

Introduction to the

Bremen Research Cluster for Dynamics in Logistics

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Bremen Institute of Industrial Technology and Applied Work Science (BIBA)

1st International Conference on Dynamics in Logistics

August 28-30, 2007, Bremen, Germany

Content of the Presentation



Bremen Research Cluster for Dynamics in Logistics (LogDynamics)

- Introduction and Overview
- Collaborative Research Centre „Autonomous Cooperating Logistic Processes“ (SFB 637)
- International Graduate School for Dynamics in Logistics
- LogDynamics Lab



LogDynamics' Motivation

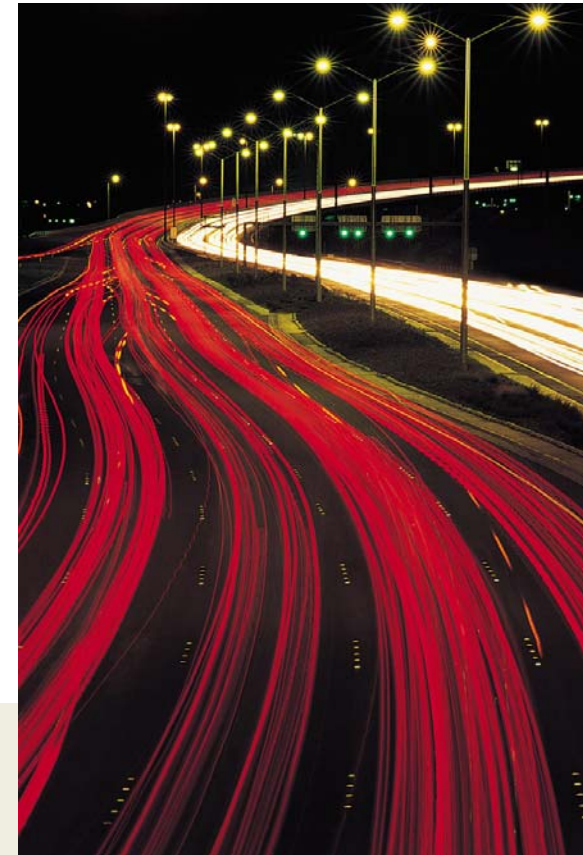


Increasing Dynamics in Logistics

- Dynamic changes in customers' demand, markets, and technologies
- Trends towards individual products and services and increasingly shorter product life cycles
- Changing demands on logistic systems and processes: fast and flexible adaptation on continuously changing conditions
- New opportunities for design and control of logistic systems and processes

Tasks of the LogDynamics Research Cluster

- Identification, description, and modelling of dynamics of logistic systems and processes
- Research and development of novel, dynamic structures of logistic systems and processes



