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ISL

Future logistics technologies and self-controlled systems

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Quelle: BTZ Bremer Touristik Zentrale

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Selected future challenges

Globalisation	Supply chain integration
Resources	Urban sourcing
Infrastructure	Bottleneck planning
Demographics	Customized services
Communication technology	Cloud logistics, open innovation, decentralized control
Climate, environment, energy	CO_2 emission trades
Products	Dematerialisation, 3D-printing
Flexibility	Self-controlled systems

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Challenges for modern logistics are related to cooperation and to communication between value chain partners and stakeholders of dynamic supply chain networks on a regional and on a global level.

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ISL – Institute of Shipping Economics and Logistics

1954 – 2014

60 years of innovation in maritime economics and logistics

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Bremen, Bremerhaven

Services for you:	**Applied research, consultancy, networking, training, documentation**
Partners:	**CEC, Federal Ministries, regional institutions, industry, retailers, LSP, NGOs, worldwide**

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IGS – International Graduate School for Dynamics in Logistics, University of Bremen

- **Business models, decision processes and economic analysis of dynamics in logistics**
- **Holistic interdisciplinary methods workshop for the modelling, analysis and simulation of dynamics in logistics**
- **Synchronisation of material, information, decision and financial flows**
- **Adaptive and dynamic control methods in logistics**

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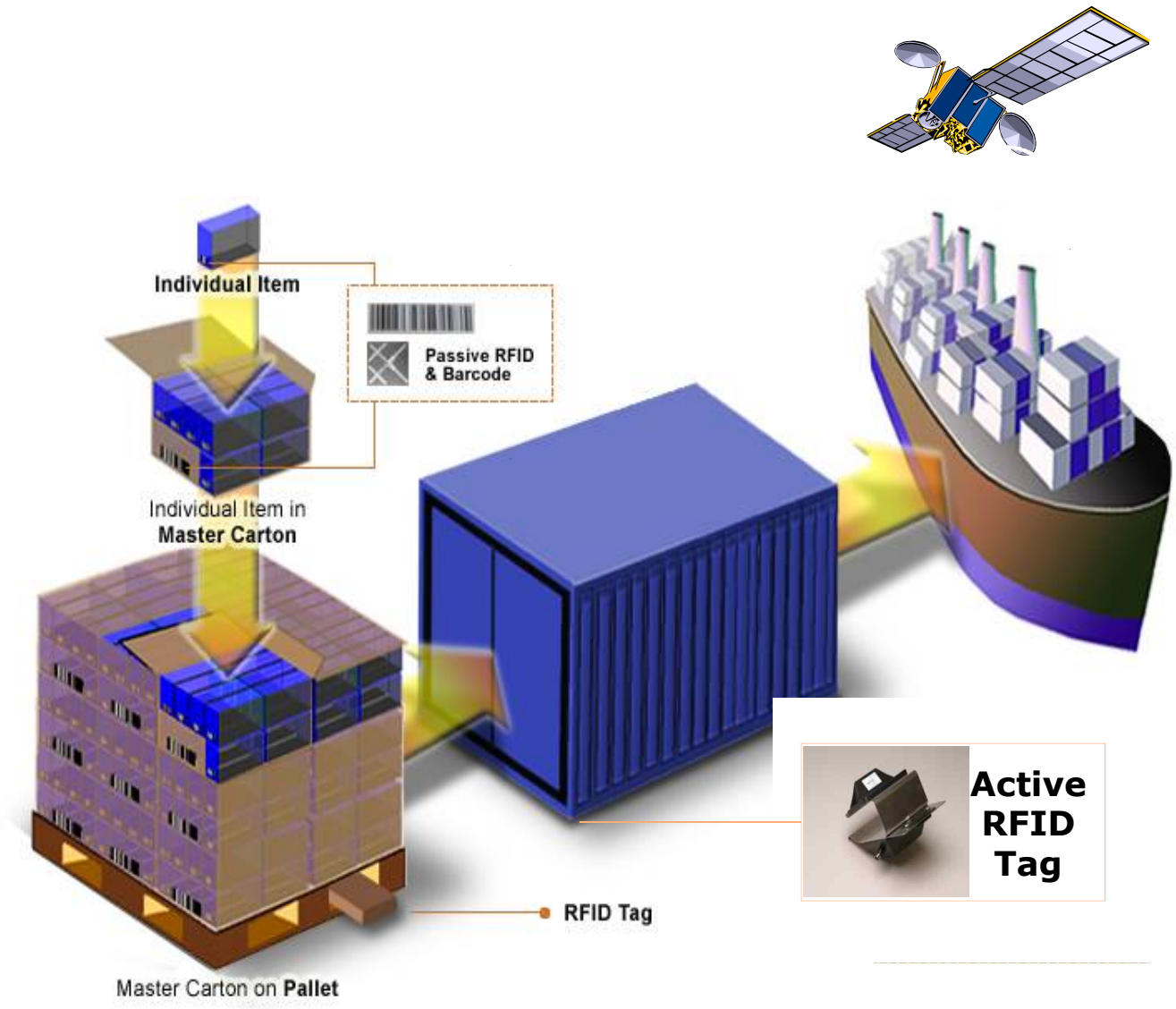

