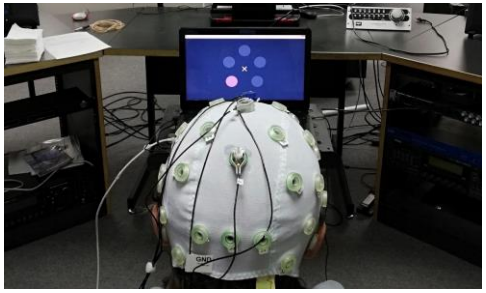
HUMAN COMPUTER INTERACTION

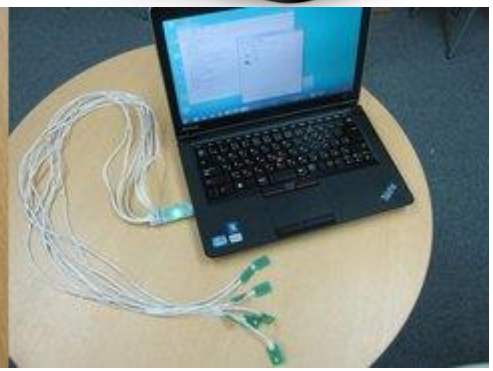
Gökhan İnce

Self-Introduction

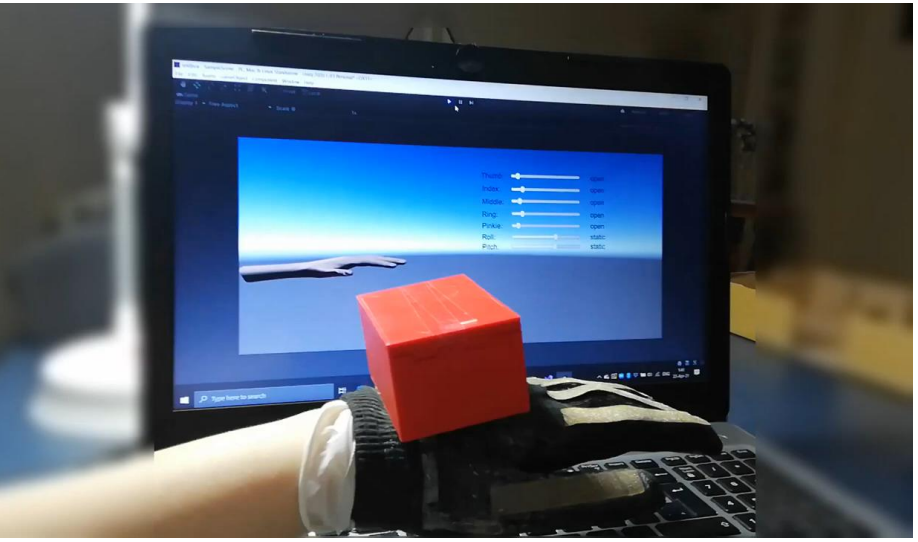
- Instructor
  - Dr. Gökhan Ince – gokhan.ince@itu.edu.tr
  - Office: EEB 4310
  - Web: www.gokhanince.com
  - Graduated from
    - Istanbul Technical University
    - Technische Universitaet Darmstadt
    - Tokyo Institute of Technology
  - Worked for
    - Honda Research Institute Europe – Germany (2 years)
    - Honda Research Institute Japan (4 years)
    - Faculty member at ITU (since 2012)
    - Founder of TRR Inc. (2013-2017)
  - Focus of research: Robotics, AI, Signal Proc., HCI

ARTIFICIAL INTELLIGENCE & HUMAN-COMPUTER INTERACTION RESEARCH





SOFT SENSORS & WEARABLES RESEARCH



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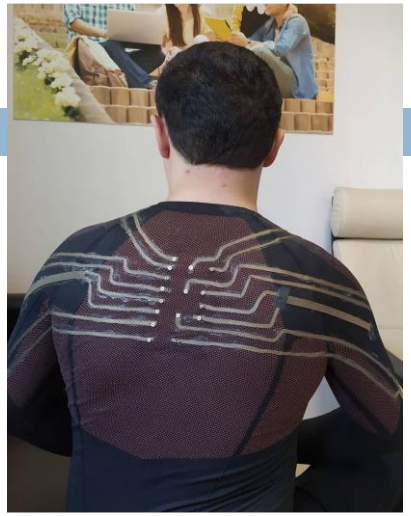

