

# MOBILWARE 2009

Berlin, Germany April 28-29, 2009

UCPA '09 First International Workshop on User-Centric Pervasive Adaptation

April 27, 2009



PerAda  
*towards pervasive adaptation*



# UCPA Programme

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09:0 - 09:30 Welcome and keynote, Jennifer Willies, Nikola Šerbedžija

## **Session 1: Applications of user-centric pervasive Adaptation**

09:30 - 9:50 Pervasive Adaptation in Car Crowds, *Alois Ferscha and Andreas Riener*

9:50 - 10:10 Utilization Possibilities of Area Definition in User Space for User-Centric Pervasive-Adaptive Systems, *Ondrej Krejcar*

10:10 - 10:30 Discussion

## **10:30 - 11:00 Coffee break**

## **Session 2: Middleware for pervasive adaptive systems**

11:00 - 11:20 A Reflective Goal-based System for Context-aware Adaptation, *Dejian Meng and Stefan Poslad*

11:20 - 11:40 Developing user-centric applications with H-Omega, *Clement Escoffier, Jonathan Bardin, Johann Bourcier and Philippe Lalanda*

11:40 - 12:0 A Component-Based Approach for Realizing User-Centric Adaptive Systems, *Andreas Schroeder, Moritz Hammer, Gilbert Beyer and Christian Kroiss*

12:00 - 12:30 Discussion and Conclusion

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# UCPA '09 First International Workshop on User-Centric Pervasive Adaptation

## ***Pervasive Adaptive Systems: User Friendly vs. User Centric Input-Process-Output vs. Sense-Analyze-React***

Nikola Šerbedžija, Fraunhofer FIRST, Berlin



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# Motivation

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## Applications of user-centric pervasive adaptation

### Man-machine interface

- Who is serving whom?

### Modern technology and society

- An elephant in the china shop!

### Motivation for smart products is huge

- Oversimplification!
- Ethical concerns!

# Motivation (cont.)

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## Middleware for pervasive adaptive systems

### **Distributed and parallel**

- Middleware

### **Event driven**

- Reactive/adaptive/goal-based

### **Self-organization**

- Dynamic
- Flexible

### **Software Engineering**

- Services
- Components
- Design patterns

# Sensuous Applications

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Come and see our Exhibition



## Co-drive Vehicle

- A co-driver observes the driver carefully, watches out for obstacles, provides for a lively atmosphere on longer trips ...
- You are alone – a vehicle plays the co-driver role ...



## Mood player

- Music and lighting/illumination have significant influence on our emotional state ...
- You come home, you are alone and not in your best mood ....



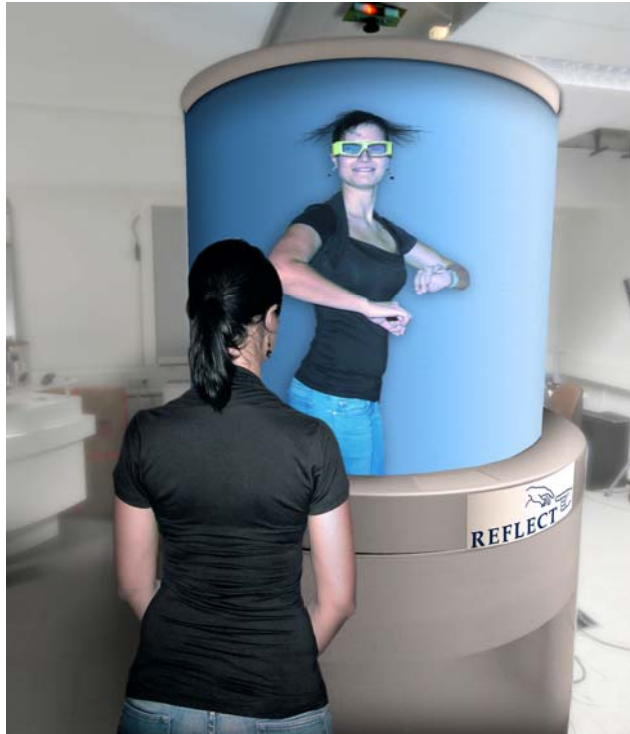
## Awareness-rich Displays

- Advertising at TV is easy – you know who is watching and you can specifically target the audience: young, old, male/female...
- Your display is at the street – would be good to know who is watching, how they react ...

