Center for
Human-Machine-Interaction

German Research Center for Artificial Intelligence

IFS Innovative Factory Systems

Introduction@DFKI

Gerrit Meixner
Head of the Center for Human-Machine-Interaction (ZMMI)

Research Departement Innovative Factory Systems (IFS)
German Research Center for Artificial Intelligence (DFKI)

DFKI – The Pentagon of Innovation

January 2012:

- 737 employees
- 200 ongoing projects
- 42 Mio. € turnover in 2011

„DFKI is the world‘s largest and leading Center of Excellence for basic and application-oriented AI research.“

DFKI is a Non-Profit Company

DFKI Funding is based on::

- 100% reimbursement of project costs from industry and government

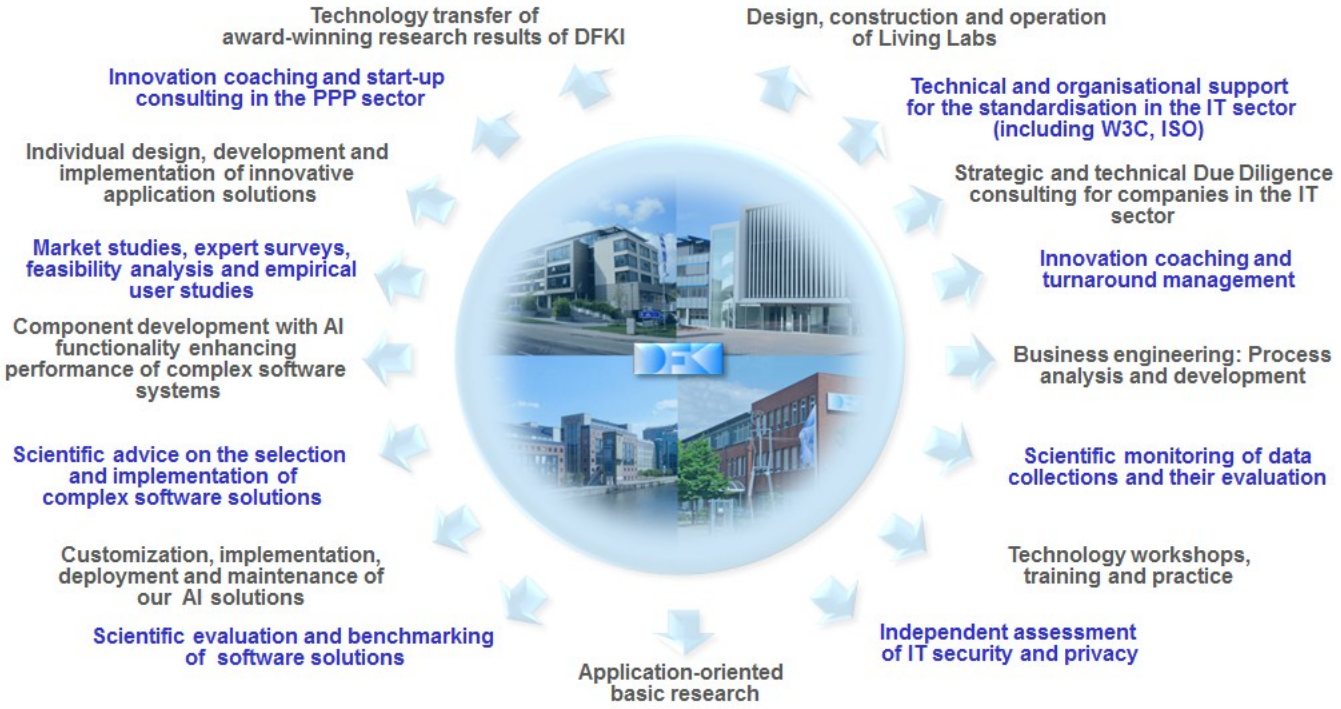
Support from Universities and Shareholders:

- 8 full professors (75%)
- Research staff from Shareholders
- Free research space in two buildings on the campus
- Joint use of infrastructure (Internet, Libraries, Catering)