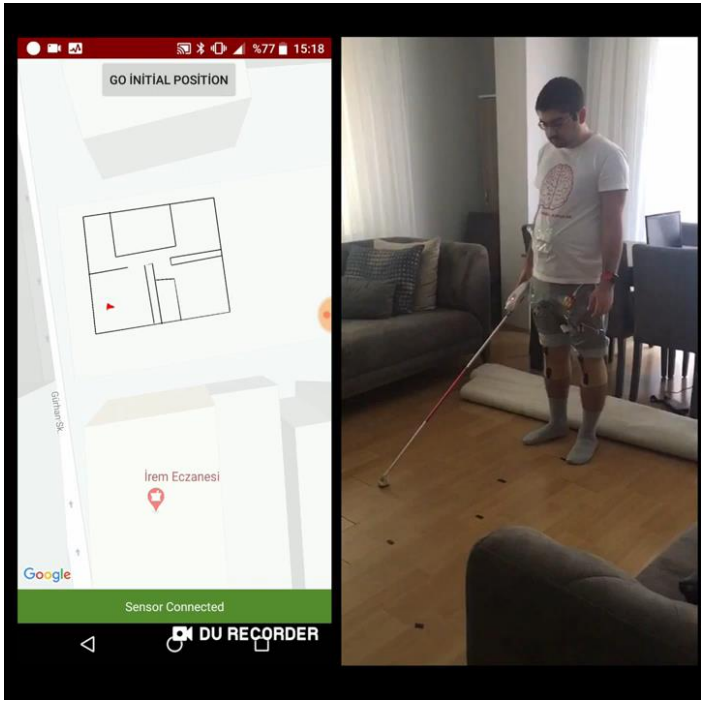

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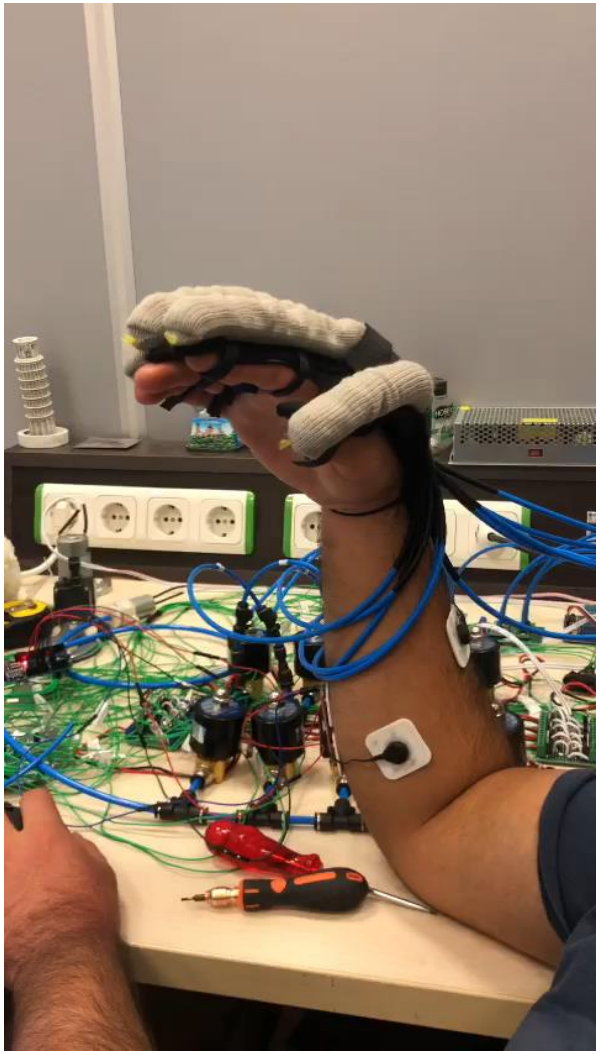