LogDynamics' Aims

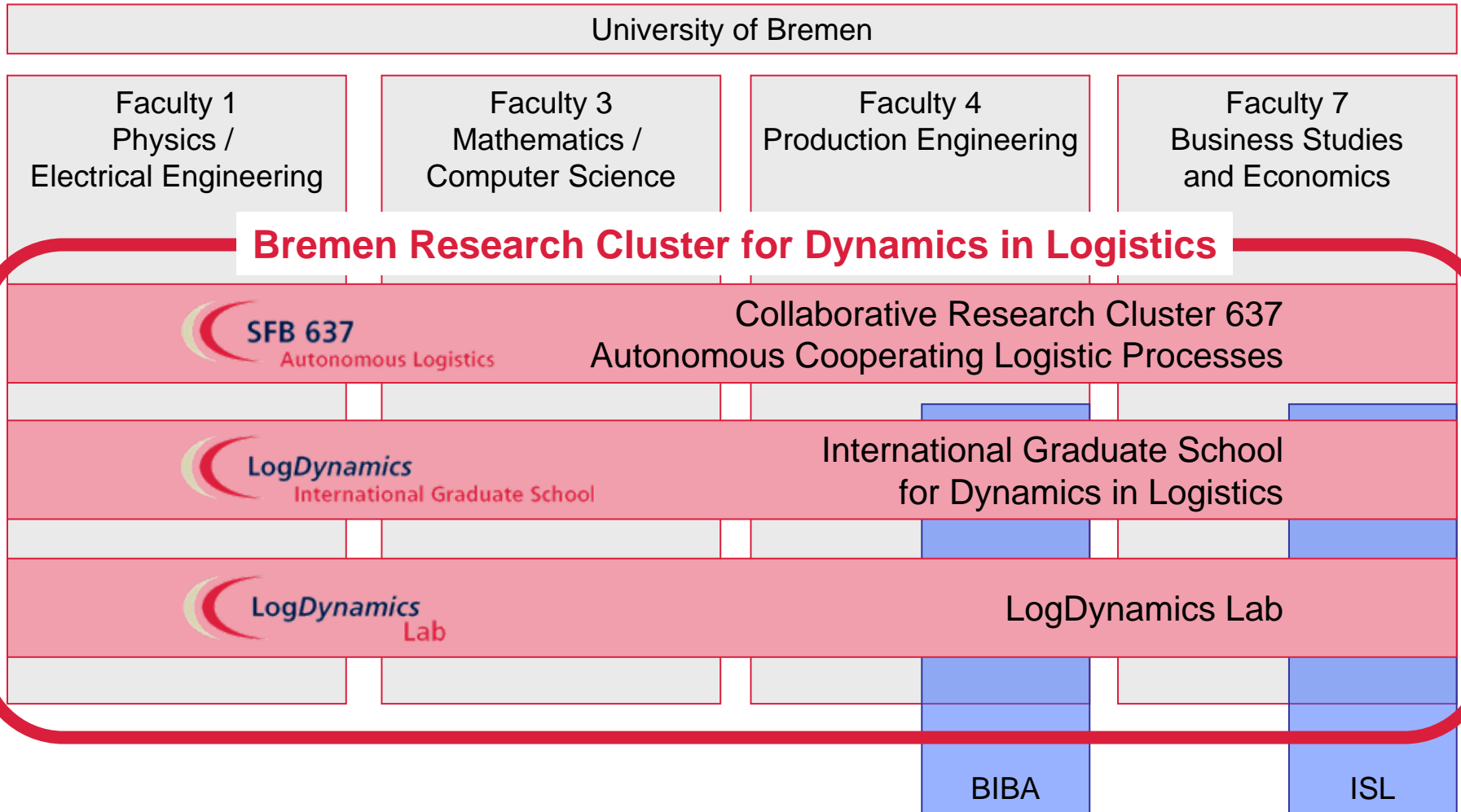


Strategic Objectives

- Fundamental research in logistics and its transfer to industry
- Demonstration and application of mobile technologies for logistics
- Logistics education and qualification on the highest level
- International visibility of Bremen's research in logistics



LogDynamics' Structure



LogDynamics' Major Activities



Research

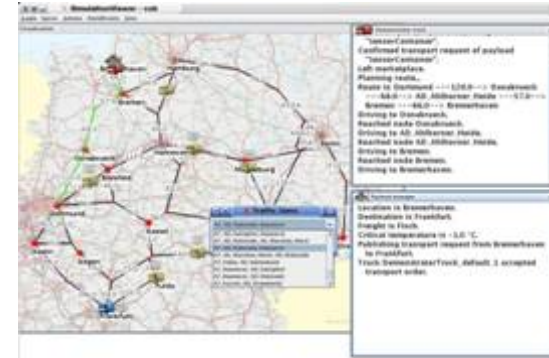
- Collaborative Research Centre „Autonomous cooperating logistic processes“ (SFB 637)

Education

- International Graduate School for Dynamics in Logistics

Application

- Demonstration and application centre for mobile technologies in dynamic logistic structures (LogDynamics Lab)