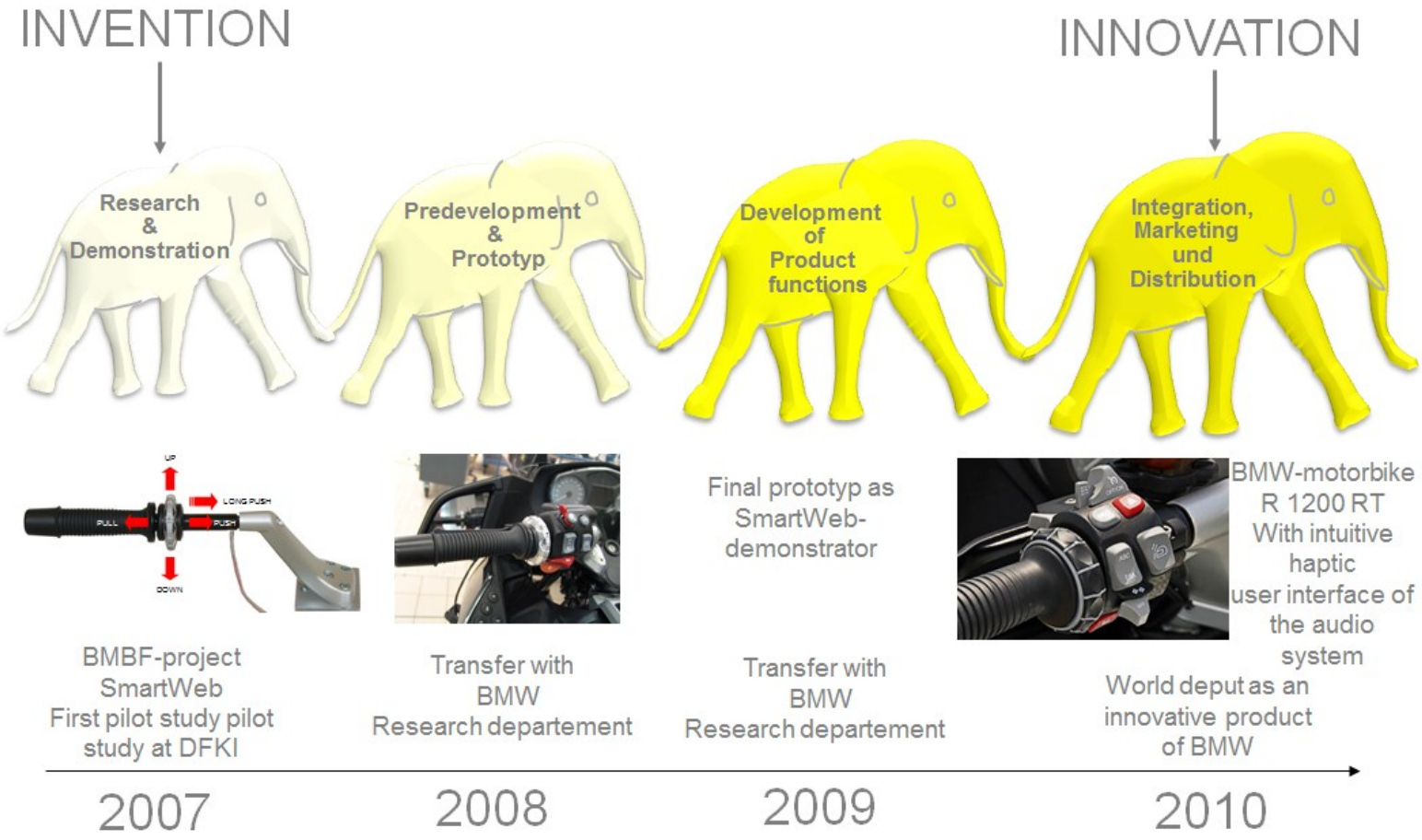
DFKI is a Joint Venture of

DFKI – Our Service Offering

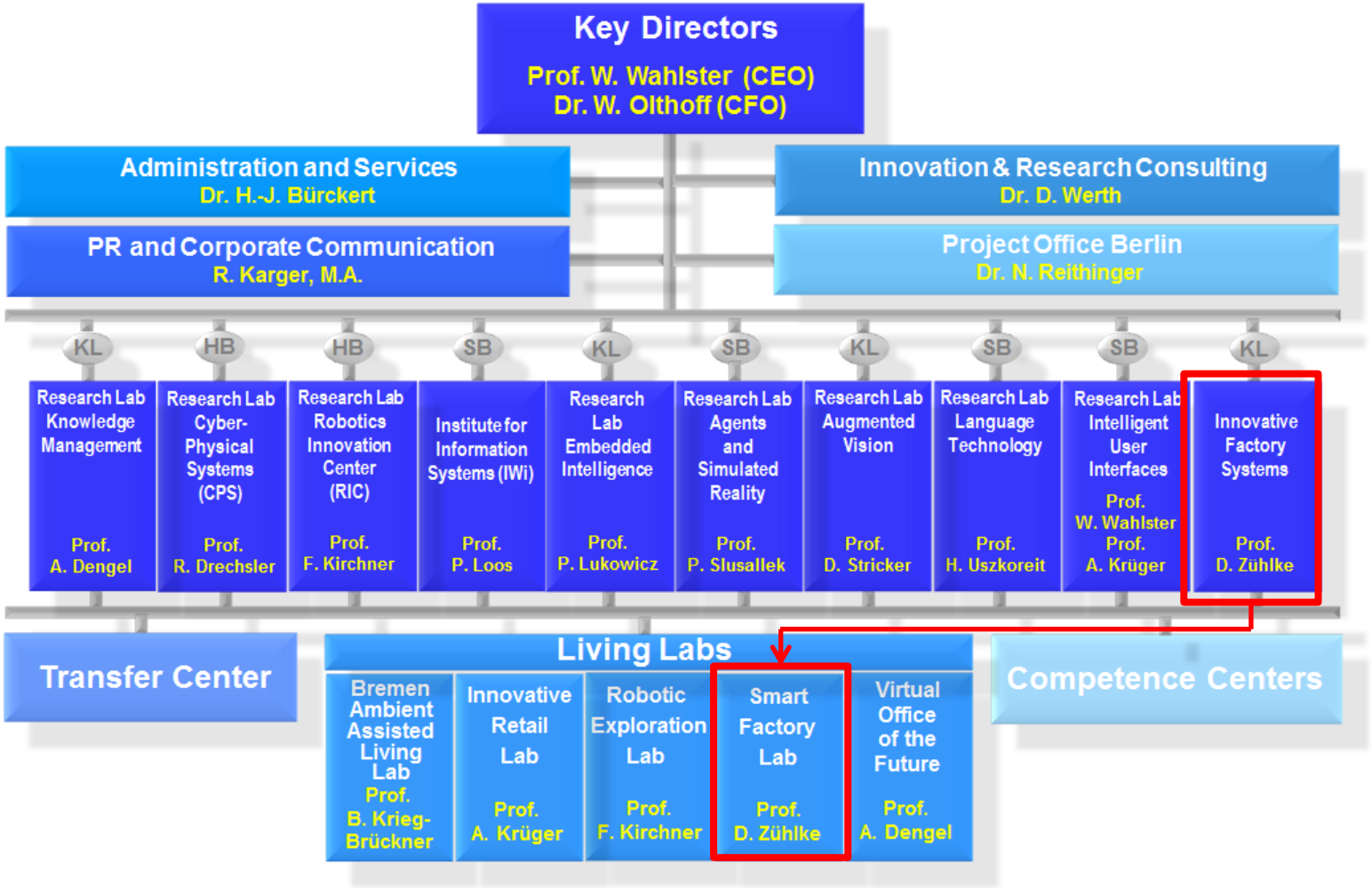
As an internationally renowned Center of Excellence for innovative software systems based on Artificial Intelligence (AI) methods we are offering the following services with more than 20 years of experience in basic and applied R&D:



Value adding along the whole chain of innovation in Germany



The Structure of the DFKI



Structure of the Innovative Factory Systems Department

Center for Human-Machine-Interaction

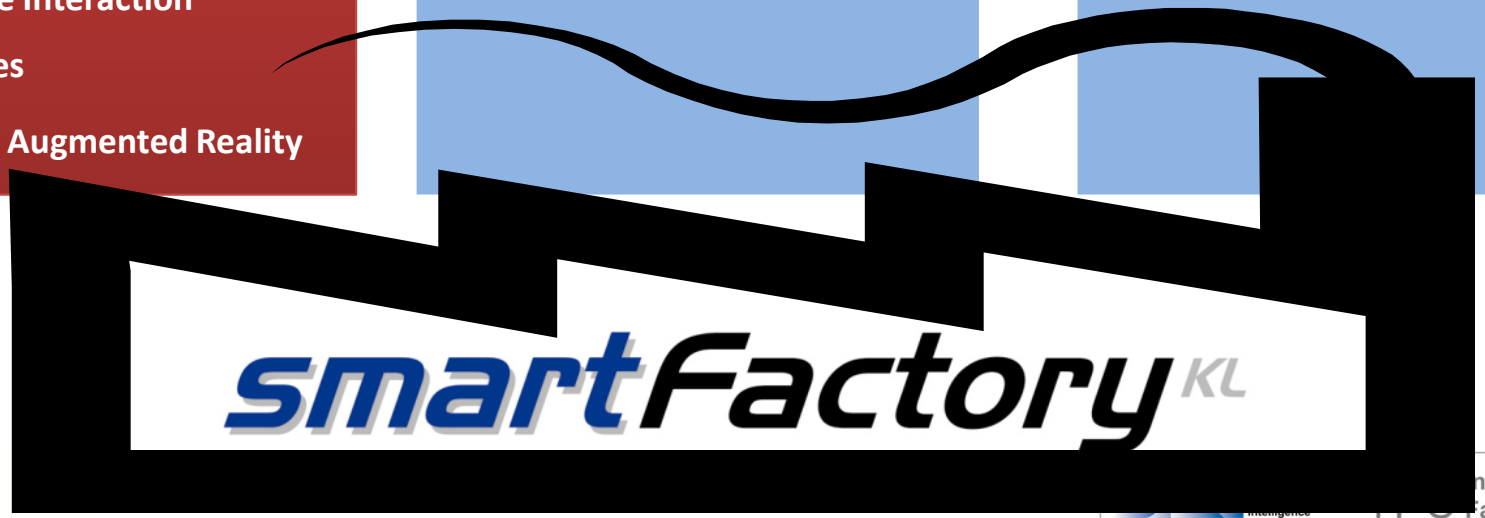
- **Usability-Engineering Process**
- **Model-Based User Interface Development**
- **(Universal) Mobile Interaction Devices**
- **Innovative Interaction Techniques**
- **Industrial Augmented Reality**

Industrial Information Management

- Location-Based Services
- Context Interpretation
- Semantic Technologies

Control Architectures & Factory Systems

- Service-Oriented Automation
- Industrial *Plug & Produce*
- IT-Security in Automation



Center for Human-Machine-Interaction (ZMMI)

Key facts:

- Established in 1991
- Focus on industrial HMI
- Currently 7 researchers + 18 student researchers

- Currently 5 ongoing projects (3 German + 2 EU FP7 projects)

