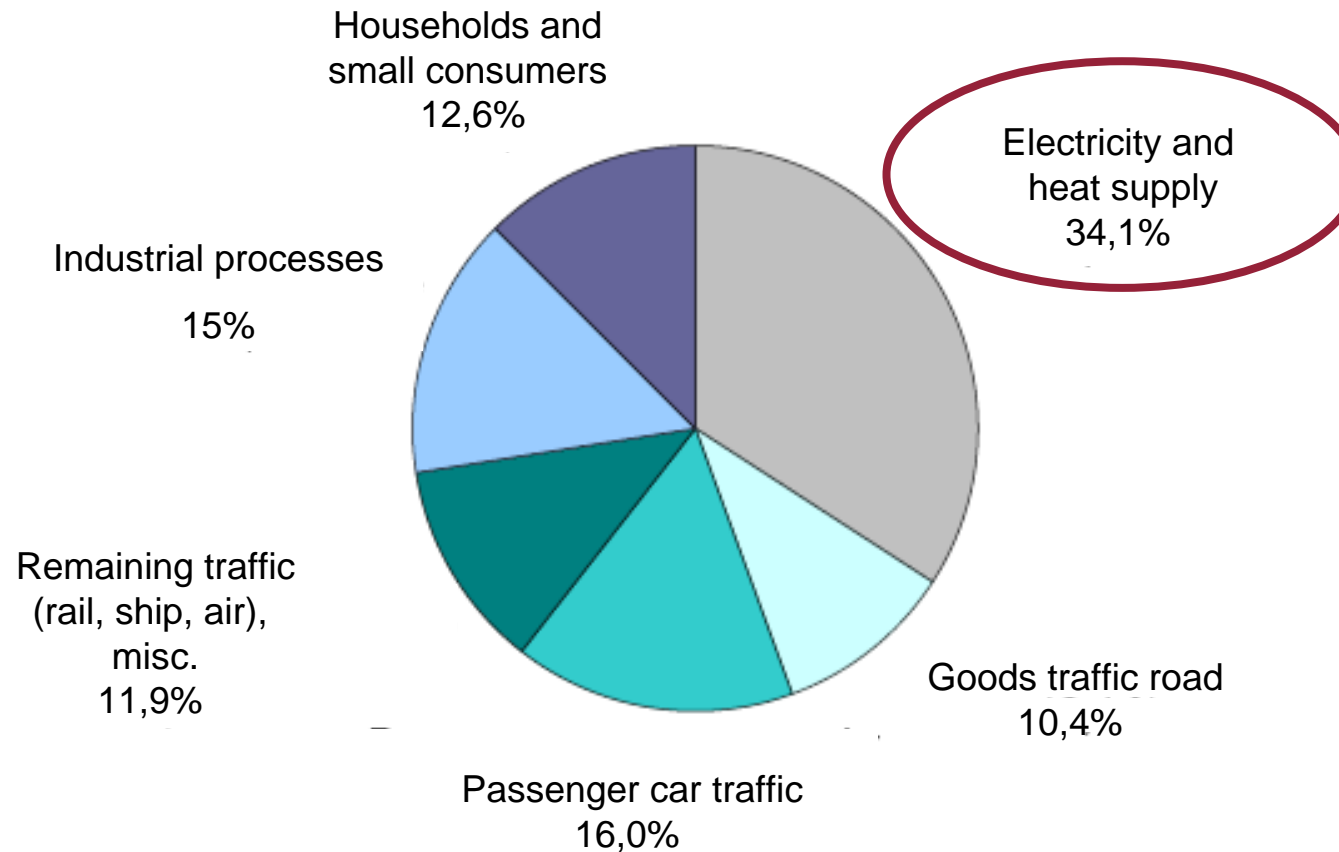


Dematic Multishuttle

[www.dematic.com]

