

2110443
Human Computer Interaction

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Overview

- Human-Computer Interaction (HCI)
 - ✦ a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them.
- The Association for Computing Machinery's Special Interest Group on Computer-Human Interaction (ACM SIGCHI)

Resources

- **HCI Bibliography** : Human-Computer Interaction Resources <http://www.hcibib.org/>
- Common Front Group at Cornell
<http://cfg.cit.cornell.edu/cfg/design/contents.html>
- <http://www.aw.com/DTUI/>
- <http://developer.java.sun.com/developer/techDocs/hi/jlf-home.html>
- <http://www.useit.com>

Introduction

- Main focus of HCI is UID

- What is involved in UI?
 - H/W
 - Behavior of S/W
 - Supporting Documentation

Who Builds Interfaces?

- A team of specialists (ideally)
 - graphic designers
 - interaction / interface designers
 - technical writers
 - marketers
 - test engineers
 - software engineers
 - customers

Human-Computer Interaction (HCI)

➤ Human

- the end-user of a program
- the others in the organization

➤ Computer

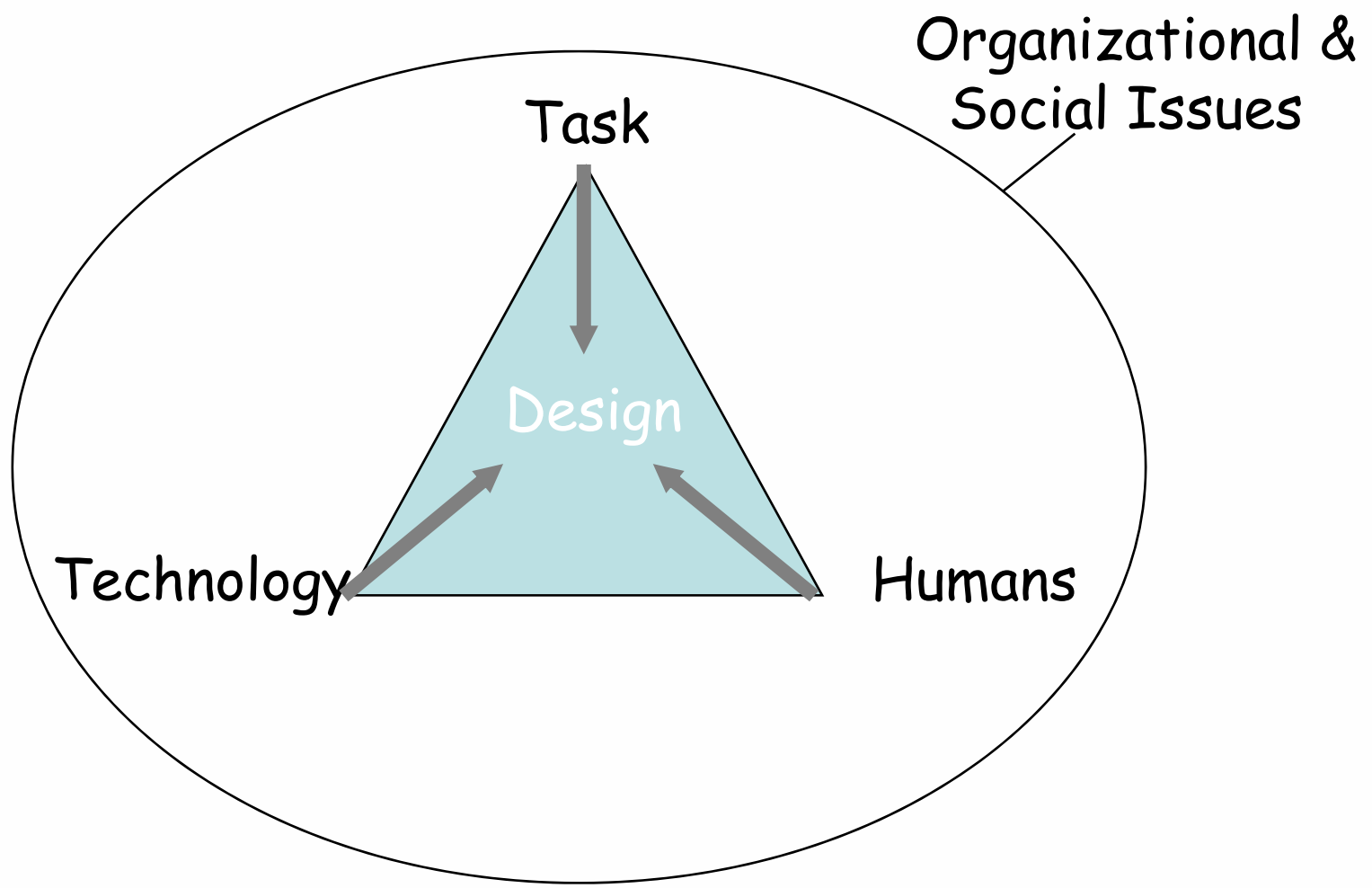
- the machine the program runs on
- often split between clients & servers



