



# CONSTRUCTING ASSEMBLIES FOR PURPOSEFUL INTERACTIONS

Mobile Interaction with real world  
Workshop @ MobileHCI 2006

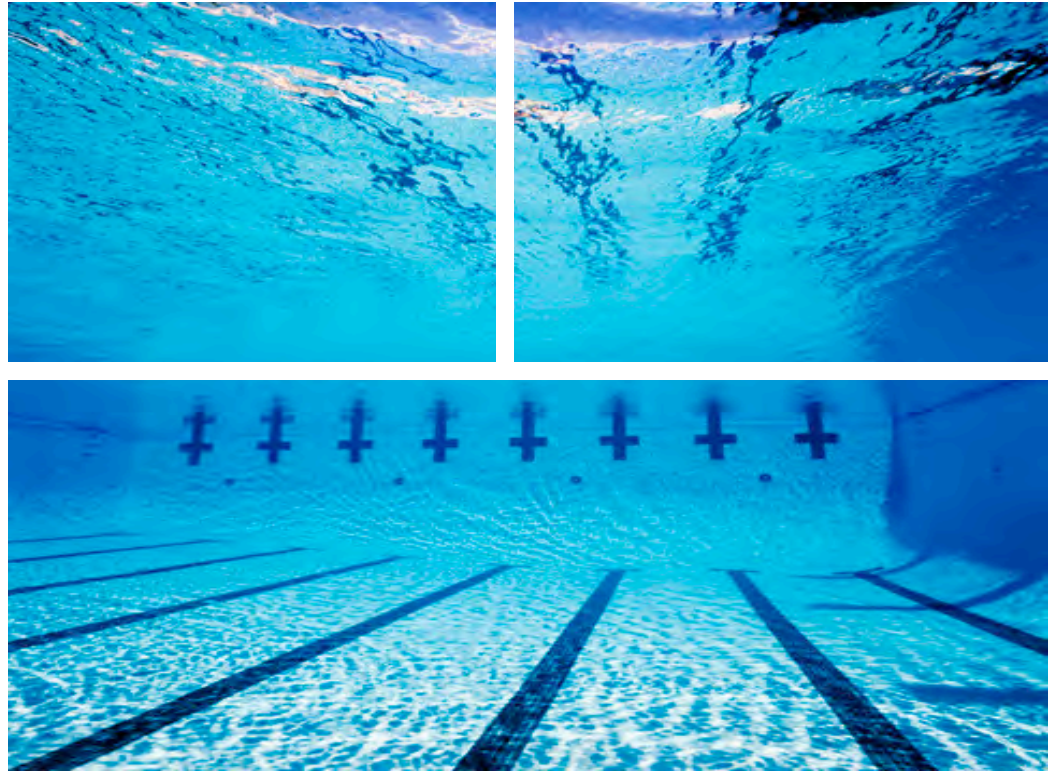
Alessandro Pollini  
Erik Grönvall

Communication Science Dpt.  
University of Siena

{pollini; gronvall}@media.unisi.it

MIRW 2006\_Espoo\_12/ 09

physical objects in  
real world



distributed system of tiles

construction / deconstruction

mobile and distant communication

grouping objects

environmental challenges

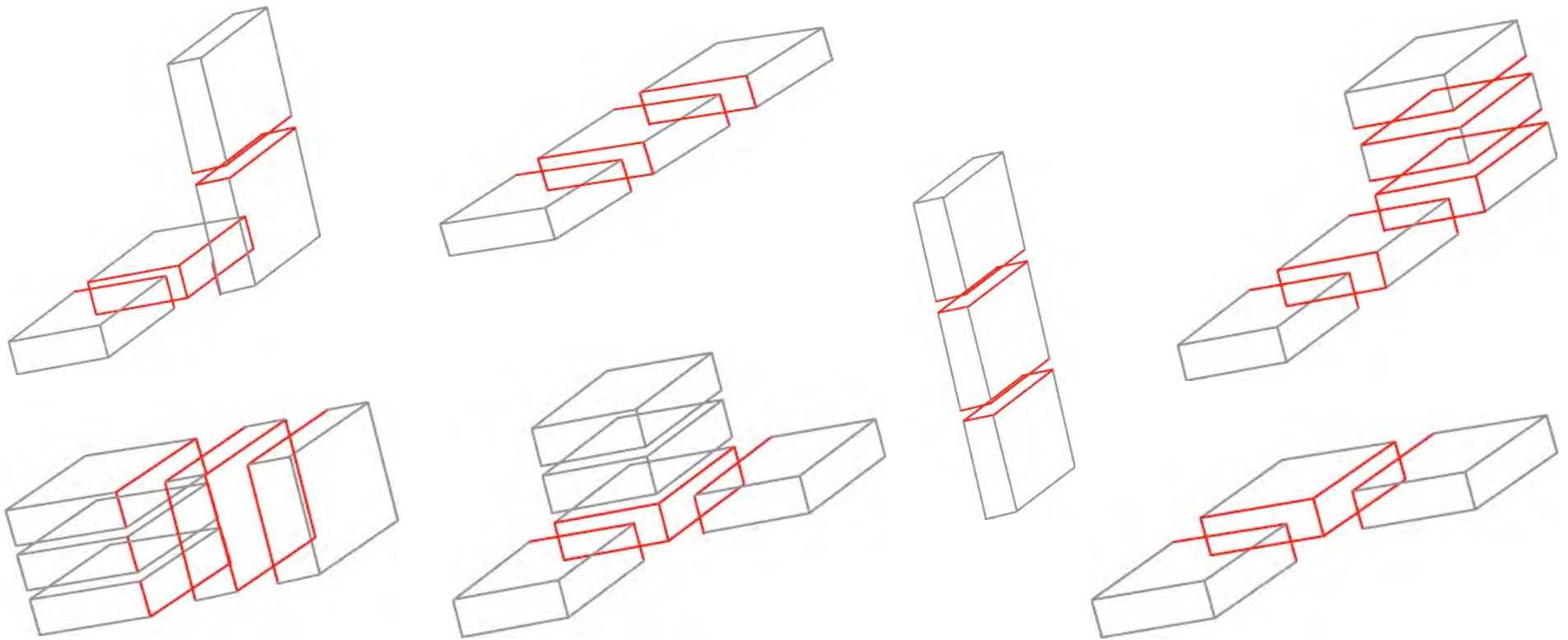
new perspective on  
ambient computing



## PalCom\_palpable computing

...purposely addresses the way in which humans meaningfully can interact with distributed computational systems available in the environment.

