Issues in Emotion-oriented Computing

Towards a shared understanding

Marc Schröder & Roddy Cowie

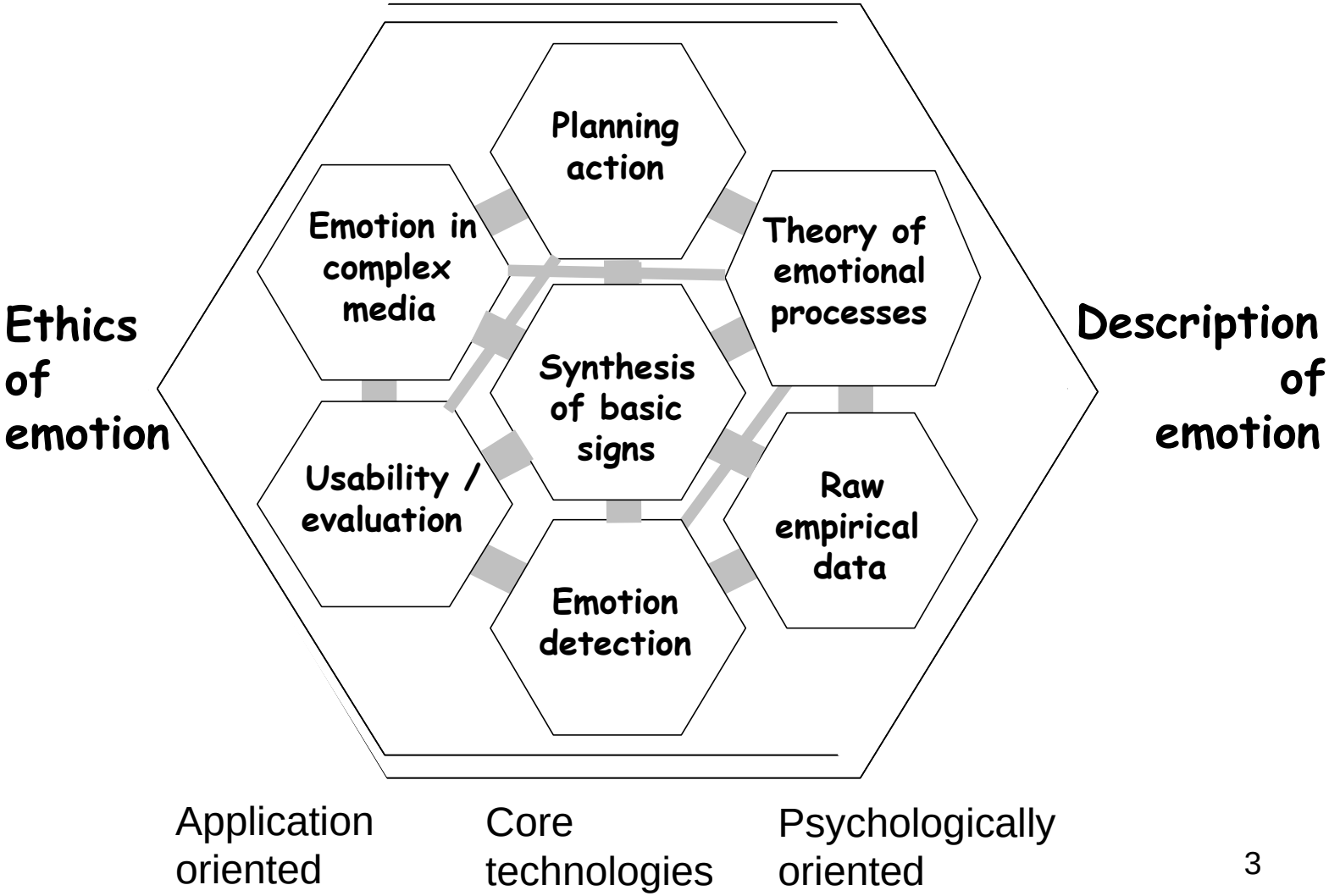
humaine

http://emotion-research.net

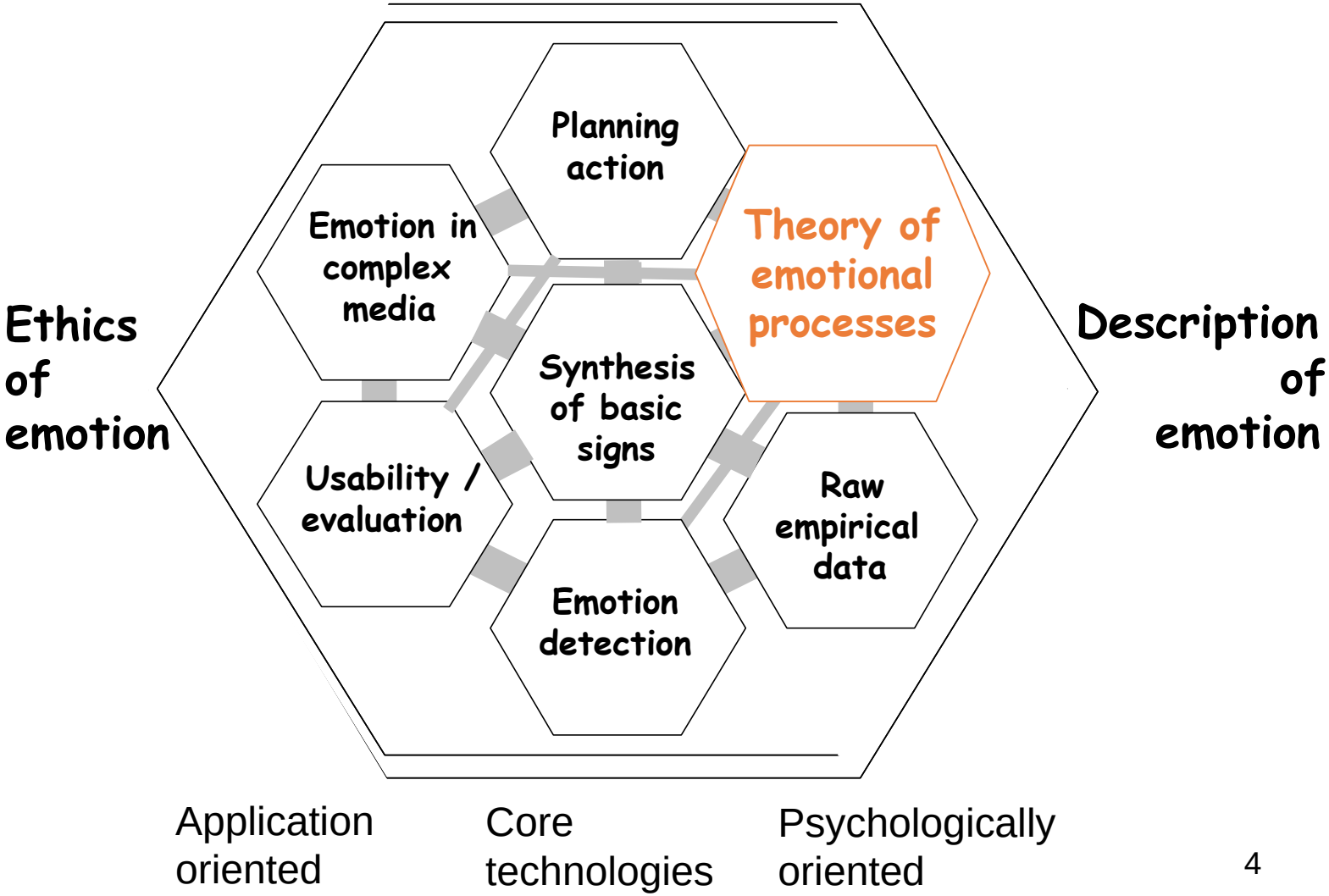
HUman-MAchine Interaction Network on Emotions

- EU network of excellence 2004-2007
- scientific and technological groundwork for emotion-oriented computing
  - interdisciplinary understanding
  - principled approaches