# Sensuous Applications (cont.)

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## Reflective display



Reflective vehicle

standard



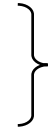
reflective



# REFLECT Fact Sheet

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- 1. Context-aware software infrastructure
- 2. Adaptive software components



reflective software

- 3. Pervasive adaptive emotional interaction
- 4. Pervasive adaptive cognitive interaction
- 5. Pervasive adaptive physical interaction



reflective computing

- 6. Pervasive adaptive vehicle demonstrator and case studies



reflective application



**reflective assistant**

2008 – 2009 - 2010



# What you feel is what you get!

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The reflective systems should:

- understand our feelings
- guess our intentions
- mind our physical condition

in order to determine/diagnose the “personal image” and exercise its influence to re-enforce positive feelings or mental/physical ease by

- assisting in achieving specific goals
- comforting us

featuring:

- natural, seamless and non-explicit interfaces
- ubiquitous assistance independent of devices and platforms

# Reflective Approach

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- Automated capture of experiences
- Context-aware and context sensitive interactions
- Natural and implicit interfaces
- Omnipresent and generic services

## Multi-ontology approach

senses

constructs

situation



EKG—  
Heart rate



Respiration —  
Breathing rate



EEG — Brain  
waves



EMG — Muscle  
tension



Camera



Micro-  
phone



Music  
box



Disp-  
lays



Home



Vehicle

# Reflective Framework: Spinning the Senses

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## Tangible layer:

controls sensor and actuator devices.

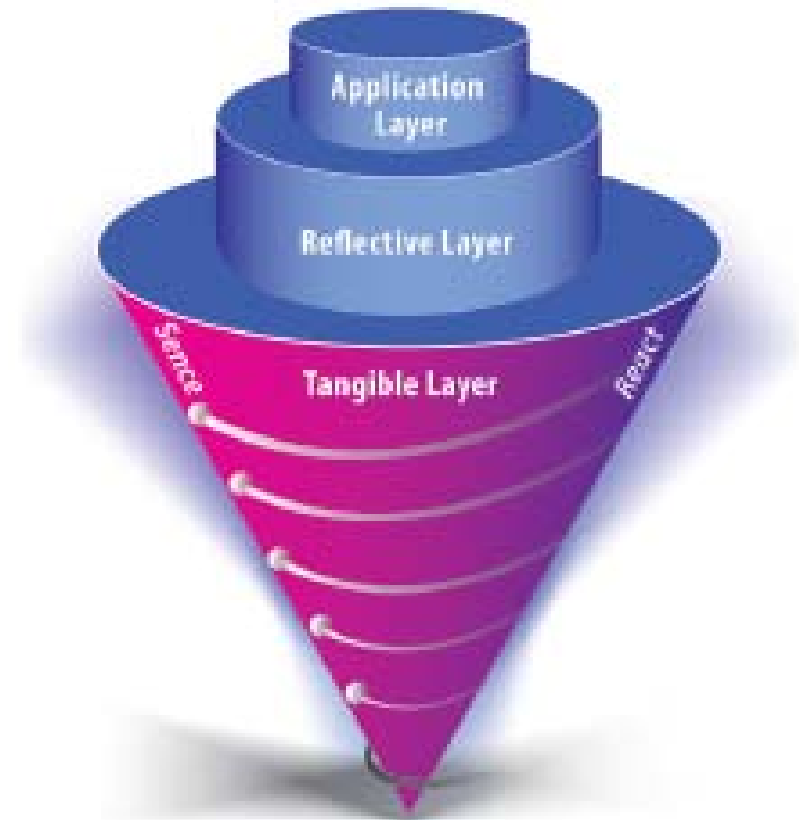
## Reflective layer:

combines the atomic services and evaluates the user's emotional, cognitive and physical constructs and proposes iterative system (re-) reaction.

