



Intelligent Transport System for Innovative Intermodal Freight Transport

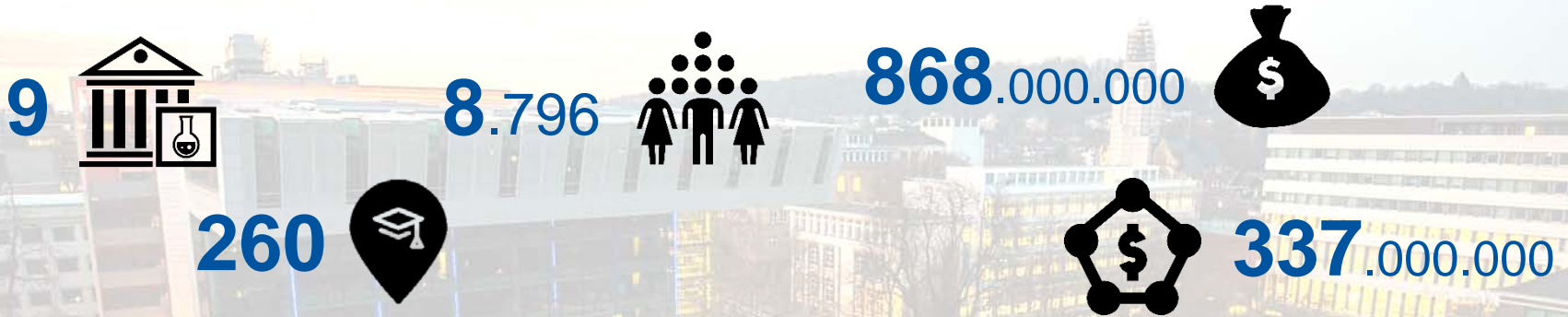
Experience from the TelliSys Project and current ITS Projects

60th Working Party on Intermodal Transport and Logistics
Geneva, Switzerland, 23 November 2017