LogDynamics' Major Activities



Research

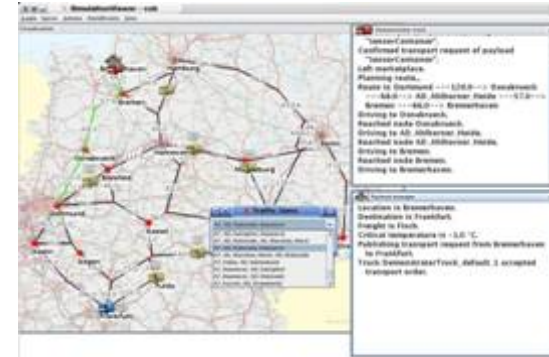
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What is a Collaborative Research Centre?



Collaborative Research Centre = Sonderforschungsbereich SFB

- Long-term university research project (3 x 4 years = 12 years)
- Cross-disciplinary research programme
- Located at a German university
- Consists of 10–15 sub-projects
- Run by 10–15 research groups
- Funded by German Research Foundation (DFG)
- Aims to create a core research focus at that university

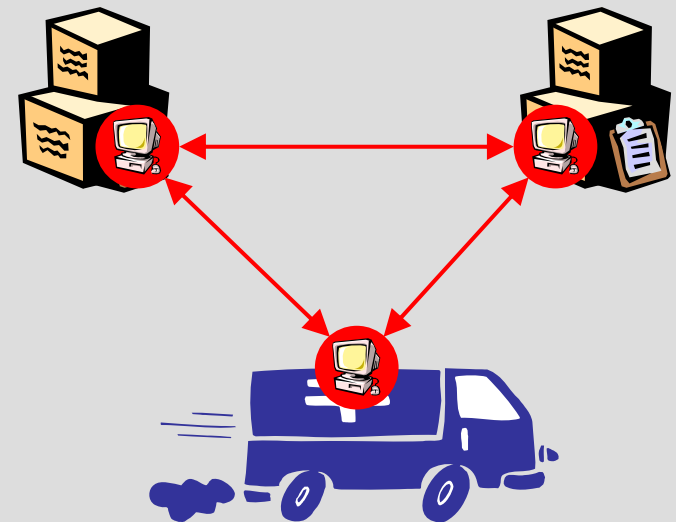
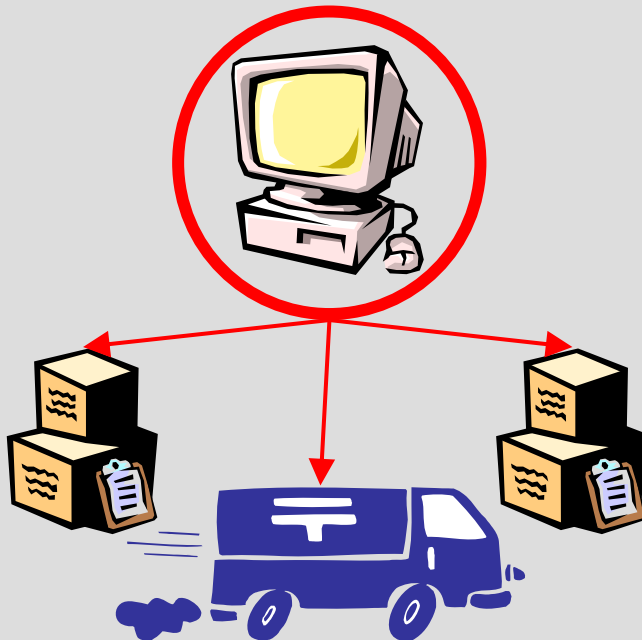