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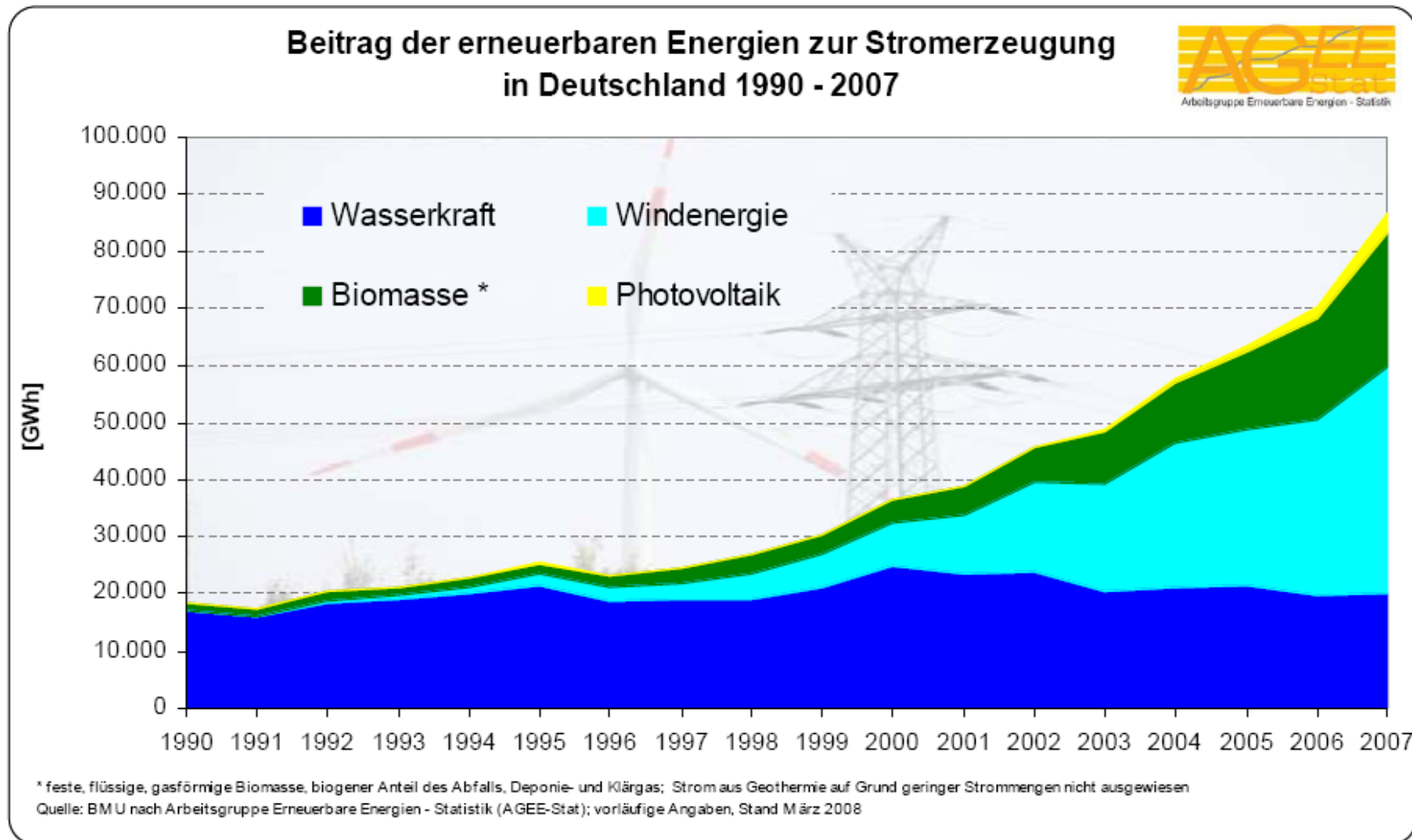
Quelle: CAFE, 2003; TREMOVE, 2004.

