



# Chapter 1

## Overview of HCI

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- Reference :
1. Dix, A.J., Finlay, J.E., Abowd, G.D., and Beale, R. 2004.  
Human - Computer Interaction, 3<sup>rd</sup> ed. Prentice Hull Europe.
  2. Norman, D.A. 2002. The Design of Everyday Things.  
Basic Books.

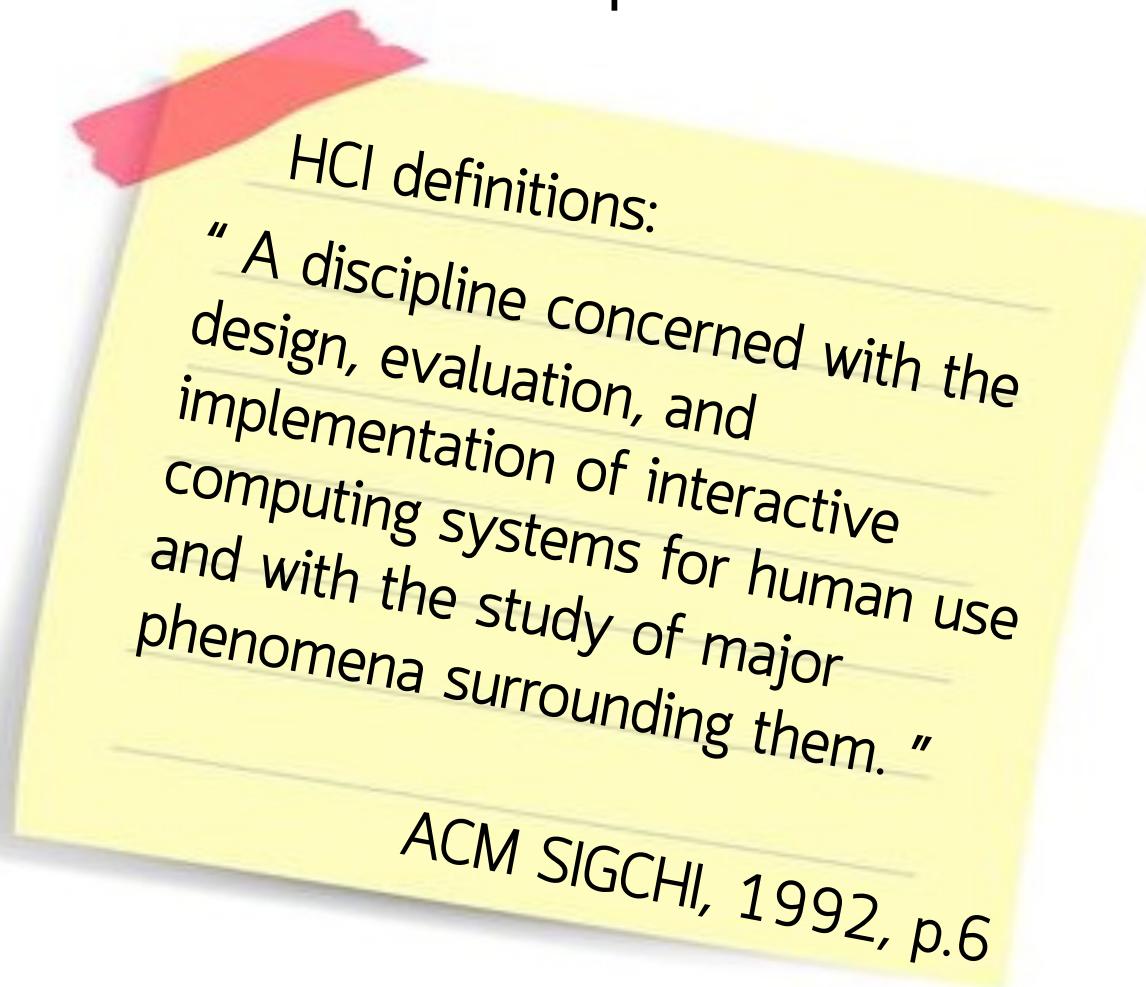
# Outline

- 1) What is HCI?
- 2) The goals of HCI
- 3) Overview: Map of HCI
- 4) Principles to ensure good HCI
- 5) The challenge of HCI
- 6) Example of successful diverse applications



# What is HCI ?

- ❖ HCI stands for Human-Computer Interaction.



# What is HCI ?



- ❖ UI is also known as Man-Machine Interface (MMI). The followings are UI definitions:

“Those aspects of the system that the user comes in contact with.”

