HEI! – The Human Environment Interaction –

Prof. Dr.-Ing. José L. Encarnação

Fraunhofer-Institut für Graphische Datenverarbeitung IGD
Fraunhoferstr. 5
64283 Darmstadt
Germany

Phone: +49 (6151) 155 – 130
Fax: +49 (6151) 155 – 430
Email: jle@igd.fraunhofer.de

Feldafing, June 8th, 2006

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Alan Kay (born 1940)

Content

Content

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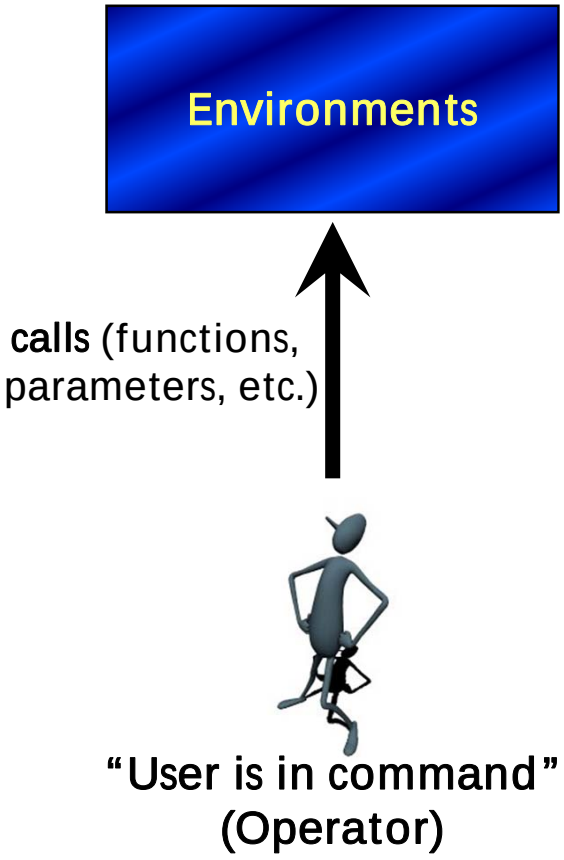
- Metaphor Change: Ambient Intelligence (AmI)
- Human in an Intelligent Environment
- HEI Research Issues
- AmI Lab
- Summary

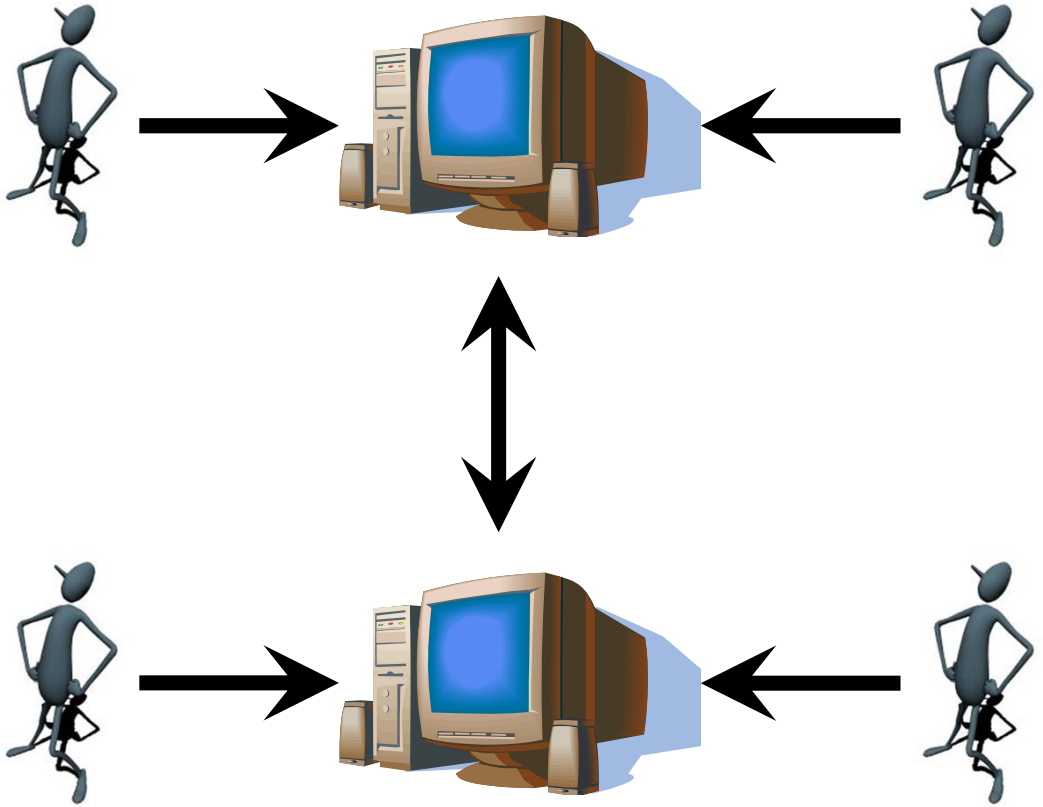

Today

Today: Human Computer Interaction

Human Computer Interaction (HCI)



Human Human Interaction (HHI)



Research for HCI and HHI

Research topics include (among others):

- Integration of multimediality and multimodality
- Integration of computer generated "realities" (VR, AR, MR, SR)
- Make interfaces easy to understand and easy to use

Examples (Virtual Reality)

Examples (Augmented Reality)

- Marker based visualization of new parts
  - different rims can be selected
  - robust against motion

Examples (Simulated Reality)

Physically based simulation of virtual objects

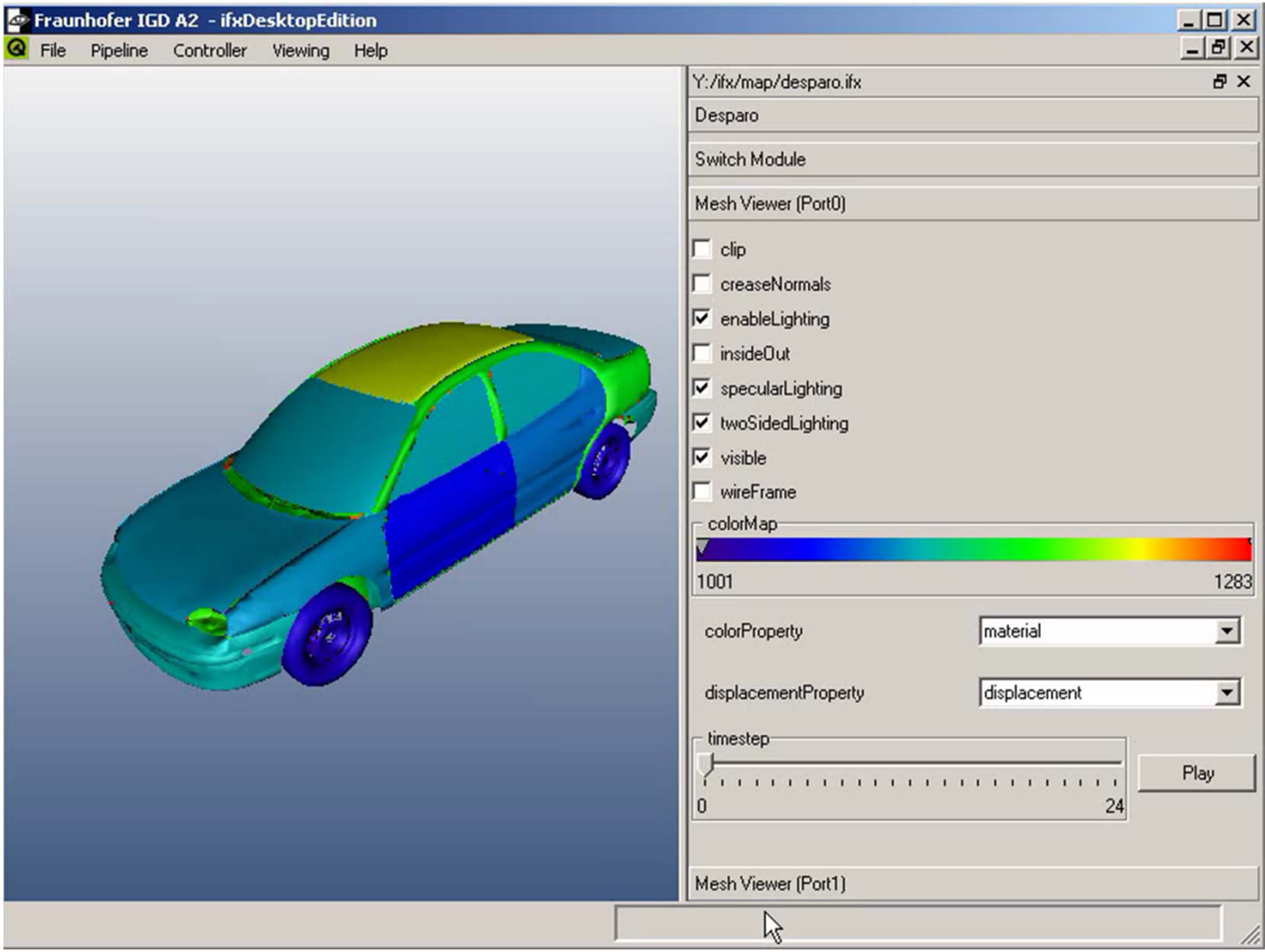
- behavior and visualization equivalent to real object
- using new algorithms and datastructures (e.g. point based methods)