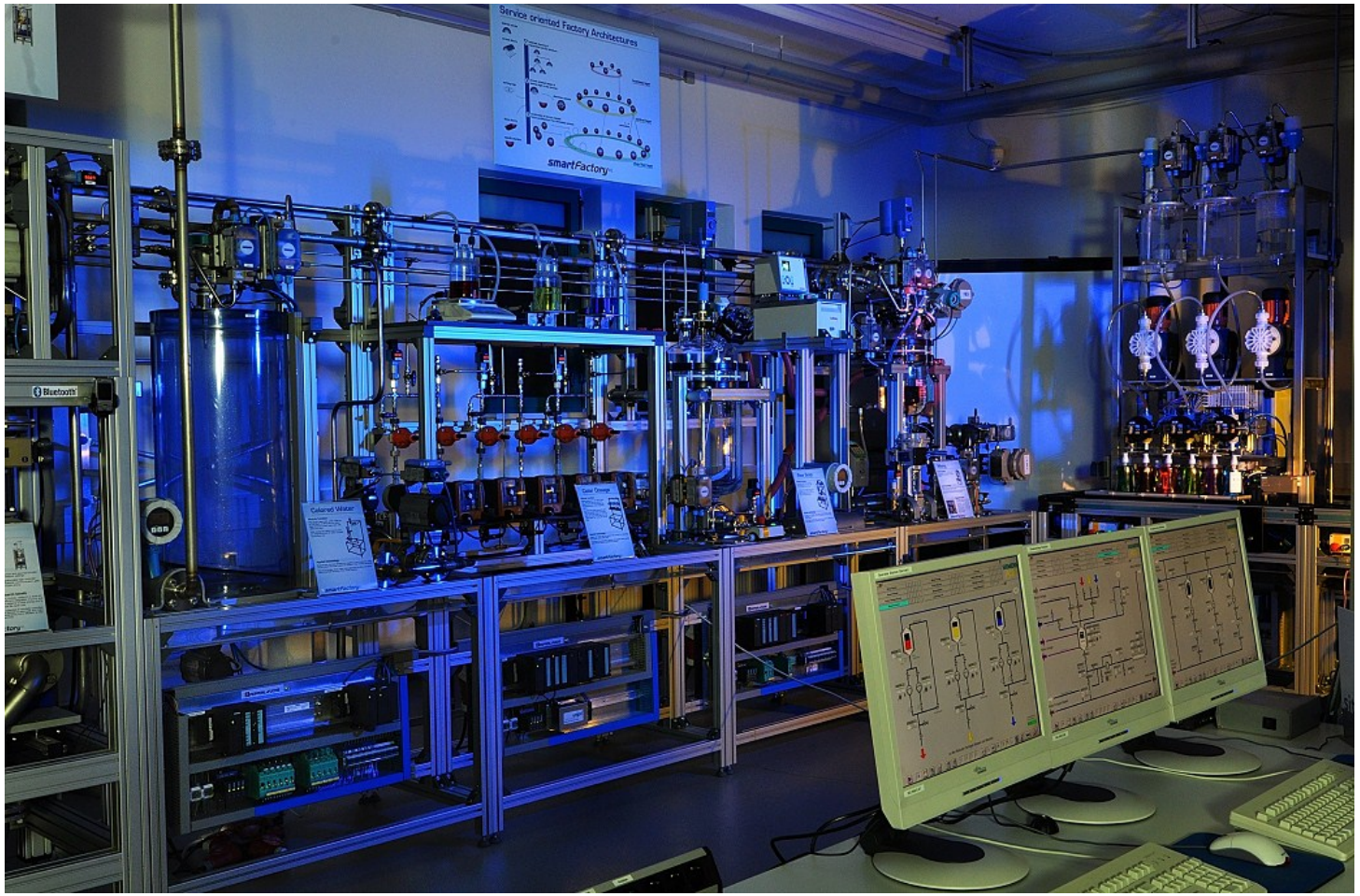
automotive HMI

vistra

Cognito

Always open for establishing a new cooperation (scientific exchange, joined project proposals, …)

Living Lab - SmartFactory



- **First multi vendor research, development and demonstration center for industrial ICT**
  - **<u>Goal:</u> The integration of mature ICT into factory automation**

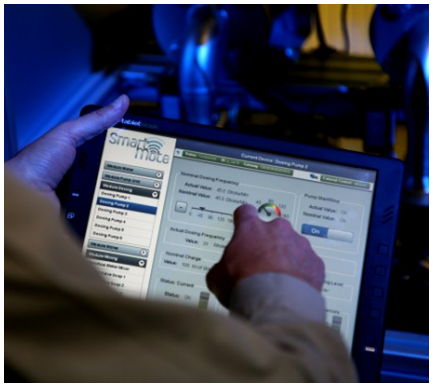
Our domain: Industrial HMI for industrial goods