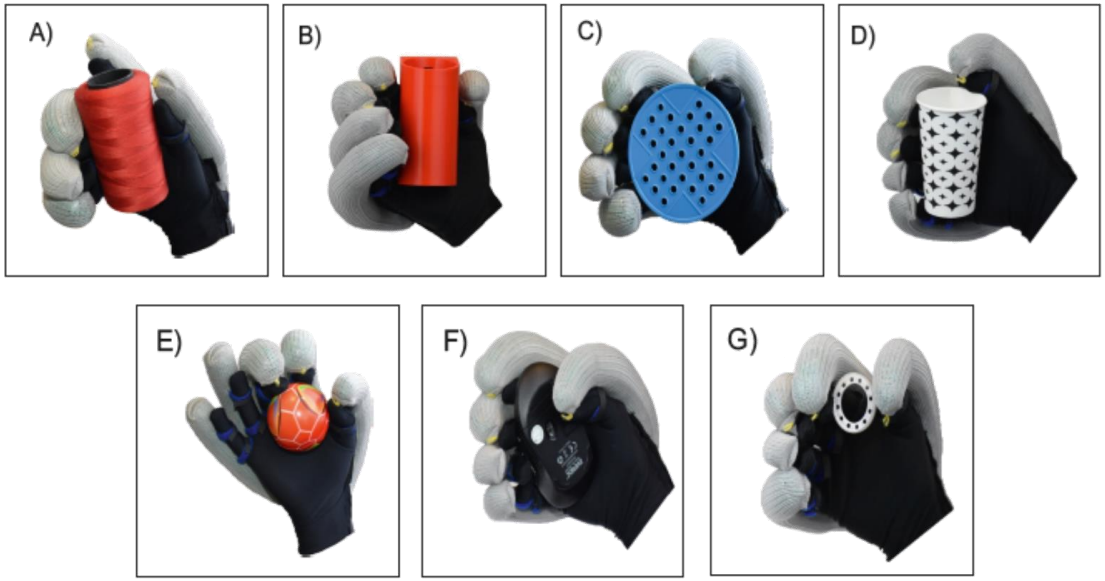

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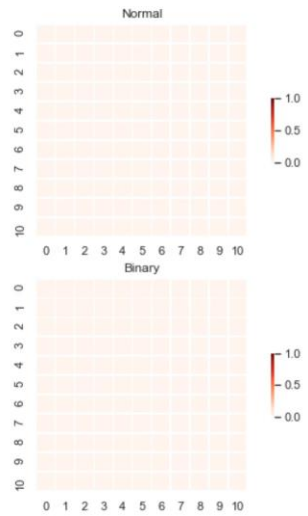
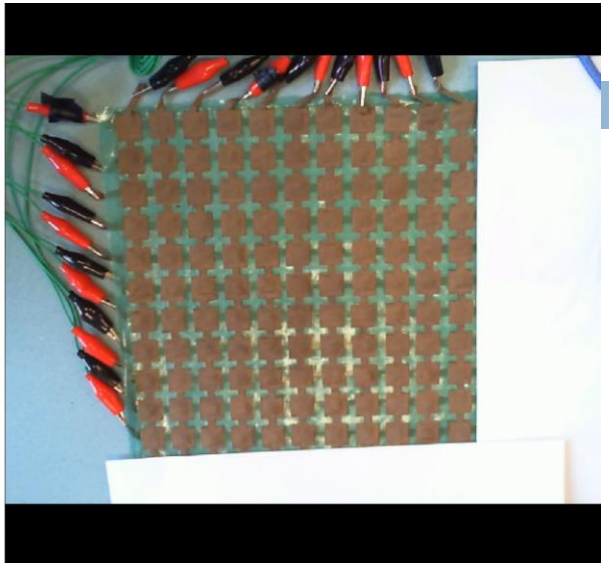
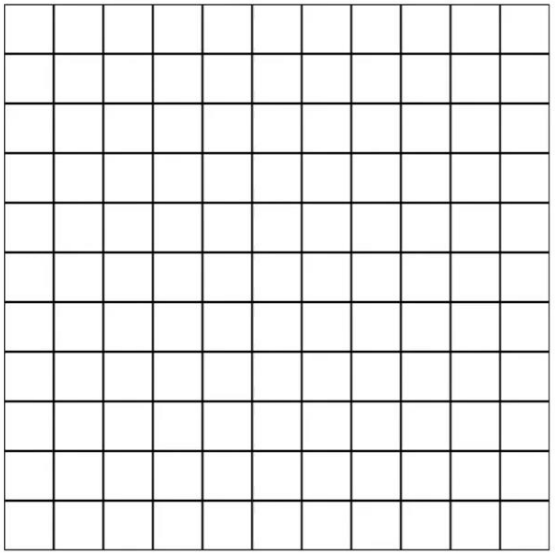
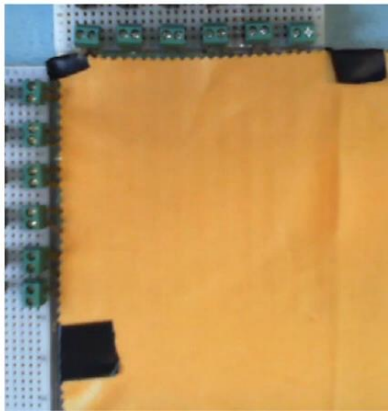






Gestures:



Human Computer Interface

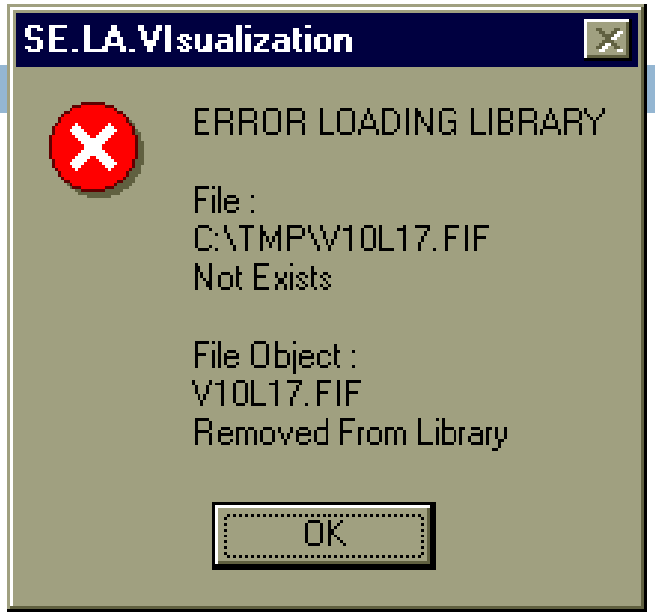
- What is Human Computer Interface?
  - Also known as
    - Man-Machine Interface
    - Computer-Human Interaction
    - Human-Computer Interaction
- What happens when a human and a computer get together to perform a task
  - Task - write document, calculate budget, solve equation, learn about a street, drive home,...
  - Task might be play, learning, communicating, …
  - Not just desktop computers
- A long term goal of HCI is to design systems that **minimize the barrier** between the human's cognitive model of what they want to accomplish and the computer's understanding of the user's task.

Intuition and insight into HCI

- How do you assess an interface?

Intro

- Why do we care about design?



- We see this all the time.
  - What's good about the design of this error box?
    - The user knows there is an error
  - What's poor about the design of this error box?
    - Discouraging
    - Not enough information
    - No way to *resolve* the problem (instructions or contact info)
  - Whose fault is this?