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## Use of Regenerative Energy

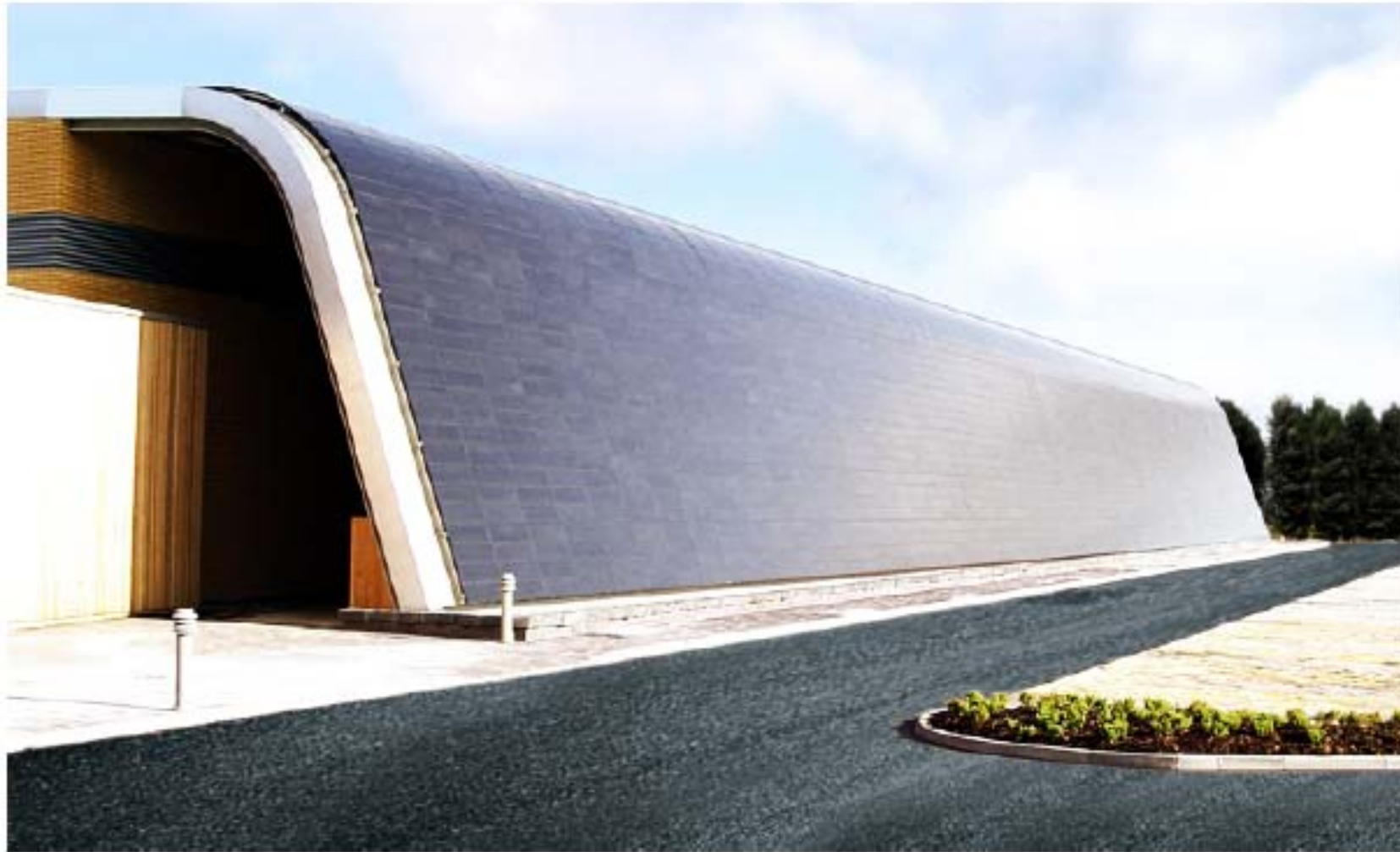
- ▶ The intensified use of regenerative energy leads to a greater independency from countries with primary energy resources.