Examples (Simulated Reality)

Interactive exploration of a large set of simulation results (e.g. sampling of the parameter space of crash simulations)

Optimization criteria (examples):

- crash intrusions and accelerations
- energy of impact
- torsional and bending stiffnesses
- eigenfrequencies of vibration
- total mass
- ...



Metaphor Change: Ambient Intelligence (AmI)

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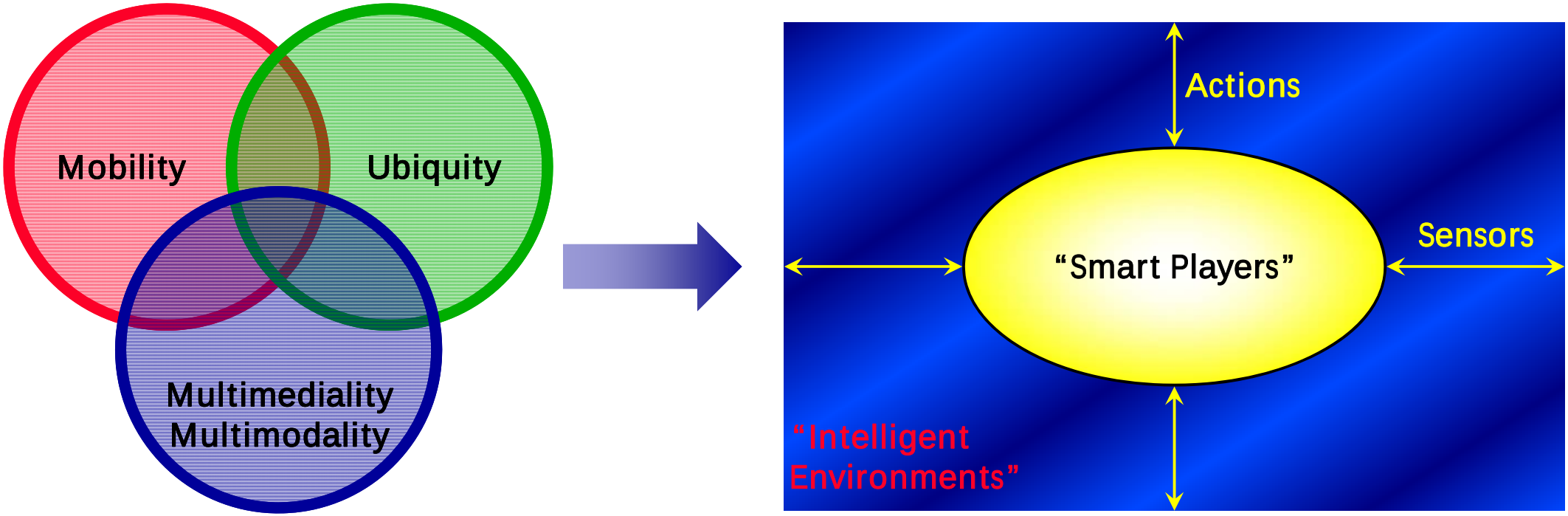
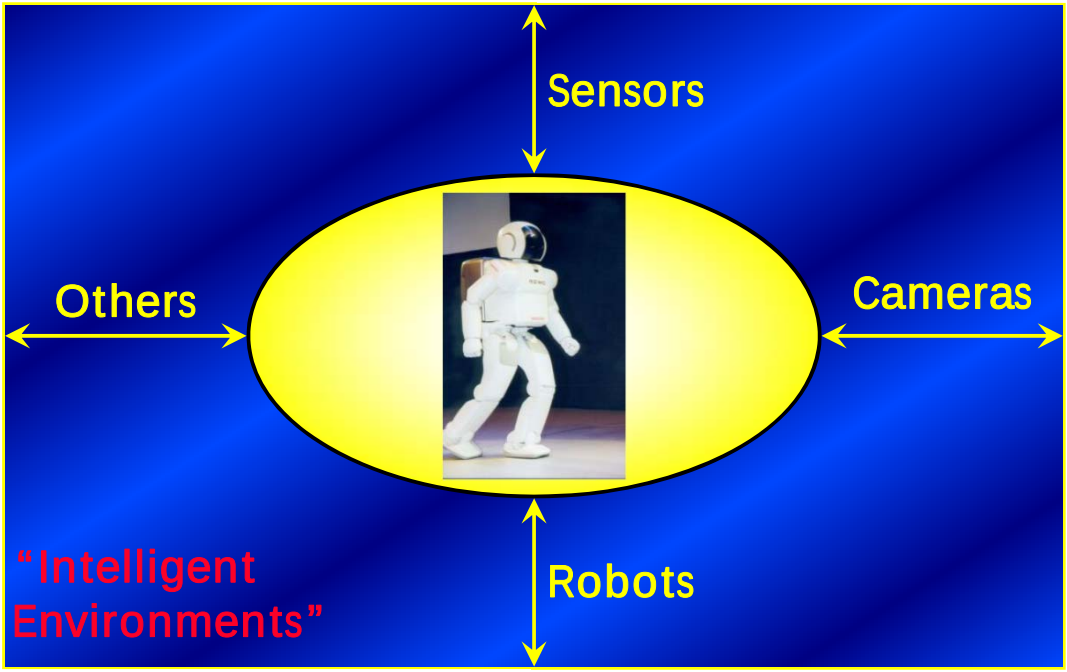
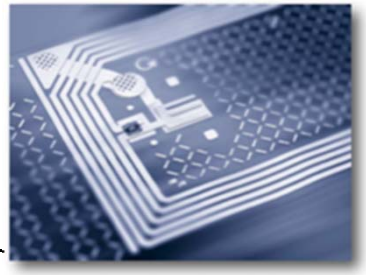


“Smart Players” in AmI (1)

There are many types of “smart players” in AmI

- Humans
- Animals
- Smart Objects
- Smart Working Places
- Smart Machines (and other smart processes, smart production environments, etc.)