Sub-areas in Emotion-oriented Computing



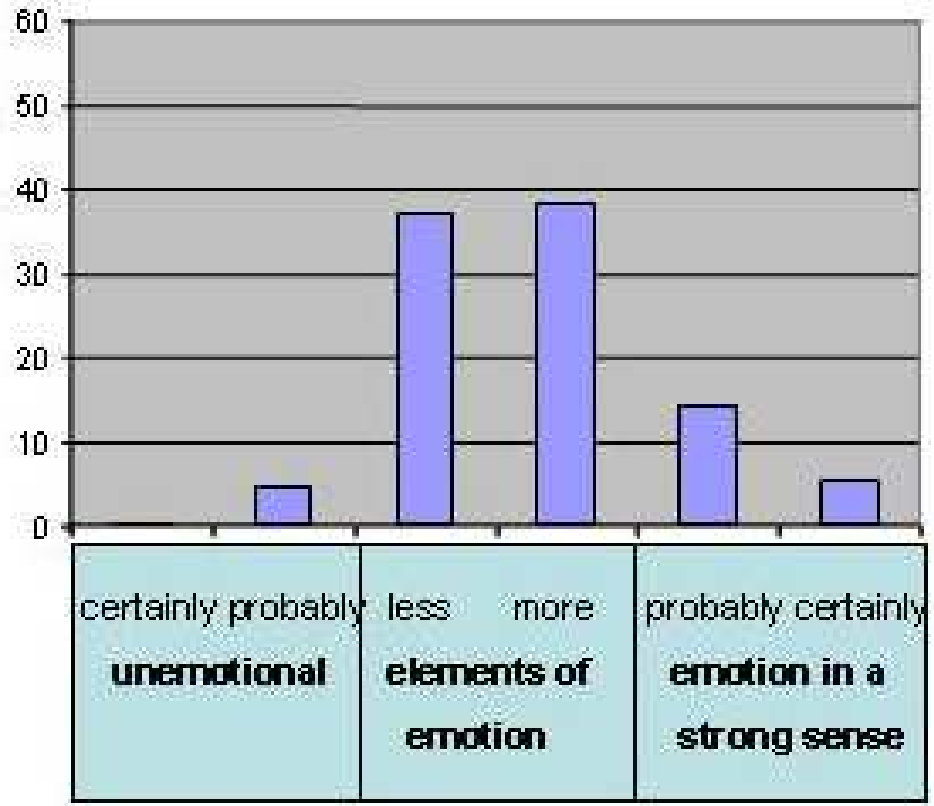
Sub-areas in Emotion-oriented Computing



Theory of Emotional Processes

- what to study: states that are relevant to emotion-oriented computing
- terminological clarification: clear definition of “emotions”, “moods”, …
- practically useful methods for describing emotional states

“Less than 10% of human life is truly unemotional”



Cowie et al., QUB:

- reality TV show “Cast away”
- ratings of unedited tapes
  - truly unemotional episodes are rare
  - emotion in the strong sense is rare
- need concepts to describe the ~80% “elements of emotion”

Aspects of “emotional life”

Cowie, O’Neill et al., QUB

- emergent emotion (full-blown)
- emergent emotion (suppressed)
- mood
- partial emotion (topic shifting)
- partial emotion (simmering)
- attitude
- established emotion
- interpersonal stances
- altered states of arousal/control/seriousness

Aspec

Cowie, C

- eme
- eme
- moo
- partial emotion (topic shifting)
- partial emotion (simmering)
- attitude
- established emotion
- interpersonal stances
- altered states of arousal/control/seriousness

Definition
This refers to states between a mood and an emergent emotion, where a person is in a single kind of emotional state, but it is not fixed on a single thing or issue – instead the emotion attaches to one object, then another, then another, in quite rapid succession.

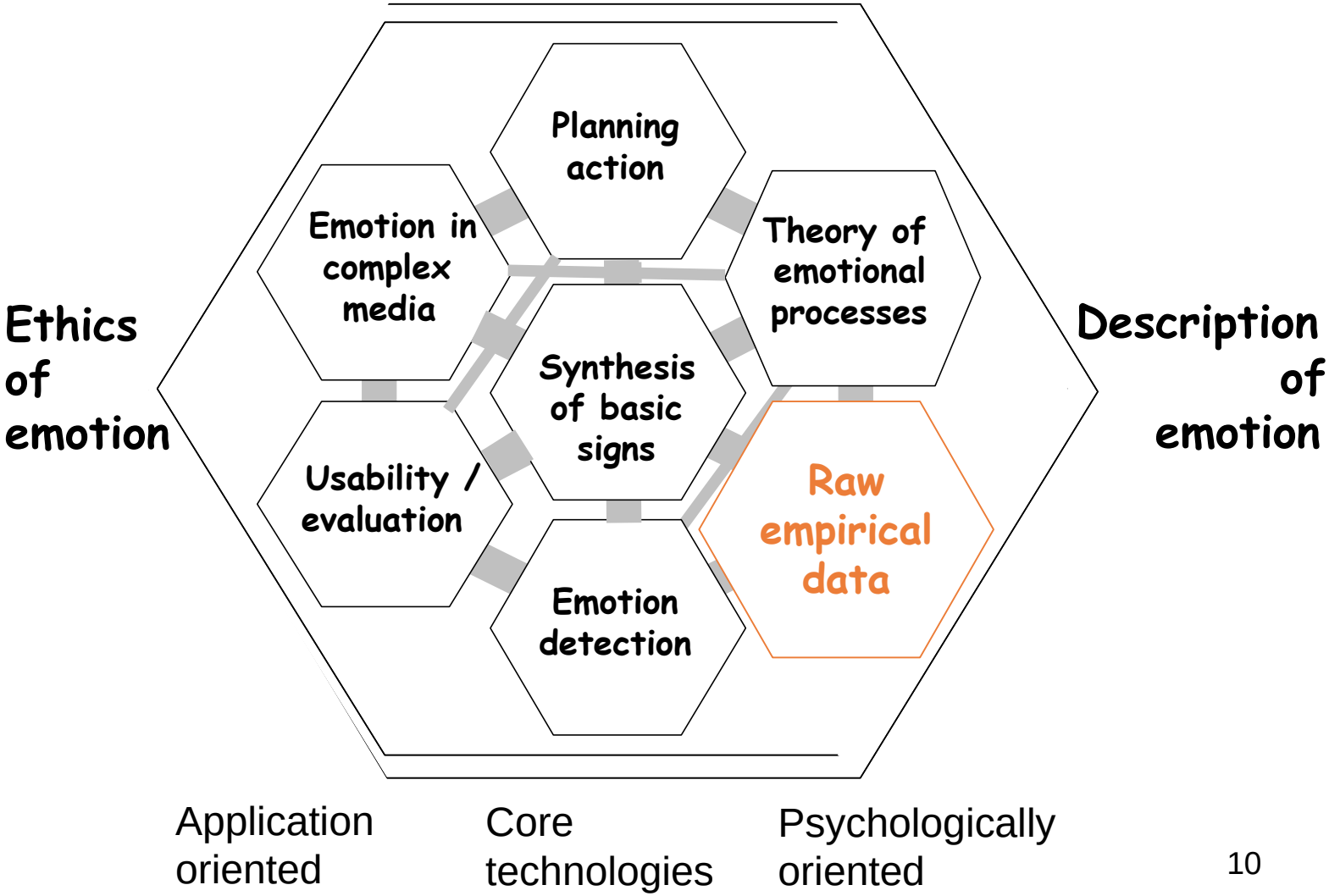
Example
"Angry and tired from previous day. Getting annoyed when styling hair because it wouldn't stay. Angry at dog trying to get out, and things at work."