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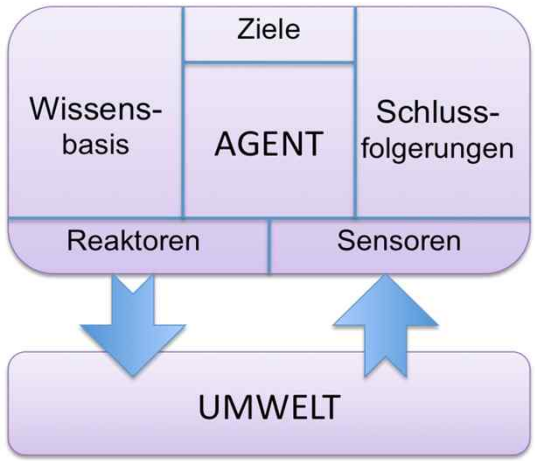
Agents

- A concept of distributed artificial intelligence
- Autonomous software programs
- Multiple interacting agents - multi-agent system (MAS)
- Still no agreement on a single definition



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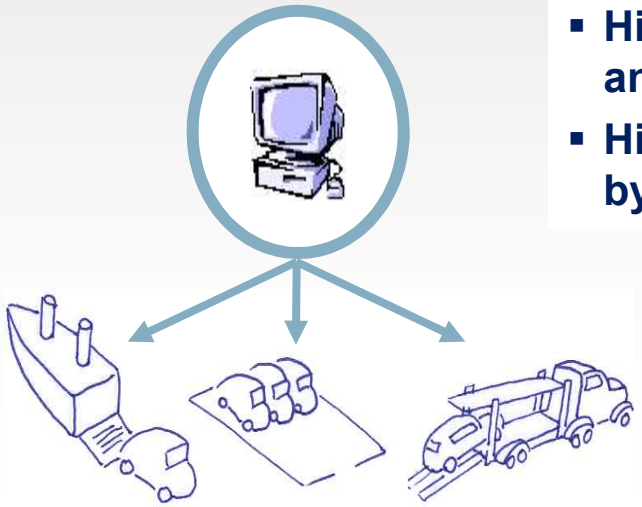
ISL-AMATRAK: Stute Verkehrs-GmbH/Kühne & Nagel
CRC University Bremen