➤ Interaction

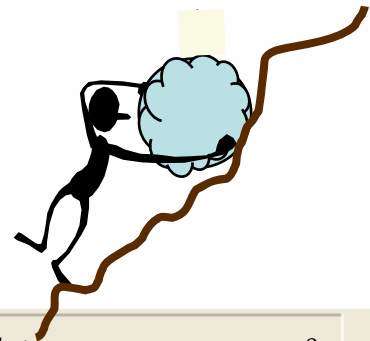
- the user tells the computer what they want
- the computer communicates results

What is HCI?

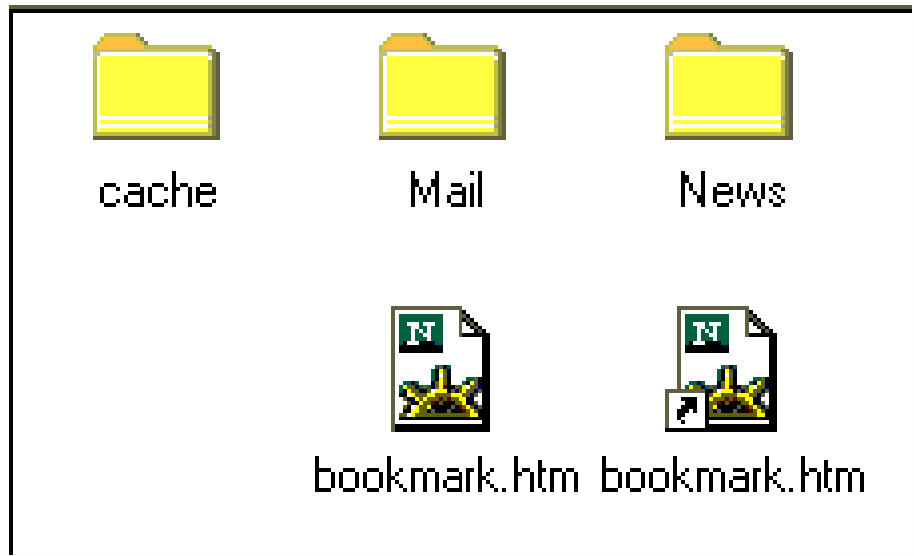


Why Study User Interfaces?