Qualitätsmanagement zertifiziert nach DIN ISO 9001:2000

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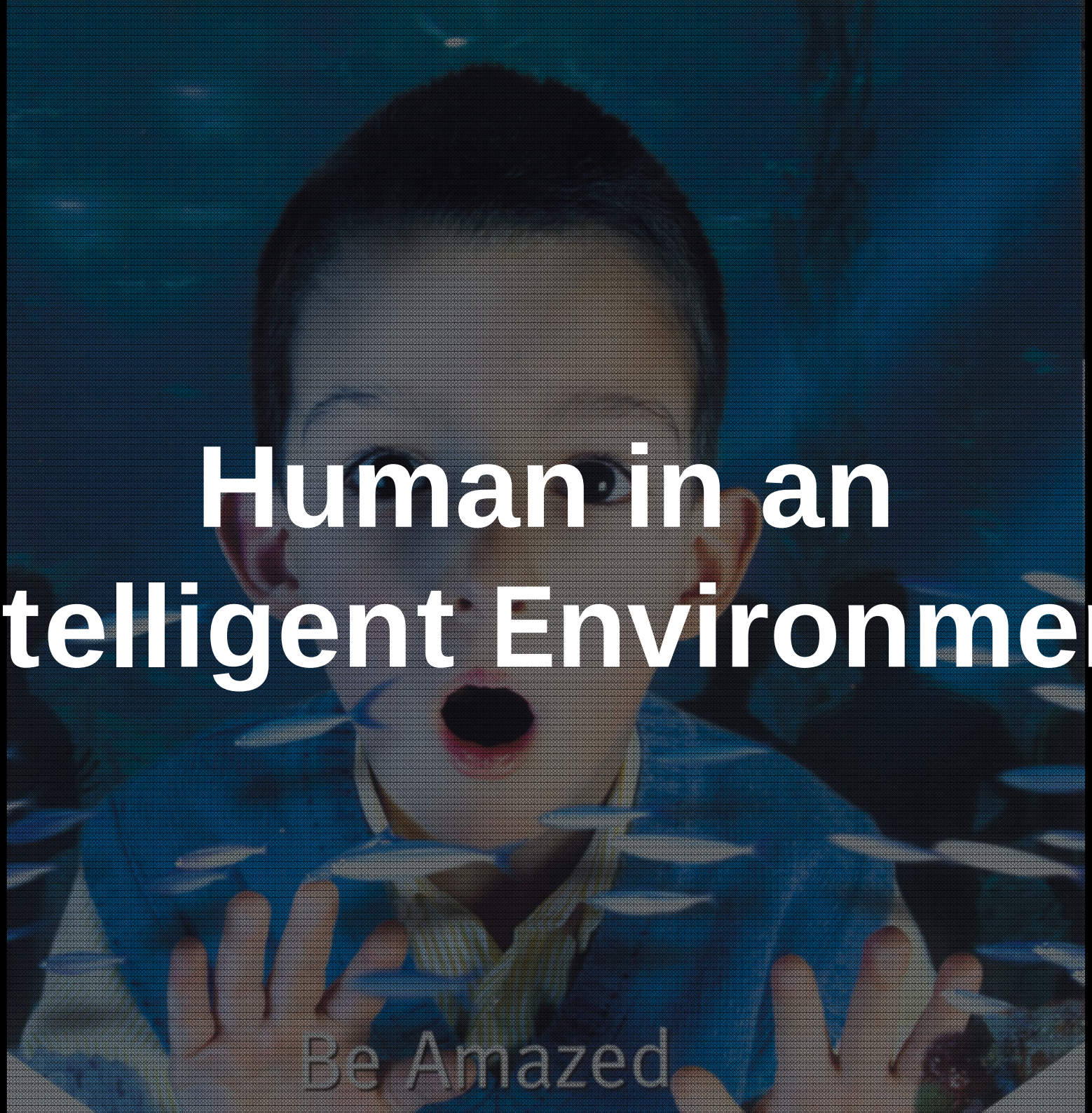
“Smart Players” in AmI (2)

The AmI Vision is therefore …

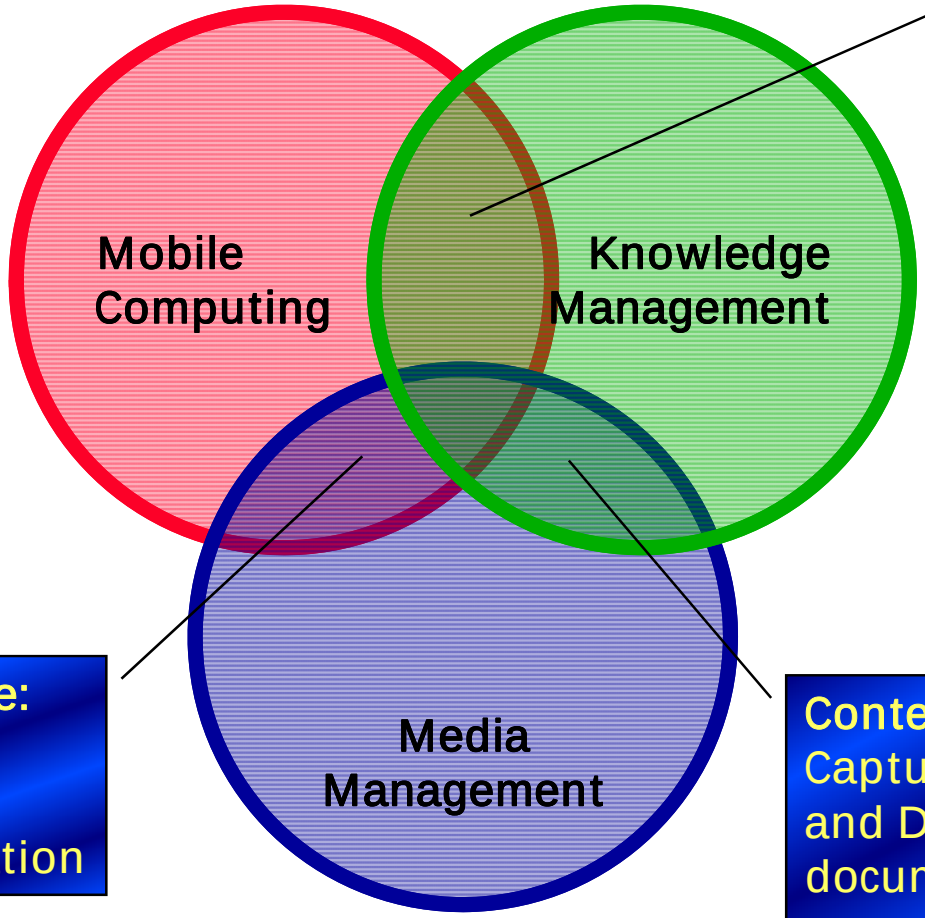
- … not only about human-centric dialogue and communication
- … but all about “Smart Players” interacting with and getting services from intelligent environments

But let us now concentrate on the human as the smart player in an intelligent environment!



Human in an Intelligent Environment

HEI: Human Environment Interaction (1)