Conventional control

- Hierarchical structure
- Global information
- Central planning and control



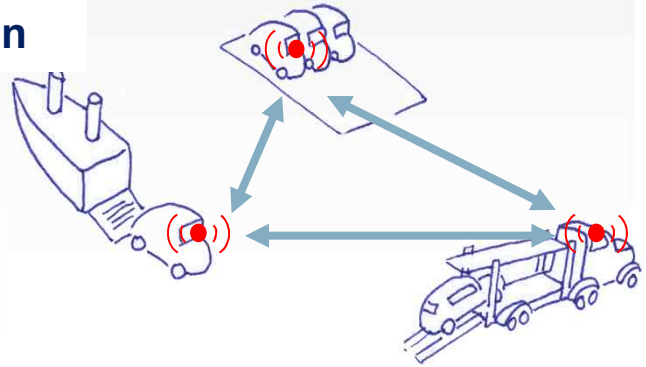
Multi Agent Technology

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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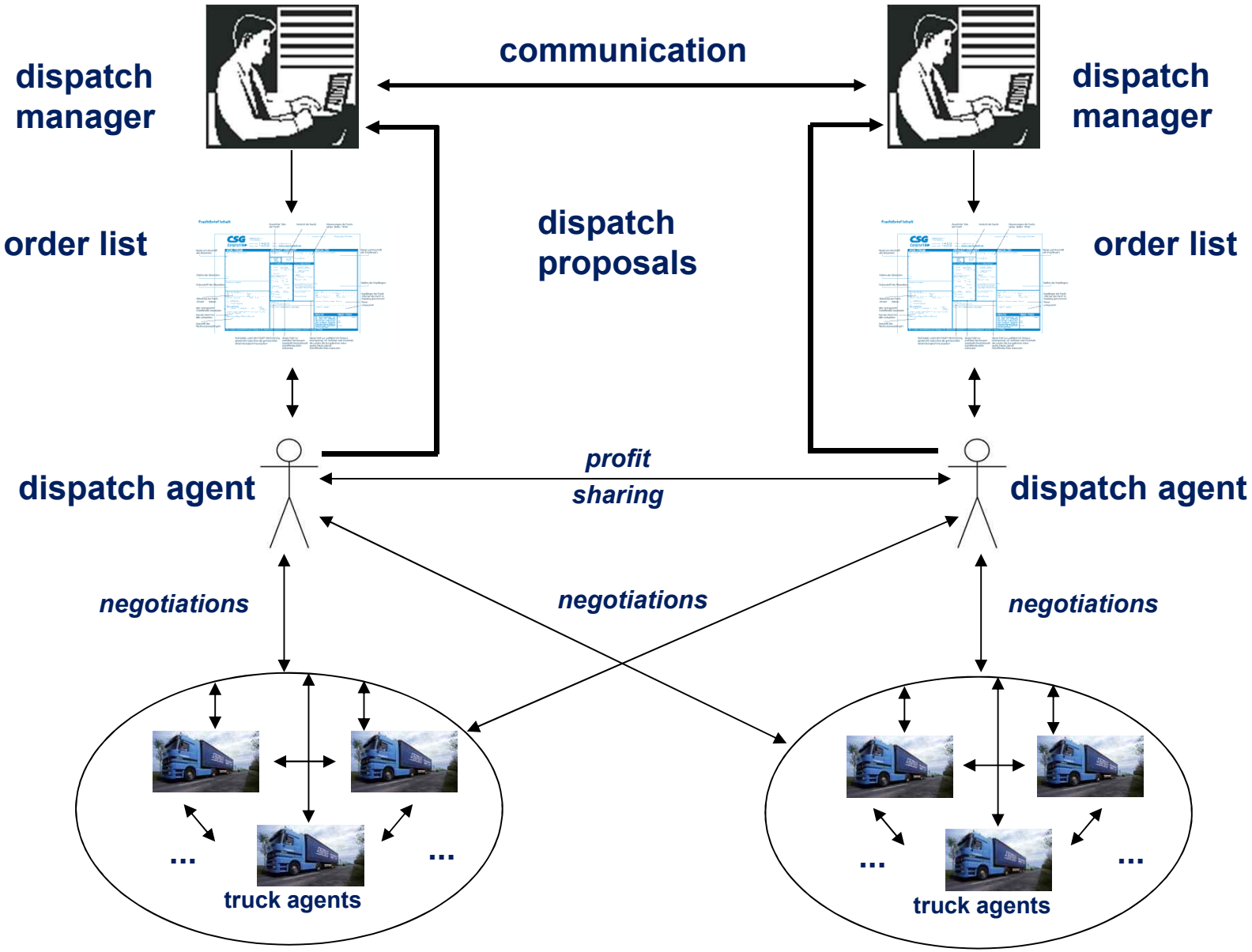
AMATRAK