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RWTH Aachen University



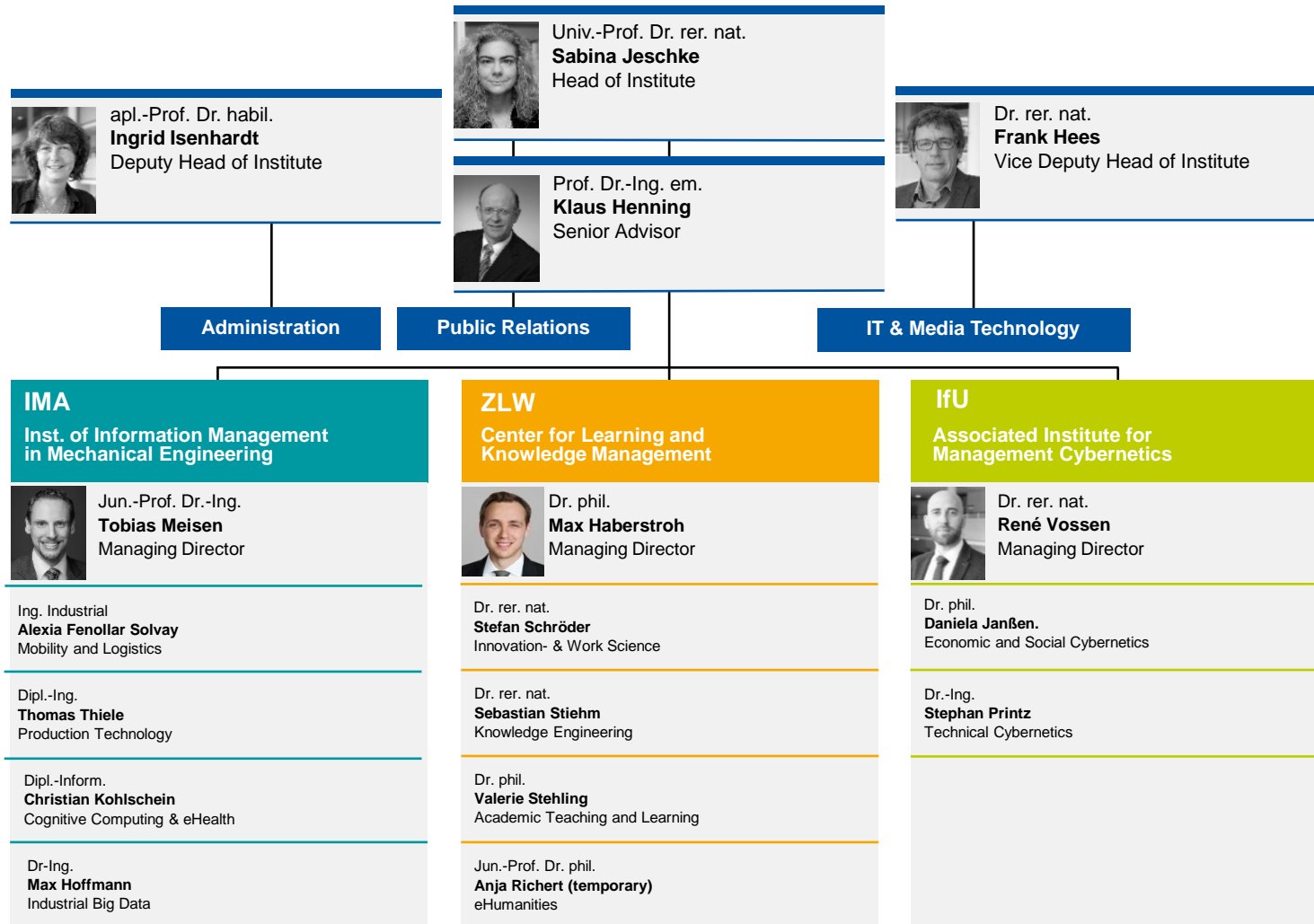
RWTH Aachen University

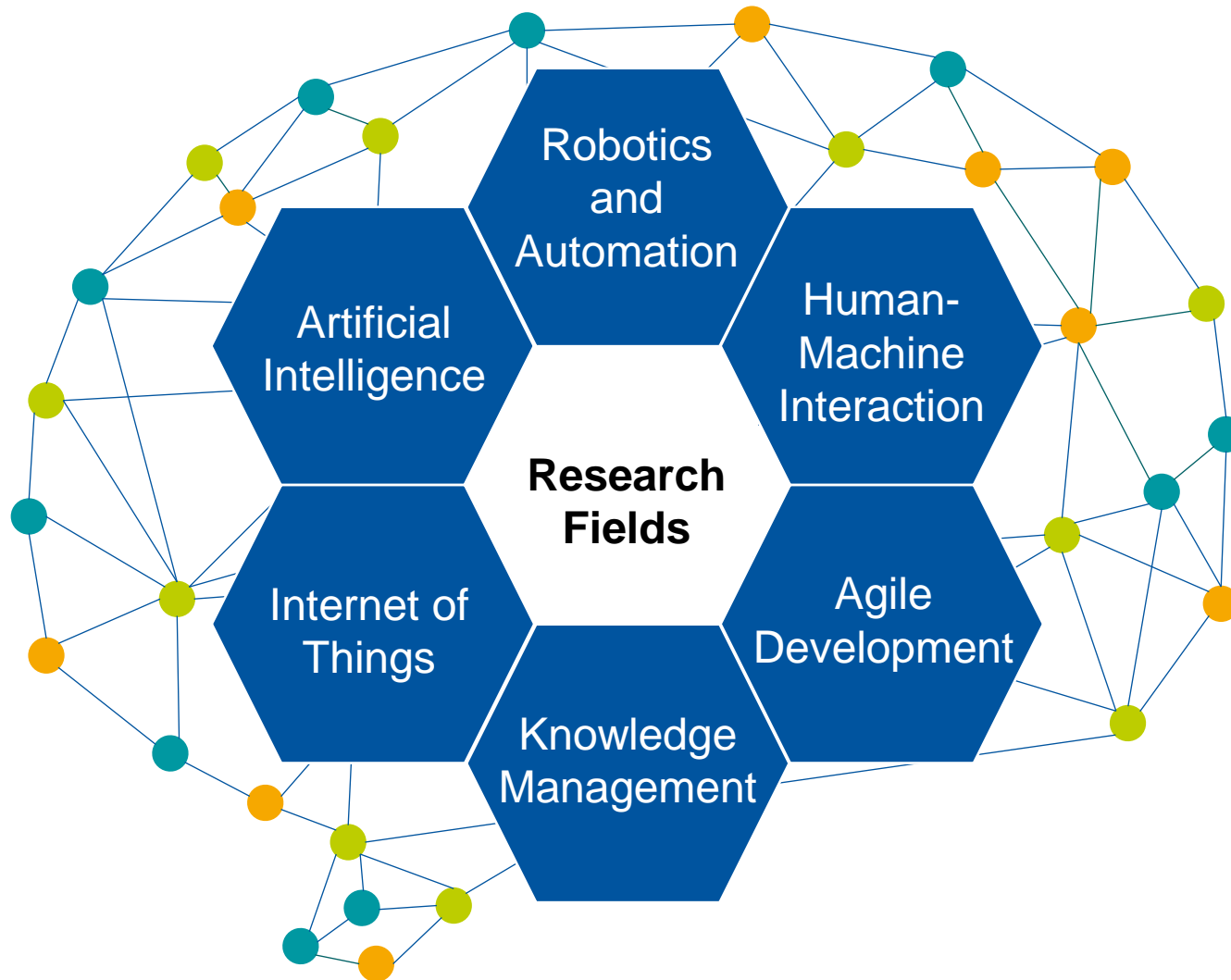


Faculty for Mechanical Engineering



Cybernetics Lab Aachen Organigram





Partners from Industry, Research and Development



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Cybernetics Lab Aachen

Partners from Industry, Research and Development

z**hb** Zentrum für Hochschulbildung

TFI
Institut für Bediensysteme
an der RWTH Aachen e.V.

fir
an der RWTH AACHEN

CATS | RWTH AACHEN UNIVERSITY

igpm | RWTH AACHEN UNIVERSITY

Fraunhofer
IPT
INSTITUT FÜR INTEGRATION OBERFLÄCHEN- UND FÄHIGKEITSTECHNIKEN

AACHEN
ENTREPRENEURSHIP
GRÜNDERZENTRUM

KIT
Karlsruher Institut für Technologie

HIC - Human-Computer Interaction Center | RWTH AACHEN UNIVERSITY

IEHK | RWTH AACHEN UNIVERSITY

Gießerei Institut | RWTH AACHEN UNIVERSITY

ibf | RWTH AACHEN UNIVERSITY

cetic

RoboScope
Hands on Robotics

TALLINN UNIVERSITY OF TECHNOLOGY

Visual Computing Institute | RWTH AACHEN UNIVERSITY

Physics Institute III B | RWTH AACHEN UNIVERSITY

ITA | RWTH AACHEN UNIVERSITY

IAW Institut für Arbeitswissenschaft | RWTH AACHEN UNIVERSITY

MIT

FVT

Operations Management | RWTH AACHEN UNIVERSITY

Research Area Technology, Innovation, Marketing, Entrepreneurship | RWTH AACHEN UNIVERSITY

tu technische universität dortmund

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IGM | RWTH AACHEN UNIVERSITY

