

Future logistics technologies and self-controlled systems

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www.isl.org**





Quelle: BTZ Bremer Touristik Zentrale

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

CO₂ emission trades

Products

Dematerialisation, 3D-printing

Flexibility

Self-controlled systems

**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.**

1954 – 2014

**60 years of innovation in maritime
economics and logistics**

www.isl.org



**Bremen,
Bremerhaven**



Services for you:

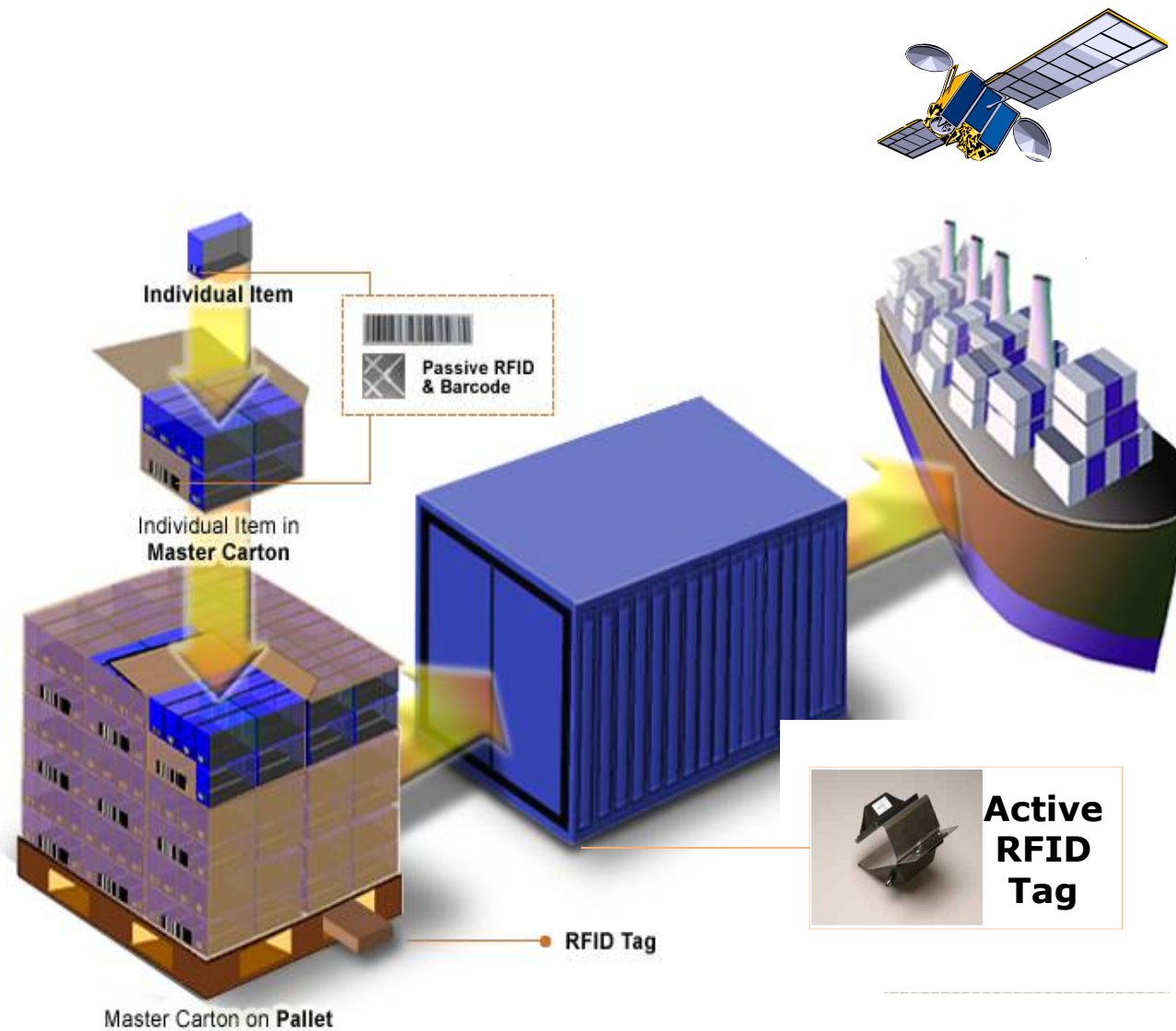
**Applied research, consultancy,
networking, training, documentation**