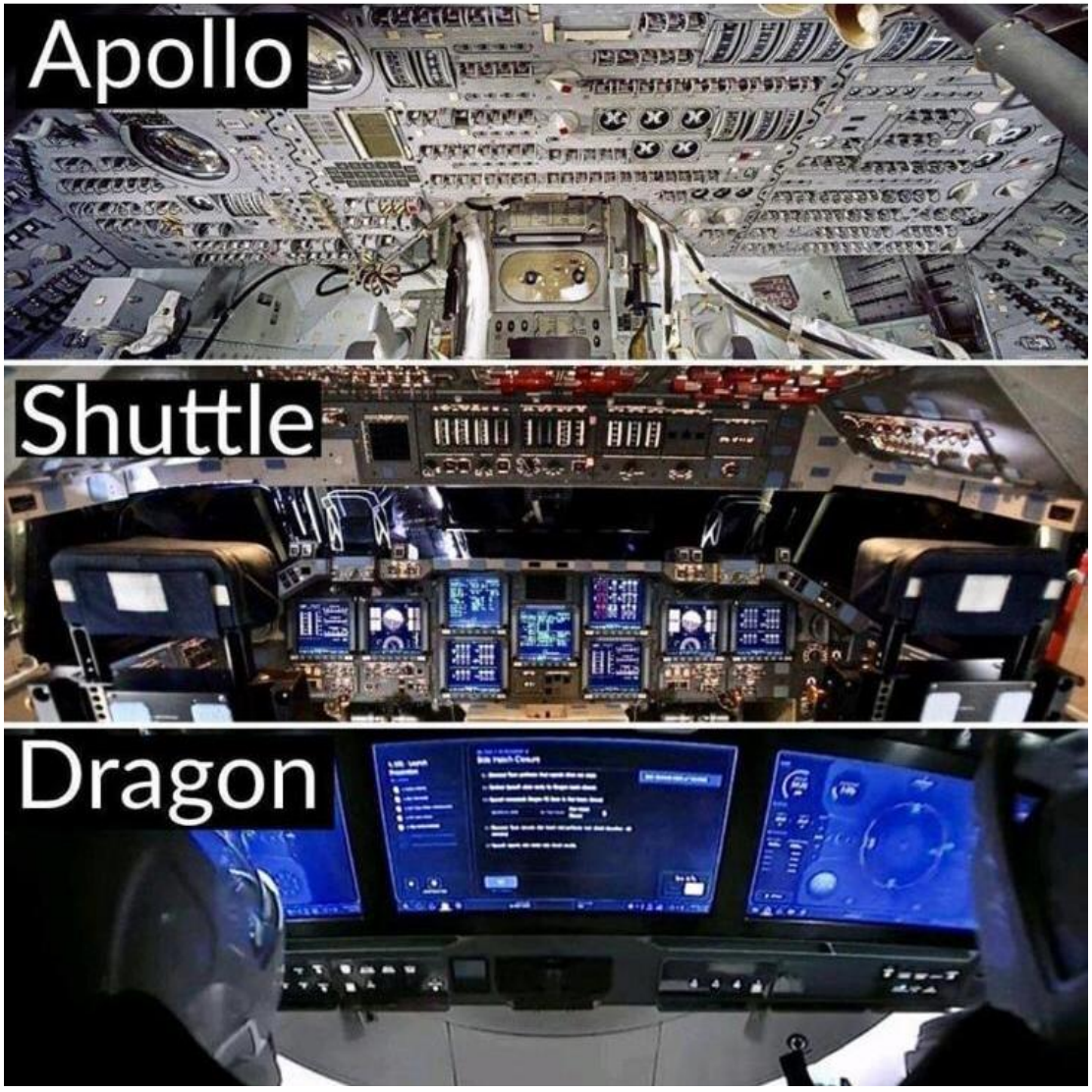
Definition of HCI

- Human-computer interaction is a discipline concerned with the **design, implementation** and **evaluation** of interactive computing systems for human use and with the study of major phenomena surrounding them.

Interfaces in the World

- Not just computers!
  - Mouse
  - Phone
  - Copier
  - Car
  - Plane cockpit
  - Airline reservation system
  - Air traffic control

Tendency towards Software



Famous Quotations

- "It is easy to make things hard. It is hard to make things easy." – Al Chapanis, 1982

- "Learning to use a computer system is like learning to use a parachute – if a person fails on the first try, odds are he won't try again." – anonymous

Why HCI is important

- The study of our interface with **information.**
- It is not just 'how big should I make buttons' or 'how to layout menu choices'
- It can affect
  - Effectiveness
  - Productivity
  - Morale
  - Safety
- Consider a **commercial** program, device, or product's interface
  - How would you describe the interface?
  - How would you describe the product to your friend?
  - Would you buy the product again?
  - Would you buy a product from the same company again?