1989

Copy mill CNC

2011

Trends in Industrial HMI



future

Stationary Interaction
N device : N user interfaces

Mobile Interaction
N device : 1 user interfaces

Natural Interaction

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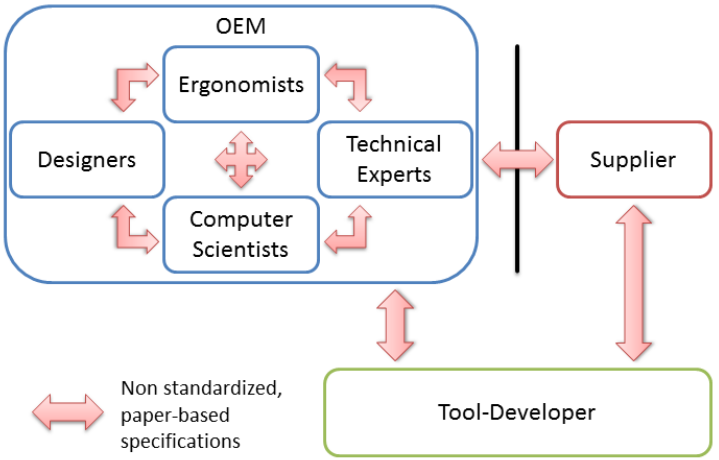
Bundesministerium für Wirtschaft und Technologie
aufgrund eines Beschlusses des Deutschen Bundestages

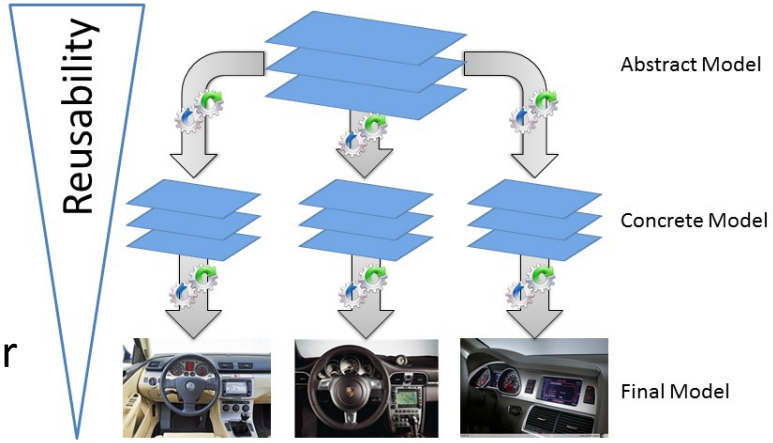
automotiveHMI

Model-Driven HMI-Development in the automotive industry



- Today: Media breaks - Paper-based specifications; Long time-to-market

- Goal: Development of a domain-specific modelling language; Optimization of HMI development processes

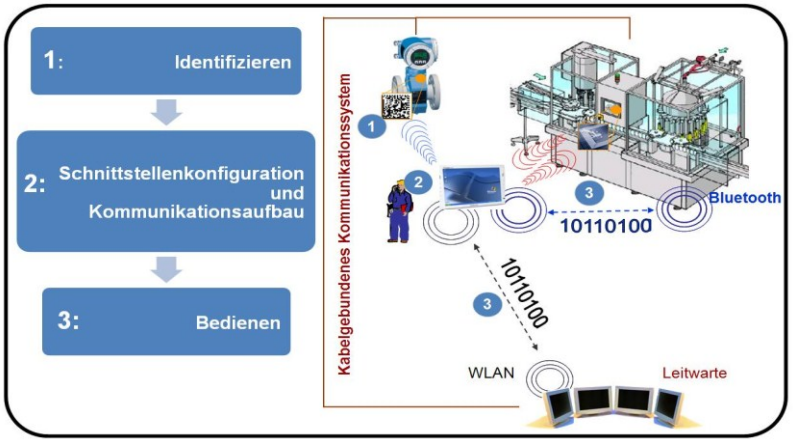


- Holistic consortium along the development chain: OEM, supplier, service provider, software developer & scientists