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## Example: Use of Regenerative Energy in Building Infrastructures

### ► Solar Panels substitute the classic outer building shell



The next step, Building Integrated PV (BIPV)

[Quelle: Karg, AVANCIS GmbH & Co.KG, 2008]

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## Example: Use of Regenerative Energies in Combination with Intralogistics

- ▶ The use of regenerative energies in industrial logistic applications is a future perspective, whose potentials are neither analyzed nor accessed

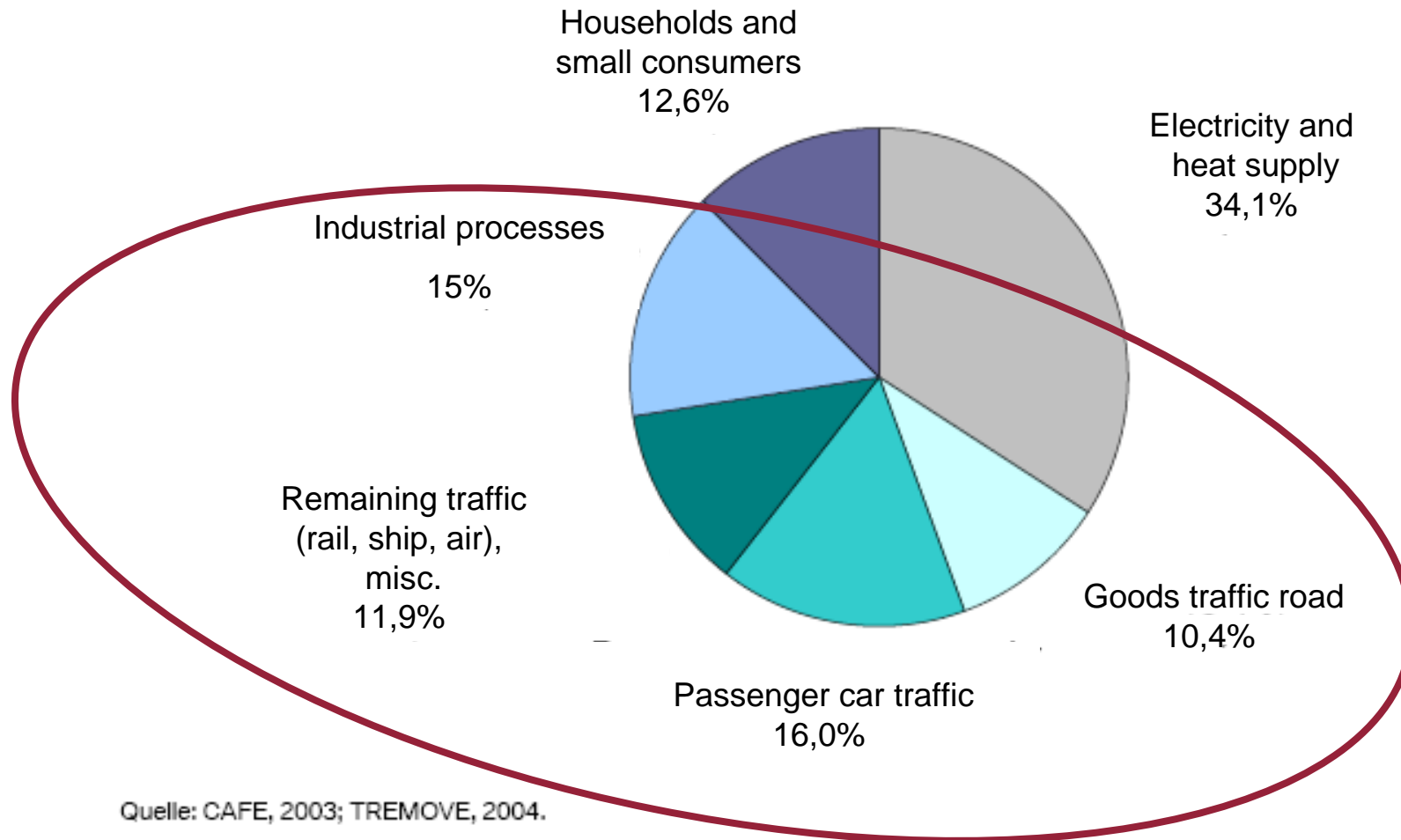


[Quelle: Fronius International GmbH]