Labels for “emotional life”

Negative & forceful Anger Annoyance Contempt Disgust Irritation
Negative & not in control Anxiety Embarrassment Fear Helplessness Powerlessness Worry
Negative thoughts Doubt Envy Frustration Guilt Shame
Negative & passive Boredom Despair Disappointment Hurt Sadness
Agitation Shock Stress Tension
Positive & lively Amusement Delight Elation Excitement Happiness Joy Pleasure
Caring Affection Empathy Friendliness Love
Positive thoughts Courage Hope Pride Satisfaction Trust
Quiet positive Calm Content Relaxed Relieved Serene
Reactive Interest Politeness Surprise

Cox et al.: List consolidated from Geneva, LIMSI, Belfast sources

Sub-areas in Emotion-oriented Computing



Emotions in Empirical Data

Acted

Induced

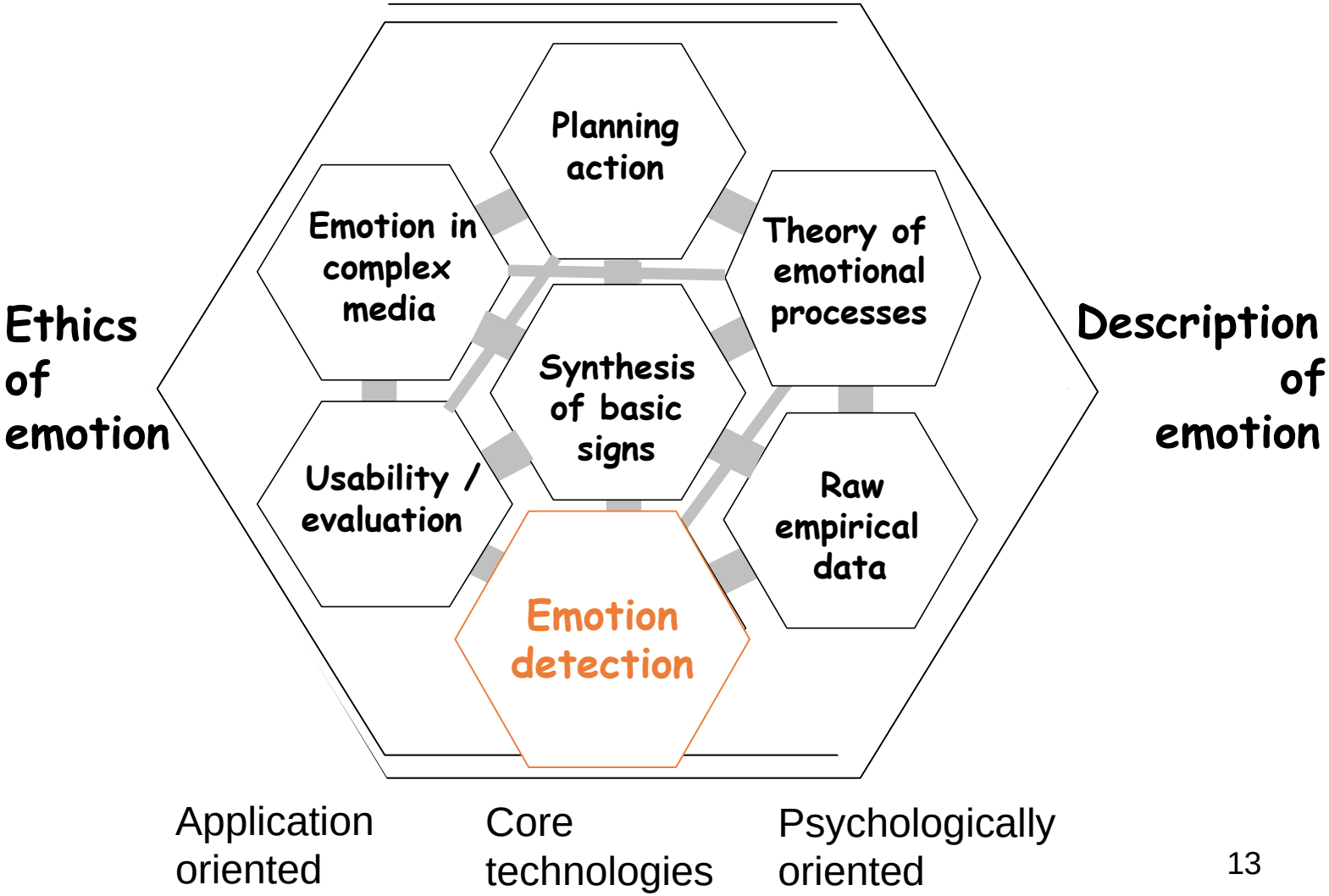
TV interviews

In action

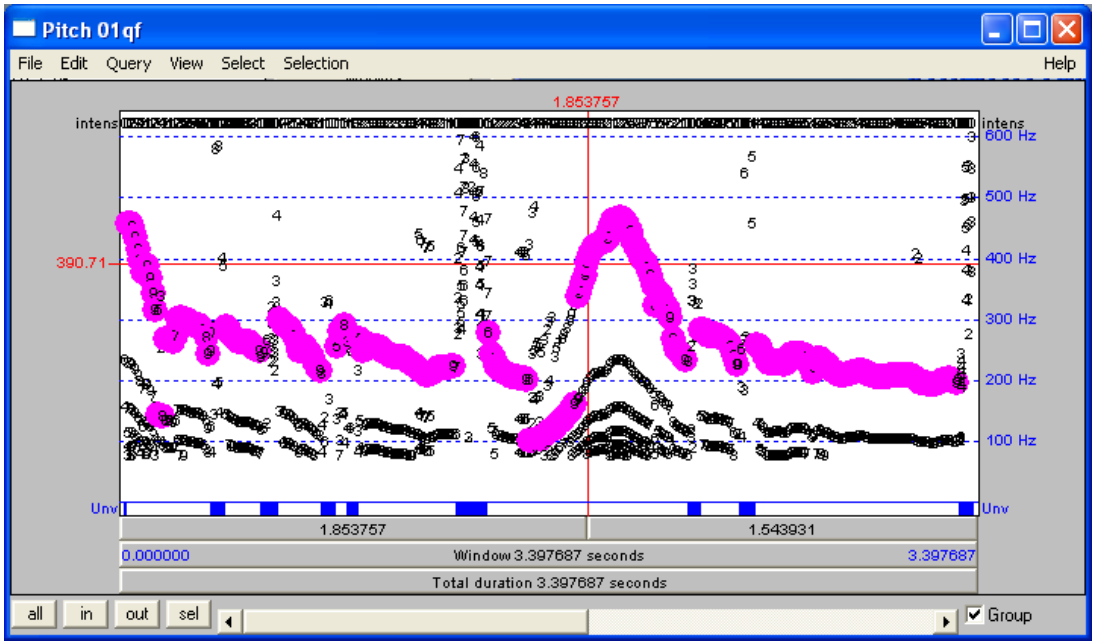
Emotions in Empirical Data

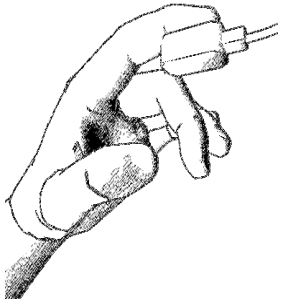
- “supportive” data
  - to fill in gaps in theory
- “provocative” data
  - to challenge preconceptions
- develop suitable labelling schemes