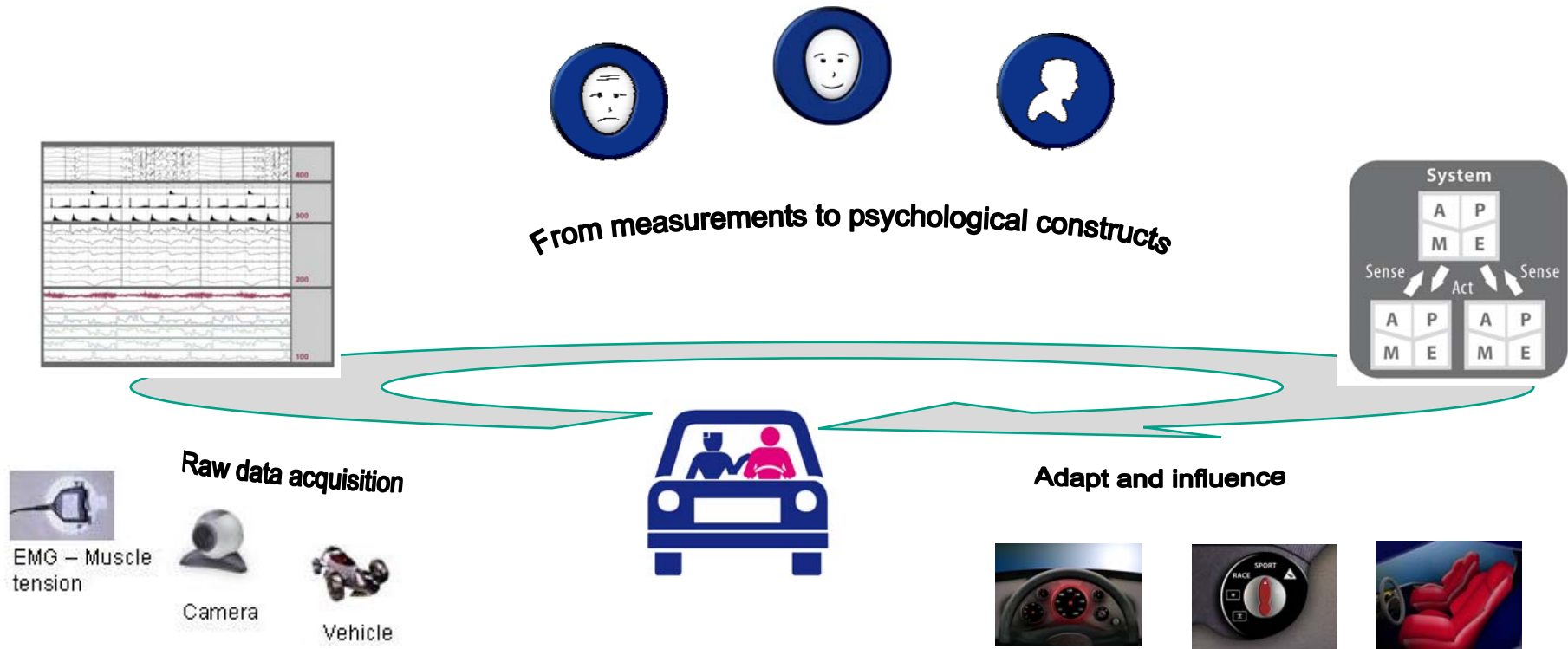
## Application layer:

presents applications scenario, takes the user profile and combines low- and high-level components from other layers to run and control the whole system.

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# Bio-cybernetic Loop



# Discussion

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## *User-centric Challenges:*

Is biocybernetic adaptation a threat to user autonomy? Why not let the user decide when a task is too difficult to do?

## *Pervasive Adaptive Software Challenges*

Do we need a new computing paradigm?

( is **sense-analyze-react** the same as **input-process-output**?)

## *Ethical Challenges*

Can we develop sensuous application and still preserve privacy?