People's Choice

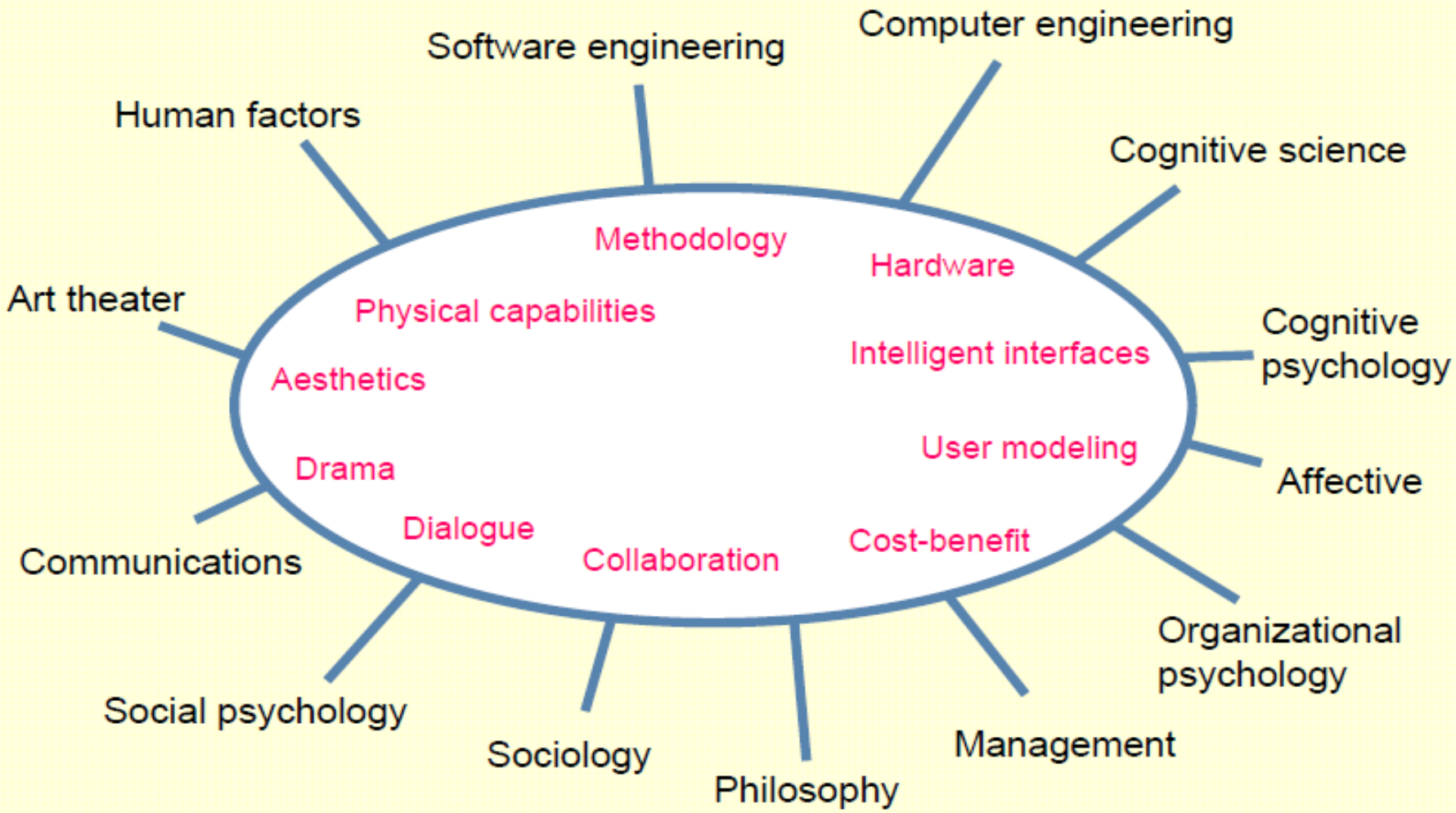
- iPhone 5 by Apple Computers (sold 5 mils. in 3 days)
- iPhone 5S+5C by Apple (sold 9 mils. in 3 days)
- iPhone 6 (sold over 10.mils in 3 days)
- iPhone 6S (sold over 13.mils in 3 days)
- iPhone 7 (company secret*)
- Update: iPhone X (was not revealed) …
- Pros:
  - Portable
  - High comp. power
  - Numerous cool apps
  - Ease of use
- Cons:
  - Scratches or breaks easily
  - Many have one

*http://nypost.com/2016/09/08/apple-will-keep-first-weekend-sales-for-iphone-7-secret/

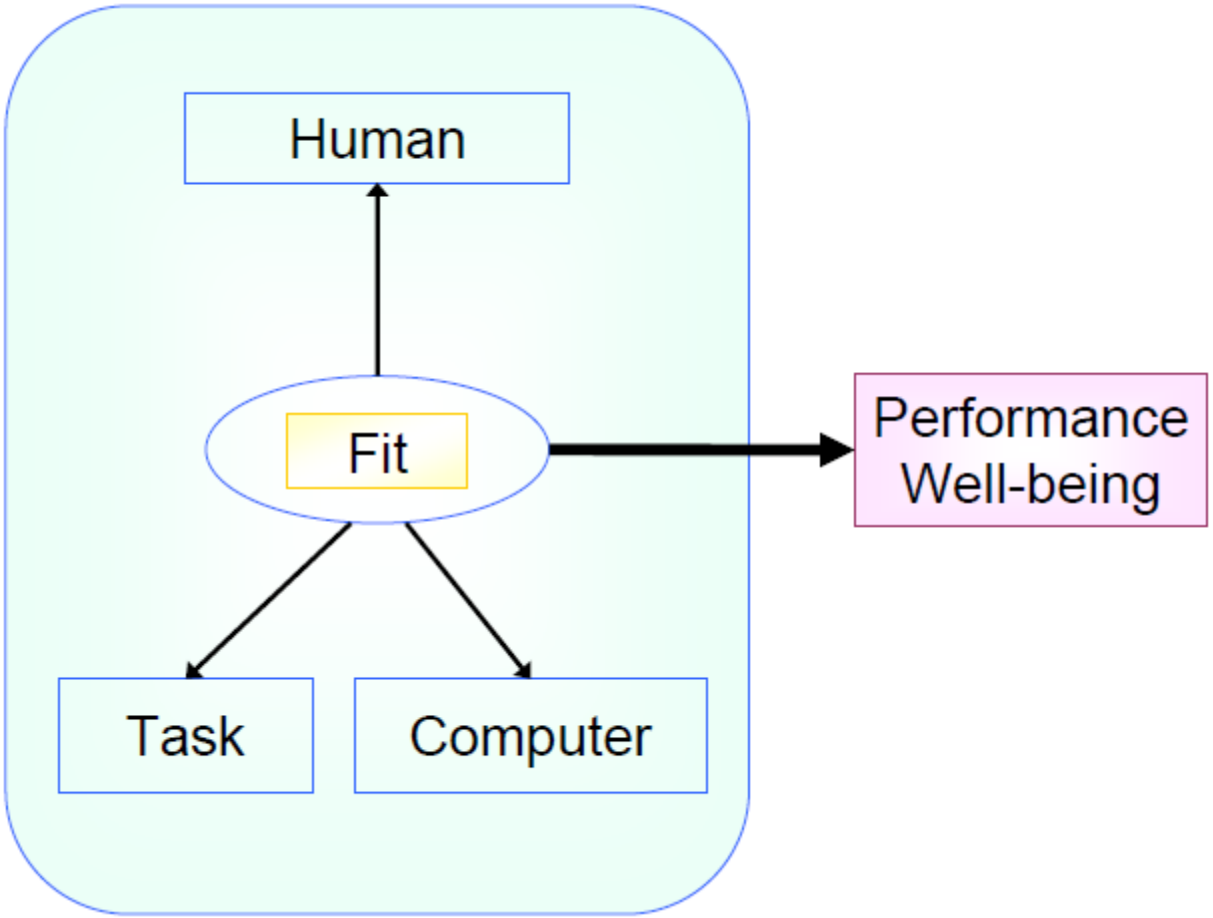
What fields does HCI cover?