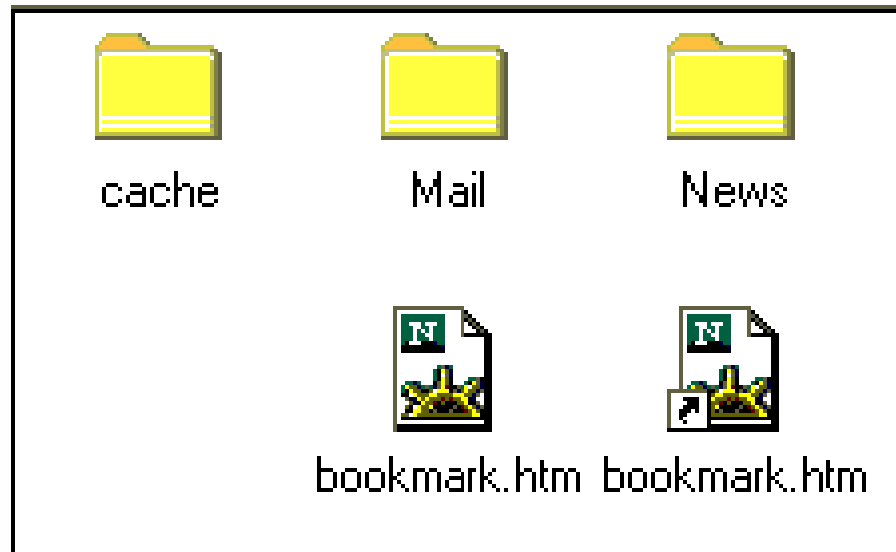
- Major part of work for “real” programs
 - ✦ approximately 50%
- You will work on “real” software
 - ✦ intended for people other than yourself
- Bad user interfaces cost
 - ✦ money (5%↑ satisfaction -> up to 85%↑ profits)
 - ✦ lives (Therac-25)
- User interfaces hard to get right
 - ✦ people are unpredictable



Interface Hall of Shame or Fame?