Lehrstuhl für Controlling | RWTH AACHEN UNIVERSITY

RWTH AACHEN UNIVERSITY OF APPLIED SCIENCES

RUHR UNIVERSITÄT BOCHUM

IUL Institut für Umformtechnik und Leichtbau

ifb

IGaD Gender and Diversity Management | RWTH AACHEN UNIVERSITY

Geographisches Institut | RWTH AACHEN UNIVERSITY

IDS Lehrstuhl für Technische Informationssysteme | RWTH AACHEN UNIVERSITY

MRE | RWTH AACHEN UNIVERSITY

INSTITUT FÜR KUNSTSTOFFVERARBEITUNG

Berkeley
UNIVERSITY OF CALIFORNIA

TECHNISCHE UNIVERSITÄT DRESDEN

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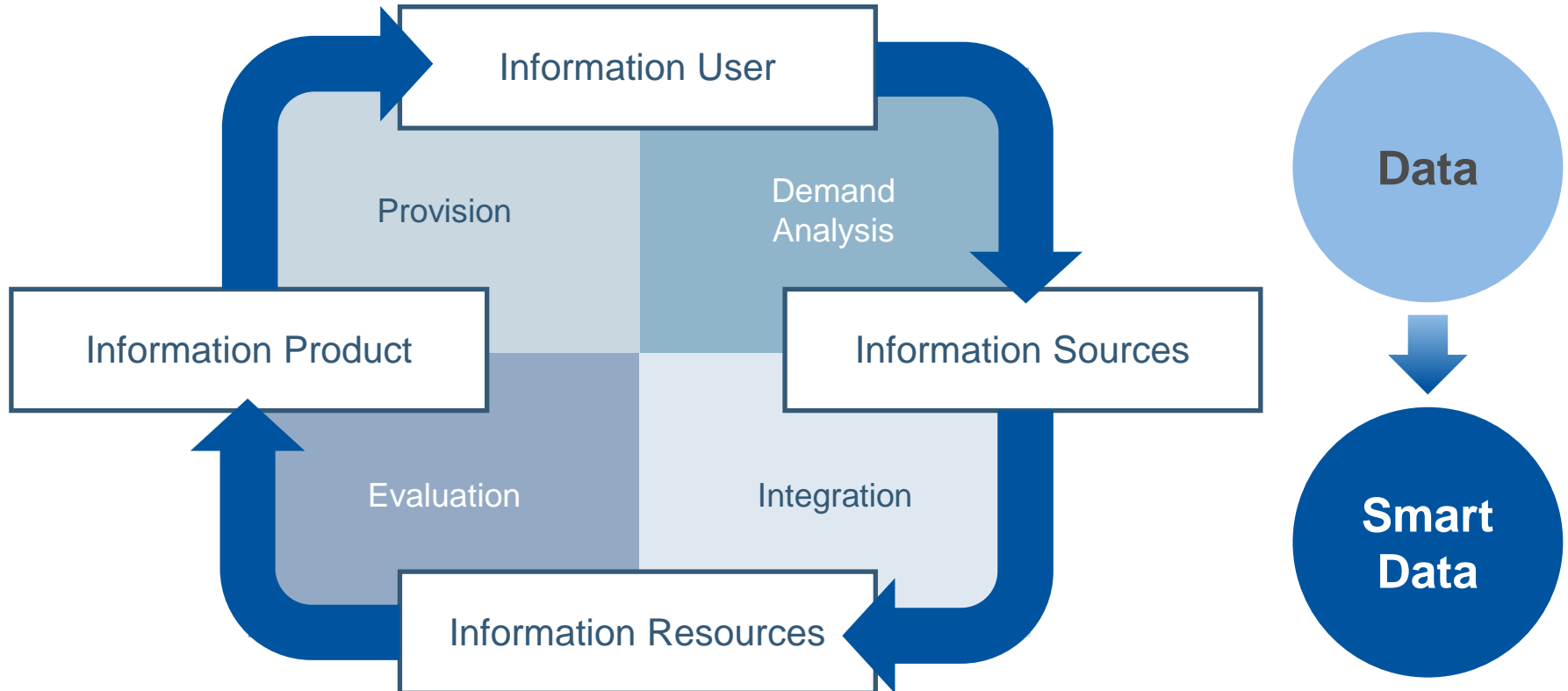
WZL | RWTH AACHEN UNIVERSITY

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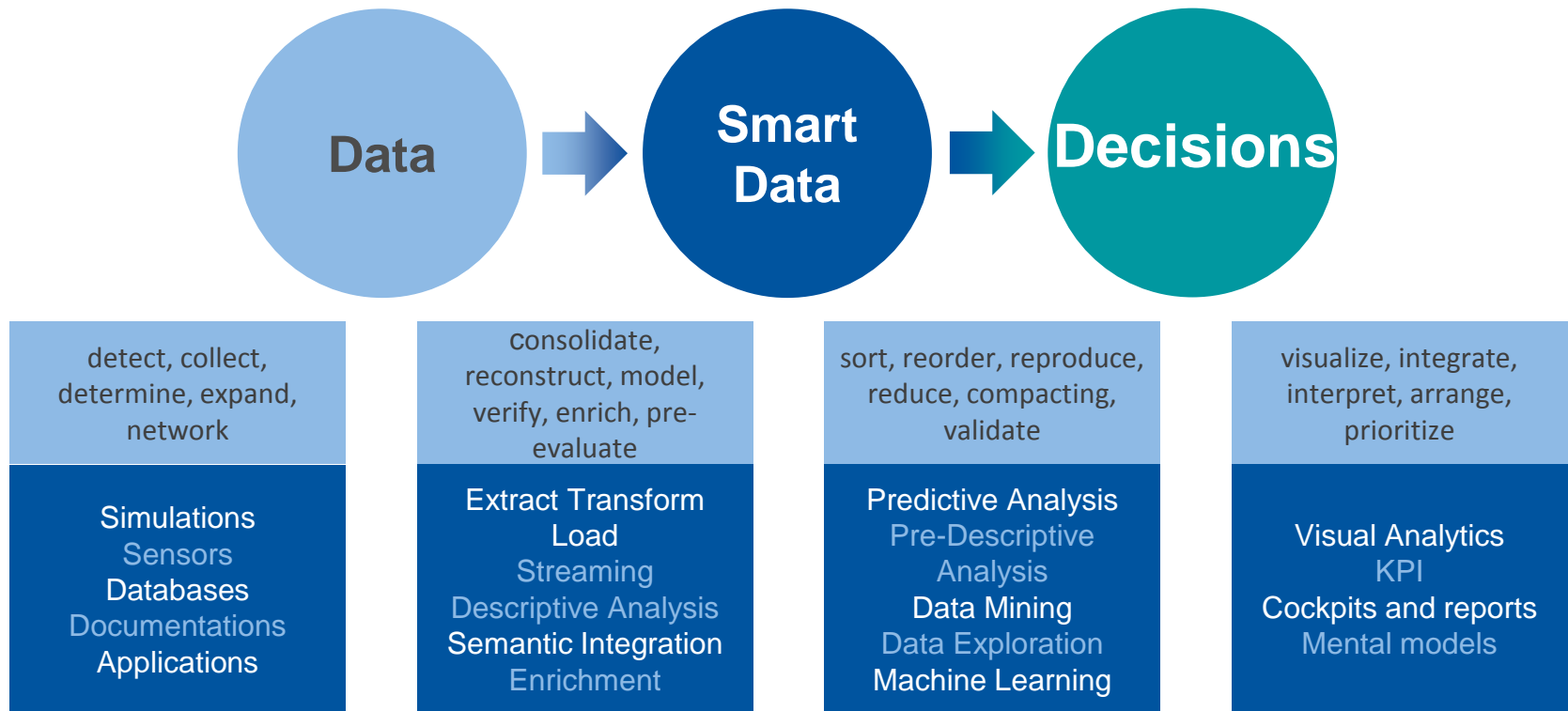
Information Management in Mechanical Engineering

