Authoring Augmented Reality (AAR)

Marie-Paule Cani (LJK)
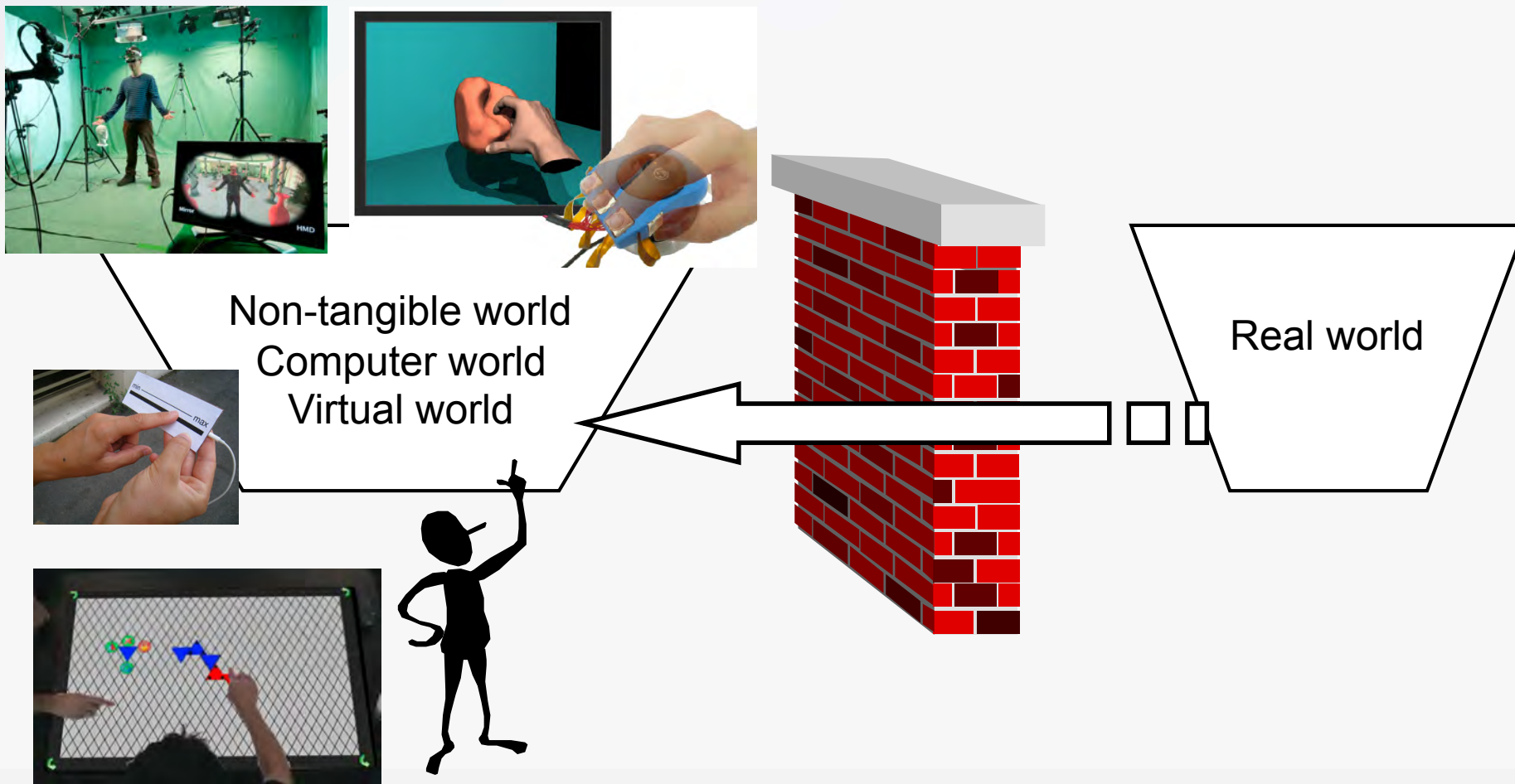
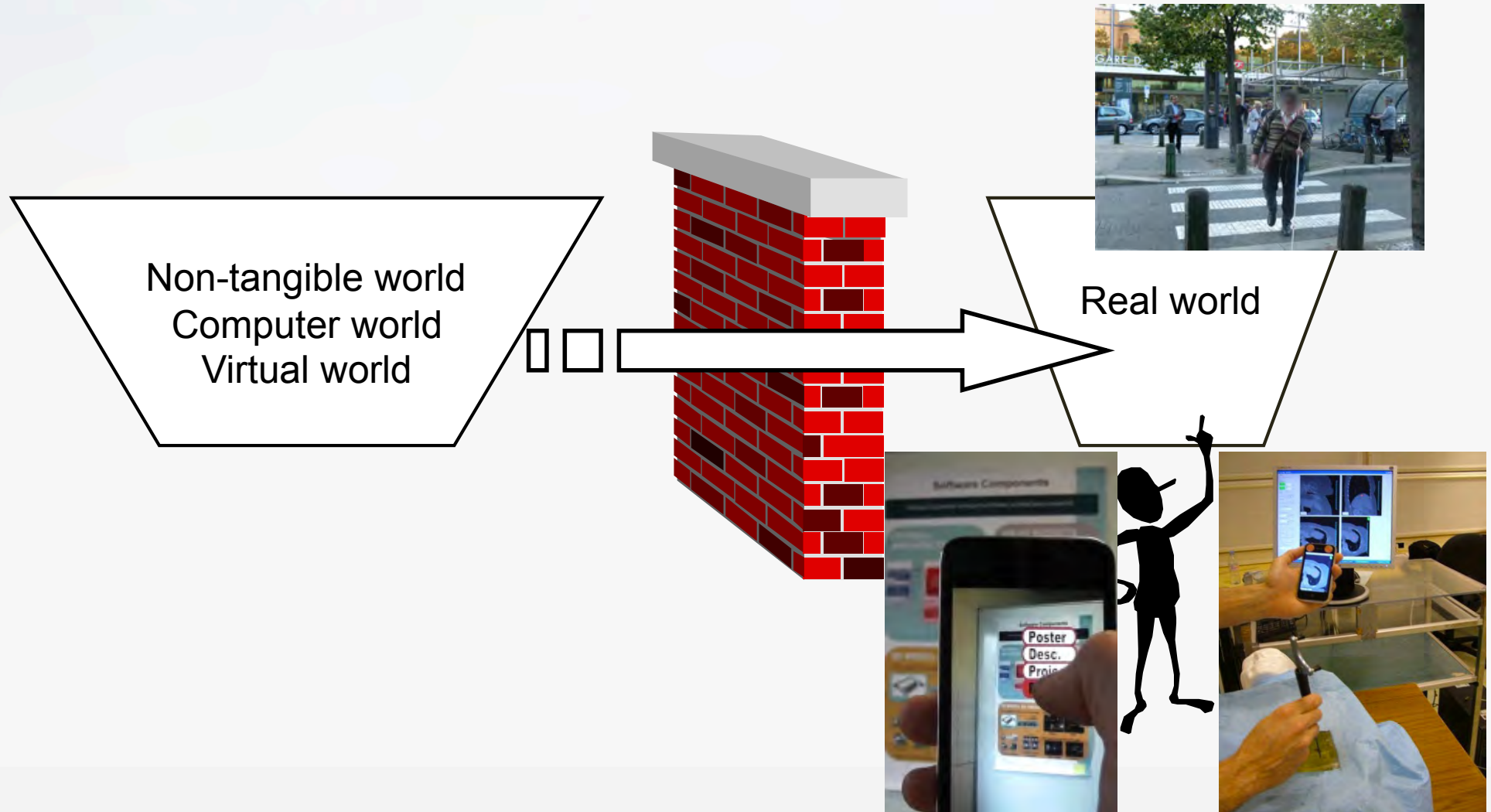and