Idea: From Conventional to Autonomous Control

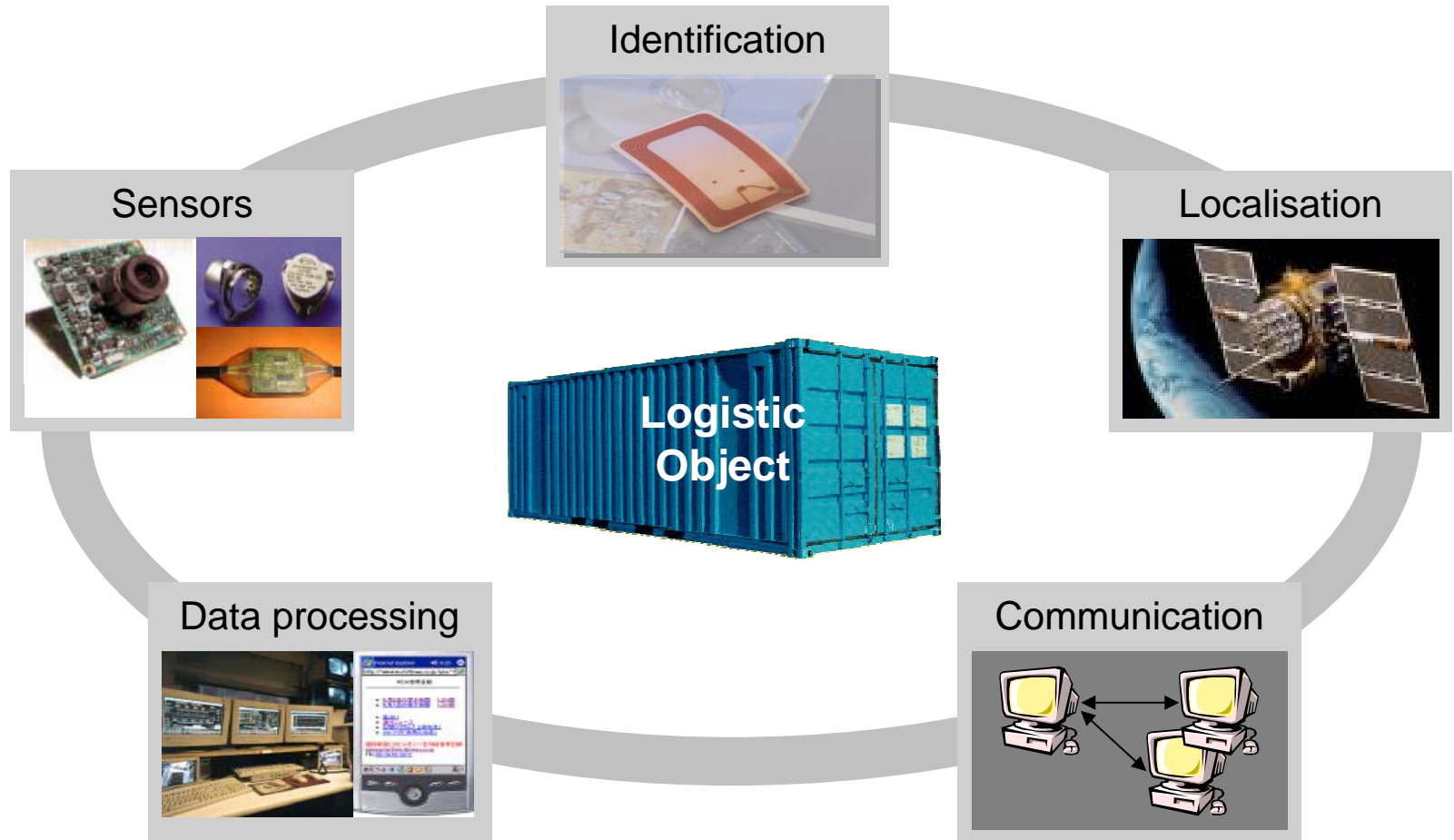
- Hierarchical IT structure
- Global information processing
- Centralised control

Paradigm Shift

- Distributed IT structure with global communication
- Local information processing
- Autonomous decentralised control



Enabling Technologies for Autonomous Control



Definition of Autonomous Control



Autonomous control describes a process of decentralised decision-making in a non-hierarchically structured logistics system.