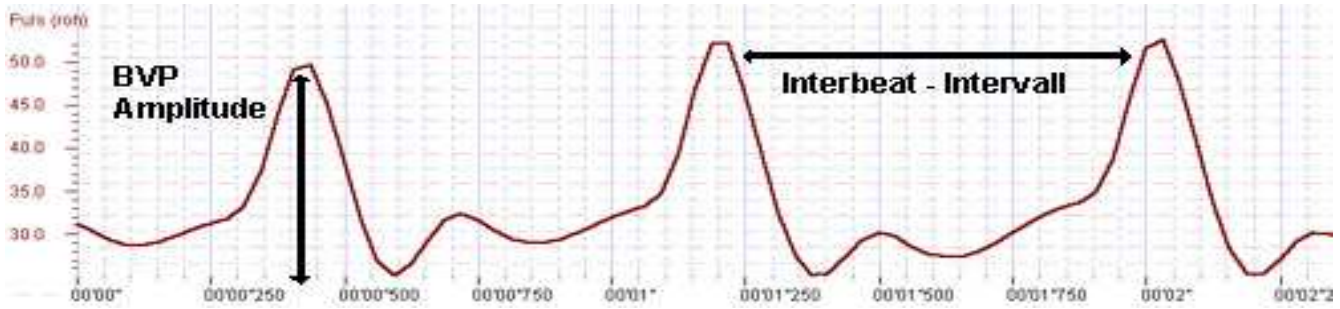
Sub-areas in Emotion-oriented Computing



Emotion Detection: Multimodal Features



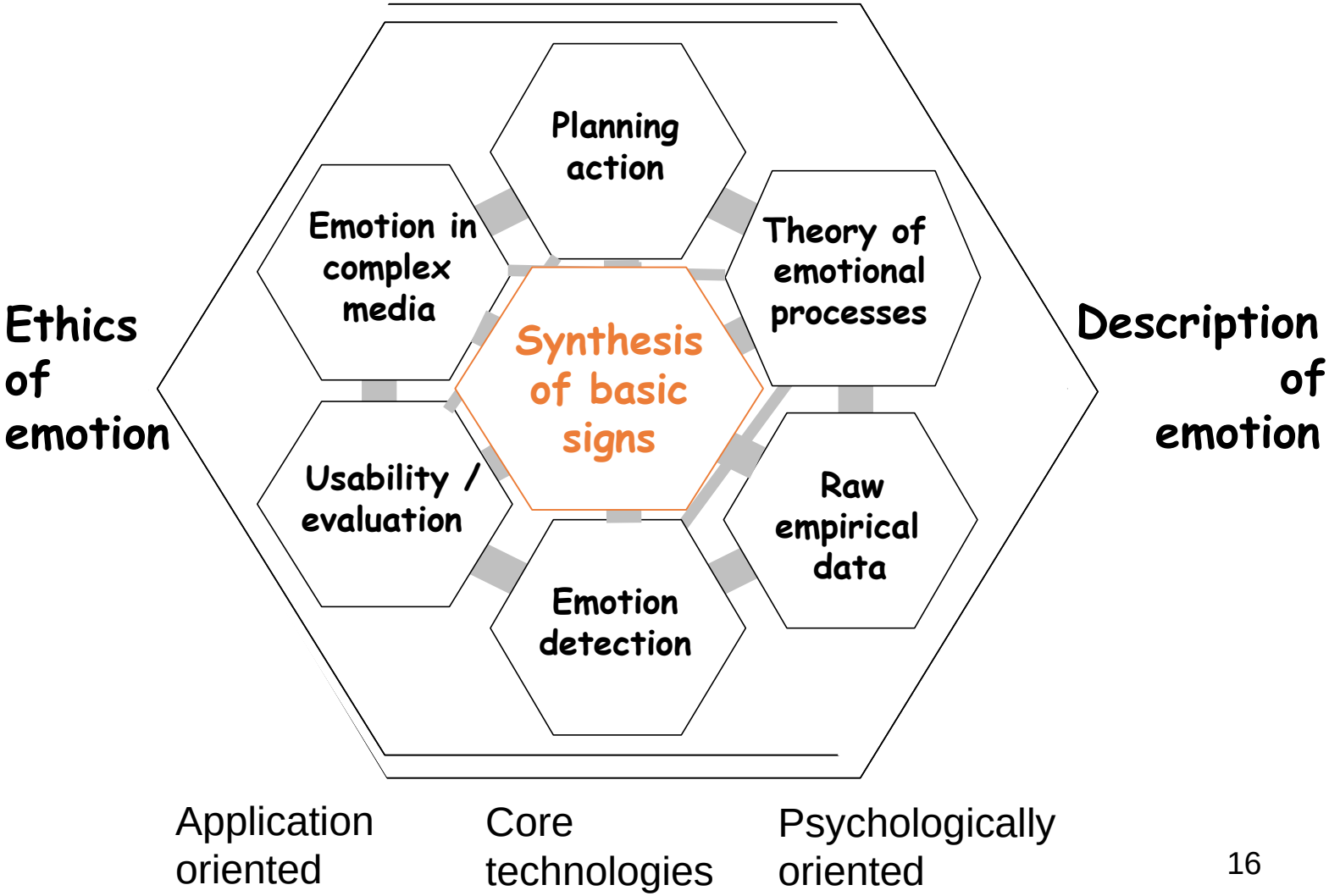




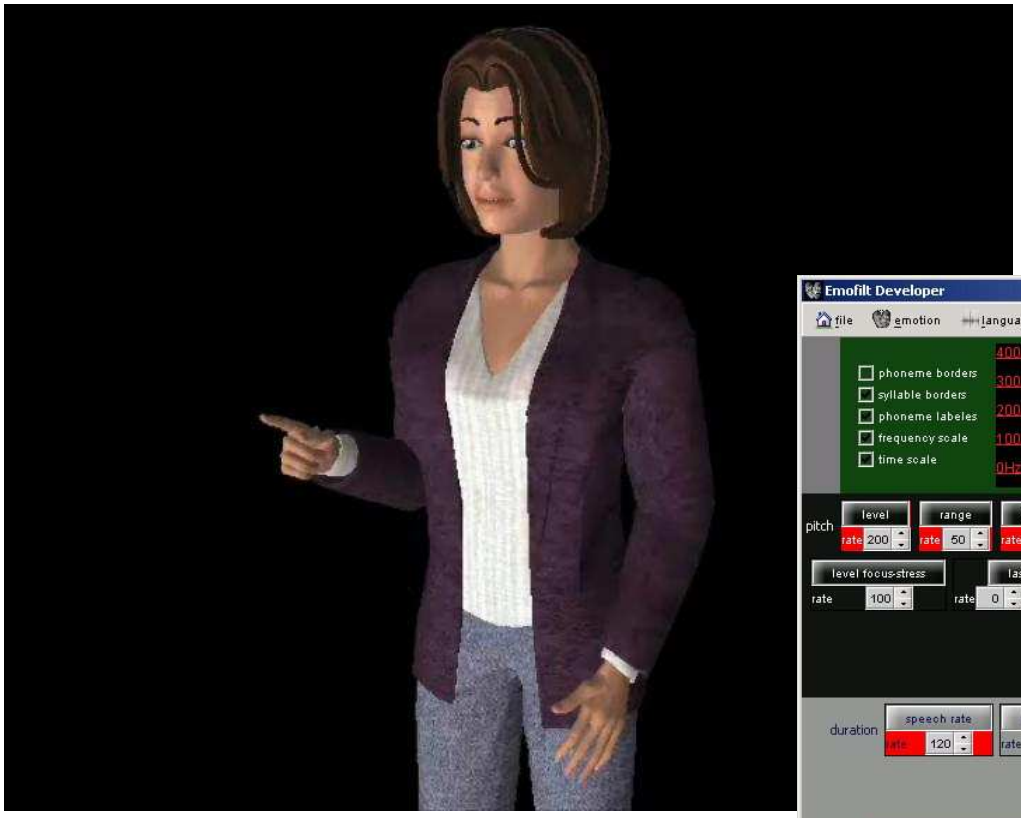
Emotion Detection: Selected Challenges

- Integration of modalities
  - different time scales for analysis
    - face = still pictures
    - voice = discrete chunks on time scale
    - physiology = slow, continuous variation over time
- Measure of success?
  - same errors as humans?
    - dialogue system
  - more accurate than humans?
    - stress detection