Partners:

**CEC, Federal Ministries, regional
institutions, industry, retailers, LSP, NGOs,
worldwide**

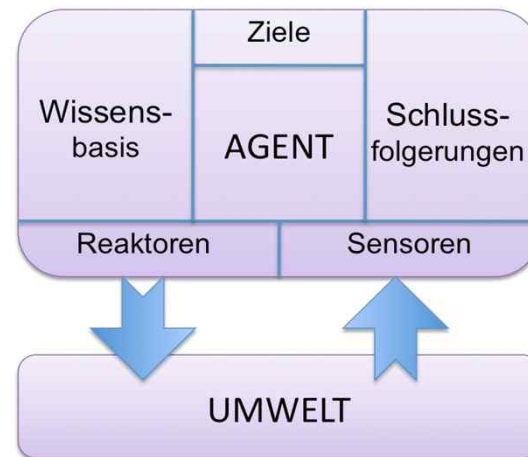
- **Business models, decision processes and economic analysis of dynamics in logistics**
- **Holistic interdisciplinary methods workshop for the modelling, analysis and simulation of dynamics in logistics**
- **Synchronisation of material, information, decision and financial flows**
- **Adaptive and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





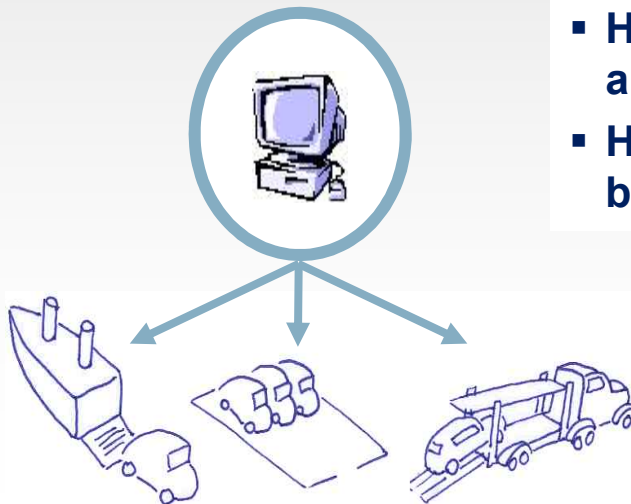
Agents

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



Conventional control

- Hierarchical structure
- Global information
- Central planning and control



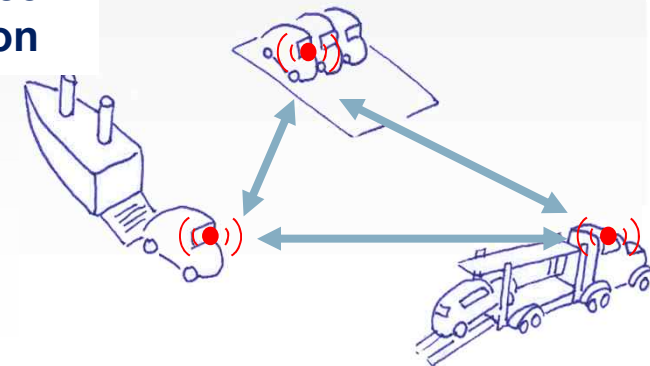
Multi Agent Technology

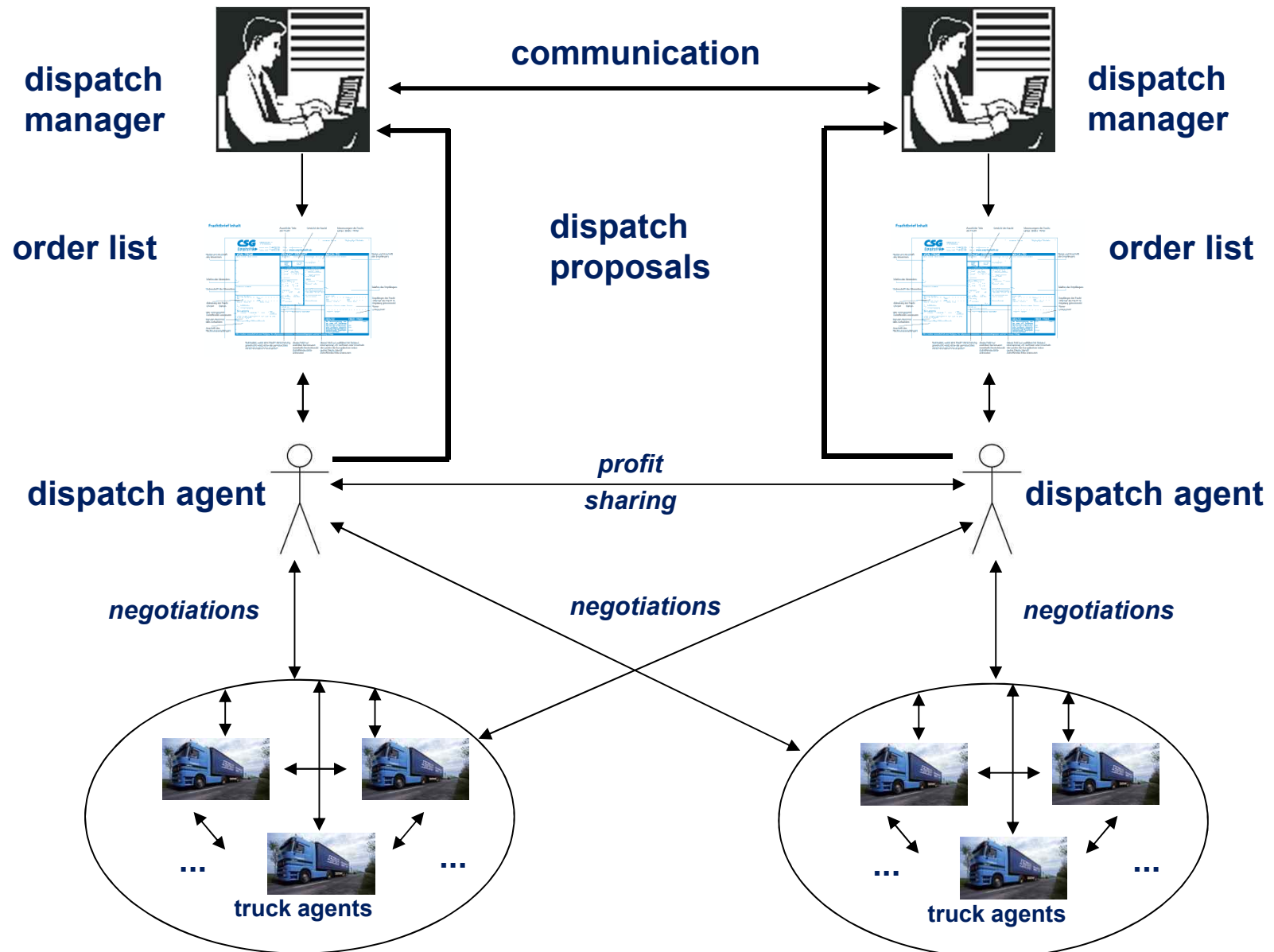
Advantages / Benefits

- 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





- **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**



Screen shot



Verbindung: Alle Abteilungen

Transportaufträge

Status	Auftrags-Nr.	Kunde	Fr. ... / ...	Von	Nach
Nicht ...	13616283	Unbekannter Au...	07.07.09 ...	Lager Stute, Lag...	Paul Hartmann A...
Nicht ...	10116729	Unbekannter Au...	08.07.09 ...	SWB KW 18, Geb...	Lenetal Stahlha...
