

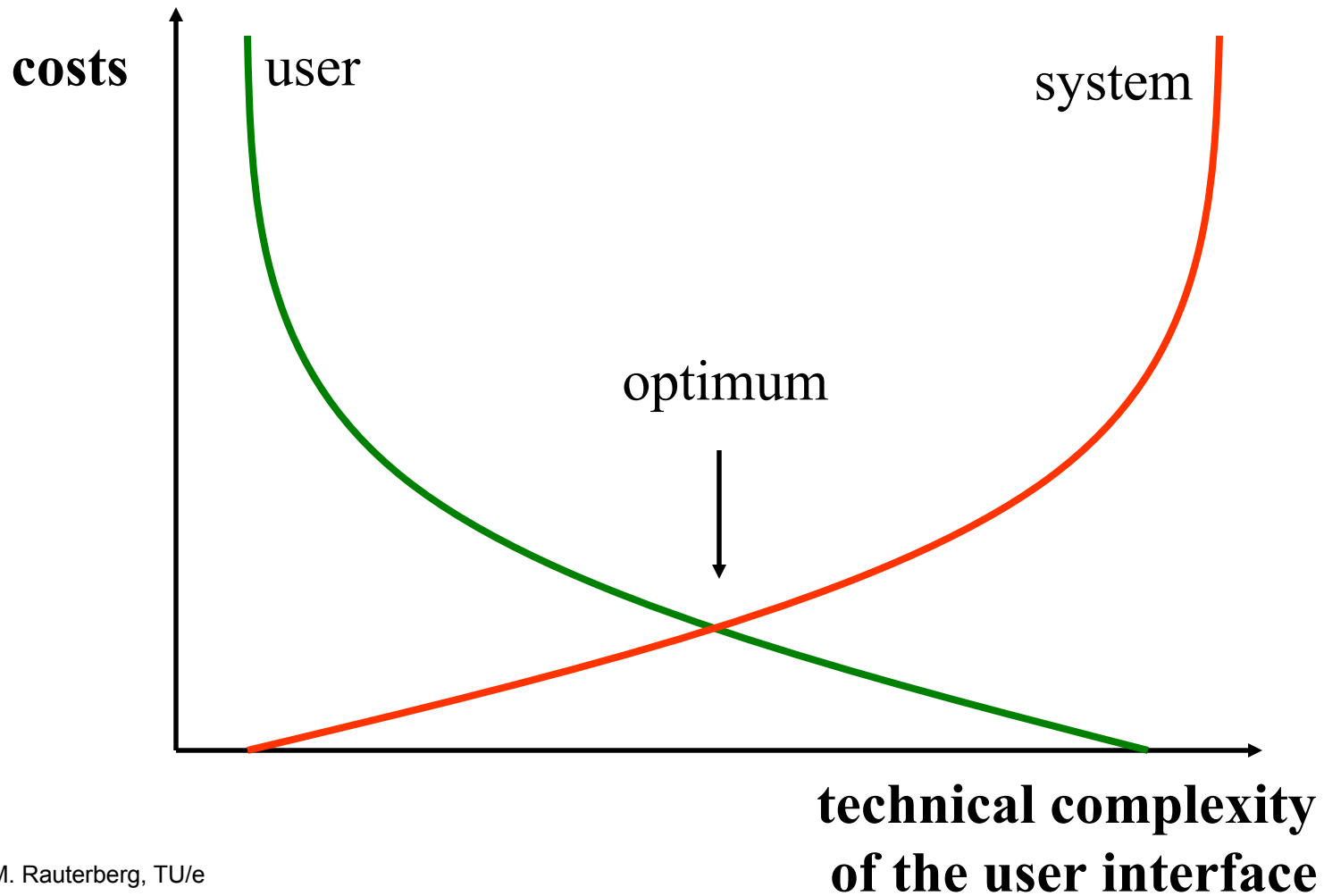
User-System Interaction: from gesture to action

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IPO - Center for User-System Interaction