Sub-areas in Emotion-oriented Computing

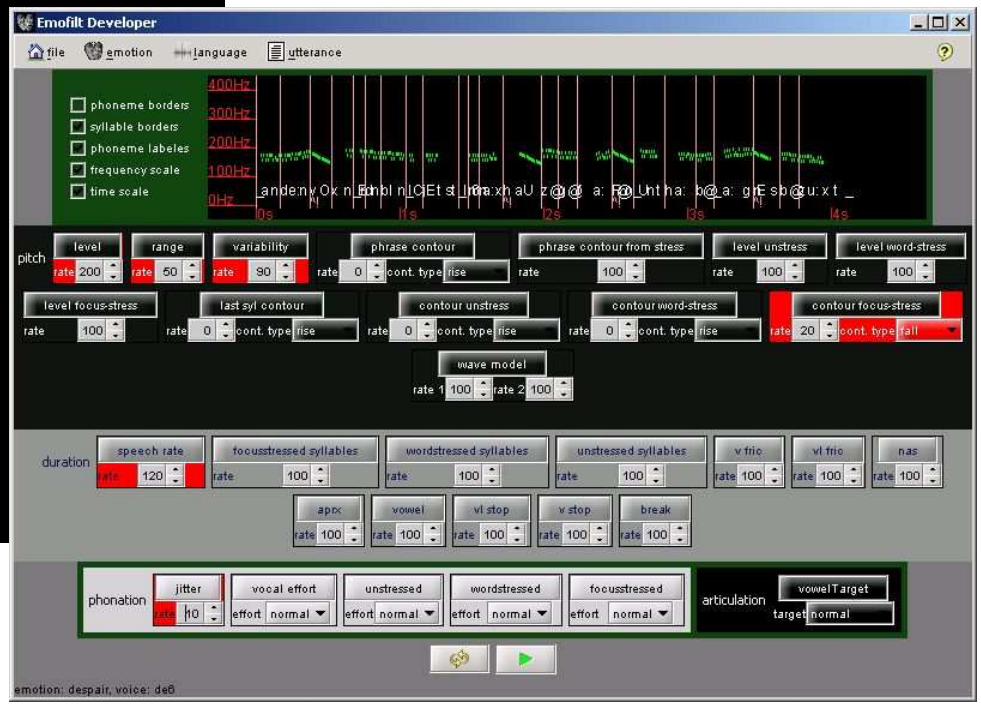


Synthesis of Signs of Emotion: Parametrisable Models of Body, Face and Voice



Greta agent
Pelachaud et al.,
Univ. Paris 8

Emofilt speech synthesis filter
Burkhardt, T-Systems



Synthesis of Signs of Emotion

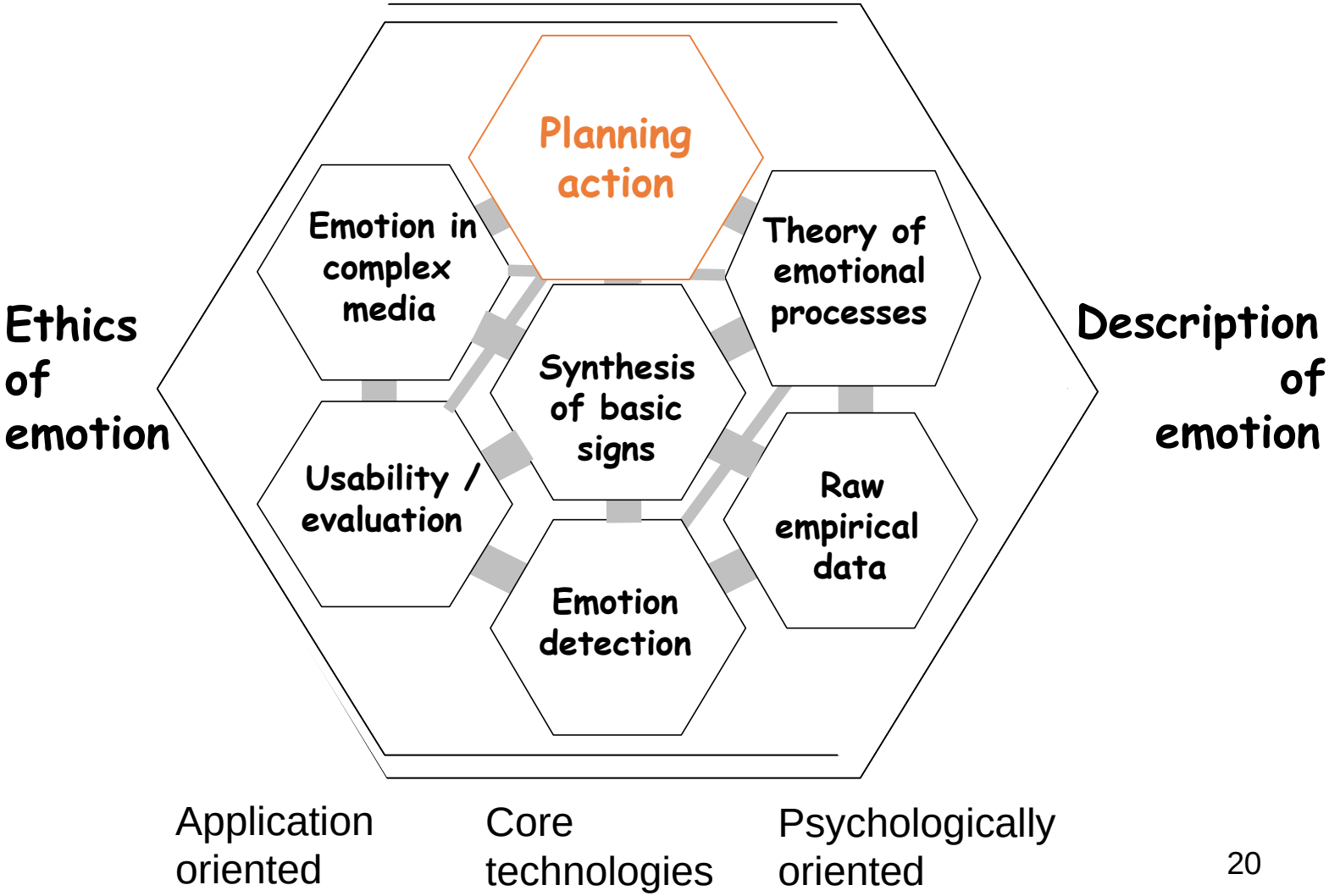
- make embodied conversational agents (ECAs) behave emotional
  - required key capabilities:
    - Coordination of signs in multiple modalities
    - Expressivity
    - Cognitive influences on action (attention model)
    - Creating affective awareness
    - Backchannel & Feedback behaviour
  - specify architecture requirements
  - towards proof-of-concept sub-systems

Attention Modelling for ECAs

- crucial for initiating and maintaining communication
- visual salience
  - contrast, color, …
  - faces
  - emotional expressions