SmartMote – An Universal Interaction Device for Production Environments

Demonstration:

- Mobile maintenance support by a Tablet-PC
- Radio-based parameterization of field devices
- Touch&Connect: intuitive wireless connection to field devices



Research Topics:

- Automatic configuration of industrial interfaces
- User-centred and task based runtime generation of user interfaces
- Use of context to display selected relevant situation-dependent operating information

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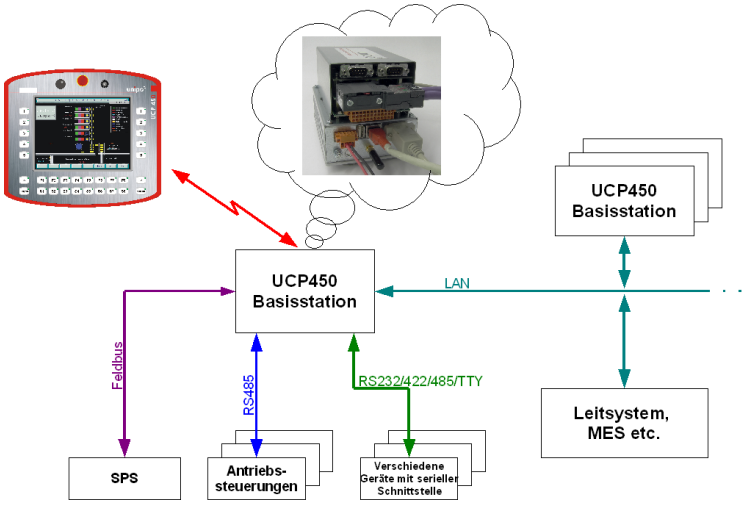
aufgrund eines Beschlusses des Deutschen Bundestages

"Universal Interaction Device" for Wireless, Mobile Interaction

Demonstration:

- Radio-based paramerterisation of field devices
- Visualisation software ProDiagXE® and project planning tool UCPToolXE®
- Central Gateway as access point



Research Topics:

- Unified access to various field devices from different vendors
- Modular concept with internal modular interface
- Storage of projects and manufacturing data on a central base station

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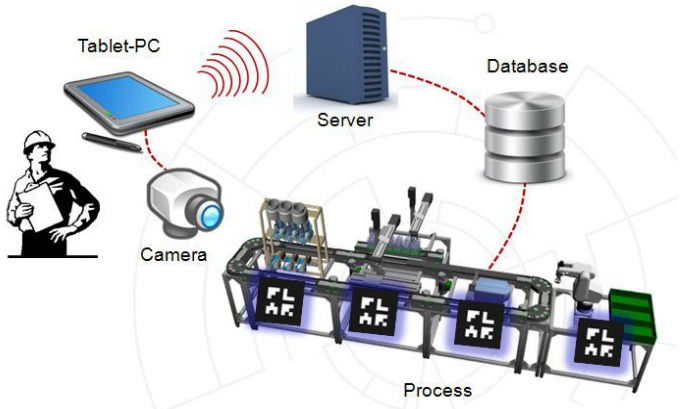
Augmented Reality in the *SmartFactory*^{KL}

Demonstration

- Industrial *Augmented Reality* application based on a tablet-PC for mobile use
- Novel communication concept in the factory: *„Virtual Information Boards“*
- Intuitive linking between process-information and the corresponding production facility

Research Topics

- Integration of real-time process- and facility-information
- Novel assistance- and information-concepts in factory applications