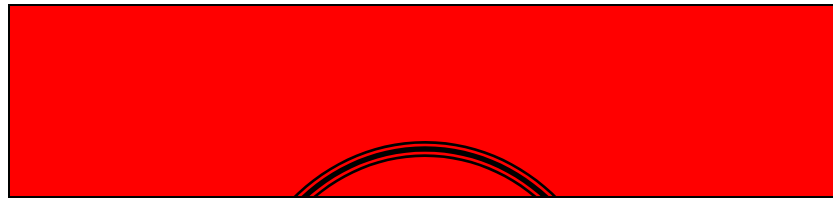
TU/e Eindhoven University of Technology

The optimization problem

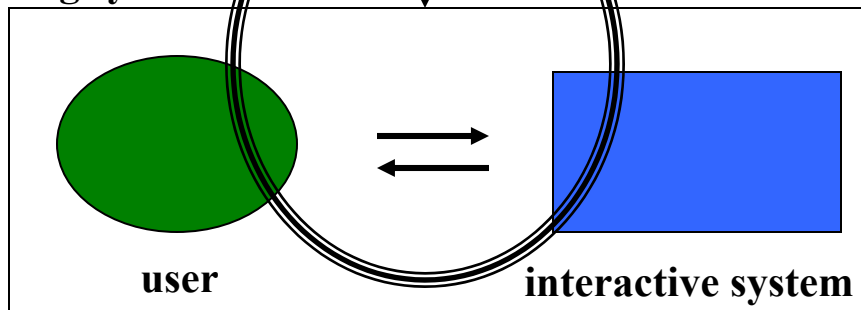


What are the research topics of USI?

Working domain



Working system



- **Communication / Co-operation**
- **Home / Office Environment**
- **Financial / Medical Sector**
- **Knowledge Management**
- **Product / Process Industry**
- **Transportation / Logistic**
- **Teaching and Learning**

Goal:

$$P_a \Rightarrow P_d$$

Science

- **perception**
- **cognition**
- **action**

Application

- **user-centered design**

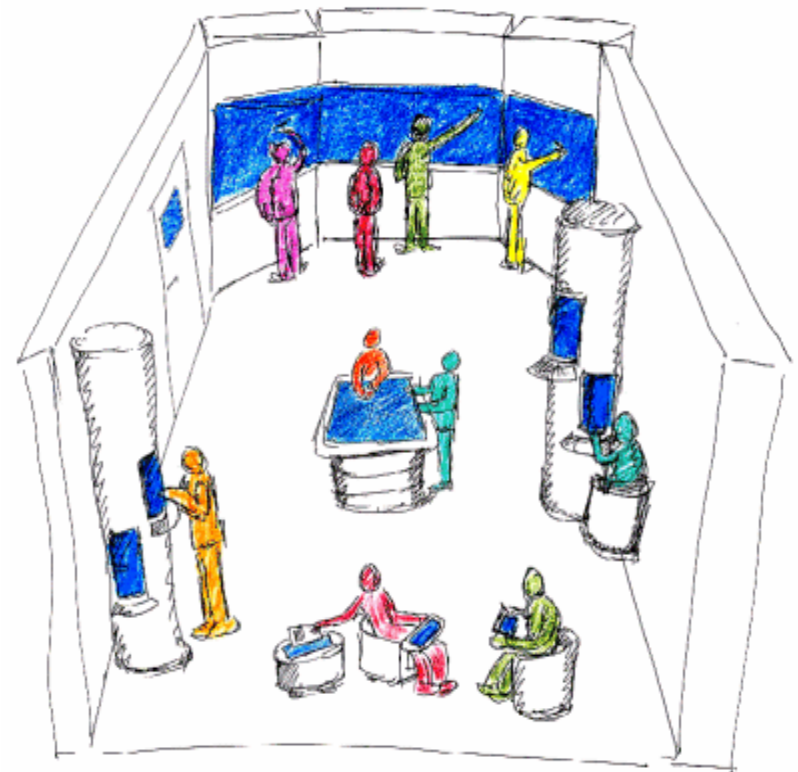
Engineering

- **audio interfaces**
- **computer vision based input**
- **speech input / output**
- **tactile input / output**