- Computer Science
- Psychology
- Communication
- Education
- Anthropology
- Design (e.g. graphic and industrial)

Human-computer interaction as an interdisciplinary field

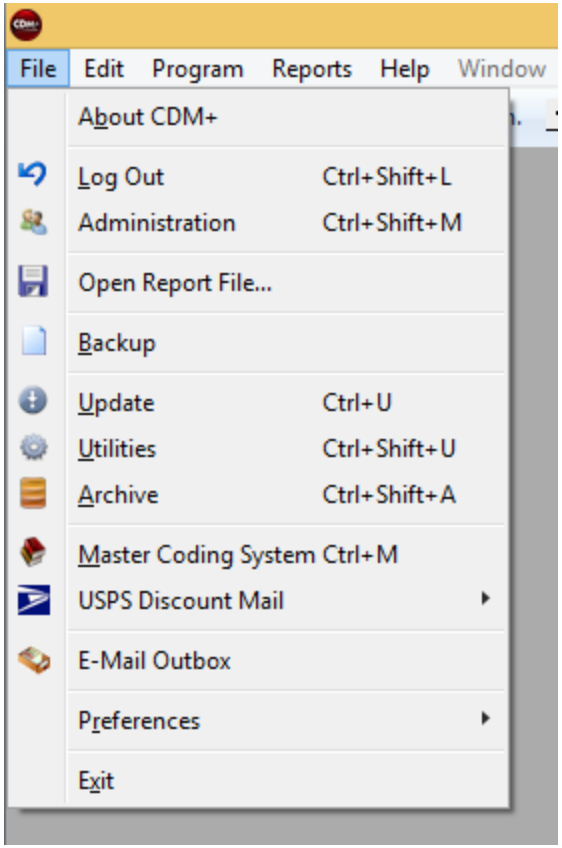


The fit of HCI elements leads to performance and well-being



HCI Community

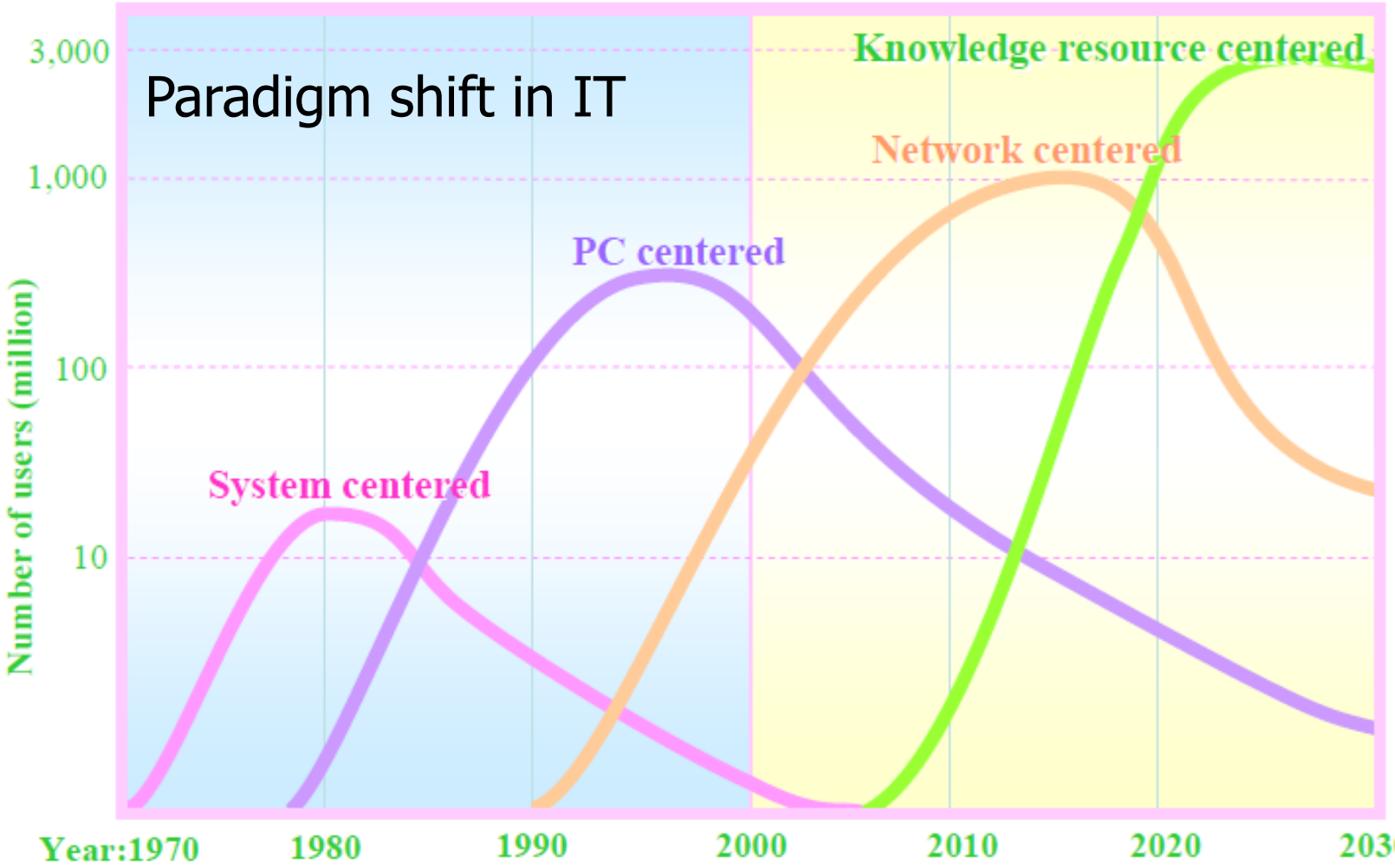
- Academics/Industry Research