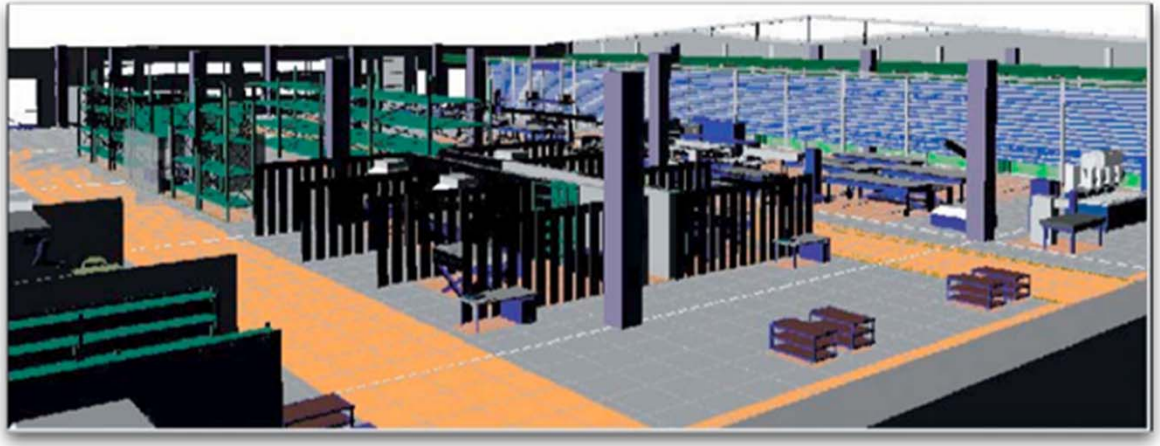


Mobiles KM:
- Mobile Portale
- Location Based Services
- Wissensverteilung

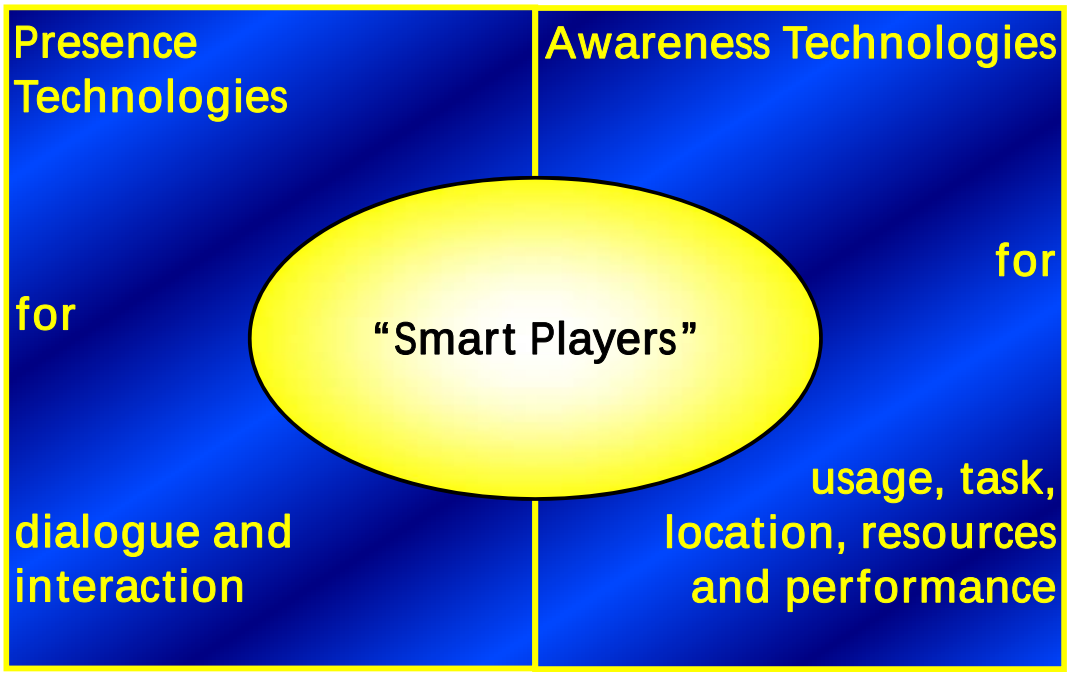
Mobile Multimedia-Systeme:
- Tourist Guides
- Mobile Blogging
- Mobile Metadata Annotation

Content-Management:
Capture, Manage, Store, Preserve, and Deliver content and documents related to organizational processes
- Collaboration, Workflow Support
- Metadatenannotationen

HEI: Human Environment Interaction (2)

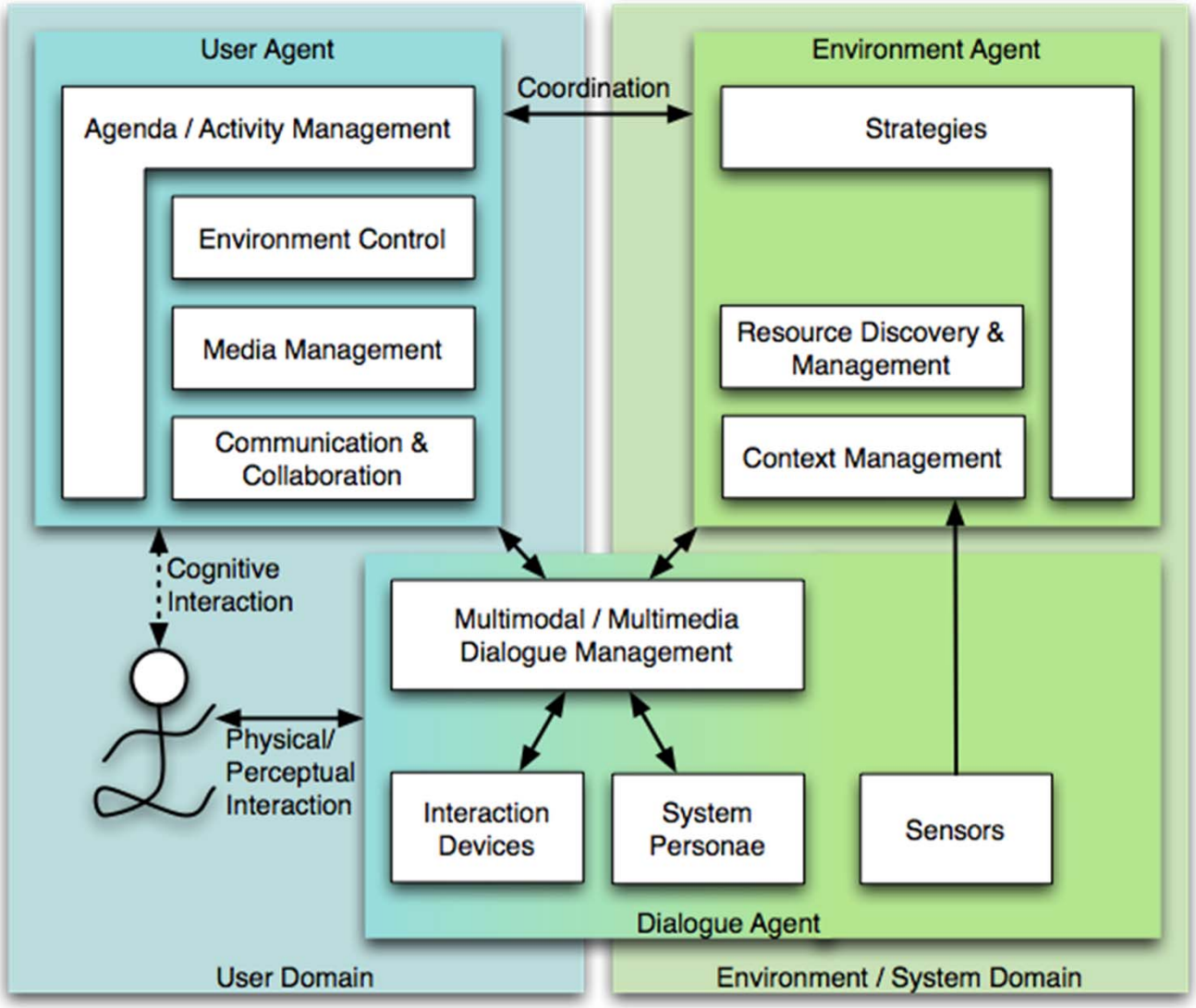


HEI: Human Environment Interaction (3)