...aims at supporting user control by composing and de-composing assemblies of devices and services.



## Active Surfaces\_the concept

re-thinking the context of the swimming pool

the pool is designed to swim. Active surfaces enable the pool to become a safe environment where different rehabilitation activities take place

merging the goals of the physical-functional and the cognitive rehabilitation



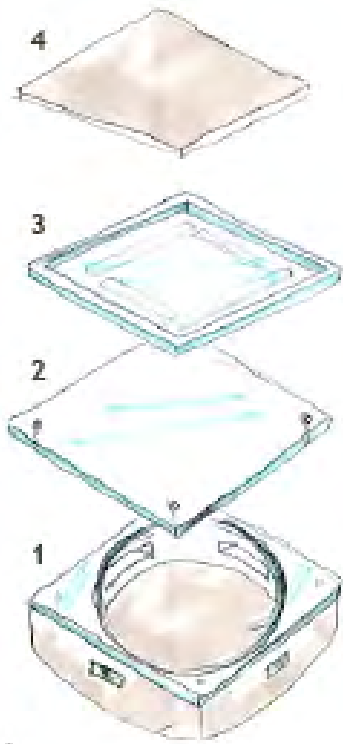
water is a  
great  
'equalizer' for  
disabled  
people

## Active Surfaces\_rehabilitation in water

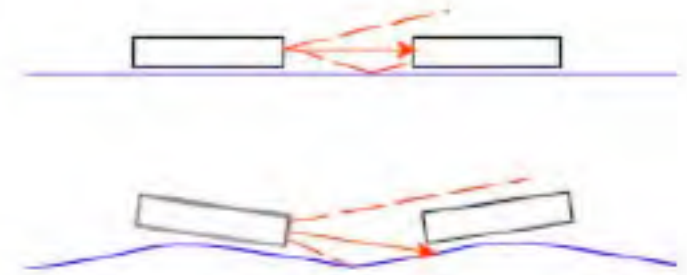
water supports the body and takes the weight off the joints. movements are easier and less painful

configurability, constructability, modularity, physicality and creativity as requirements for the rehabilitation practice