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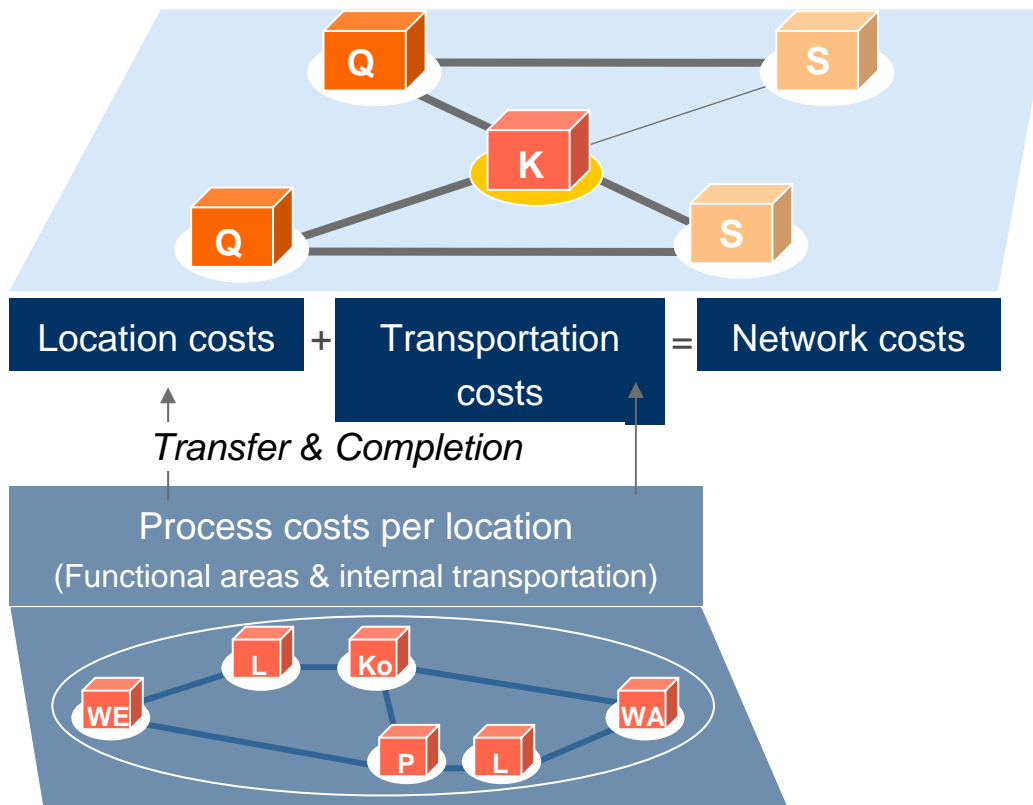


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## Example: Wholistic View of Global Production and Service Networks

- ▶ Extension of the up to now isolated treatment of side-related costs and logistics costs up to a wholistic treatment under monetary assessment of the resource consumption

### Network



### Location

Source: Wolff, 4flow



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### Future Requirements:

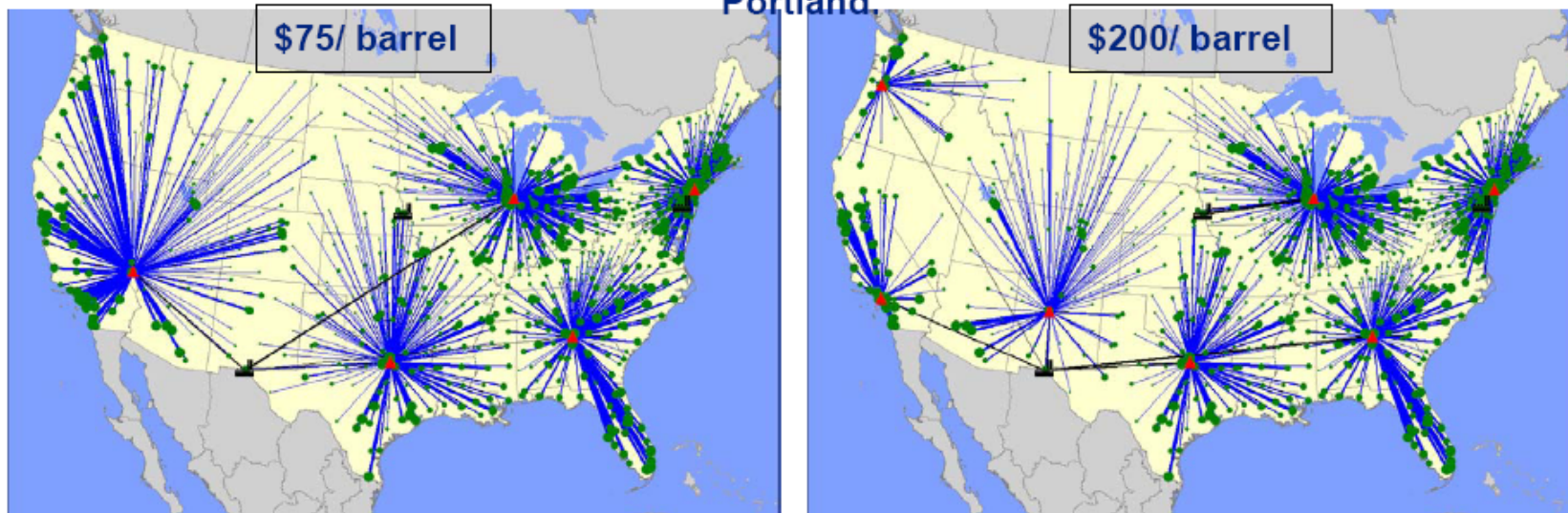
- Inclusion of the resource consumption into the design and control of networks
- Transparency of resource consumption and pollutant emissions for decision makers
- Quantification and interpretation of consumption data along with decision support
- Controlling instruments with key data about resource consumption for the operative controlling
- Balancing of the resource consumption
- Inclusion into side-related issues of the network: suppliers, transfer (cross docking) points, manufacturer plants, retailer
- Consideration for outsourcing/insourcing issues
- Consideration for the design of intermodal transport chains
- ...

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## Oil price vs. inventory carrying and facility costs



Moving from \$125/ barrel to \$150/ barrel changes the optimal number of DC's from 5 to 7. In particular, you can think of Las Vegas being replaced by Los Angeles, Albuquerque, and Portland.



[Quelle: Simchi-Levi, 2008]

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## Conclusion

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1. **Today and in Future, there will be Competition between Supply Chains and not between individual Companies**
2. **Companies meet today`s Challenges by Networking and Restructuring the Supply Chain**
3. **Supply Chain Optimization results in an Increase in Corporate Values for all Parties**
4. **Logistics is the link between all Partners along the Supply Chain providing the necessary Preconditions for Collaboration and accelerating Convergence between Industrial Sectors**
5. **Logistics Service Providers will take a Key Role in this Process**
6. **Decision makers can no longer elude the topic of sustainability. Political determination and increasing energy prices are drivers of this topic.**
7. **Direct impact of sustainability on logistics:**
  - Optimization of the intermodal transport chains concerning design, control and operation
  - Use of regenerative energies in logistics infrastructure
  - Use of resource preserving and energy efficient technologies in the intralogistics
  - Transparency of resource consumption, pollutant emissions and costs on all levels of global production networks as a decision support for design, control and operation
8. **In this context, Logistics is increasingly considered a Top Management Issue and a key sector**

**Thank You for Your attention!**