Interface Hall of Shame



- ▶ Hard to tell the difference between the two icons & names

User Interface Design Goals

“Usability”

What is Usability?

- 1. Learnability*
- 2. Efficiency*
- 3. Memorability*
- 4. Errors*
- 5. Satisfaction*

Learnability

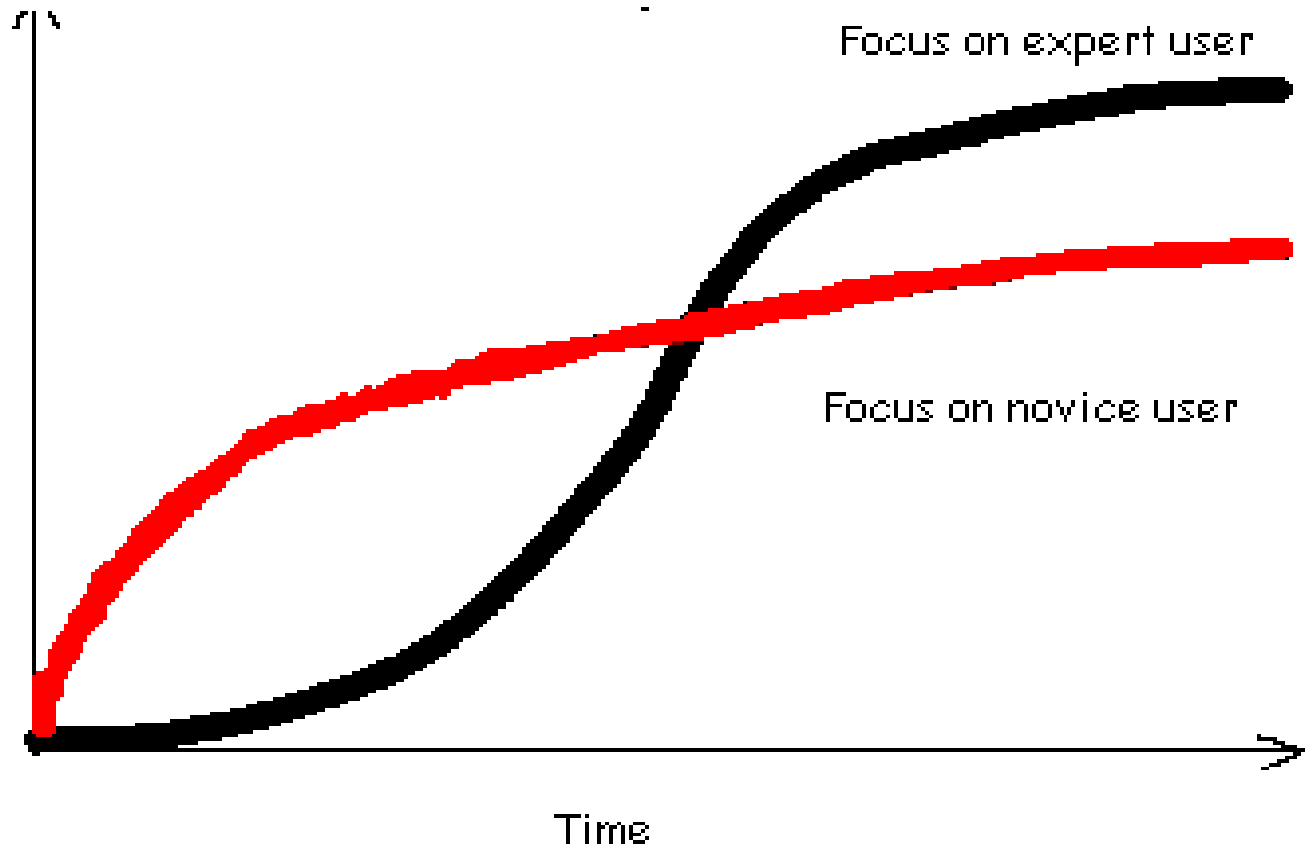
- Easy to learn
- How long does it take for typical member of the community to learn relevant task?