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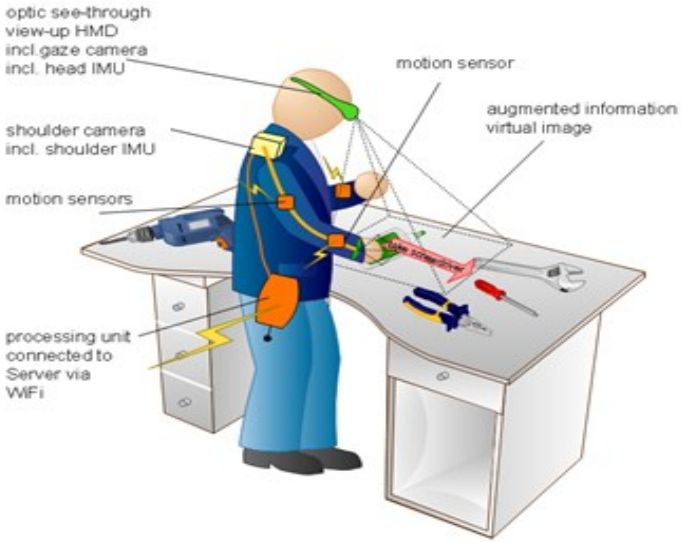
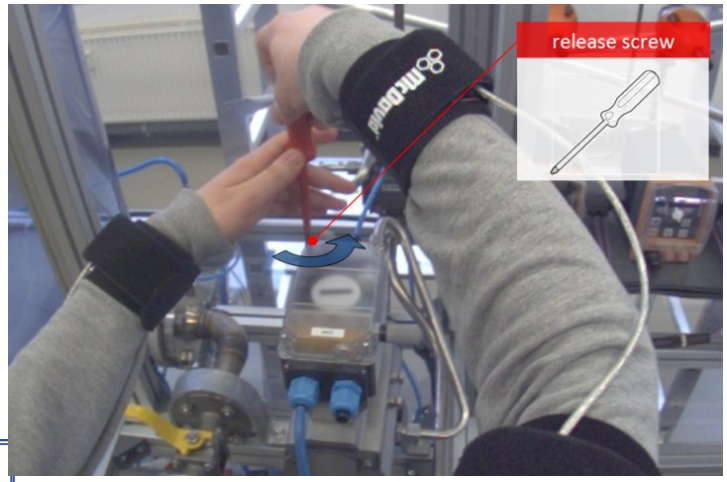
COGNITO: Cognitive Workflow Capturing and Rendering with On-Body Sensor Networks



- **An experienced user teaches the system how to perform a task…**
- **…afterwards the system can guide and train an inexperienced person.**



+ reducing the time required to execute a given assembly task
+ increasing the process reliability
+ reducing the training period
+ reducing the effort for documentation

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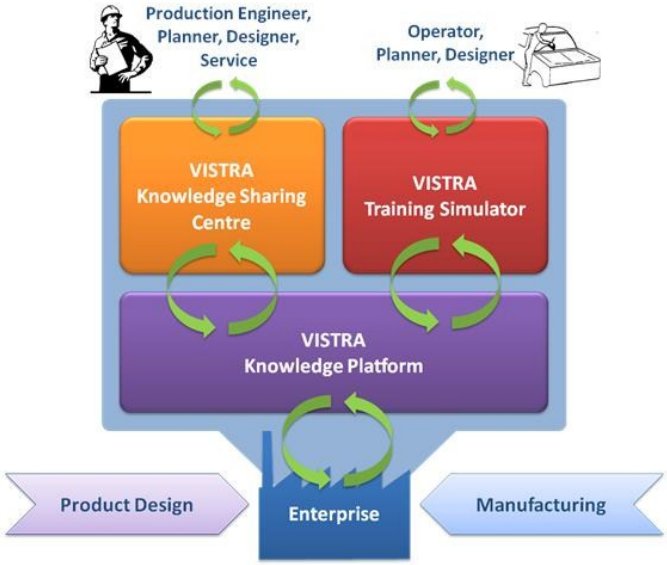
VISTRA: Virtual Simulation and Training

Development of a consistent and complete digital tool set for the simulation and training of manual assembly processes.



- Develop a game that represents the associates daily work and that makes fun to play at the same time

- Generate training data from existing sources of the digital factory (e.g. CAD product data)
- Automatic generation and evaluation of training data through semantic technologies
- Interactive Integration of users through *low-cost* hardware like e.g. *Microsoft Kinect*

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Thank you for your attention!

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