Nicht ...	10116778	Unbekannter Au...	08.07.09 ...	SWB Bregal, Geb...	ArcelorMittal Aut...
Nicht ...	10116929	Unbekannter Au...	08.07.09 ...	SWB Bregal 2, G...	HOERMANN KG, ...
Dispo...	10116963	Unbekannter Au...	08.07.09 ...	SWB Bregal 2, G...	HFS-Hagener Fe...
Nicht ...	10216944	Unbekannter Au...	08.07.09 ...	SWB Bregal, Geb...	Noble Internatio...
Nicht ...	13116924	Unbekannter Au...	08.07.09 ...	Didier-Werke AG...	ArcelorMittal Bre...
Nicht ...	13616096	Unbekannter Au...	08.07.09 ...	Airbus Deutschla...	Airbus Deutschla...
Nicht ...	13616097	Unbekannter Au...	08.07.09 ...	Airbus Deutschla...	Airbus Deutschla...
Nicht ...	13616098	Unbekannter Au...	08.07.09 ...	Airbus Deutschla...	Airbus Deutschla...
Nicht ...	13616099	Unbekannter Au...	08.07.09 ...	Airbus Deutschla...	Airbus Deutschla...
Nicht ...	13616354	Unbekannter Au...	08.07.09 ...	Robert Schmitz, ...	Kynast GmbH
Nicht ...	13616769	Unbekannter Au...	08.07.09 ...	Inmet Stahl Gmb...	Klockner Stahl-u...
Nicht ...	248685750	Unbekannter Au...	08.07.09 ...	Corus SSC	Klockner Stahl-u...

Verhandlungen

Auftrags-Nr.: 13616096 Kunde: Unbekannter Auftraggeber

Transport: Airbus Deutschland GmbH Airbus Deutschland GmbH, Halle 241 / A: 711 km (681)

Angebote

Fahrzeug	Code	Angebot /