dealing with dynamic situation and changing conditions



palpability  
emerges as a  
property-in-use



## Palpable qualities

Change / Persistence

Understandability

Flexible ad-hoc network

Hybrid programming

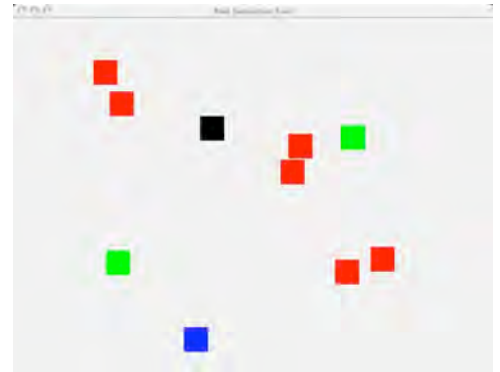
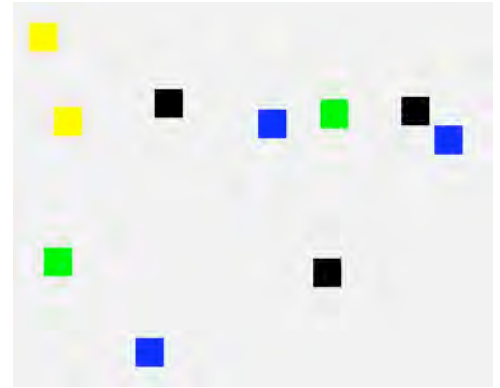
Discovery and communication

End-user composition

Re-use of stored games

...logical and physical assemblies

constructing  
assemblies

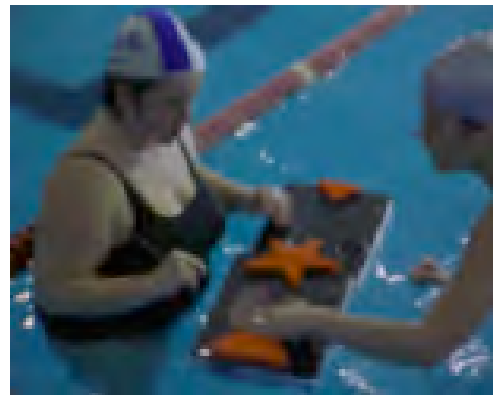
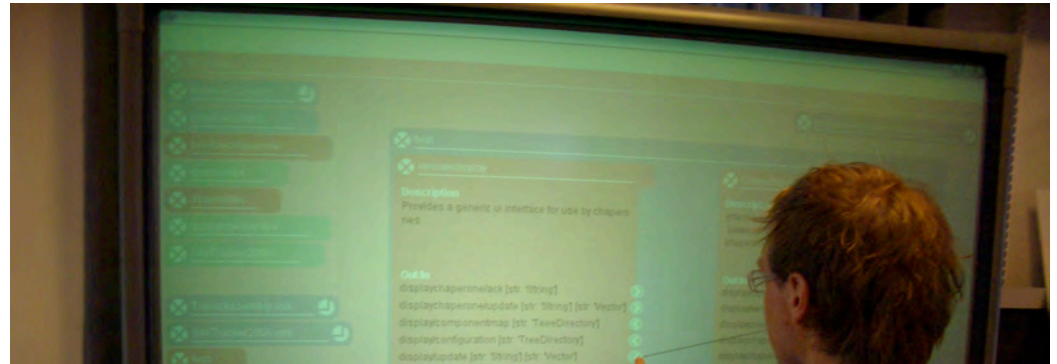


Active Surfaces can be configured and assembled on-the-fly by the therapists according to different disabilities, usage, physical space and exercises' complexity

The assembled tiles constitute a network of physical and software objects that communicate and exchange data

thus it provides the users with the opportunity to overcome tile breakdown and system failures by relying on other working components

## constructing assemblies



The PalCom Virtual Machine provides an execution platform for components to be embedded in Active Surfaces physical devices

communication, discovery, dynamic assembly, inspection and recovering degradation are implemented as components running on the Pal-VM

Migrating User Interface (MUI) makes use of the fact that the Assembler Tile distributes to the tiles information about devices, connections and services



early trials with end-users

playing with Active Surfaces mock-up

trials in the real context of use

Texture based task , Image composition task

free exploration

iterative design  
and participation

early trials with end-users

flexibility

end-user composition

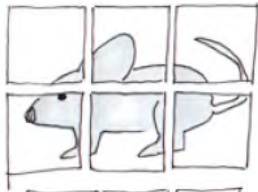
ready-at-hand technology

configuration and creativity

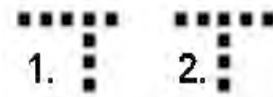
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H E L L O