Information Management Cycle

“Information is the oil of the 21st century, and analytics is the combustion engine” - Peter Sondergaard, senior vice president at Gartner

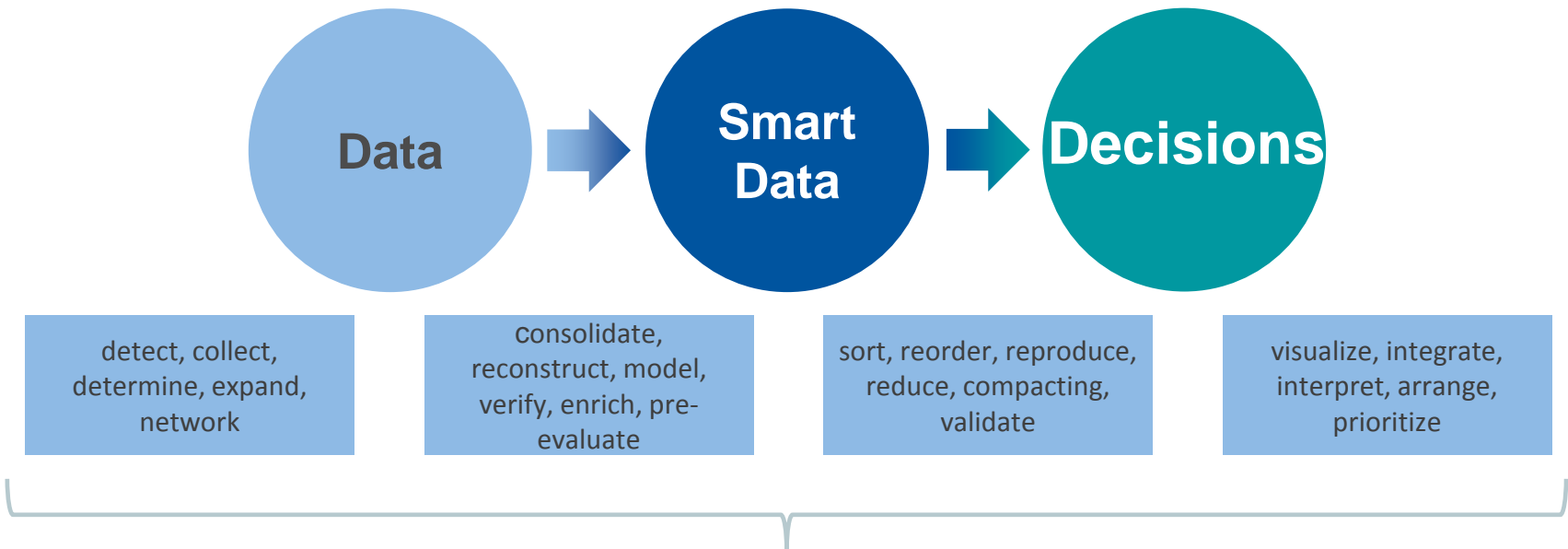


“At the end of the day, it's not about how much data you have, it's about how well you use it.” - Tjeerd Brenninkmeijer, CMSWire, 2013



! “Data about data, or metadata, is growing twice as fast as the digital universe as a whole” - Gantz and Reinsel 2011

“Challenges occur along the multiple distinct phases of the analysis of Big Data” [Agrawal et al. 2012]



Challenges that underlie many of these phases





Content

I. Short Presentation

II. TelliSys Project

III. Trends and Conclusions

Intelligent Transport System for Innovative Intermodal Freight Transport

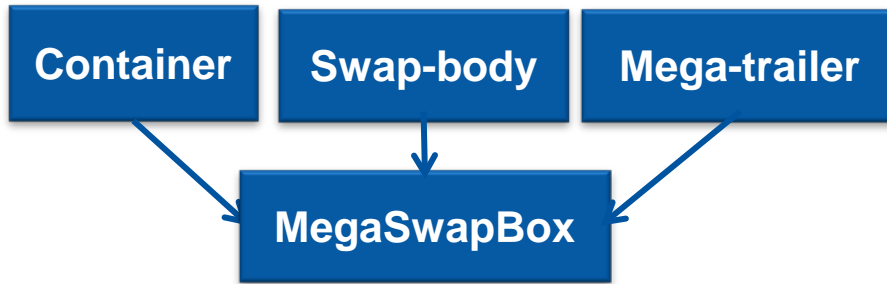
- Collaborative project funded by the **7th Framework Programme** of the European Commission
- **Project Start:** 1st of December 2012
- **Project Duration:** 3 years
- **Total project budget:** 4.287.231 € (funded)
- Follow-up Project of **Intelligent MegaSwapBoxes** for advanced Intermodal Transport (**TelliBox**)

TelliSys Project

From TelliBox to TelliSys

- Project aim TelliBox:

↳ Combining the advantages of existing loading units in one MegaSwapBox



- Project aim TelliSys:

↳ Development of an intelligent intermodal freight transport system






TelliSys Project Consortium and Advisory Board

Freight Forwarder

 **GEFCO**
LOGISTICS FOR MANUFACTURERS

France

Research Facility

   **RWTH Aachen University, IMA/ZLW & IfU**

Germany

Consultant

Heiko Sennewald, Intermodal Consultant

Germany

Manufacturer

 **Wecon GmbH**
Germany

 **Wesob Sp.z.o.o.**
Poland

 **DAF Trucks N.V.**
A PACCAR COMPANY
Netherlands

 **Goodyear**
Luxembourg

Association

 **European Intermodal Association**
Belgium

Advisory Board



 **STEINHOFF**

DUVENBECK 
THE CULTURE OF LOGISTICS

 **UIRR**
INTERNATIONAL UNION FOR ROAD-RAIL COMBINED TRANSPORT

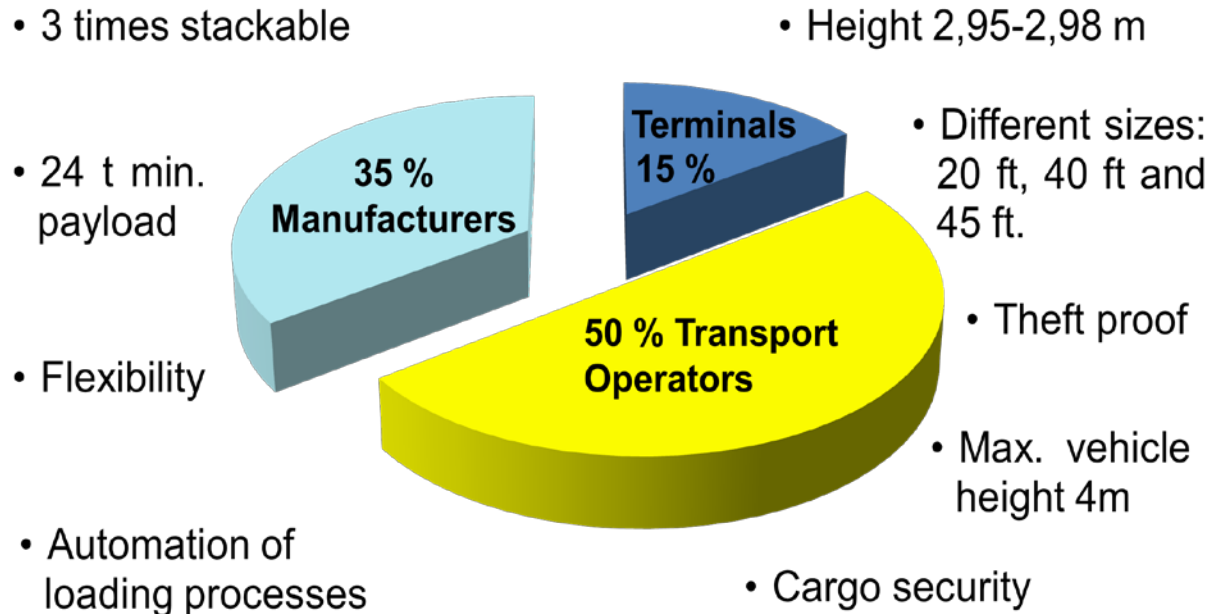
Objectives:

- Development of a complete volume optimized intermodal combination satisfying current market demands
- Enhance the performance of intermodal logistic chains and contribute to a more efficient transport by easing the transition between different transport modes

Innovation highlights of TelliSys:

- **Product-family of MegaSwapBoxes** for different use cases
- Next level **Super Low-Deck tractor** unit with 850 mm fifth wheel height
- **Low profile tyres** enabling the significant lower truck chassis height
- Lightweight **Trailer Chassis** to carry the MSBs
- Up to 100 m³ cargo volume while keeping the total system at 4 m height on the road

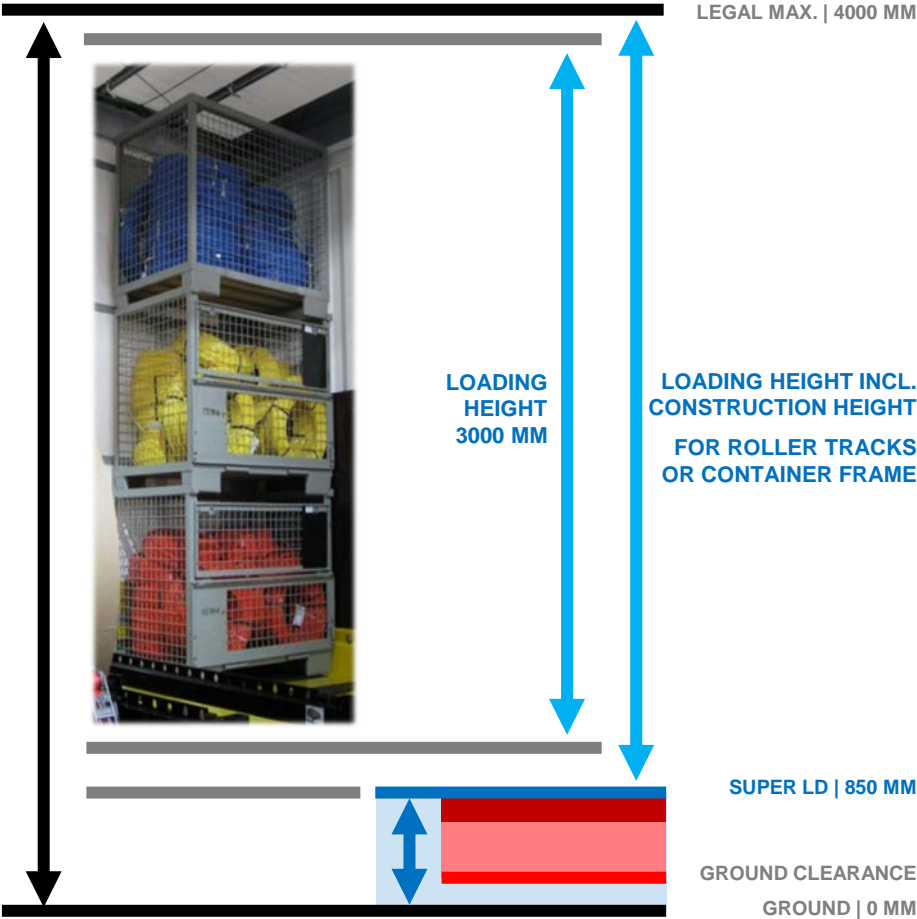
- A total of **21 interviews with companies from manufacturer, transport and logistic sector** have been performed, including terminal operators and port authorities.
- Desired characteristics of an intermodal loading unit:



SHARING THOUGHTS: **HOW TO REDUCE CO₂**
BY MAXIMIZING INTERNAL LOADING
VOLUME WITHIN OUR CURRENT (INTERMODAL)
TRANSPORT SYSTEM

TelliSys Project

Challenge - Maximum Volume Transport Concept



TelliSys Project

Family of Intermodal Loading Units

Characteristics	Continental MSB		Intercontinental MSB
	Stackable MSB	Automotive Box	
Size	40 ft / 45 ft	45 ft	40 ft / 45 ft
Height (internal)	2940 mm	2970 mm	2970 mm
Width (internal)	Euro-pallet	Euro-pallet	Euro-pallet
Long sides	One open	Two open	Closed
Pay load	Min. 24t	Min. 24t	Min. 24t
Roof	Hinged	Hinged	Hinged
Handling	Corner castings	Corner castings Grappler pockets	Corner castings Grappler pockets
Stackability	2 times (1+1)	Stackable (empty)	3 times (2+1)

Continental MSB



Features:

- Internal height of 2940 mm
- EU Pallet wide
- Liftable Roof
- One openable long side

Automotive MSB



Features:

- Internal height of 2970 mm
- 3 metre trays stackable
- Liftable Roof
- Two openable long sides