Autonomous control requires interacting elements of a non-deterministic system which are able to make decisions by themselves without external instructions.

Autonomous control aims towards higher robustness and positive emergence of the global system by a distributed and flexible management of dynamics and complexity.

LogDynamics' Major Activities



Research

- Collaborative Research Centre „Autonomous cooperating logistic processes“ (SFB 637)

Education

- International Graduate School for Dynamics in Logistics

Application

- Demonstration and application centre for mobile technologies in dynamic logistic structures (LogDynamics Lab)



International Graduate School



Start in Autumn 2005

4 Faculties with 8 Supervisors

- Physics/Electrical Engineering
- Mathematics/Computer Science
- Production Engineering
- Economics

16 Graduates with funding

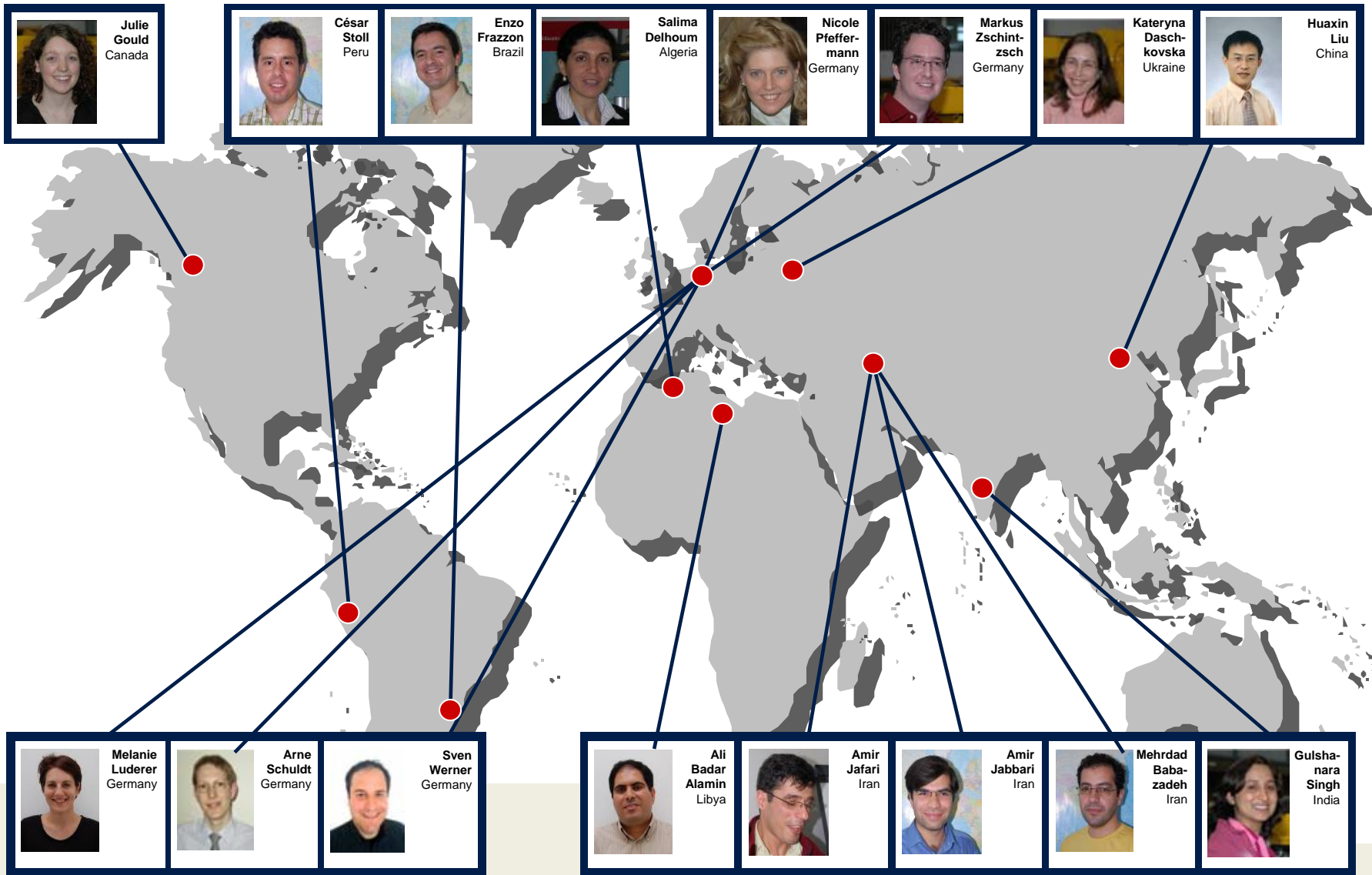
- 7 from external resources
- 9 from IGS