Two Trends in User Interface Technology



Ubiquitous and Mobile computing

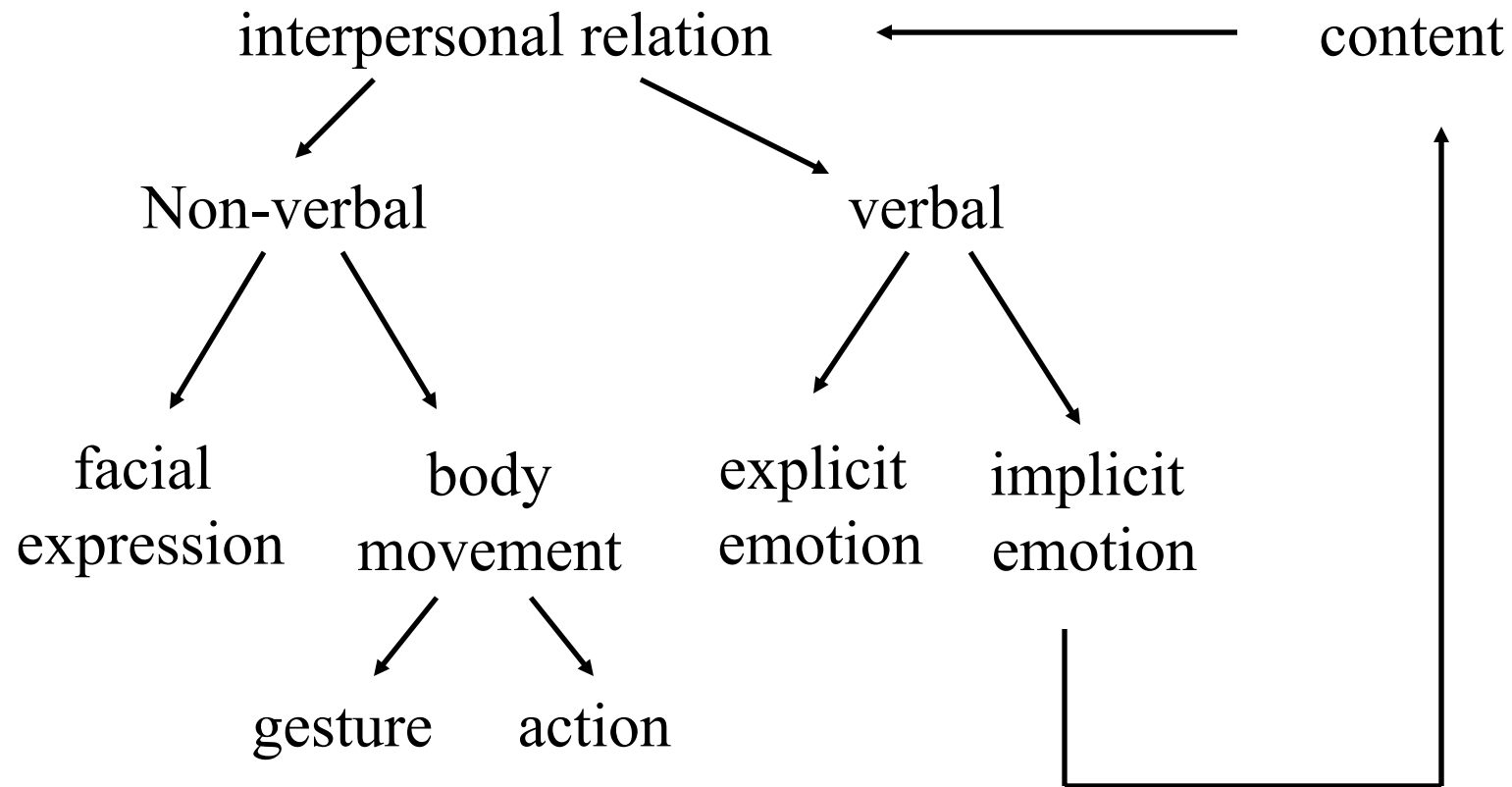


Ambient rooms and
Cooperative buildings

What are the technical challenges?

- **New interaction styles**
 - speech input/output
 - computer vision based input (e.g., gestures)
 - audio interfaces (e.g., non-speech audio)
 - tactile and force feedback
- **New interface concepts**
 - adaptive and intelligent software
 - natural user interfaces

Human-human communication



Non-facial gestures associated with speech act

- **Iconic gestures**

- form of this gesture supports a feature of the described action or event (e.g., “he climbed up the pipe...”)