TelliSys Project

Prototype Vehicle

Main specifications Super Low Deck

- Vehicle type 6x2, Euro VI
- Wheelbase 3.300 mm
- Fifth wheel 850 mm
- Axle front 8.0t, air
- Axle rear 11.5t, air, sr13.44
- Tag axle 4.0t, air
- GCW 44t
- Vehicle weight target 8.000 kg

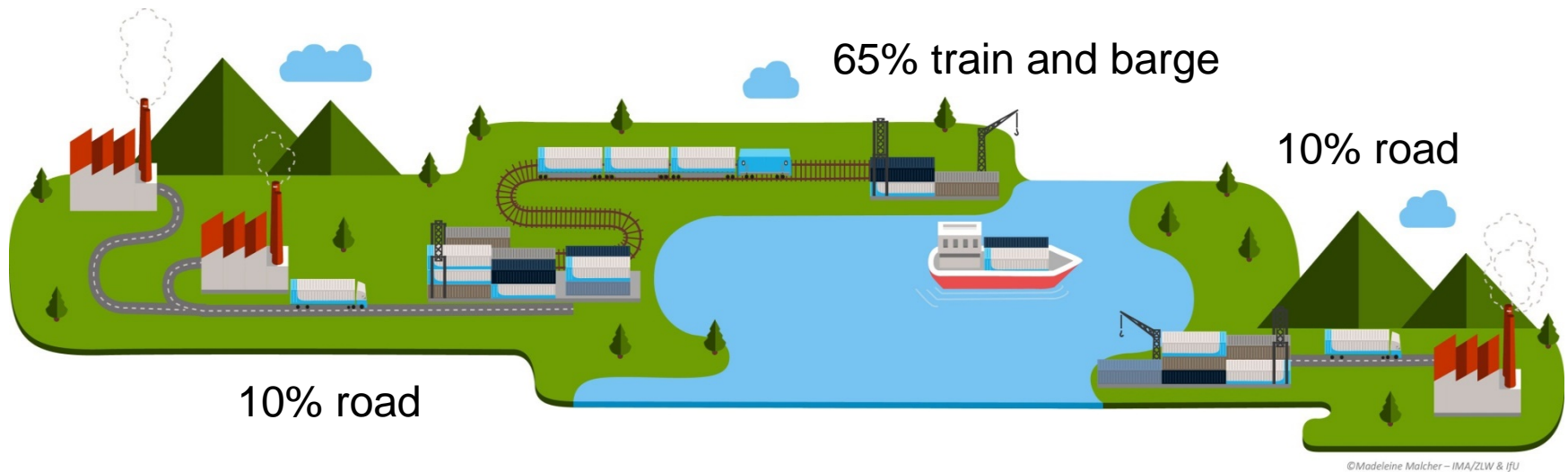


TelliSys Project

Performance Evaluation

Real intermodal scenario from PL to GB for:

- Economic evaluation
- Life cycle assessment

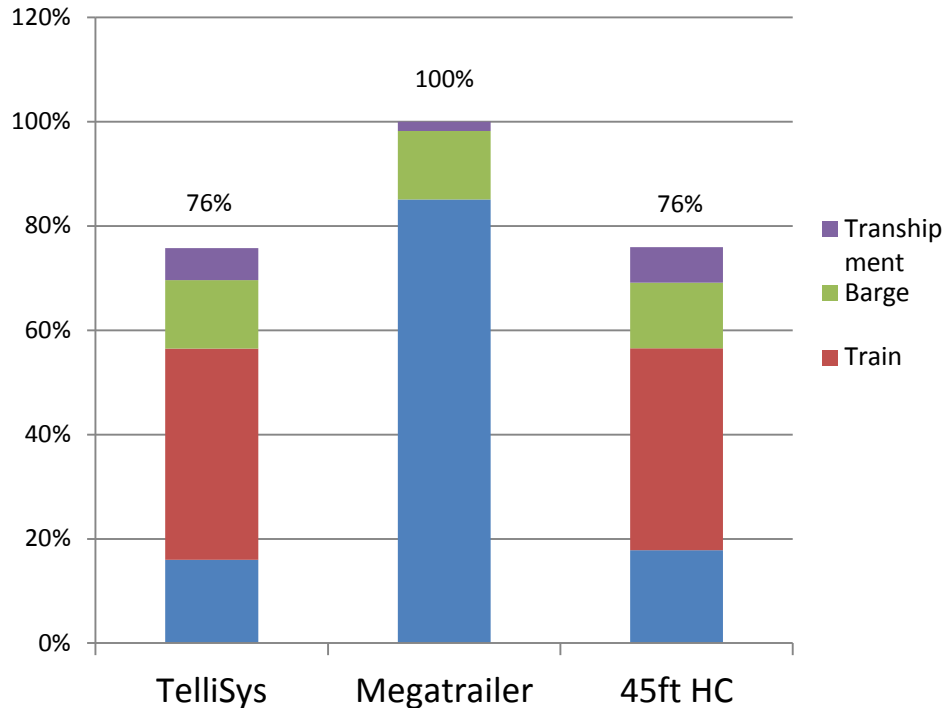


Comparing TelliSys with Mega-trailer for the reference scenario

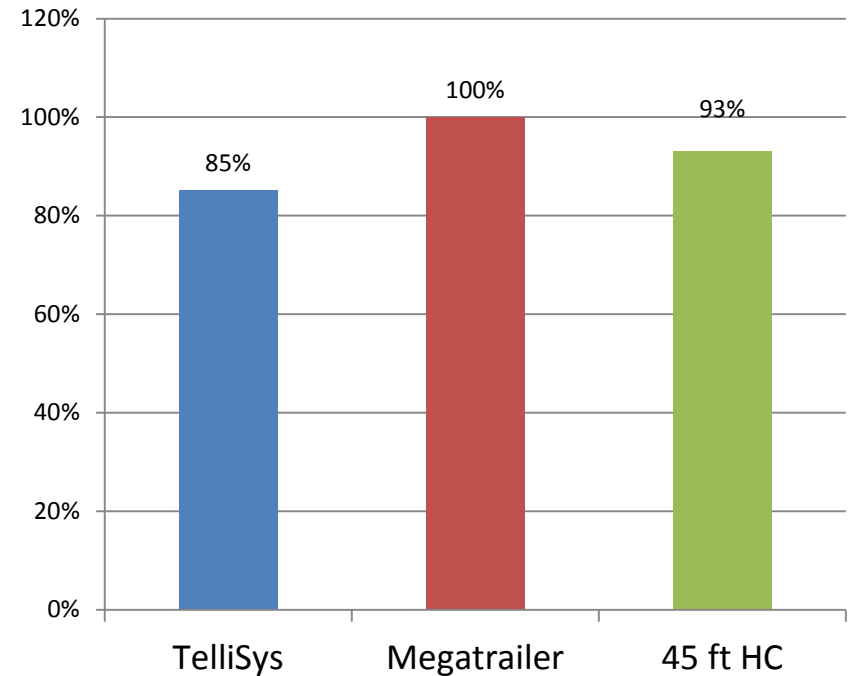
- Up to **25%** reduced CO₂ emission
- Up to **15%** cost savings