Efficiency

- How long does it take to carry out the benchmark set of tasks?
- A high level of productivity is possible
- Efficiency refers to the expert user's steady-state level of performance at the time when the learning curve flattens out.
- Speed of performance

Efficiency

Usage proficiency and efficiency



Memorability

- Easy to remember
- Frequency of use and ease of learning help make for better user retention
- Retention over time

Errors

- Low error rate
- How many and what kinds of errors are commonly made during typical applications?

Satisfaction

- Pleasant to use
- Allow for user feedback via interviews, free-form comments and satisfaction scales
- Questionnaires in 1-5 or 1-7 rating scales
- Likert scales or semantic differential scales

Trade-offs

- The system may be easy to learn or eventually efficient, though initially hard to learn
- Alternatives:
 - providing a UI w/ multiple interaction styles
 - Accelerators

User-centered Design

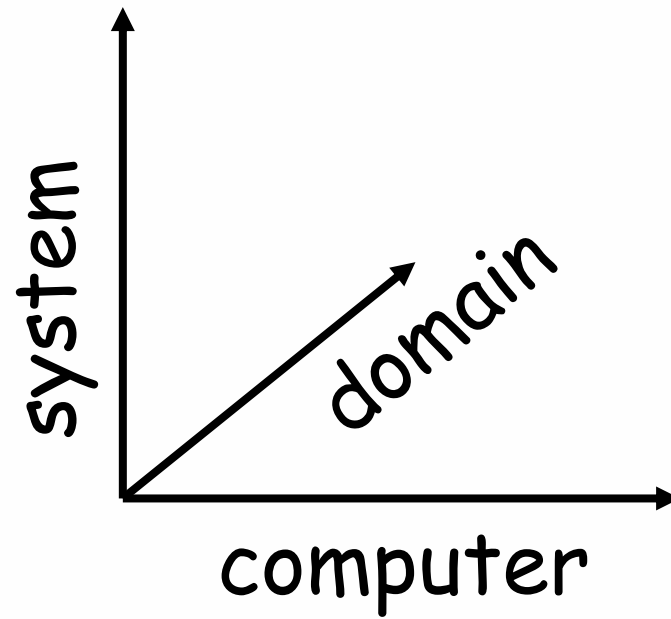
“Know the Users”

- Cognitive abilities
 - visual & aural perception
 - physical manipulation
 - memory
- Organizational / job abilities
- Keep users involved throughout project

Categories of User

- Novice User of System vs. Expert User of System
 - Minimal Computer Experience vs. Extensive Computer Experience
 - Ignorant about Domain vs. Knowledgeable about Domain
- * Difference between individual user is very high.

