The Enactive Network of Excellence
Enactive Interfaces

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http://www.enactivenetwork.org

Helsinki, November 2006
ENACTIVE NETWORK

- A Research Community on Enactive Knowledge;
- Aim of investigating its foundations and the potentialities of Multi Modal Interfaces in this field;
- Exploiting guidelines and application for the development of future interfaces able to connect the Digital Realm and Physical Environments.
Three Kinds of Knowledge
Symbolic knowledge

long abstract sequences of reasoning-text, logic or mathematics;

- A printed or written form of knowledge that makes use of text and vocabulary-signs to represent operations, processes, elements or relations, ...
- Typical forms are: procedural, declarative, episodic
- Typical use: languages
Iconic knowledge is based on images
The word ‘Enactive’ has been attributed to the psychologist Jerome Bruner.

... The third type of knowledge is enactive. It is inherently tied to actions, and it is the craftperson’s way of knowing. It is the most intuitive and so the easiest to learn.

According to Varela’s model of “enactive cognition” (Varela et al. 1991), enactive knowledge is primarily “knowledge for action”, and conversely, action is always necessary to acquire knowledge.

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Enactive knowledge

- A craftperson needs to touch his/her work.

- This touch can be indirect but it must be physical and continual, and it must provide control of the whole process.

- ENACTIVE knowledge is not positional (knowing that) but rather embodied (knowing how).

- Enactive knowledge is not simply a multisensory mediated knowledge, since the user is an active part of the learning process.

- The knowledge is not only physical but also experiential.

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Enactive knowledge is constructed on motor skills, such as manipulating objects, riding a bicycle, etc.

Enactive representations are acquired by doing

*Elena Pasquinelli, 2004*

Enactive knowledge is not far from our everyday life.

- SPORT
- MUSIC
- ART
- WORK
- DANCING
- CRAFTING
- PLAYING

- ... and much more
Enactive interfaces: addressing the Paradigm Shift

- Tracker
- Virtual Reality Tracker
- Pads and pens
- Mouses
- Computer Graphics
- Keyb & Files

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ENACTIVE NoE
Enactive Systems

- Haptic Interfaces
- Audio Interfaces
- Visual Interfaces

ENACTIVE Interfaces

Manual/body language and physical interaction

Learning and Training

Virtual Environment

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ENACTIVE NoE
ENACTIVE Interaction

Capturing:
• Multimodal recording
• Motion analysis
• Motion Interpretation

Ontology and Representation

Rendering:
• Authoring
• Metaphors
• Action control

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PARTNERS OVERVIEW

- 25 Partners
  - Experimental Psychology
  - Cognitive Sciences
  - Technology (Robotics, Computer Science, Virtual Environments)
  - Interaction Design

PERCRO Laboratory Computer Sciences and Artistic Creation Laboratory Biomedical Physics Group Centro de Estudios e Investigaciones Tecnicas de Guipuzcoa Centre for Research in Sport Sciences Department of Design Sciences COSTECH Department of Psychology Institute of Robotics and Mechatronics, DLR Expertise center for Digital Media Sound Processing and Control Laboratory Human Factors Research Laboratory Fundation LABEIN Max Planck Gesellschaft Zur Foerderung der Wissenschaften E.V. MIRALab VRlab Department of Information Engineering Engineering SONY Computer Science Laboratory Department of Communications, Computer and Systems Science Institut Jean Nicod Association pour la Création et la Recherche sur les Outils d'Expression Université Pierre Mendès Laboratoire de Psychologie Expérimentale
**Research Activities**

- RD1.1 Technologies for Haptic Interfaces
- RD1.2 Technologies for haptic-auditory-vision-interfaces
- RD1.3 Multisensory Information Transfer
- RD1.4 Hardware and software Trends and standards
- RD2.1 Psychophysics of Multisensory-Motor Interactions
- RD2.2 Kinaesthetic Model of the User
- RD2.3 Enforcing Believability of Computational Models
- RD3.1 Special users and Uses
- RD3.2 Enactive Human Computer Interfaces for Teaching and Learning Manual Tasks
- RD3.3 Creativity, Art and Enaction
The 1° Enactive workshop was organized by the network. The event took place on March 21° and 22° 2005 in Pisa at Scuola Superiore Sant’Anna.

The workshop dealt with the presentation of the research on enactive interfaces and Enactive knowledge carried out during the first year of the network. The program included: cognitive aspects of human perception, basic technologies of haptic interfaces, integration of visual-audio and haptic sensory information, applications of Enactive Interfaces.

Two plenary speakers by Stephen Brewster (Multimodal Interaction Group, University of Glasgow) and Dale Lawrence (University of Colorado).
ENACTIVE 2nd annual conference was organized by PERCRO and DIST. The conference took place in Genova Italy, on November 17th and 18th 2005. ENACTIVE 2005 addressed a wide scientific community, gathering together leading scientists from the domains of technology, psychology, human factors, cognitive sciences, HCI, interaction design and engineering, and is aimed at creating a truly multidisciplinary research community on the new generation of human-computer.

The conference program included two plenary talks, 55 paper presentation, posters sessions and hands-on demos.
Eurohaptics Conference and Symposium On Haptic Interfaces For Virtual Environment And Teleoperator Systems has been jointly for the first time. WHC took place in Pisa at CNR on March 18th -20th 2005. The event was organized by PERCRO and supported by the ENACTIVE Network. The conference addressed all the aspects related to haptic interaction - from the basic scientific underpinnings, to the technological developments, to the different realizations and applications.
Strategies at 3rd Year of NoE

Focusing on representative research scenarios that may find relevant Mass and Interest to continue research after the termination of financial contribution

Creating Applications and relationships to foster results among industrial and social environment

Enhancing Web services, Clustering Technologies, Platforms and Guidelines into a Common Virtual Laboratory
Haptic & Tactile for Manipulation

Whole Body Mot. & reaching in VE

Navigation Exploration Recognition

Coordination Cooperation Collaboration

Creativity

ENACTIVE Emblematic Scenarios
INDUSTRY & TRAINING

ARTS

SPECIAL USERS

ENACTIVE Reference Applications
Other VL resources

- Documents
- Know-how
- Libraries and Tools
- HW-SW Databases
- WEB Services for networking
- Development Environments
- Interactive experiments
- Virtual Seminars
- Streamed workshops

Helsinki, November 2006

ENACTIVE NoE
Thank you for your attention

www.enactivenetwork.org

Info and Demo at 5G