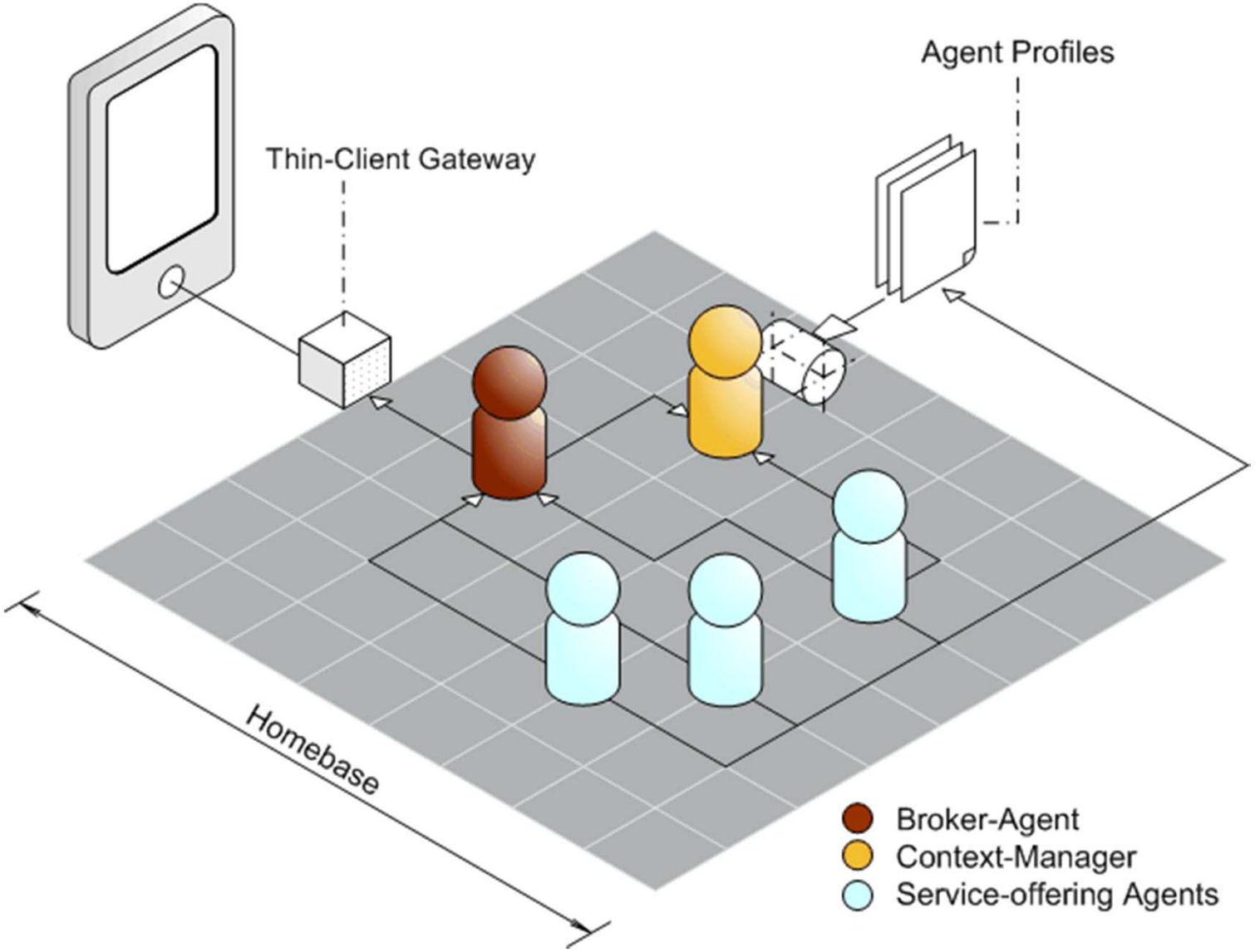


- Interdependency between “Presence” and “Awareness”
- Human is not the operator of the environment
- Human is served by the environment

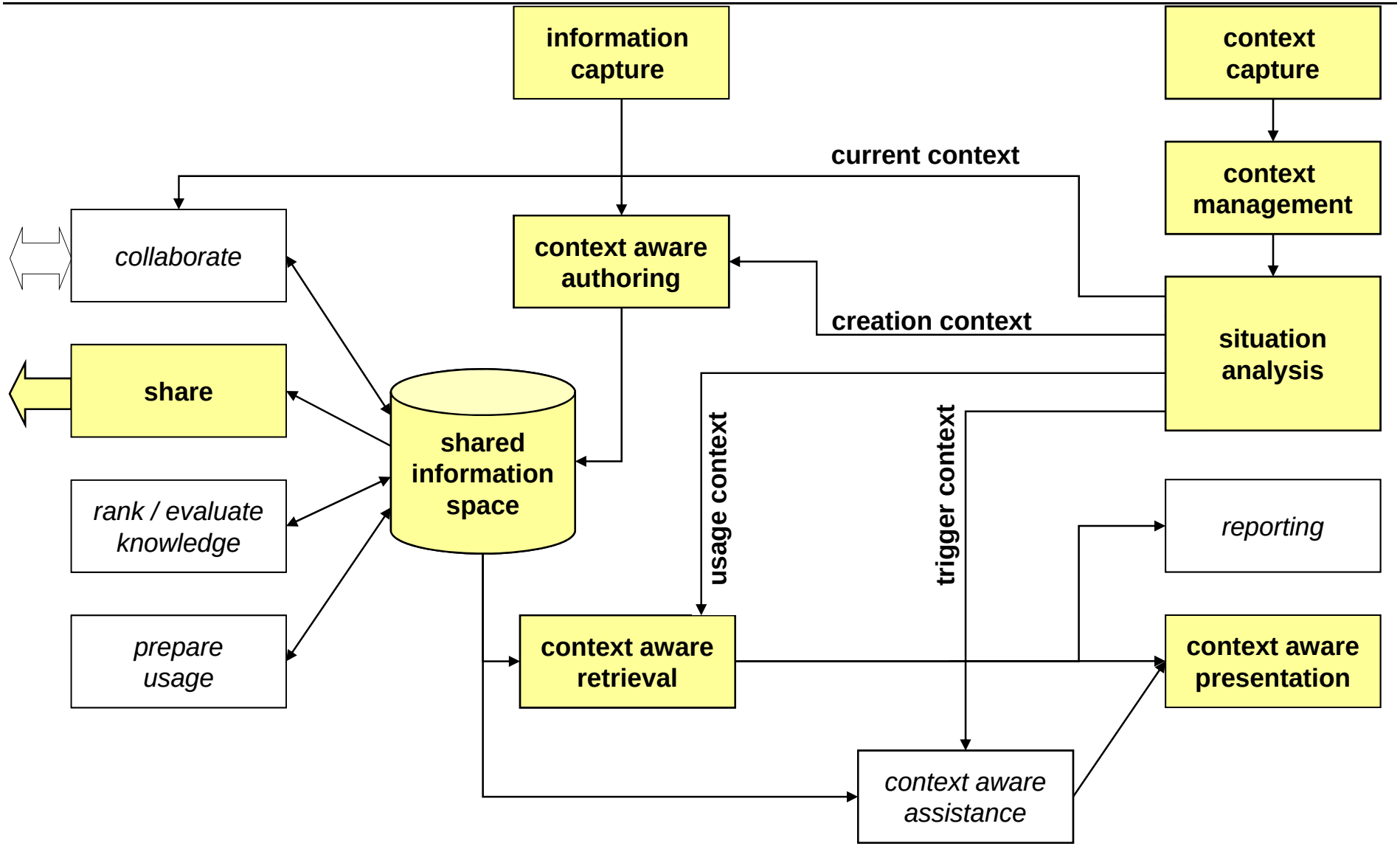
HEI: Human Environment Interaction (4)