Categories of User



Accommodation of Human Diversity

- Physical abilities and physical workplaces
 - There is no average user
 - Physical measurement of human dimensions are not enough,
 - Dynamic measurement needed, e.g., reach, strength, or speed
 - Vision: depth, contrast, color blindness, and motion sensitivity
 - Touch: keyboard and touchscreen sensitivity
 - Hearing: audio clues must be distinct
 - Workplace design

Accommodation of Human Diversity

➤ Cognitive and perceptual abilities

✦ Cognitive process/central process

- short-term memory
- long-term memory and learning
- problem solving
- decision making
- attention and set
- search and scanning
- time perception

Accommodation of Human Diversity

- Cultural and international diversity
 - Characters, numerals, special characters
 - Left-to-right versus right-to-left versus vertical input and reading
 - Date and time formats
 - Weights and measures
 - Telephone numbers addresses

Accommodation of Human Diversity

- Users with disabilities
 - ✦ Designers must plan early to accommodate user with disabilities
 - ✦ Early planning is more cost efficient than adding later
- Elderly Users
 - ✦ Including the elderly is fairly ease, designers should allow for variability with in their applications via settings for sound, color, brightness, font size, etc.

การมีปฏิสัมพันธ์คืออะไร

➤ การติดต่อสื่อสารระหว่าง



• ภาษาของงาน
• (task language)



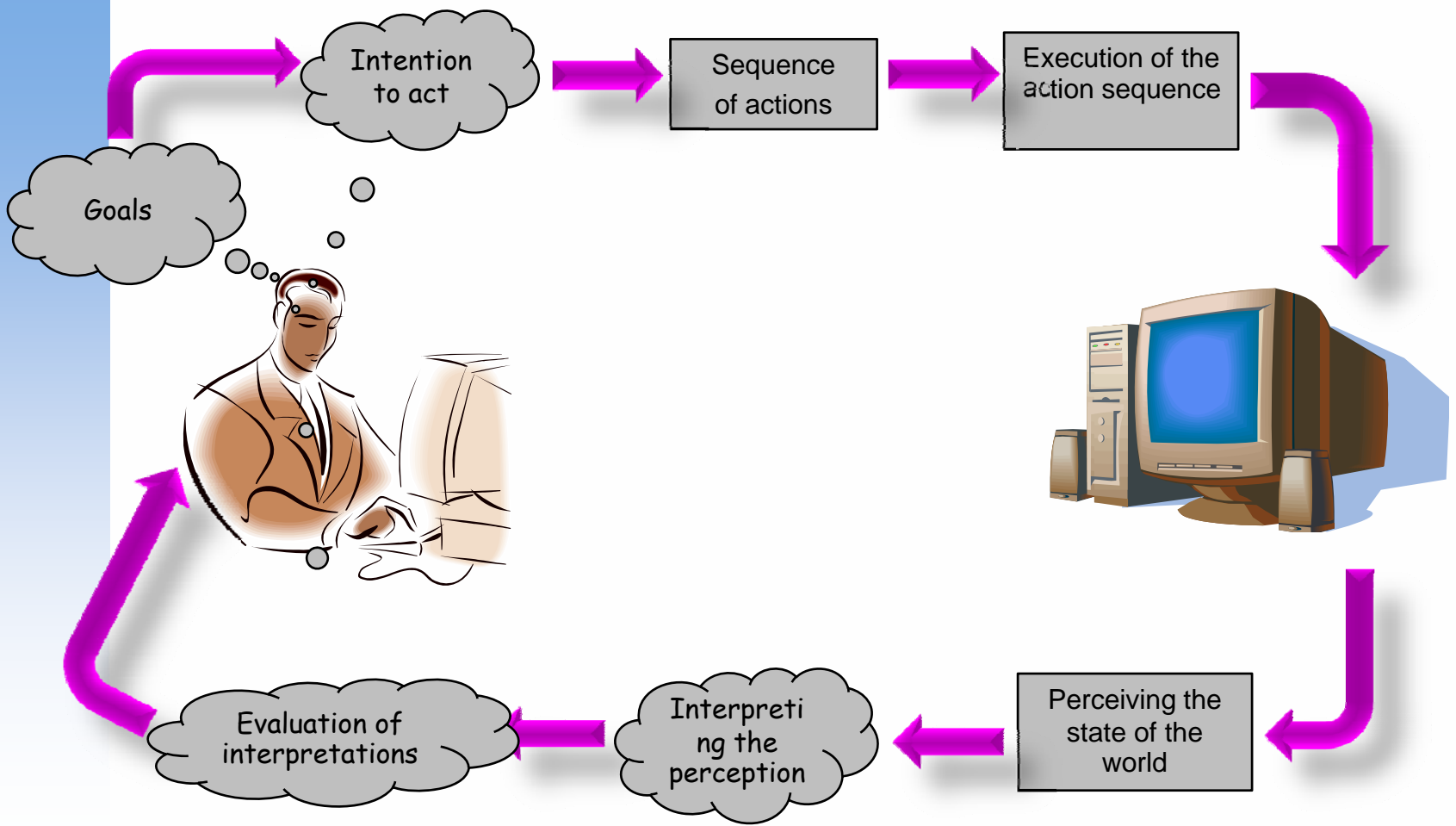
• ภาษาแก่น
• (core language)