AUR-SN 91	1100015	1015.0
AUR-SP 703	1100068	1026.0
AUR-CT 722	1100057	1039.0
AUR-SN 725	1100124	1048.0
AUR-CT 703	1100041	1048.0
TU2461	1100133	1067.0
AUR-SN 727	1100063	1068.0
AUR-SN 726	1100125	1090.0
AUR-SP 716	1100078	1104.0
AUR-SN 728	1100060	1104.0

Annehmen Verkaufen Neu Aussch... Abbrechen

Auftrags-Nr.: 13616354 Kunde: Unbekannter Auftraggeber

Transport: Robert Schmitz, Spedition GmbH Kynast GmbH 185 km (158)

Angebote

Fahrzeug	Code	Angebot /
AUR-SN 735	1100126	185.0
OHZ-HL 130	1100130	208.0
AUR-SV 209	1100097	209.0
AUR-SP 124	1100092	209.0
AUR-SN 728	1100060	211.0

Transportdetails

Auftrags-Nr.: 13616096 Kunde: Unbekannter Auftraggeber

Transport: 88471 LAUPHEIM -> 21129 HAMBURG

Abfahrt/Ankunft: 08.07.09 00:00 -> 08.07.09 00:45 09.07.09 00:00 -> 09.07.09 00:45

Ladung

Anzahl Koll	Beschreibung	Gewicht(kg)
4	Typ C	24.000,00

06.07.09 00:00 -> 07.07.09 19:33 Skalierung

	NEUWIED	KAISERSLAUTERN	EDENKOBEN	KÖNIGSBAACH-STEI	NEUWIED	KAISERSLAUTERN	EDENKOBEN	BLI
NEUWIED AUR-CT 712	+	187 km (181 min)	48 km (48 min)	87 km (84 min)				
NEUWIED AUR-CT 713					+	187 km (181 min)	48 km (48 min)	91 km (78 min)
EDENKOBEN AUR-CT 714		EDENKOBEN	19 km	261 km (252 min)				
NEUWIED AUR-CT 715	+					WOLFSBURG	SALZGITTER	11:15(480 min)