- **Metaphoric gestures**

- form of this gesture is representational (e.g., “the meeting went on and on...”)

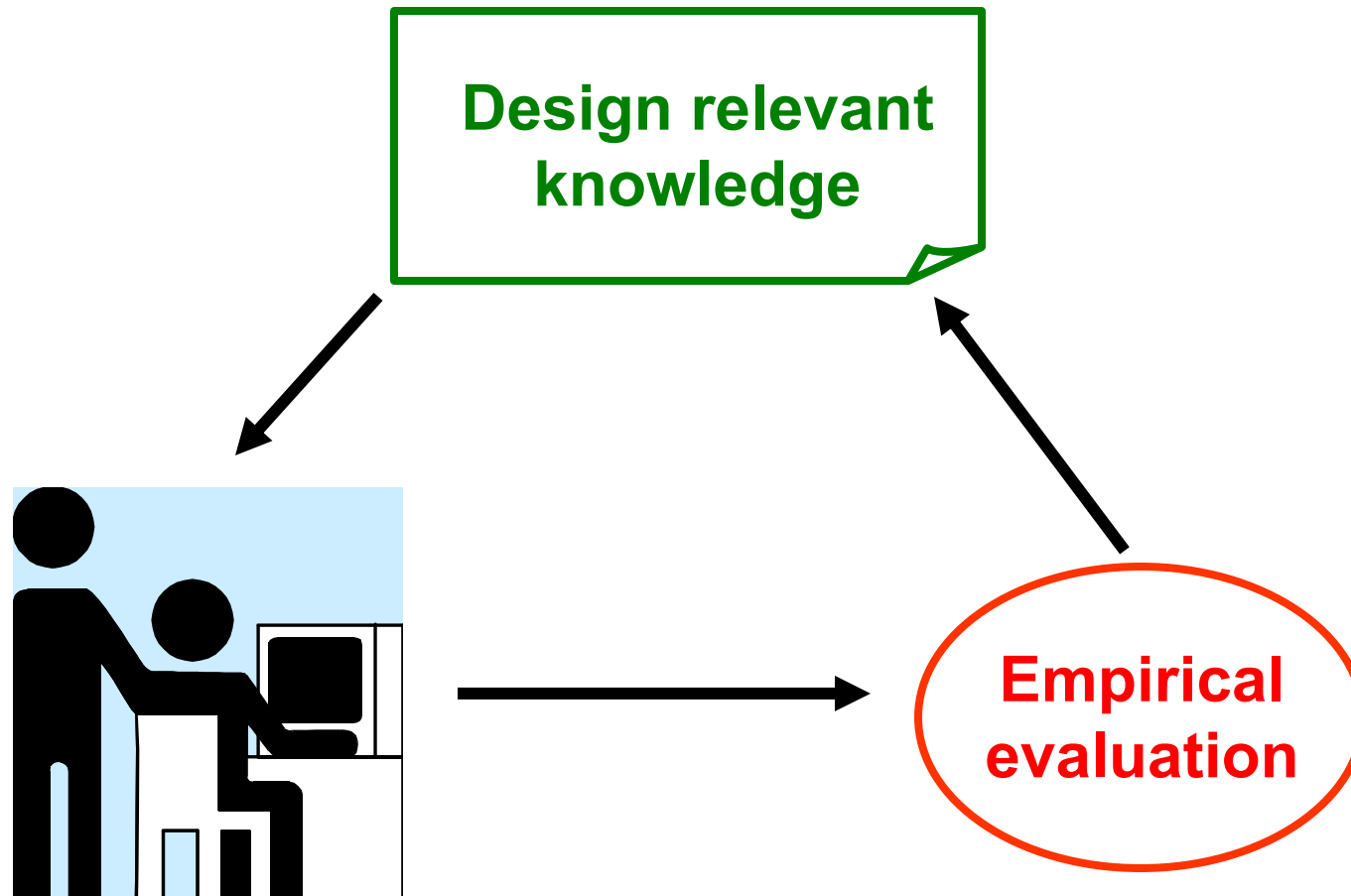
- **Deictic gestures**

- form of this gesture specializes or locates something in the physical space nearby the narrator (e.g., “this document shows...”)