TelliSys Project Performance Evaluation

Global Warming Potential



Costs



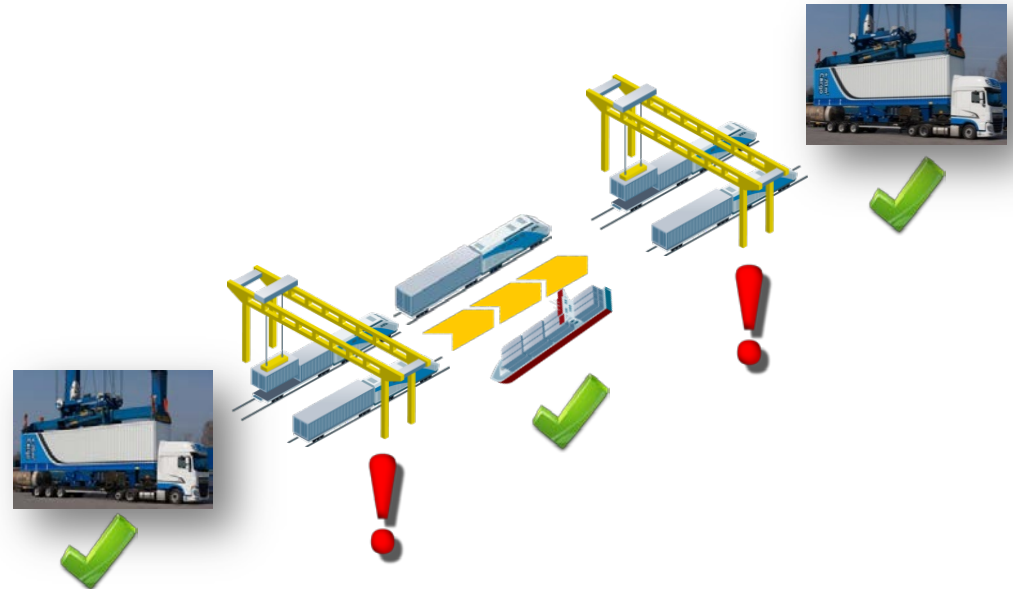
! The superior volume and efficient use of intermodal transport systems let TelliSys outperform the leading transport solution.

TelliSys Project Stakeholder Roadshow



TelliSys Project Learnings

- TelliSys is able to serve market demands, but infrastructure has to develop along the chain of combined transport in equal dimensions → Currently just 10% out of 100 terminals in Europe are able to handle all members of the TelliSys – family*.
- Benefits:
 - Maximised transport volume
 - Good system behaviour
 - Flexibility during loading and unloading processes
 - Suitable for combined transport (Point - Point Traffic)

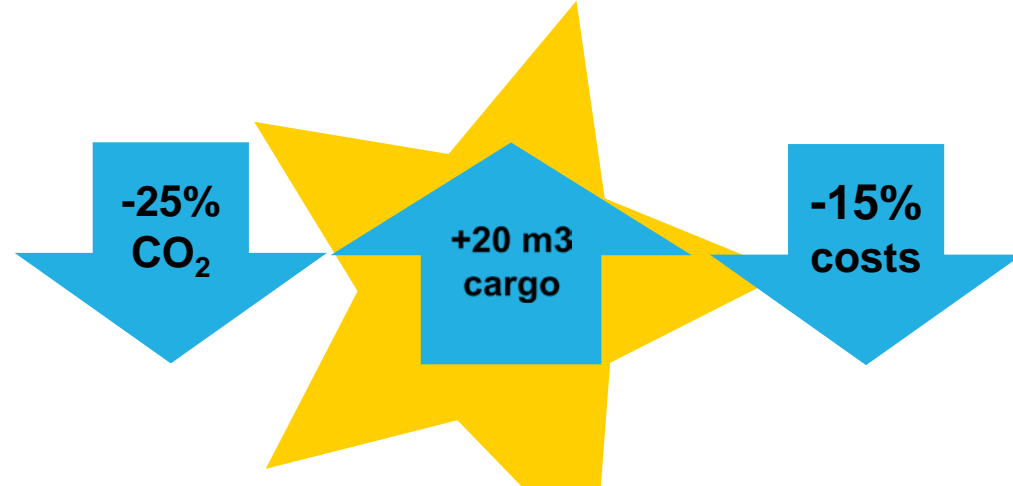


! The market reactions were very positive and promising. “If we manage to eliminate the described restrictions, there are good chances for a successful market launch.” – H. Herz, Resp. Intermodal Transport by GEFCO

* According research by TelliSys

TelliSys Project Summary

- Complete volume optimized intermodal combination
- Family of new intermodal loading units addressing different use cases
- More environmentally friendly and costs efficient.
- Open new market possibilities for the intermodal transport





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4.0 Design principles

Network

- Vertical and horizontal supply chain collaboration on a full connected network
- New services and business models