HEI: The Key Concept



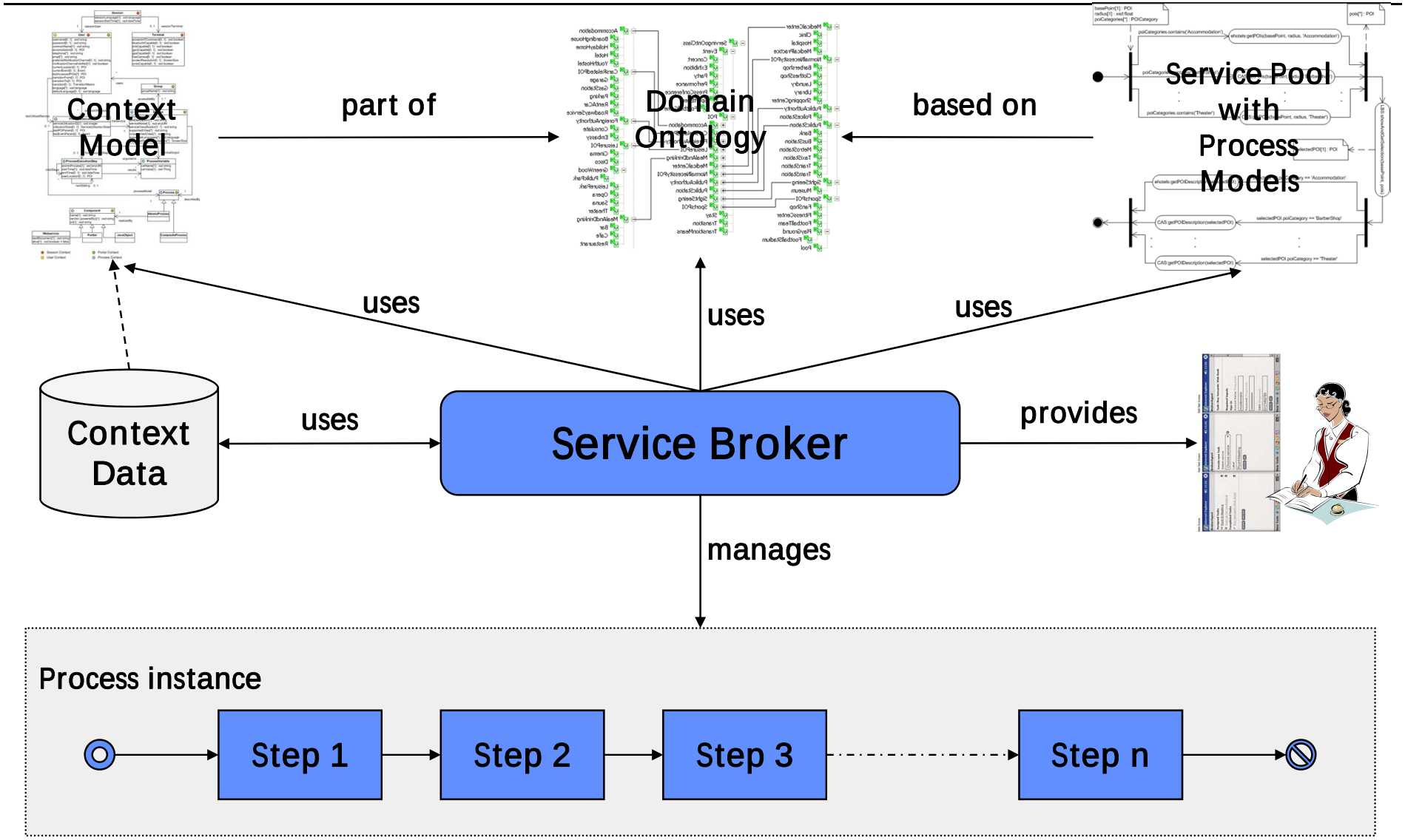
HEI: Context Aware Information Processing



HEI: Early Prototypes (Examples)

- Mobile information and knowledge handling by extending knowledge management to support authoring, sharing, retrieval, and visualization processes in mobile work.
- Added value by just-in-time mobile assistance, facilities to speed up the workflow of spatially distributed business processes

HEI: Service Brokering



HEI: Early Prototypes (Servingo)

Platform for mobile Services during soccer World Championship 2006

- Information, communication, orientation and individual experiences around the World Championship 2006
- Multi-lingual services

Beyond Technology HEI Requires:

Interdisciplinarity

- Integration of many different technologies
- Integration of non-technological disciplines (psychology, social science)

Multiculturality

- Applicability across cultures and specialization towards the specific originalities of individual cultures

Interoperability

- Between components developed by different companies in different nations
- Based on a common reference model and a shared vision

HEI Research Issues

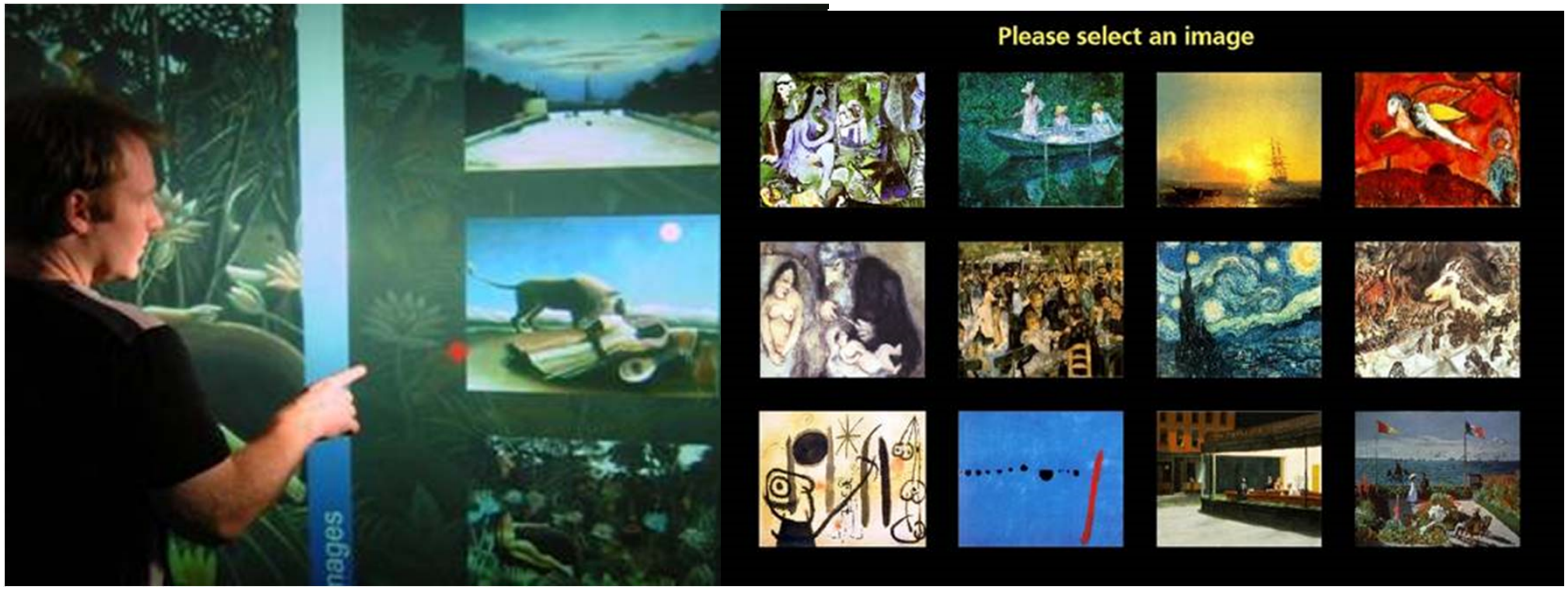
HEI: Some Research Issues

- New Interaction Tools
- Tracking (indoor, outdoor)
- Natural Dialogues
- ...