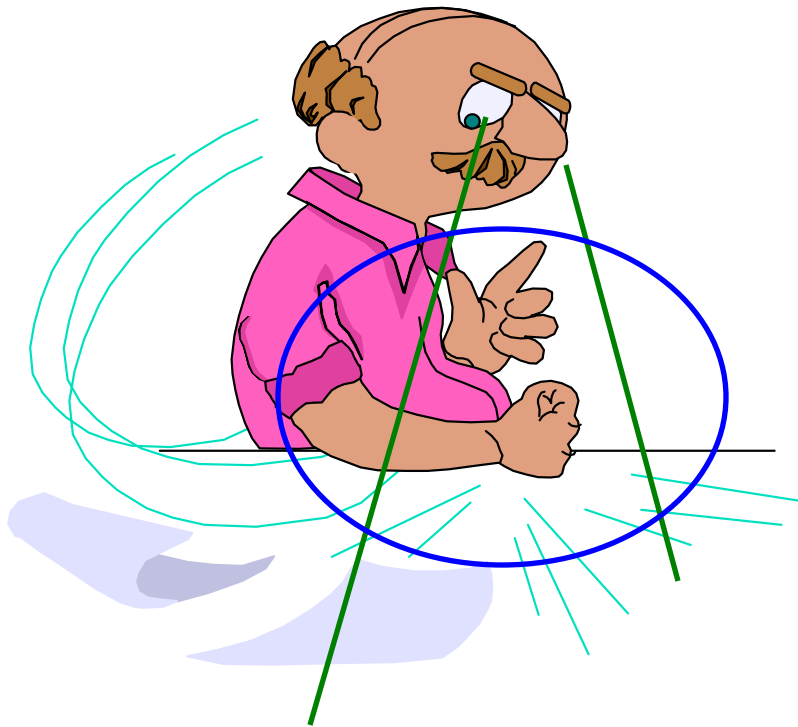
- **Beat gestures**

- small baton-like gestures that serve a pragmatic function (e.g., “she talked first, I mean second...”)

What is the research approach?



The most important design principle



- Perception Space

- The physical space where the user's attention is.

- Action Space

- The physical space where the user acts in.

- Design Principle:

- perception space and action space must coincide!

Two design principles for natural user interfaces (NUIs):