Decentralized decisions

- Artificial Intelligent
- Learning Systems
- Multi-agent Systems



4.0 Design principles

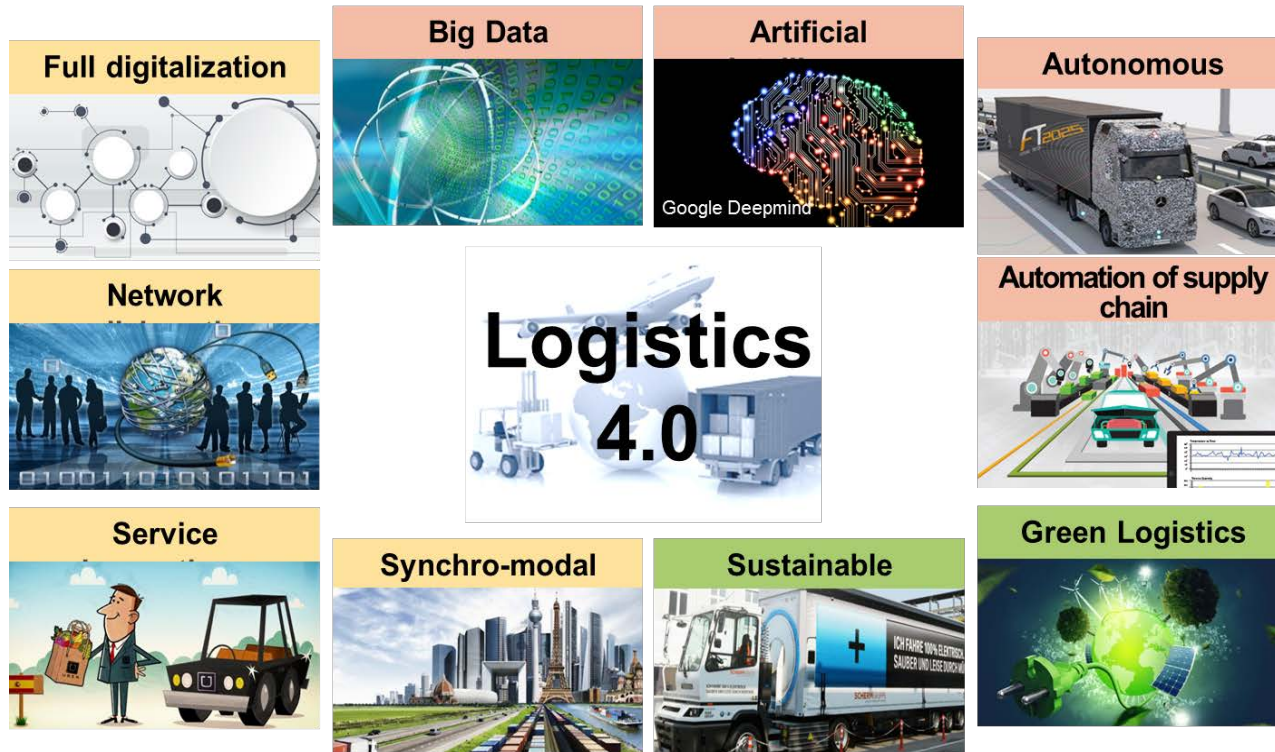
Information transparency

- Continuous information flow
- Virtually
- Context sensitivity
- Big Data analysis

Technical assistance

- Decision support systems
- (Partial-)autonomous systems

From Industry 4.0 to Logistics 4.0

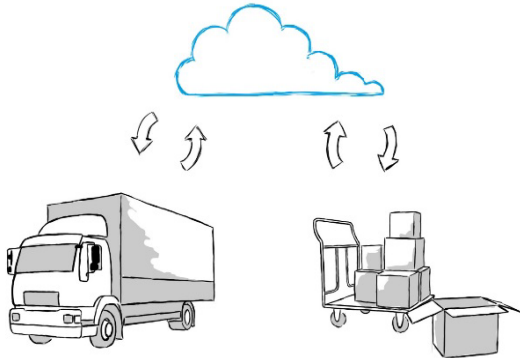


Definition of logistics 4.0 along two different time scales:

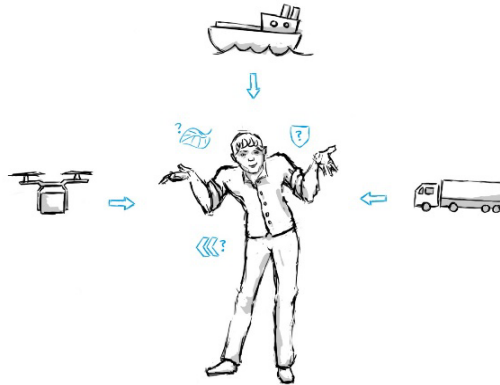
- 1. Short-term:** data-driven, highly networked processes between heterogeneous players (optimization, efficiency, transparency of processes, ...)
- 2. Medium-term:** autonomous systems and self-organization of systems of systems

Logistics 4.0 main competences and actions fields

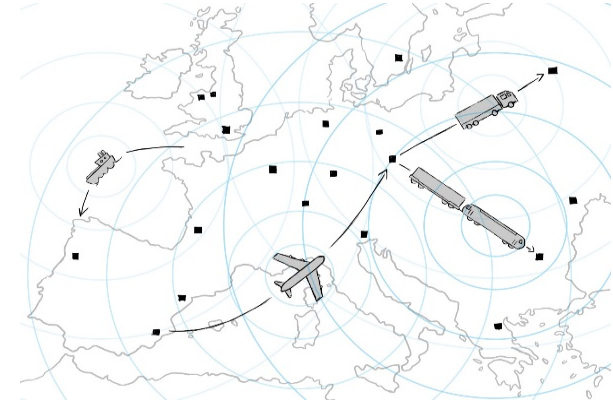
Digitalization



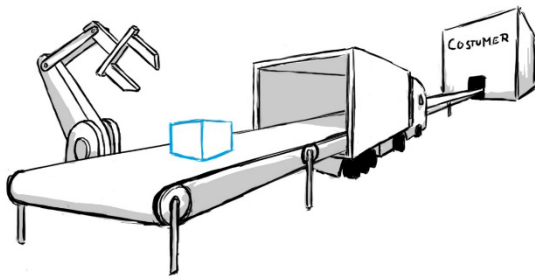
Service level extension



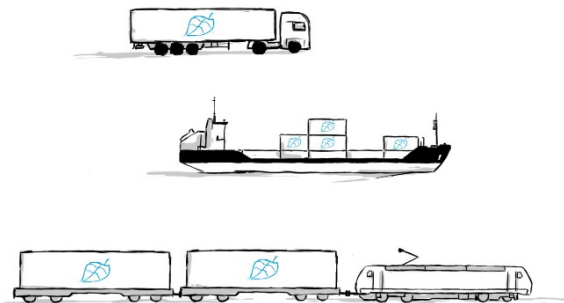
Network collaboration



Automatization



Sustainable transport





Conclusions

The impact of IoT and Big Data on the ITS:

- Logistics and transport are going to change on all levels in the context of a 4th industrial revolution:
 - Interconnection of everything with everything in real-time
 - Context and user sensitive system using semantic technologies
 - Distributed artificial intelligent systems of systems
 - Automated systems
- In addition to the development and adoption of new technologies, organizational and social change are the key challenges in a rapidly changing market:
 - New, data driven services and business models
 - Formation of new cross-company networks
 - Emergence of new stakeholders



Thank you very much for your attention

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