Laurence Nigay (LIG)

Authoring Augmented Reality

- Seamless integration of the physical and digital worlds

- Context:
Mixed –Physical/Digital- environments
  - Enrich and explain the physical world by adding dynamic deformable digital content
  - Design new forms of interaction between humans and mixed environments

Combining
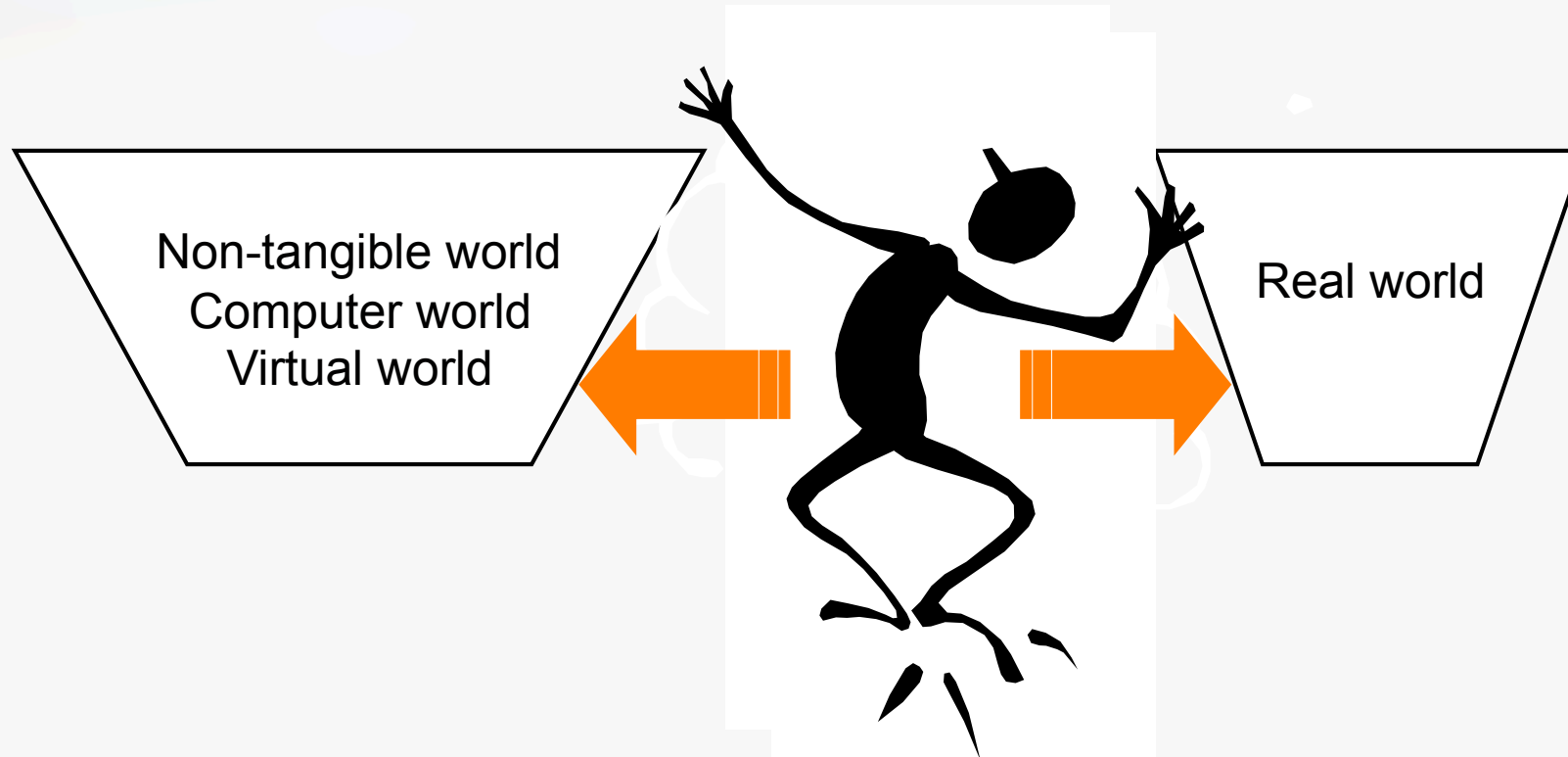# the physical and digital worlds

Non-tangible world
Computer world
Virtual world

Real world

Combining
the physical and digital worlds

Non-tangible world
Computer world
Virtual world

Real world

Combining
the physical and digital worlds

- A large scope but a common objective

| Non-tangible world Computer world Virtual world | | Real world |

Interactive Mixed environment

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- Interactive Mixed Environments

- Challenges
  - Real-time capture and simulation of the real world
  - Representation and editing of virtual prototypes
  - Natural interaction with mixed environments

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- Persyval: Complementary expertise
  Master of Science in Informatics

Human sensory motor and cognitive skills

Non-tangible world
Computer world
world

Real world

Signal processing
Image processing
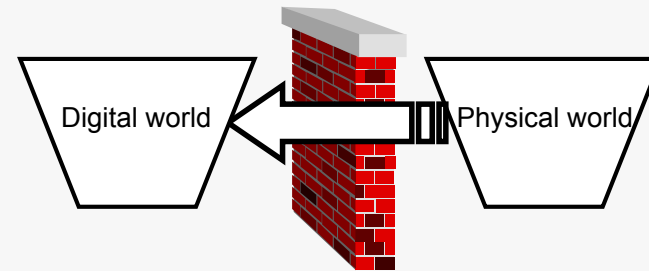Biosignal processing
Computer vision
Computer graphics

Geometry
Topology
Mathematical and
physical models

Human-Computer Interaction

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- Illustrations:
  - Focus on two subjects highlighting the synergy between the researchers of Persyval

Digital world   Physical world

  1. Tangible interaction - physically manipulable interfaces
 2. Controlling the performance of a virtual actor by demonstration

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- Illustrations:

  – Focus on two subjects highlighting the synergy between the researchers of Persyval