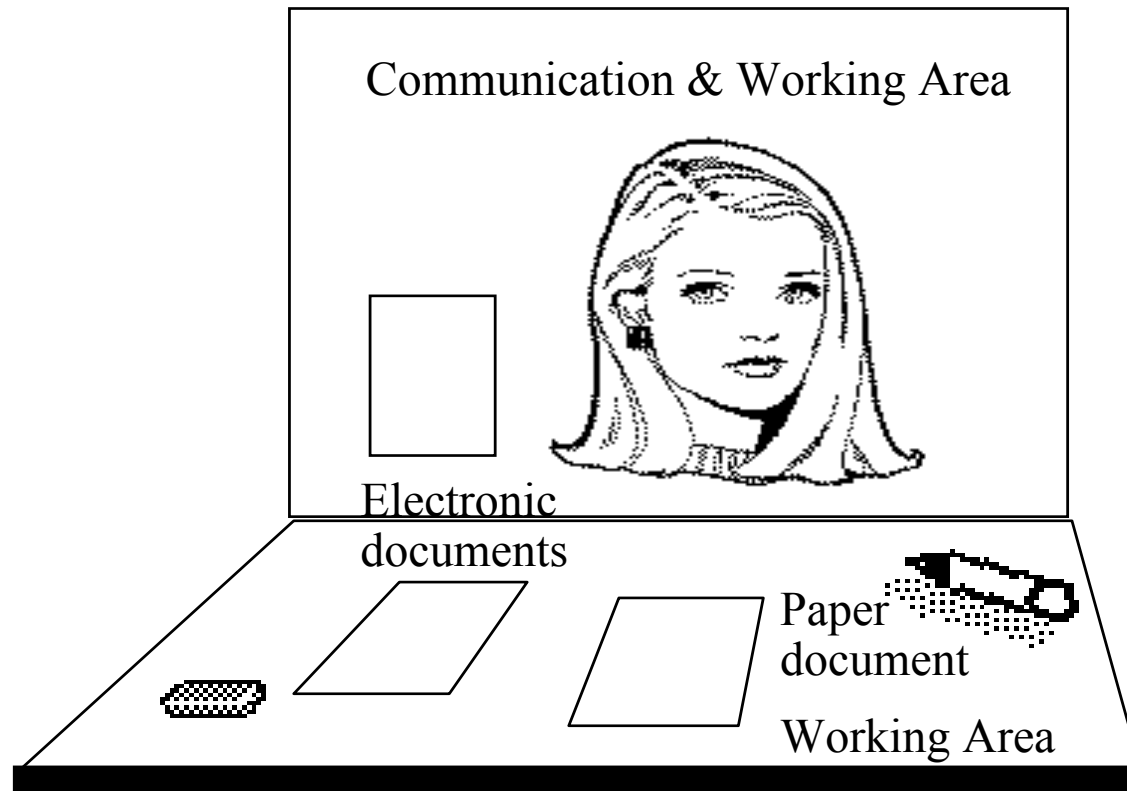
1. design principle

No technical equipment inside to body space of the user!

2. design principle

Perception space and action space must coincide!

Architecture of a Natural User Interface (NUI)

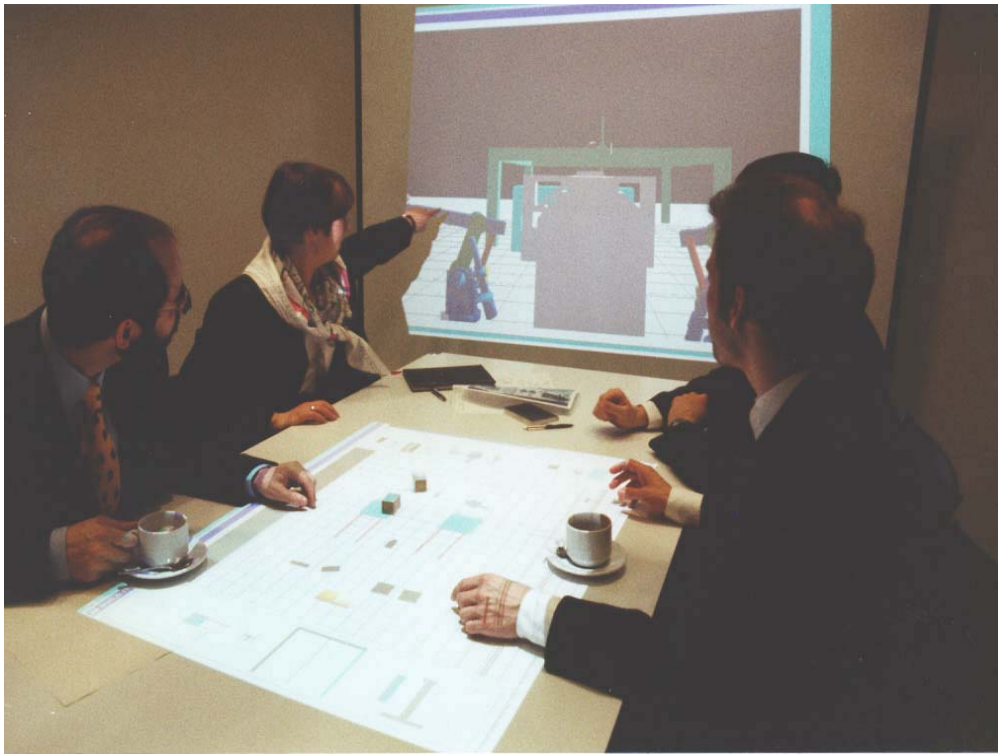


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BUILD-IT: a tool for integrative design



- design team with experts from different disciplines
- integration of **different expertise**
- intuitive interaction style
- an example for a natural user interface

How to meet the challenges?

Co-operation inside TUE



Research in perception, cognition, and action



Research in speech and computer graphics



Research in signal processing and pattern recognition

Co-operation outside TUE