Results of simulation experiments

Data base: 1 day, 70 trucks, 160 orders

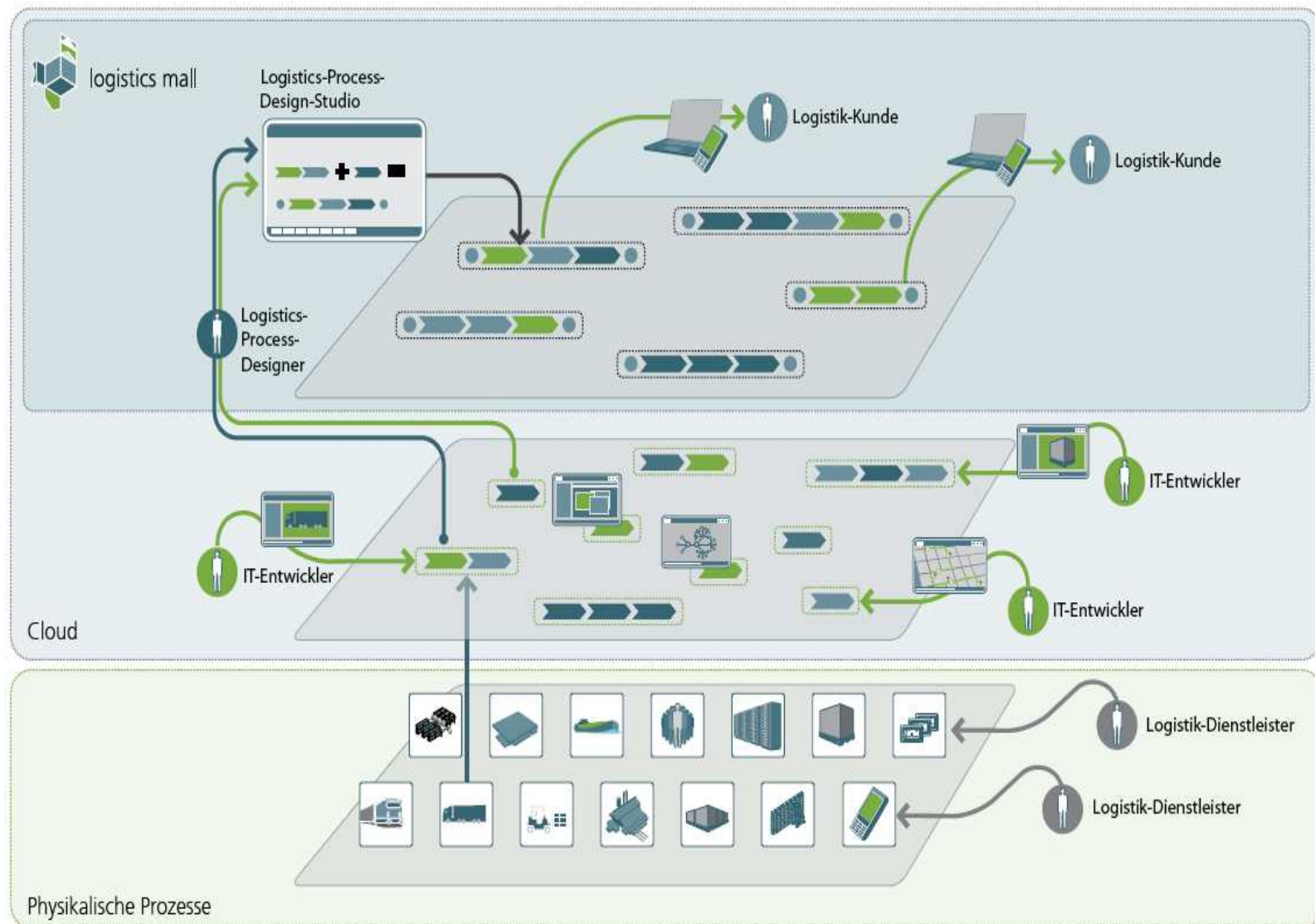
- **Savings in total km: 10 %**
- **Increase in load usage rate: 12 %**
- **Calculation time: 35 orders per minute**