Peters et al., Univ. Paris 8

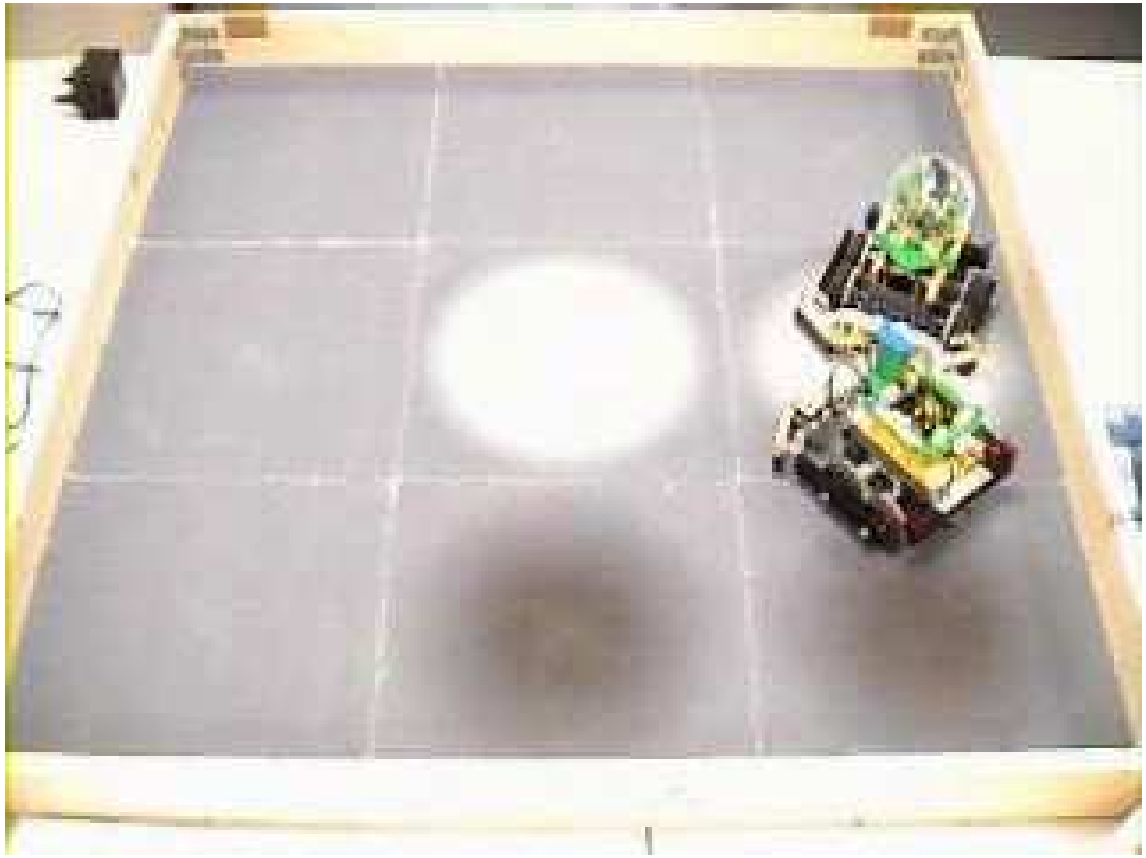
Sub-areas in Emotion-oriented Computing



Emotion in Planning and Action

- conceptual and practical work on cognitive architectures with emotion
  - low-level / sub-symbolic / reactive
  - high-level / symbolic / deliberative
  - hybrid: bridging the gap

Low-level Perception-action Loop: Emergent “aggression”



Cañamero et al., Univ. Hertfordshire

- robots need two resources to survive
- wander around avoiding objects
- blue robot: bumper sensitivity reduced when deficit too large
- resulting behaviour: pushing the other away from resource
- ethological analysis: “aggressive” behaviour

Low-level Perception-action Loop: Imprinting a “desired perception”

K. Lorenz

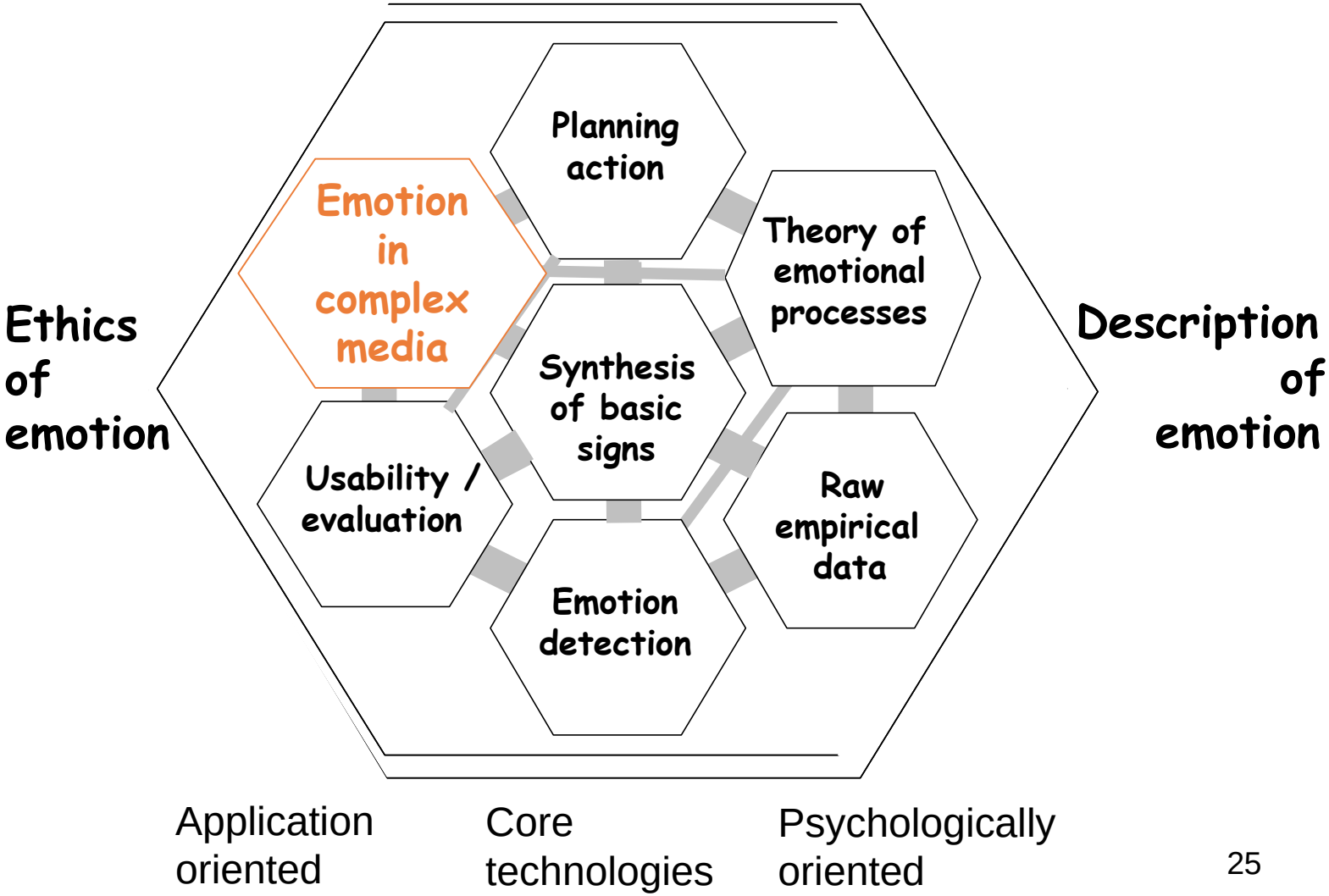
Blanchard & Cañamero, Univ. Hertfordshire

- Imprint visual perception of “optimal” box distance
- Robot will follow box in this distance, goal = re-establish desired perception

High-level: Emotions in BDI models

- Reasoning about emotions
  - *interpret* emotional impact of previous dialogue move
  - *guess* possible emotional impact of next dialogue move
- Based on an appraisal model (e.g., OCC)
  - link events to emotional meaning