New Interaction Tools: The Interactive Screen (1)

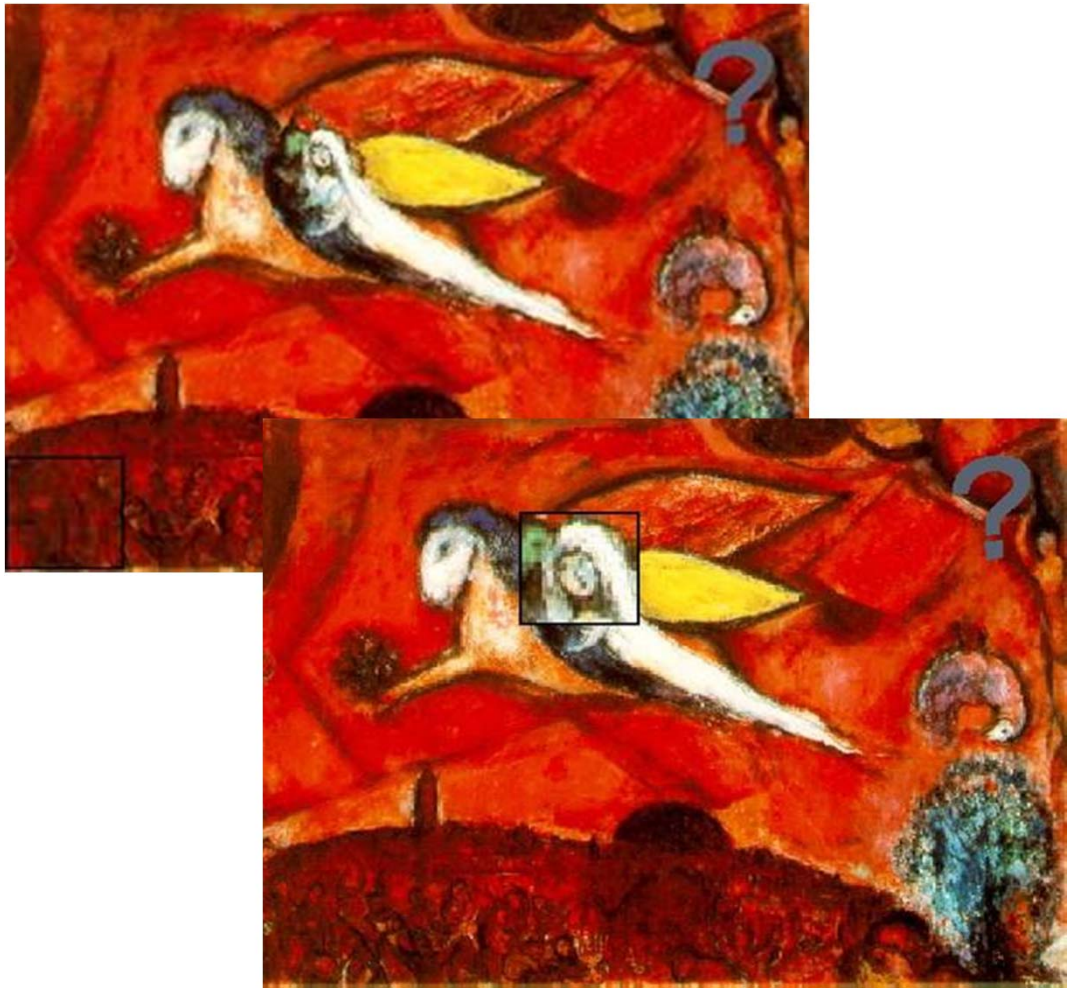
Multiple interaction tools

- Laser pointer
- Magnifying glass
- Flash light



New Interaction Tools: The Interactive Screen (2)

New Interaction Tools: The Interactive Screen (3)



New Interaction Tools: Tracking

Feature based Tracking

Starting Point:

- 3D geometry model
- Reference images

Different approaches

- Tracking of edges
- Feature matching
- Patches

New Interaction Tools: Tracking

Feature based Tracking

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New Interaction Tools: Natural Dialogues

Guided operation in a natural dialog

Guided operation by …

- Narrative environments
- Interactive storytelling

Natural dialog

- Conversational user interfaces
- Dialogs
- Human models, „Virtual characters“
  - Realistic appearance
  - Mimic and gestures

New Interaction Tools: Natural Dialogues

World Heritage Site:
Cavity Messel

- Largest Mammal Fossils Site in Europe
- 2007: New Information Center
- Adoption of new Technology (AR) for the presentation of the information
  - Topic: “The Genesis of the Maar”

Application Scenarios

- User support in specific application domains (AmI Lab)
- Sports
- Medicine
- Edutainment
- Games
- “Serious” Games
- ...


AmI Lab
Explore

AmI Lab (1)

Living assistance systems specialized on the assistance of people with special needs (esp. elderly) in daily life activities within their homes

Goals:

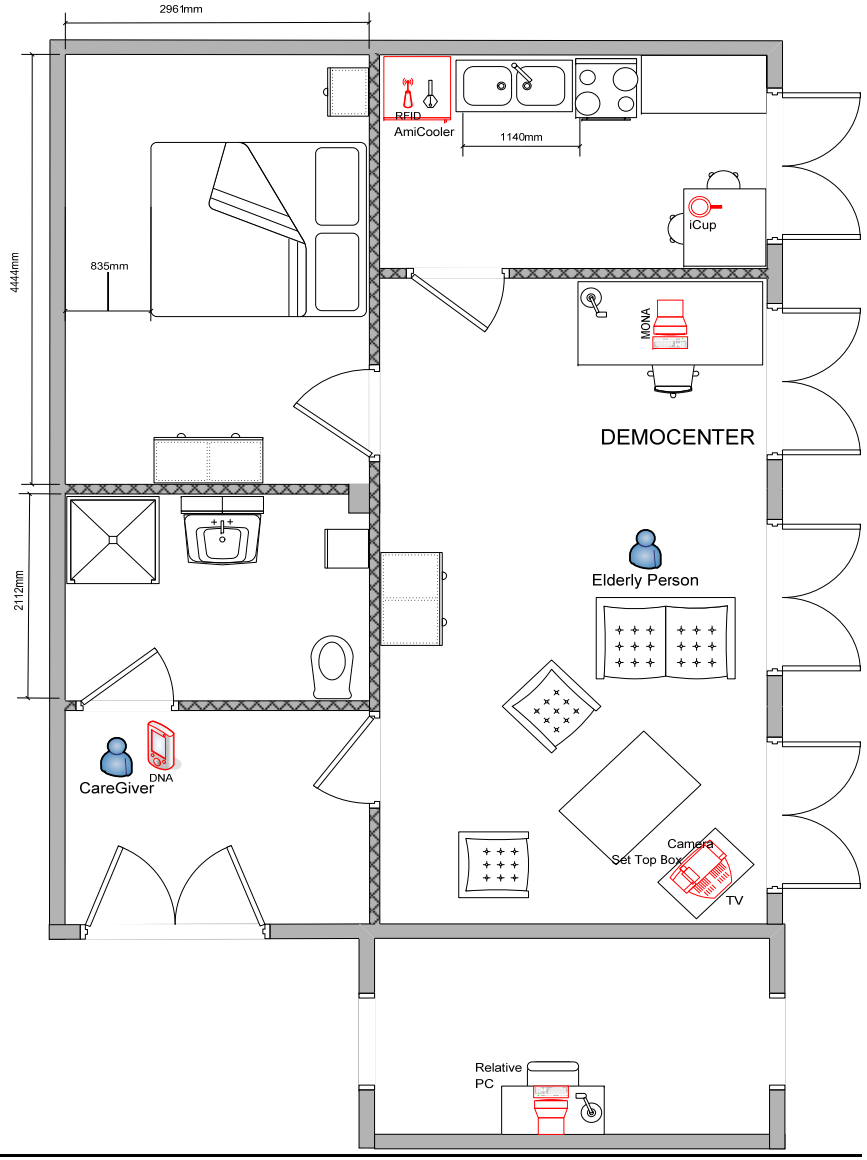
- Allow a self conducted life of elderly people as long as possible
  - ↳ increased quality of life
- Minimize the need for external assistance by doctors, nurses and social care services
  - ↳ Reduce care costs for the elderly people and the public

An additional year at home would already be a considerable benefit!