  - Taxonomies (classification)
  - Theories
  - Predictive models
- Experimenters
  - Empirical data
  - Product design
- Other areas (sociologists, anthropologists, managers)
  - Motor
  - Perceptual
  - Cognitive
  - Social, economic, ethics



Goals of HCI

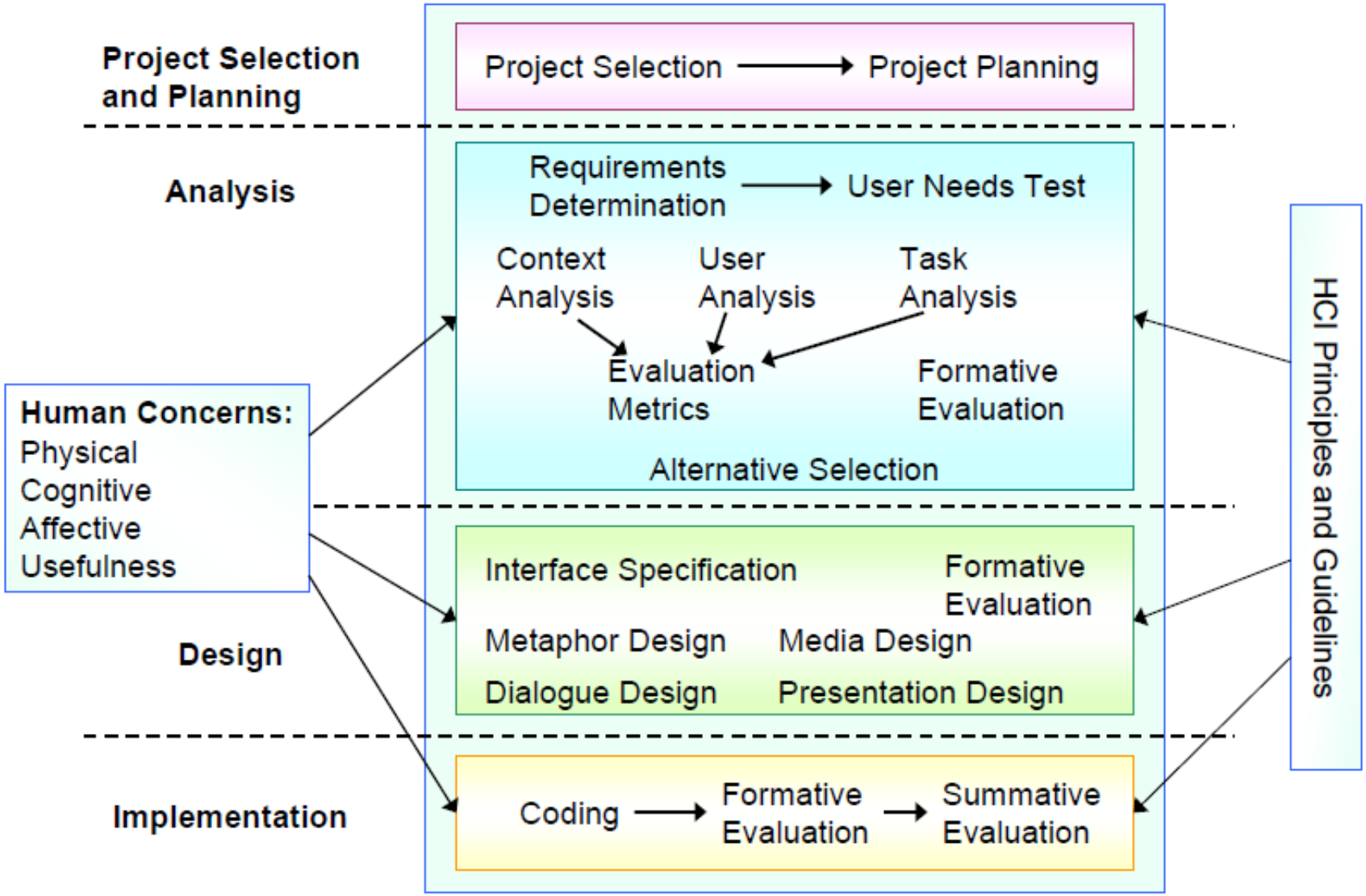
- Allow users to carry out tasks
  - Safely
  - Effectively
  - Efficiently
  - Enjoyably