Features

- Interdisciplinary
- Multicultural



The Graduates of IGS



Research Areas



- Holistic interdisciplinary method workshop for the modelling, analysis and simulation of logistics
- Synchronisation of material and information flow
- Adaptive and dynamic control methods for logistics



Structured Doctoral Education



Dialogue forum
with industry

Lectures and
seminars

Interdisciplinary research
colloquium

Research
team

Three-year doctoral
project

Supervision
and mentoring

LogDynamics' Major Activities



Research

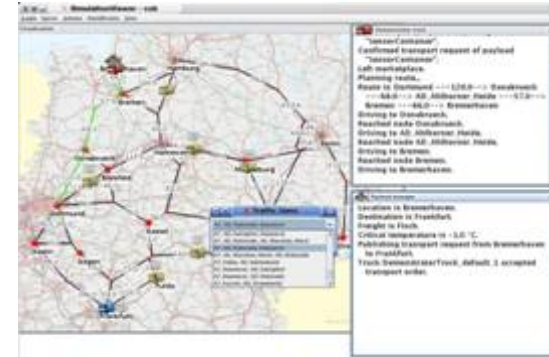
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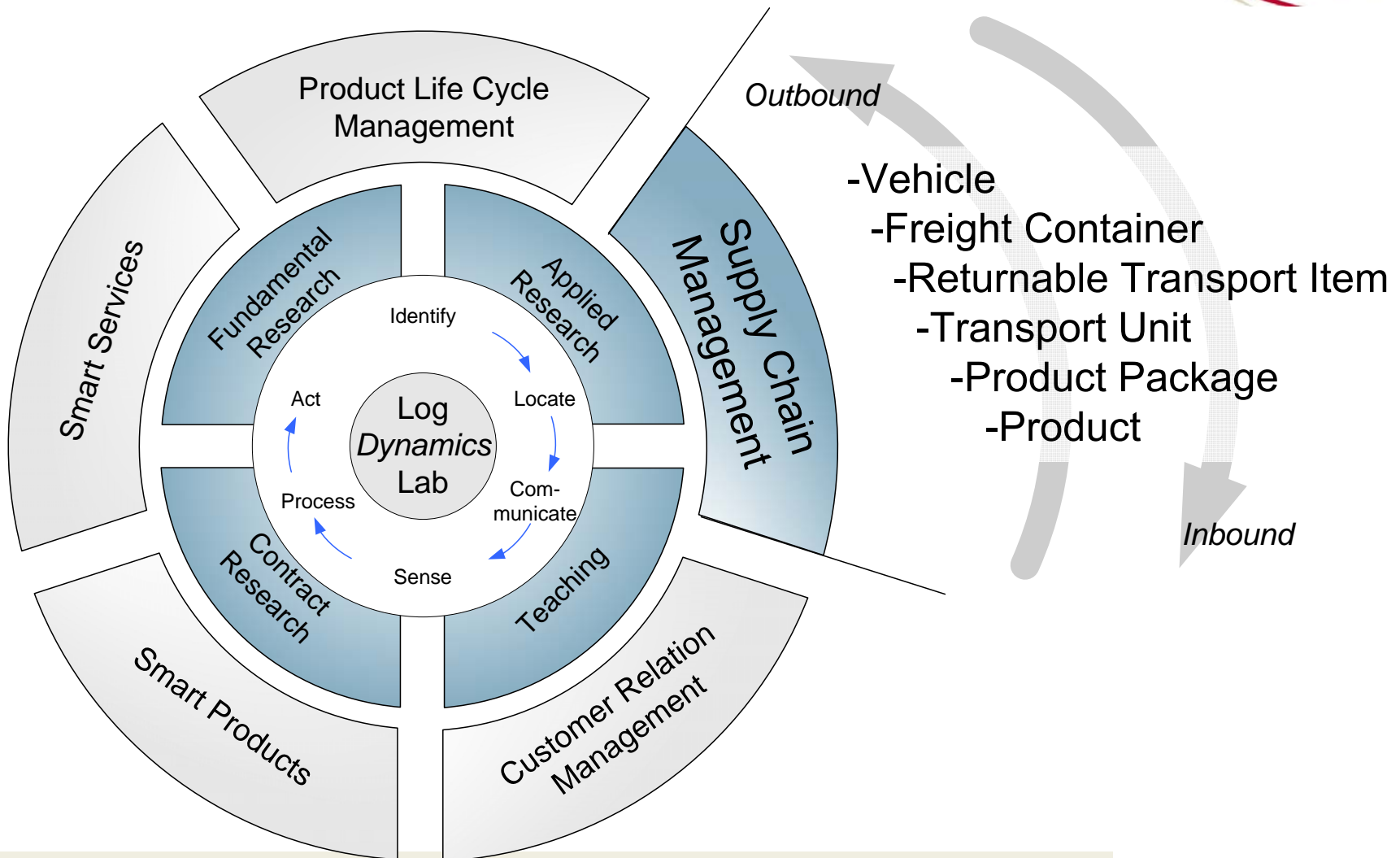
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Application