AmI Lab (2)

Assisted Living Lab

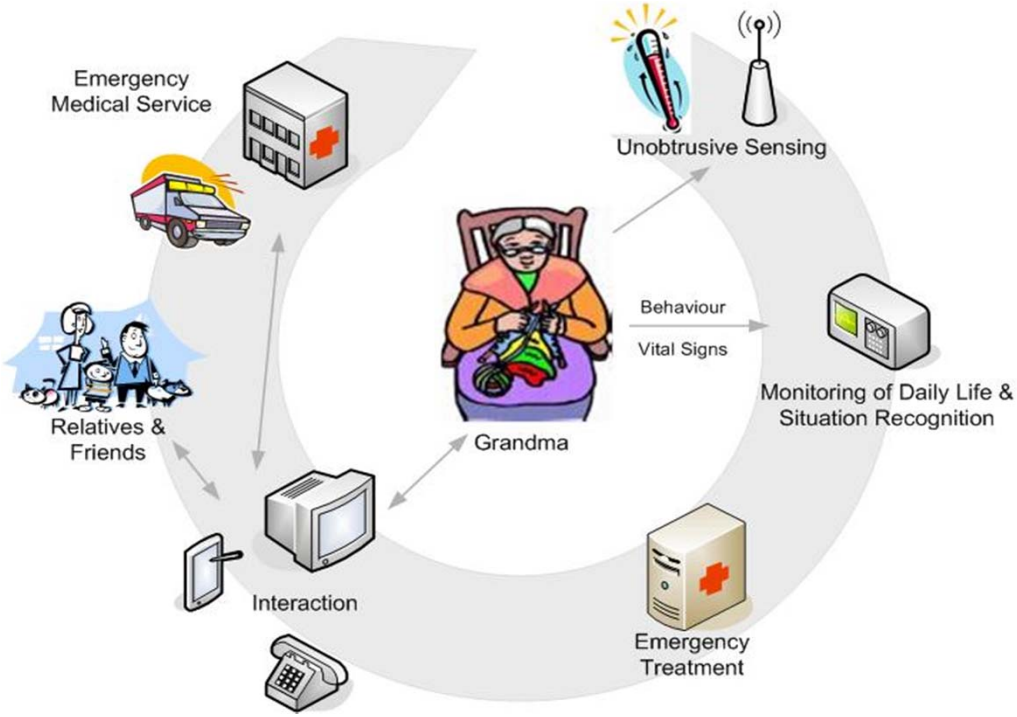
- currently planned to build up at IGD
- focused home care systems
- integrates AmI solutions
  from different providers
- contribution to FhG
  health assistance demonstrator
- provides measuring
  and simulation facilities
- opportunity to test solutions in
  external facilities exist

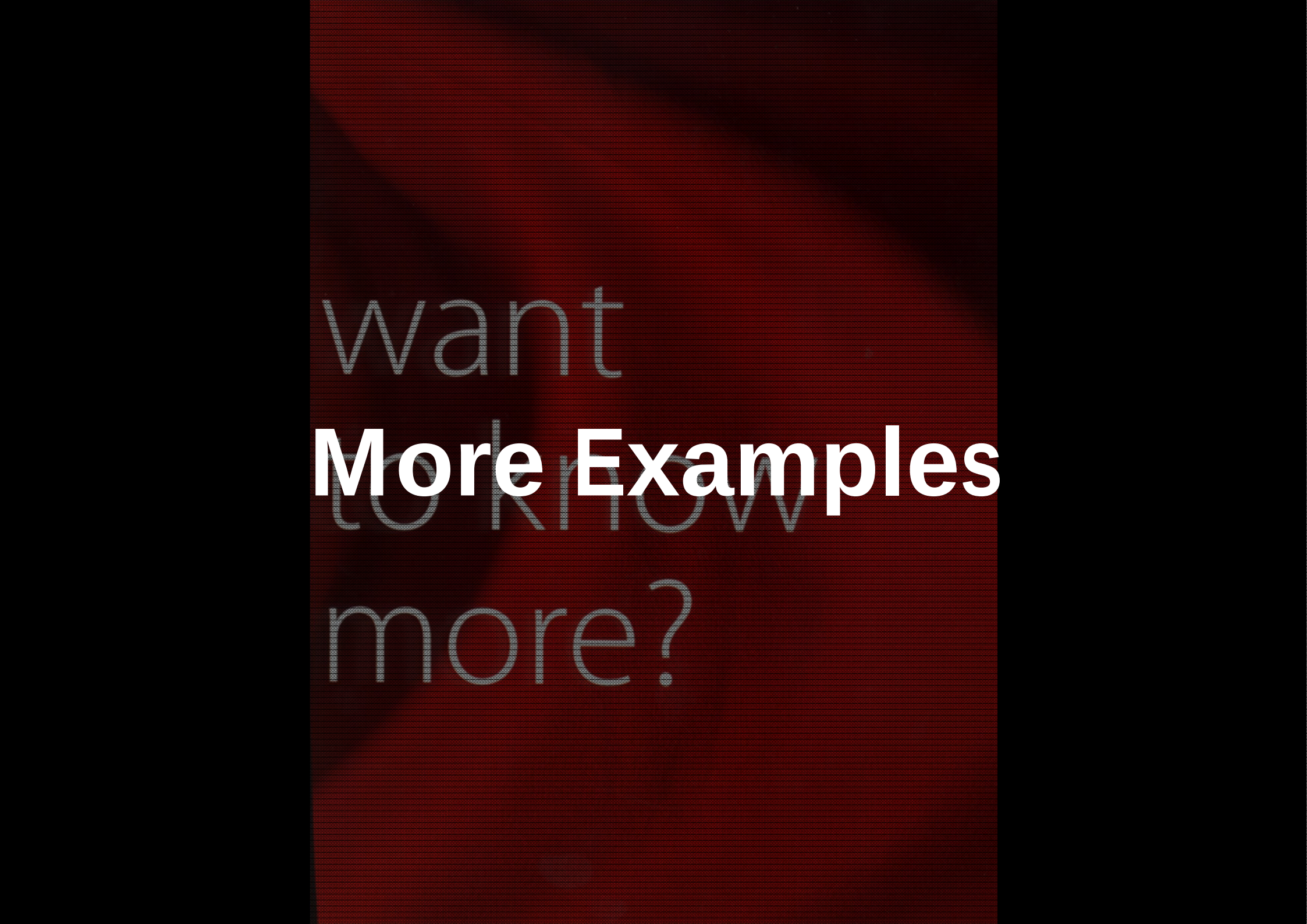


AmI Lab (3)

AmI solutions developed by IGD

- Vital-Data tracking
- Location Tracking
- Activity Tracking
- Sensor fusion, situation detection, history building, reasoning about emergency situations
- AmI Service platform
- Ambient Interaction with person and relatives (e.g. assisted video telephony)
- Involvement of caregivers and emergency medical service providers





More Examples

More Examples (1)

- Dialogue-based Storytelling Platform
- Development of Guardi-Story for art gallery in Vienna (real showcase, exhibition)
- „Mobile“ demo for exhibitions, trade fairs

More Examples (2)

- Projection screen acted as mirror of the real world
- Virtual 3D-Avatar was integrated in the „mirror“
- People could interact with the avatar
- The user experienced a mixed reality installation

More Examples (3)

- Individual tempo of music for sports (e.g. jogging)
- Training programs with sensor technology (pulse, blood pressure, skin resistance, etc.)
- Health care
  Personal Mobile Trainer
- Motivating interface

Summary

Get the spirit of tomorrow

Summary (1)

- Paradigm shift from HCI/HHI to HEI
- Enabling technologies
  - Presence
  - Awareness
- Key interaction concepts
  - Context aware information processing
  - Service brokering

Summary (2)

- Beyond technology
  - Interdisciplinarity
  - Multiculturality and Multilinguality
  - Interoperability
- HEI – some research issues
  - The Interactive Screen
  - Tracking
  - Natural Dialogue

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William Gibson (born 1948)

Thank you for your kind attention!