Port Management and Self- Controlled Systems

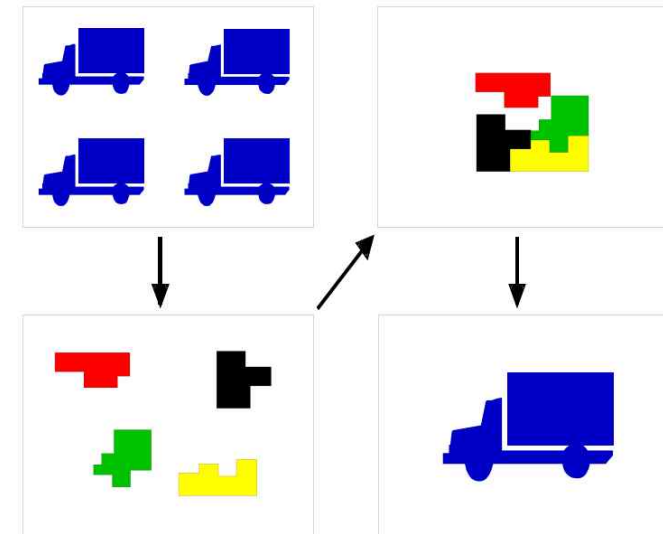
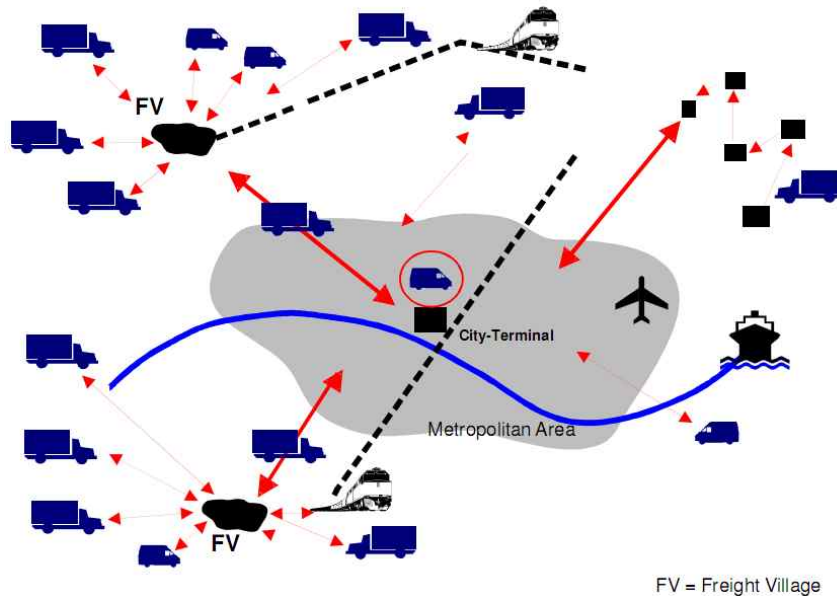


Source: bremenports GmbH
& Co. KG



(IML 2012)