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AMATRAK

- **AMATRAK will be implemented in the existing IT infrastructure consisting of dispatch, trace and communication devices**
- **The communication of the MAS is based on the contract net protocol**
- **The allocation algorithm considers different factors such as length of transport and vehicle utilization**

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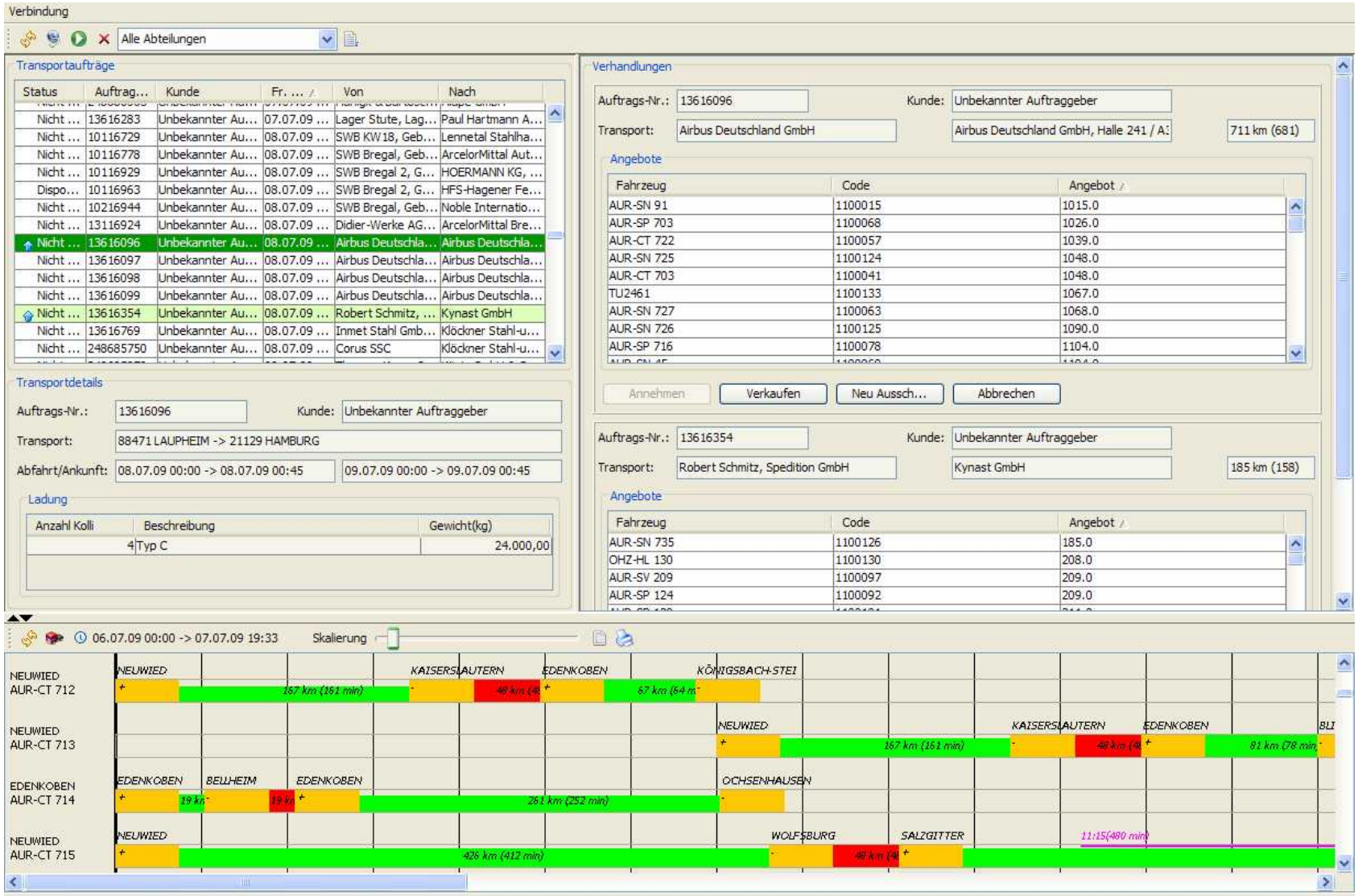
Screen shot