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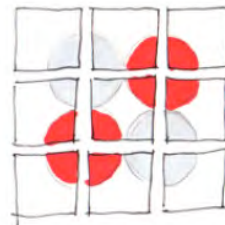
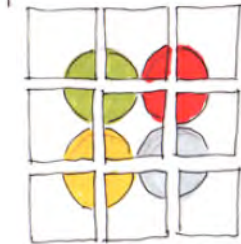


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2 touch → AT LL

2 touch → AT OOO

1 touch → AT HELLO



Position games

Scrabble games

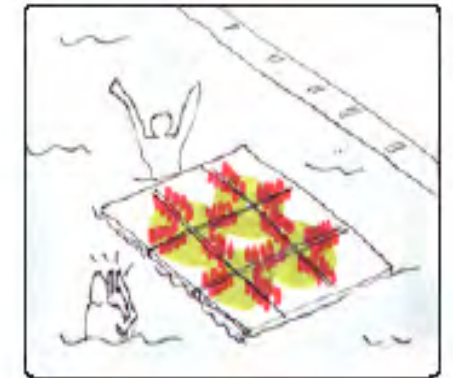
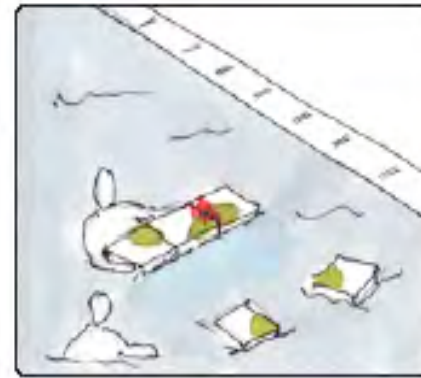
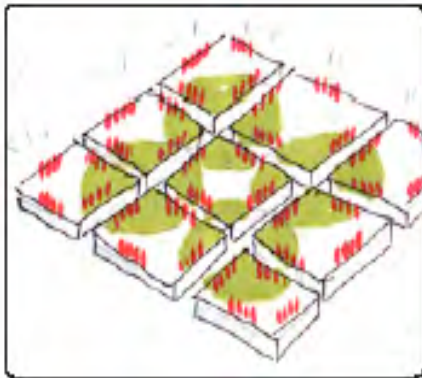
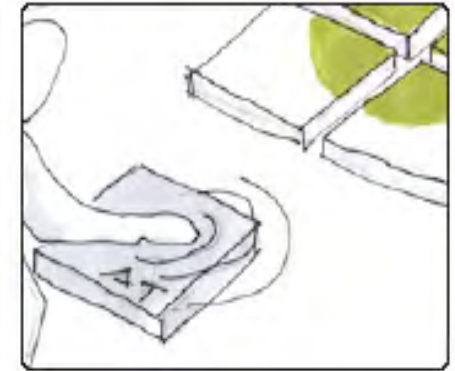
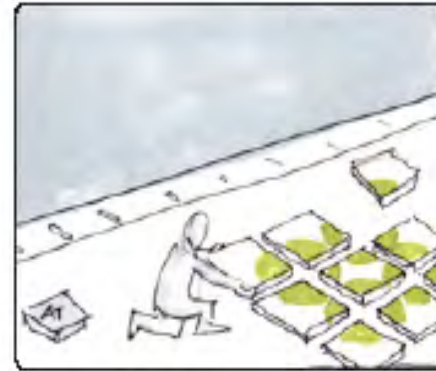
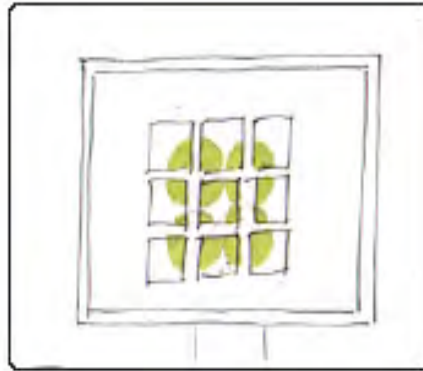
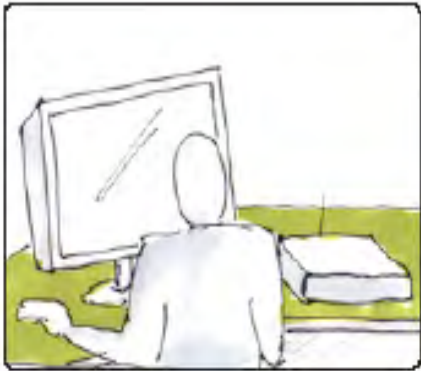
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## scenario\_designing games