แบบจำลองของ โคนัล นอร์แมน (*Donald Norman's Model*)

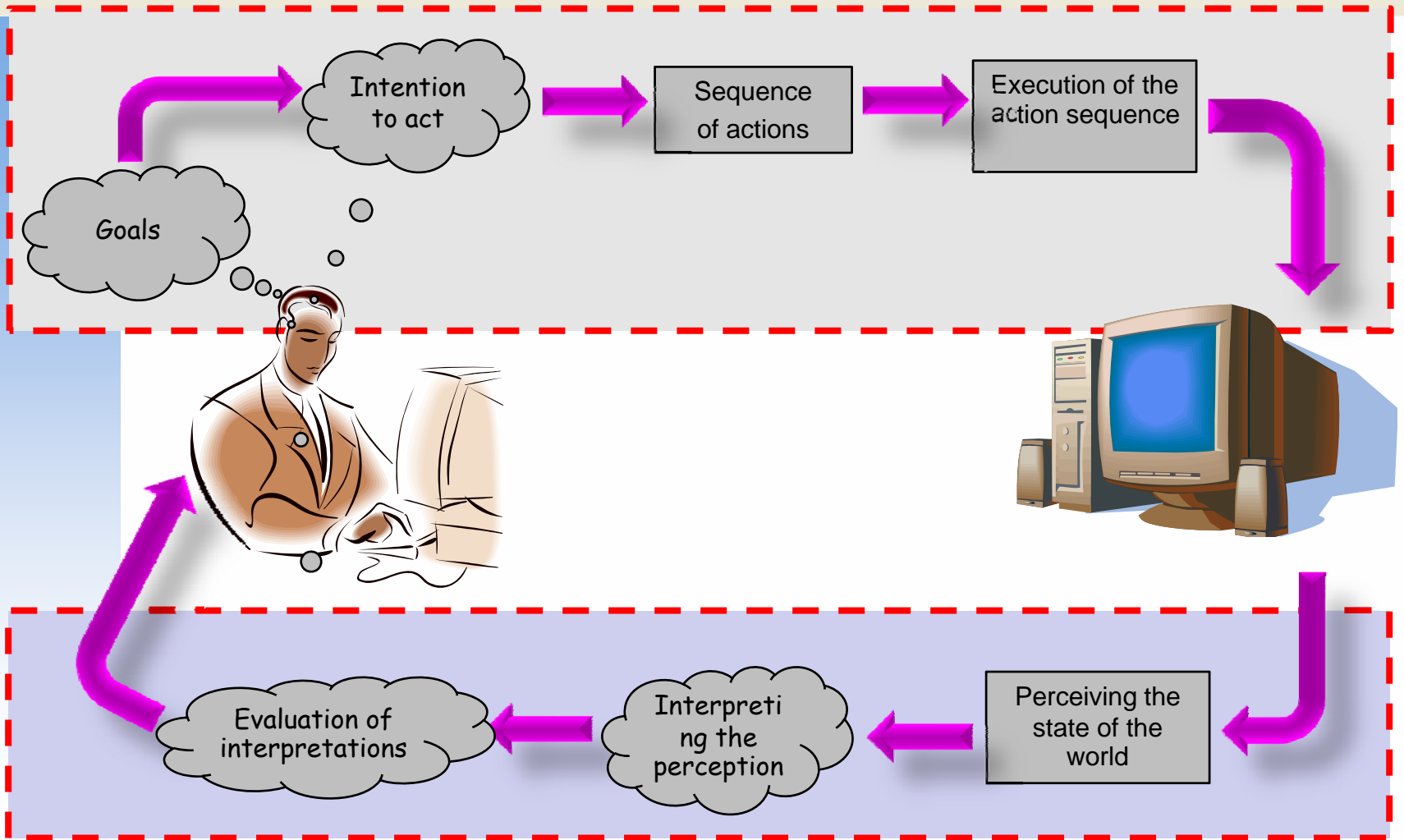
มี 7 ระยะ

1. ตั้งเป้าหมาย (forming the goal)
2. สร้างความตั้งใจ (forming the intention)
3. กำหนดการกระทำที่ส่วนต่อประสาน (specifying action at interface)
4. ดำเนินตามการกระทำ (executing the action)
5. รับรู้สถานะของระบบ (perceiving the system state)
6. แปลสถานะของระบบ (interpreting the system state)
7. ประเมินผลลัพธ์เปรียบเทียบกับเป้าหมาย (evaluating the outcome respect to goal)

Human Activity Cycle



Human Activity Cycle



ตัวอย่าง

- ▶ สมมติเรากำลังนั่งอ่านหนังสืออยู่ ปรากฏว่าต้องการแสงเพิ่ม
 - ▶ เป้าหมาย: ต้องการแสงเพิ่ม
 - ▶ การกระทำ: เปิดคอมไฟ
 - ▶ เอื้อมมือไปเปิด
 - ▶ ถ้ามีคนอื่นอยู่ใกล้คอมไฟก็วานให้เปิดให้
 - ▶ ผล
 - ▶ ไฟเปิด
 - ▶ ไฟไม่เปิด
 - ▶ จะทำอะไรต่อไป

การนำเอาแบบจำลองของนอร์แมน ไปใช้

- ทำไมส่วนต่อประสานกับผู้ใช้บางระบบใช้ยากกว่าระบบอื่น
- เหวลึกของการกระทำ (Gulfs of execution)
 - ✦ ความแตกต่างระหว่างการวางเป้าหมายของการกระทำ กับการกระทำที่ระบบมีให้
- เหวลึกของการประเมิน (Gulfs of evaluation)
 - ✦ ความแตกต่างของการแสดงสถานะของระบบกับความคาดหวังของผู้ใช้

สรุป

➤ Usability

➤ ลักษณะของผู้ใช้

➤ แบบจำลองของนอร์แมน