  – Tangible interaction - physically manipulative interfaces

    ■ Biosignal modalities

      – Brain/Muscle-Computer interaction

      – Multimodal interaction

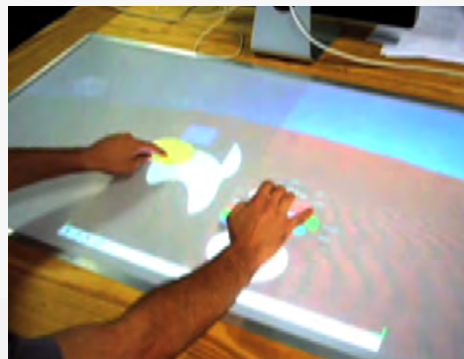   ■ Augmented objects for interaction
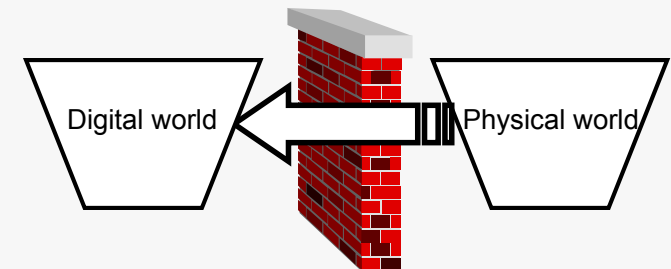
Tangible interaction

- Brain-Computer interaction

- Scientific challenges

  – Convert EEG signal into commands
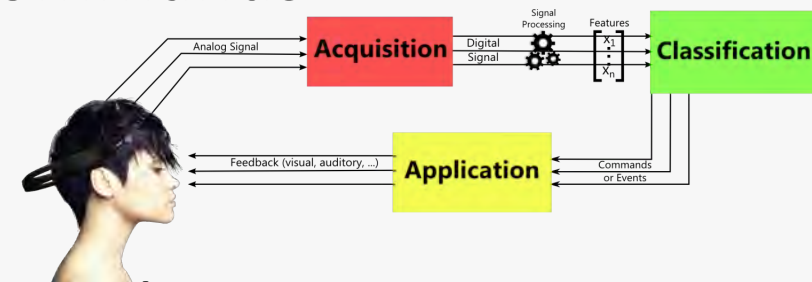
  – Multimodal interaction: complementarity
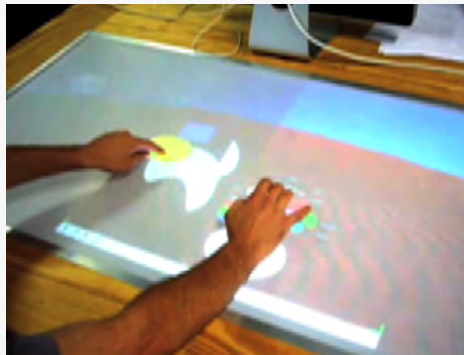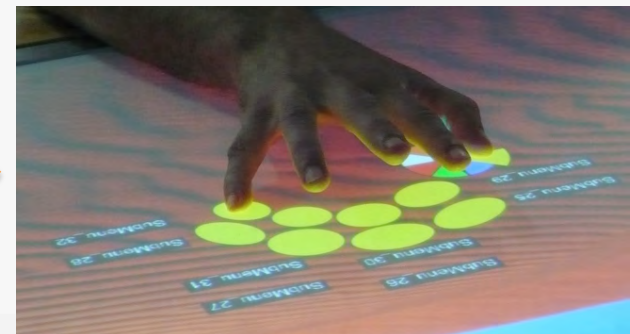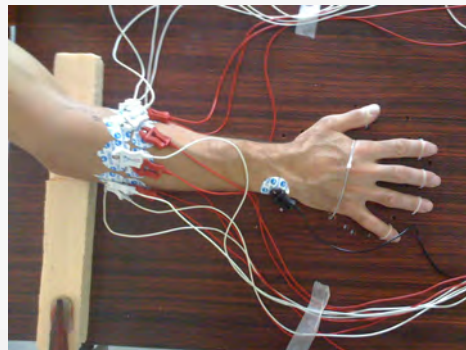
  position   +   parameter

Tangible interaction

- Muscle-Computer interaction

- Challenges

  – Convert EMG readings into gestures/pressures

    ▪ Biomechanical modeling / Motor control theories

  – Multimodal interaction: complementarity (position + pressure)

Tangible interaction

- ## Augmented objects for tangible interaction

  - Deformable physical objects as input tools

  - Scientific challenges

    - Design space
    - Digital/Physical material

Smaller object / Low precision

Bigger object / High precision

Controlling the performance of a virtual actor by demonstration

- The director plays the scene in front of a camera

- The system analyzes her/his performance (diction, facial expressions and head movements)

- The system creates a virtual actor imitating the director

- **Technological challenges**

  - analysis and synthesis of multimodal behavior, statistical modeling and learning by demonstration

- **Cognitive challenge**

  - model of the coupling between the director and the virtual actor (satisfactory experiences and unsuccessful imitations) -perception-action links

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Authoring Augmented Reality - AAR

- Scientific committee

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- Gérard Bailly Gipsa-Lab
- Denis Beautemps Gipsa-Lab
- Hervé Pajot Institut Fourier
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