Multi-Agent City Logistics



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

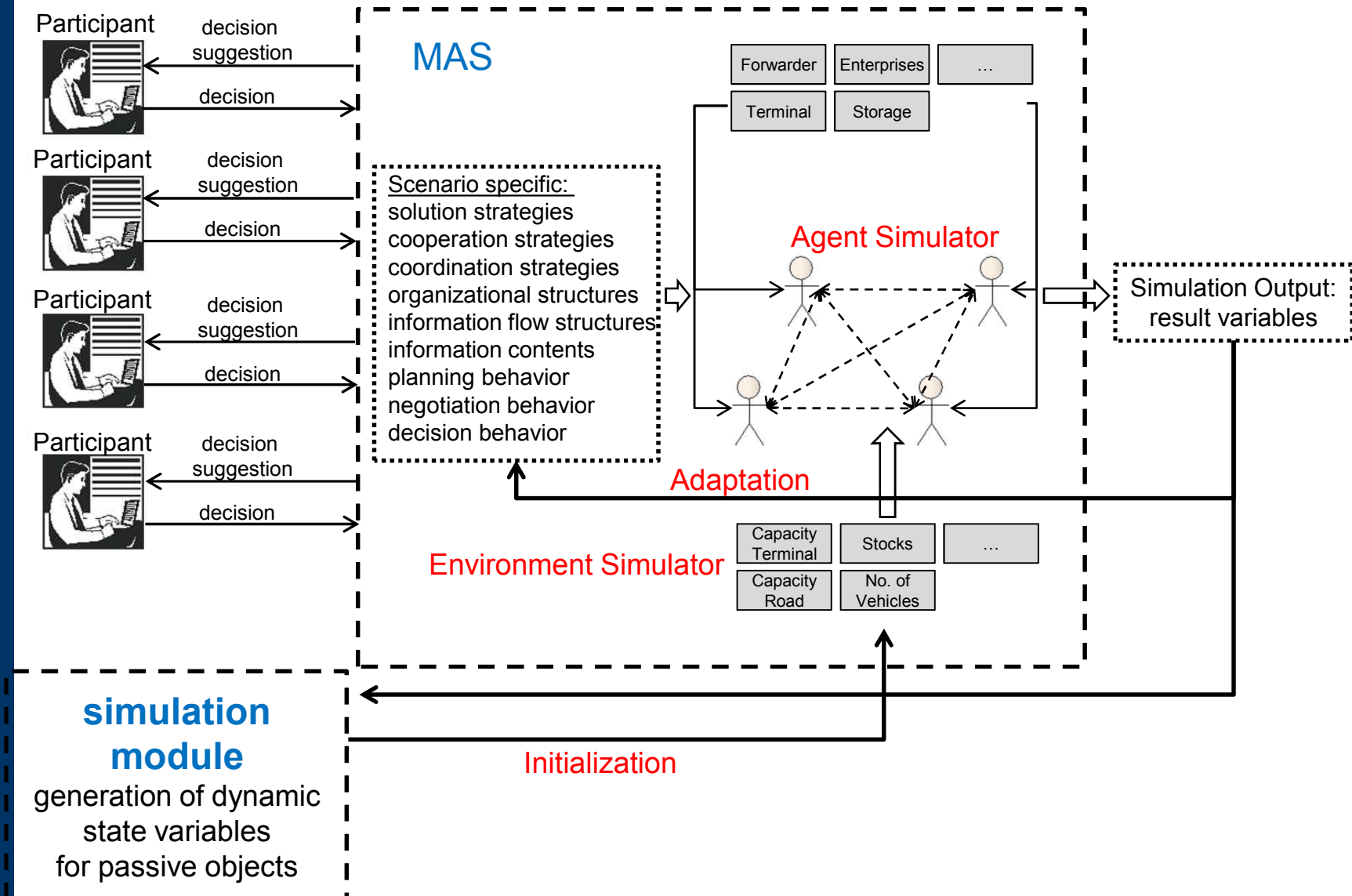
- less cargo vehicles in urban traffic
- higher vehicle capacity utilization
- reduction of needless empty drives
- reduction of noxious and noise emissions

- **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







ISL

**Innovative Solutions
for Logistics**