Sub-areas in Emotion-oriented Computing



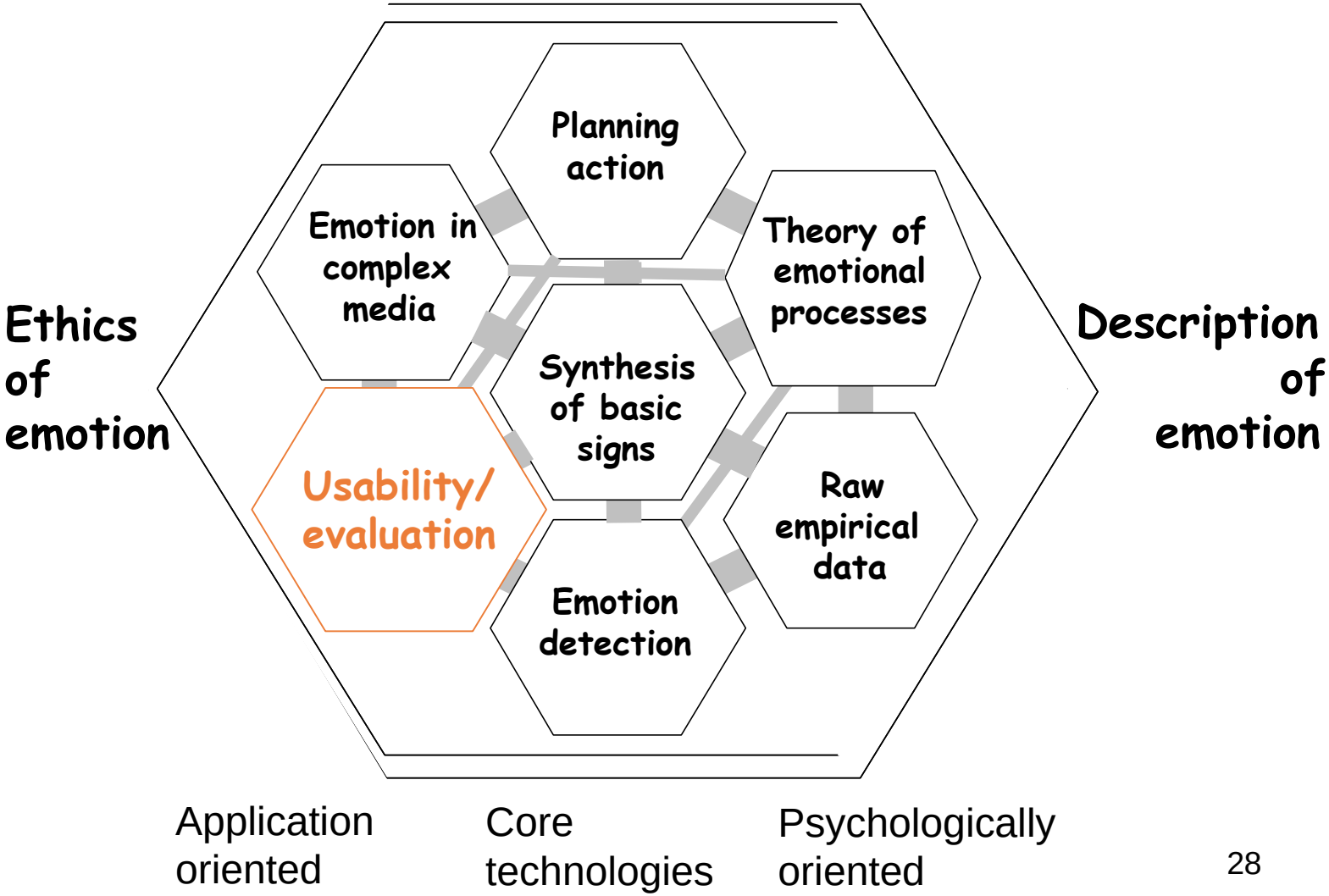
Emotion in Complex Media

- closest to applications
- exploratory work
  - automatic generation of potentially funny slogans
    - playing with semantic ambiguities in language
    - human has to decide which slogans are funny
    - Example: slogan for soft drinks:
      “Thirst come, thirst served!” (Stock et al., itc-IRST)
  - persuasive ECA communication
    - politeness
    - lying behaviour

Generating Lying Expressions in an ECA

GAMBLE dice game
Rehm et al.,
Univ. Augsburg

Sub-areas in Emotion-oriented Computing

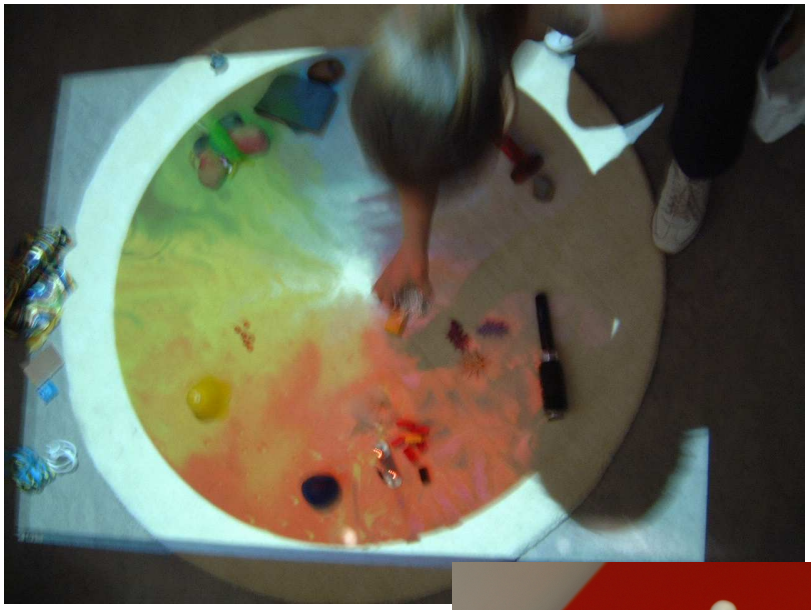


Usability of Emotion-oriented Systems

- existing usability criteria do not apply
  - e.g., control, predictability, transparency
- Develop criteria and methods to evaluate affective interaction systems
  - “sensual” feedback methods
  - Wizard-of-Oz studies
  - extended think-aloud protocol

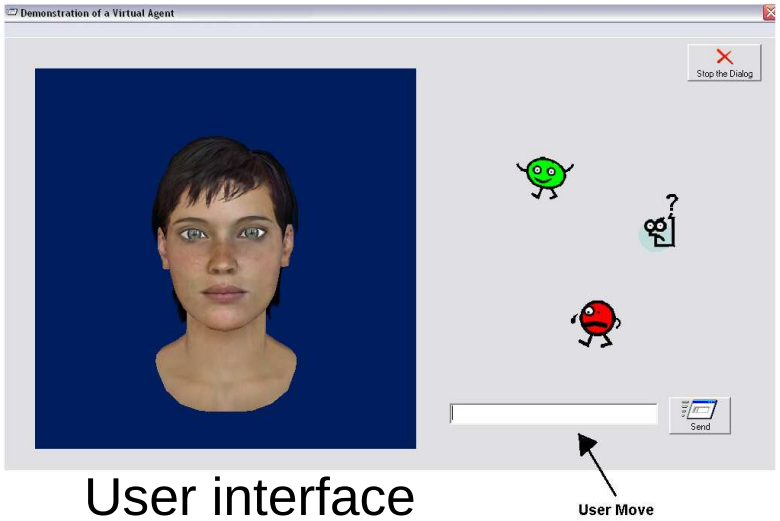
“Sensual” Feedback Methods for Usability Testing