- **Demonstration and application centre for mobile technologies in dynamic logistic structures (LogDynamics Lab)**



LogDynamics Lab at a Glance



Technology-independent

- Process analysis
- Application tests
- Technology tests
- Prototyping

RFID-specific

- Read range optimisation
- Read rate optimisation in harsh environments
- Bulk reading
- Evaluation of
 - Hardware
 - Software



The Global RF Lab Alliance (GRFLA)



What is the Global RF Lab Alliance (GRFLA)?

- The GRFLA is confederation of RF-focused labs
- Purpose is to provide a mechanism for communication and collaboration among RF labs
- GRFLA members share resources, such as students and professors, and collaborate (as appropriate) on research projects
- Each participating lab will maintain its own identity, yet hold membership in the GRFLA

Why is the GRFLA needed?

- Little collaboration among the RF labs on a a global basis
- Duplicate research
- Sub-optimization of research funding
- Difficult for individual labs to handle projects of sufficient magnitude
- Slow dissemination of research results to industries



Technologies

- Radio frequency identification (RFID)
- Real time location sensing (RTLS)
- Near-field communication (NFC)
- RF-based Sensors
- Middleware and advanced data processing

Research topics

- Supply chain automation
- Product life cycle
- Cold chain
- Food quality
- Pharma applications

Branches and industries

- Retail/FMCG
- Automotive
- Aviation
- Logistics and CEP (Courier Express & Parcel)
- Cold Chain
- Pharmaceutical
- Healthcare

GRFLA Founders



Asia

- Chinese Academy of Sciences' Institute of Automation (CASIA)
- Hong Kong University of Science and Technology
- Pusan National University



Europe

- University of Bremen
- University of Parma



USA

- University of Arkansas
- University of Florida
- Georgia Institute of Technology



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