Position game / Scrabble game

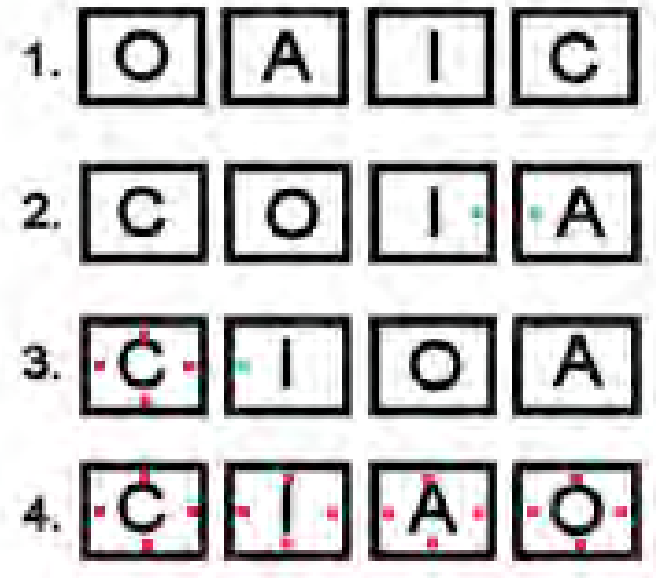
each tile acts as an autonomous component, while being aware of its surroundings

system resilience by mean of grouping service with Assembler Tile



## scenario\_designing a position game

1. The MUI browser
2. Setting of general game rules
3. Physical programming of the Active Surfaces
4. Using the Assembler Tile to create bindings between the tile components
5. The tiles discovers that they are in the winning position
6. Start of activity
7. Local solutions made
8. The game is solved



## conclusion

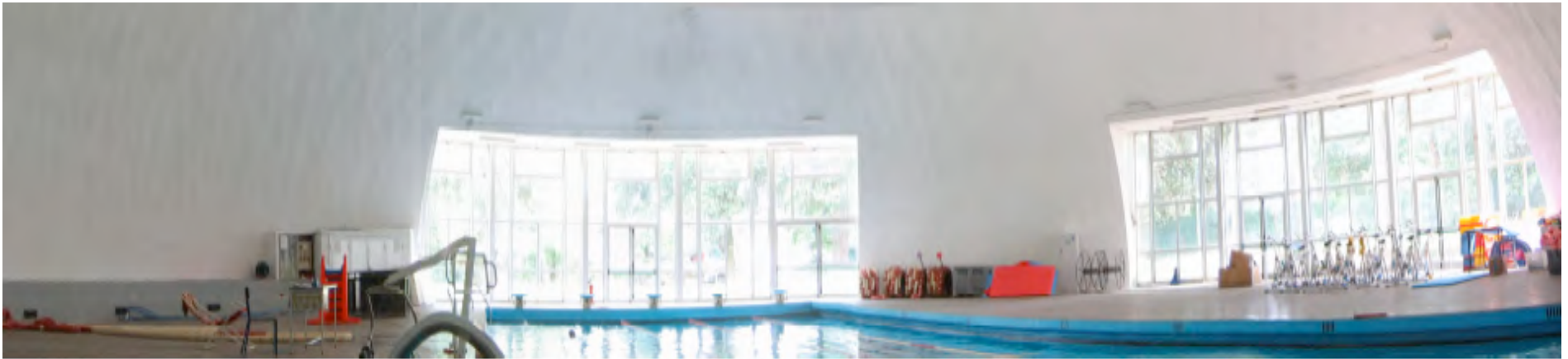
In case of graceful degradation palpable systems can support resilience in case of functional breakdowns. If part of the system fails, still some functionality should be available and working.

Inspection allows the user to examine the current state of a system or component and to reconfigure the system accordingly. If a system is subject to degradation, it should be able to communicate its new state.



Active Surfaces embodies **invisibility** (the capacity of unobtrusively performing computing tasks in the background environment) but also **visibility**, (as the capacity of making visible to users what they are doing and what they may do).

It offer both **construction** (the ability to support end-user composition of devices or services to form new devices and/or services) and also **deconstruction**, (that is, the ability to disassemble a device or service into its constituent parts to enable understanding and manipulating of each part individually)



the first full functioning prototype is now under development in joint collaboration with Lund University, SE University of Aarhus, DK Aarhus School of Architecture, DK  
To be presented in the next few months.

thank you