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Results of simulation experiments

Data base: 1 day, 70 trucks, 160 orders

- **Savings in total km:** **10 %**
- **Increase in load usage rate:** **12 %**
- **Calculation time:** **35 orders per minute**

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Port Management and Self-Controlled Systems

Source: bremenports GmbH & Co. KG

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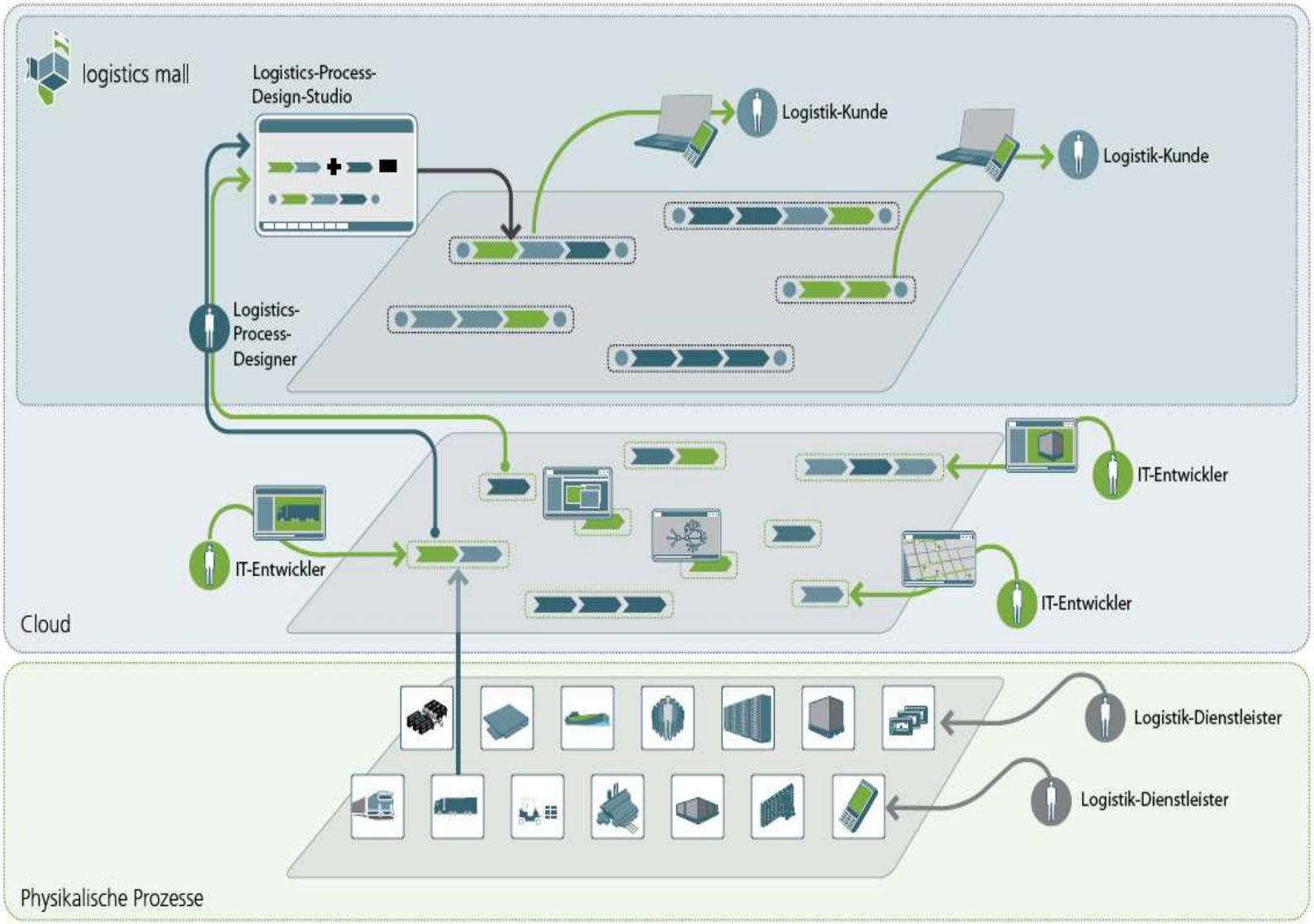