Reading the trends



David C. Moschella: "Waves of Power"

Overall HCI development methodology



HCI Tools

- Sound
- 3D
- Gestures
- Animation
- Video
- Devices
  - Size (small→very large)
  - Portable (PDA, phone, tablet)
- Context sensitive/aware
- Personalizable
- Ubiquitous

Usability Requirements

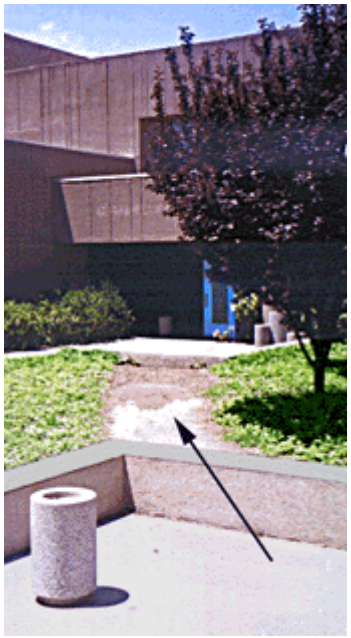
- Goals:
  - Usability
  - Universality
  - Usefulness
- Measures:
  - Time to learn
  - Speed of performance
  - Rate of errors
  - Retention (i.e. remembering) over time
  - Subjective satisfaction
- Achieved by:
  - Planning
  - Sensitivity to user needs
  - Devotion to requirements analysis
  - Testing

Bad Interfaces

- Encumbering
- Confusing
- Slow
- Trust (e.g. windows crashing)
- What makes it hard?
  - Varies by culture
  - Multiple platforms
  - Variety of users
- 22 ways to kill a patient
  - bit.ly/bWfcsr

- What's wrong with each?
  - Type of error
  - Who is affected
  - Impact

- What's a redesign solution?



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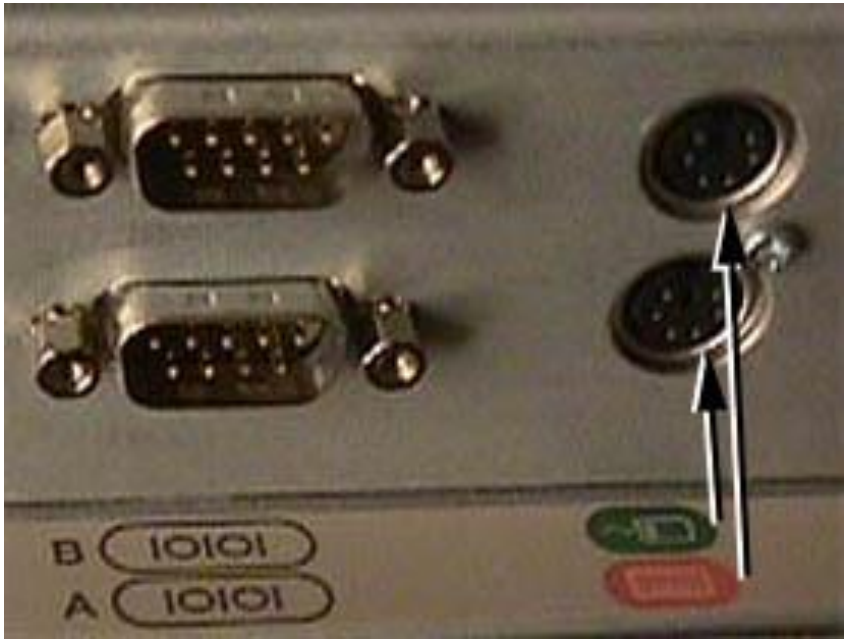

Usability Labs

- IBM early leader
- Microsoft next (>25 labs)
- Now hundreds of companies
- Recording equipment of all sorts

Ethical Concerns

- IRB (Institutional Review Board) items
  - Participation should be voluntary
  - Informed consent should be obtained
  - Focus users on interface
  - Tell them the task, duration
- Logging and recording (privacy)
- Anonymity and confidentiality
  - No individuals will be identified
- Data Integrity and Presentation
  - tendency to soften bad results to preserve relationship with the team

Books

- B. Shneiderman, *Designing the User Interface, 5th Edition, Addison-Wesley, 2010.*
- Alan Dix, Janet Finlay, Gregory Abowd, & Russell Beale, *Human-Computer Interaction (3rd ed.), Prentice Hall, 2003.*
- Donald Norman, *The Design of Everyday Things, Basic Books, 2002.*
- Jonathan Lazar, Jinjuan Heidi Feng, Harry Hochheiser, Research Methods in Human-Computer Interaction, 2010