SenToy puppet
Paiva et al., INESC-ID



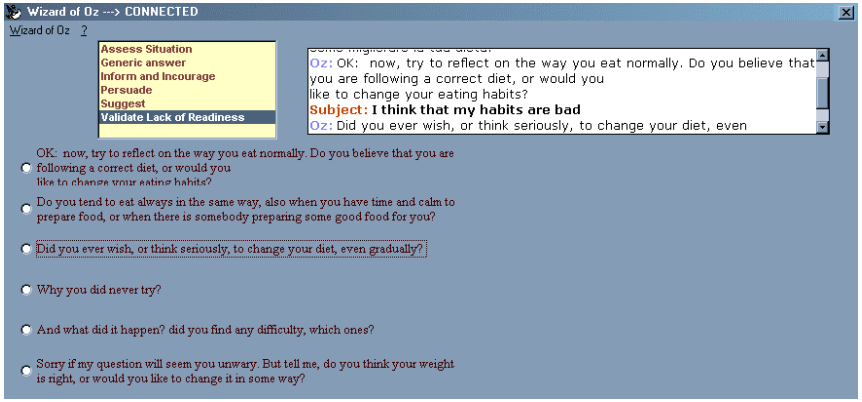
Colour and shape
Höök et al., KTH

Wizard of Oz Method: ECA-based Dialogue



User interface

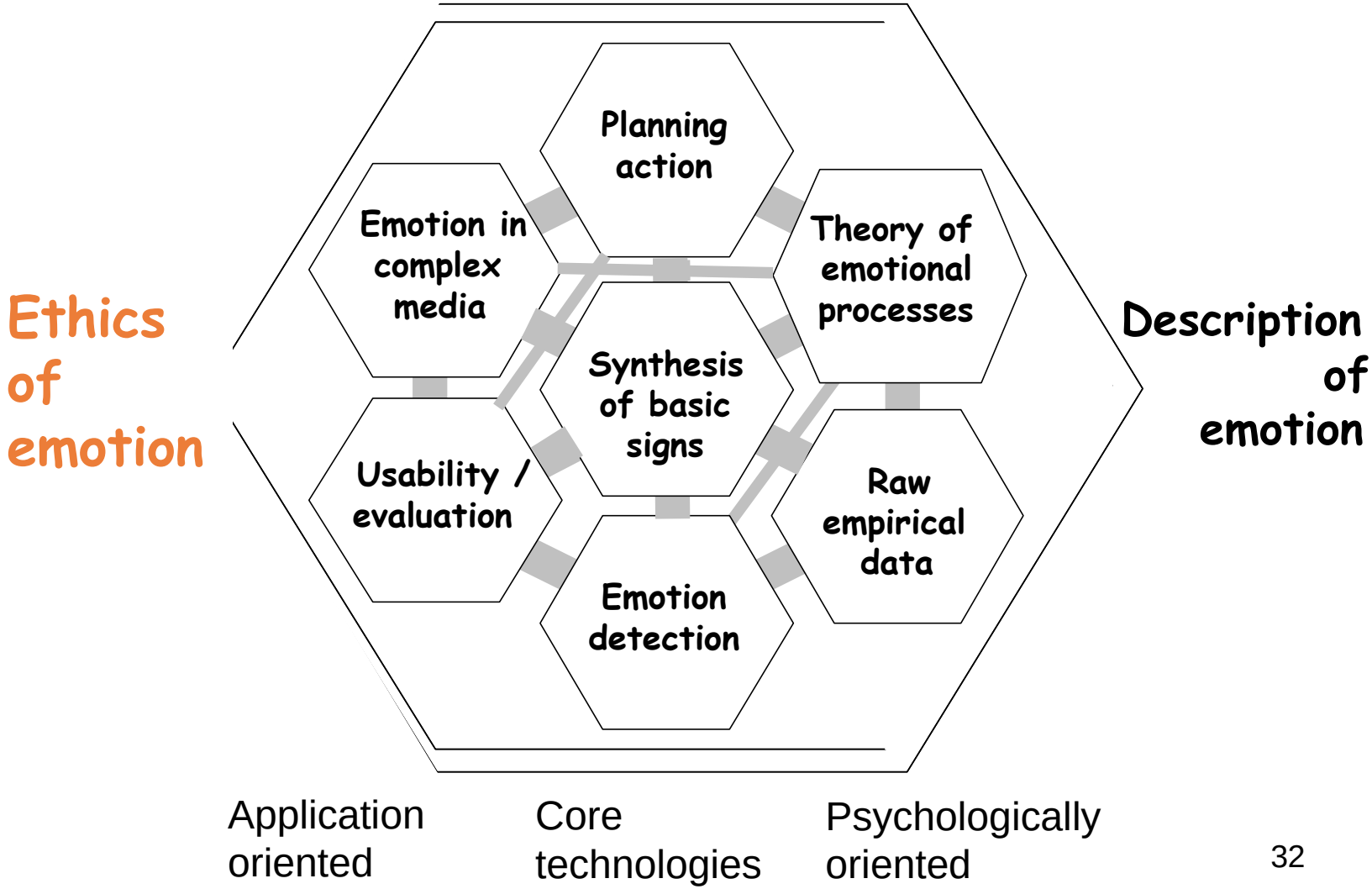
de Rosis et al.,
DI-BARI



Wizard interface

- study user behaviour
- user-centered design loop
  - design->test->redesign
- explore affective interaction
  - social relationship / empathy

Sub-areas in Emotion-oriented Computing



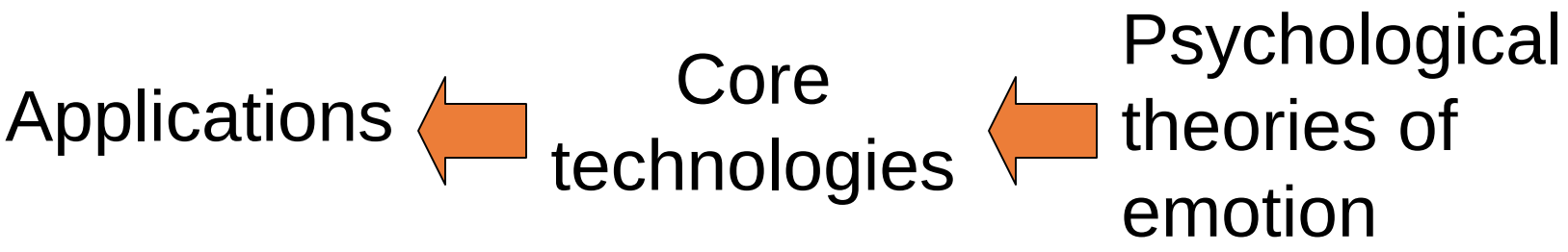
Ethics in HUMAINE

- Data collection: emotional data is sensitive
- Potential abuse of emotionally competent systems
  - automatic persuaders
  - surveillance systems
  - …
- Address ethical issues proactively

Ethics in HUMAINE

- Ethics research is new to this community
  - unrealistic to formulate a closed set of criteria
  - approach: “Principlism” (Beauchamps & Childress, 2001)
  - Four Level Model
    - nonmaleficence, autonomy, beneficance, justice
    - universally shared ethical standards
    - relies on “seeing things right”
- Install ethical committee
  - because every case is different

Conclusions



- Working on these different levels
  - removing obstacles in cooperation ("make things fit together")
  - building basis for future work
  - suggesting sensible research agendas

small text normal text large text

search

humaine

emotion-research.net

home | news | upcoming | partners | jobs | press | bibliography

you are not logged in log in

You are here: home

navigation

- Home
- About HUMAINE
- Partners
- Deliverables
- Workshops
- Bibliography
- Wiki
- Databases
- Demonstrators
- Related Projects
- Press
- Portal Guide

log in

Name

Password

log in

Forgot your password?

The HUMAINE Portal

Research on Emotions and Human-Machine Interaction

humaine news

HUMAINE Summer School 2006

The school aims at a deeper understanding of the emotional processes and a better exploitation of this knowledge for the development of emotion-oriented systems. Research topics will be addressed by HUMAINE partners and invited researchers. The HUMAINE EU Summer School will include seminars, tutorials, round tables, and experimental activities. The latter will be finalised to the setup of a final public concert, where continuous measurement and investigation on emotional phenomena in music performance will be faced.

Genoa, Italy, 22 September 2006

Workshop on Intelligent technologies, affective computing and interaction

Athens, Greece, 14 September 2006

Special session on 'Emerging Multimodal Interfaces' during the Artificial Intelligence Applications and Innovations conference

Athens, Greece, 07 June 2006

Agent Construction and Emotions (ACE 2006): Modeling the Cognitive Antecedents and Consequences of Emotion

Vienna, Austria (EU), 18 April 2006

More...

Foreseen Application of the day

Emotion-sensitive jukebox
(by Marc Schröder)
A music or video player that selects media based on the user's current mood. The media in a central archive or in a personal selection could be indexed with respect to their general emotional tone, and/or with the emotion the user experienced last time he watched or

Researcher of the day

Mehdi El Jed
GRIC IRIT

Key research interests:

virtual reality, emotion, social interaction, context.

Learn more about Researcher of the day.
Browse other researcher profiles.

community news

Special Session on Affective Computing and Adaptive Human-Machine Interaction

30 May 2006

Engaging with Emotions - The Role of Emotion in HCI

30 May 2006

Reinventing trust, collaboration and complaince in social systems

09 May 2006

Combining Visualisation and Interaction to Facilitate Scientific Exploration and Discovery

08 May 2006

Reinventing trust-collaboration-compliance in social systems

07 April 2006

More...