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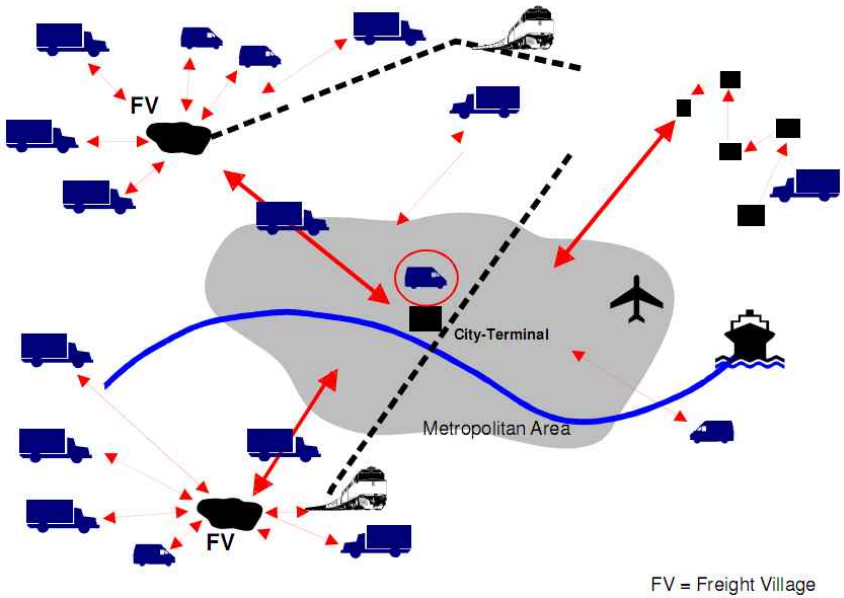
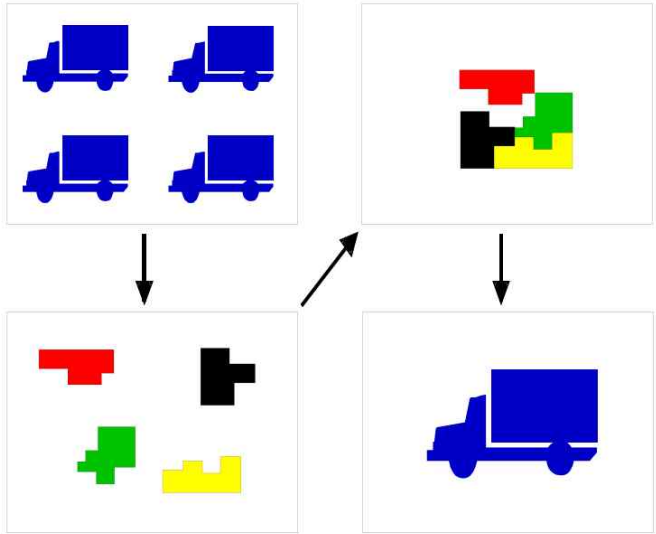
Multi-Agent City Logistics





Advantages by bundling of goods flows in line with City Logistics concepts:

- less cargo vehicles in urban traffic
- higher vehicle capacity utilization
- reduction of needless emty drives
- reduction of noxious and noise emissions

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PreparedNET - Security Management in Meso-Logistics

- **Disturbance/loss of:**
  - Road
  - Rail
  - Intermodal terminal
  - Freight village

- **Damage specific reduction of capacities**
  → damage specific reaction necessary

- **Possible damage events:**
  - Terrorist attacks
  - Unexploded ordnance
  - Accidents on any mode of transport
  - Riots
  - Natural disasters

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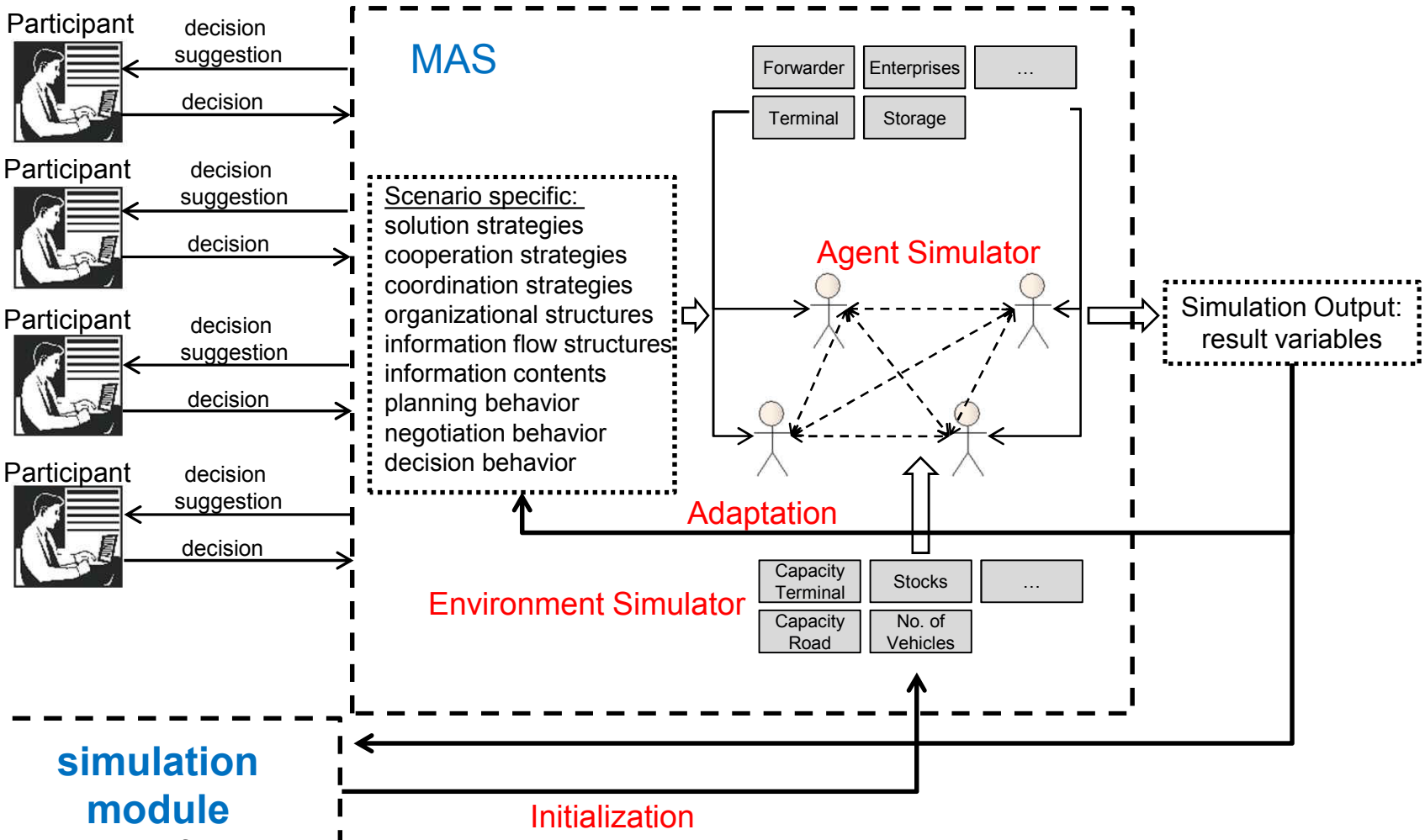

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