Moran, 1981

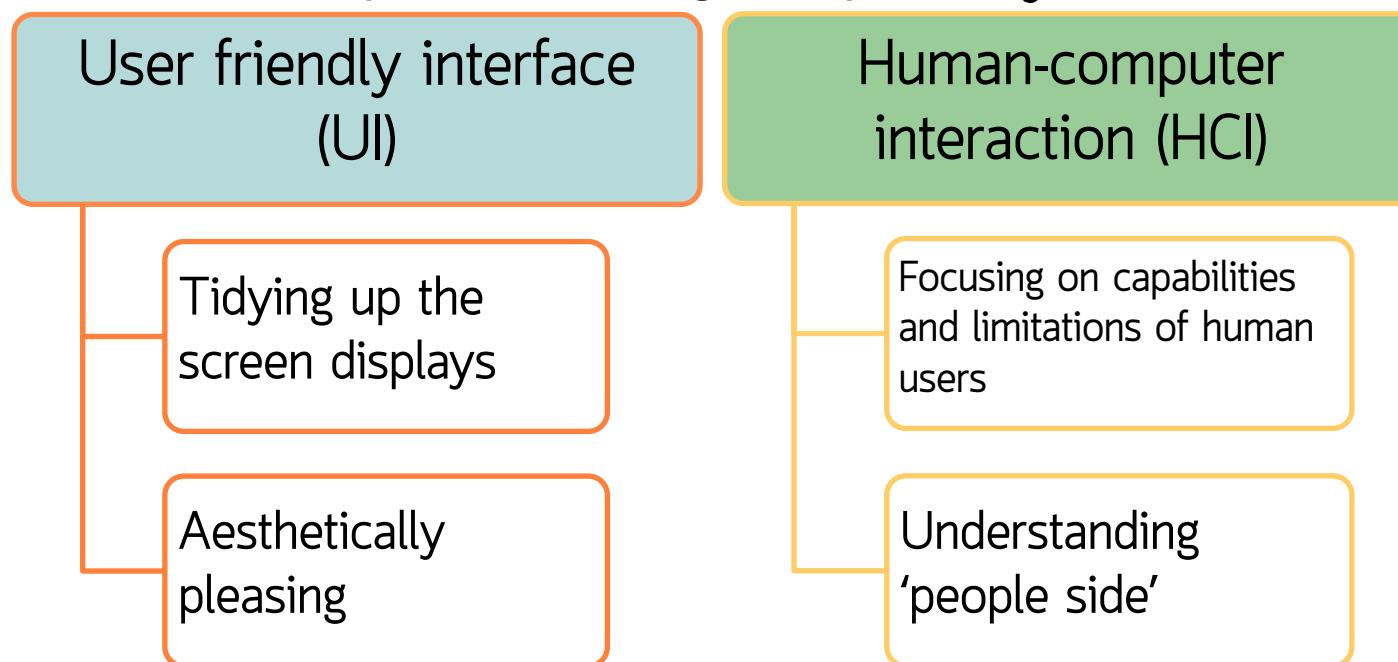
“An input language for the user, an output language for the machine, and a protocol for interaction.”

Chi, 1985

# What is HCI ?

- ❖ The differences between the terms 'user interface' and 'human-computer interaction':

Example: Producing computer systems



Training issues, working practices, management and organizational issues and health hazards are important factors contributing to the success or failure of using computer systems.

# The goals of HCI

## ❖ Goals of HCI

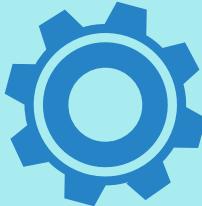
To produce usable and safe systems, as well as functional or systems.

To develop or improve the safety, utility, effectiveness, efficiency, and usability of systems that include computers.

Interacting with computers, 1989

# The goals of HCI

## System



- An entire environment uses or is affected by the computer technology. (not just hardware and software)
- e.g. an organization of people at work, at home or engaged in leisure pursuits



## Effectiveness and efficiency

- Improving effectiveness and efficiency are self-evident and ubiquitous



## Safety

- The promotion of safety in relation to computer systems is of paramount importance in the design of safety-critical systems

# The goals of HCI



## Utility

- The functionality of a system or, in other words, the things it can do



## Usability

- A key concept in HCI
- Concerning with making systems easy to learn and easy to use

# The goals of HCI

- ❖ Underlying all HCI research and design is the belief that:



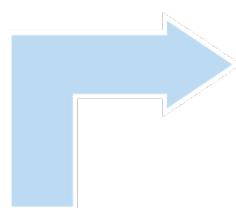
“ The people using a computer system should come first. Their needs, capabilities and preferences for performing various activities should inform the ways in which systems are designed and implemented. ”

“ People should not have to change radically to fit in with the system, the system should be designed to match their requirements. ”

# The goals of HCI

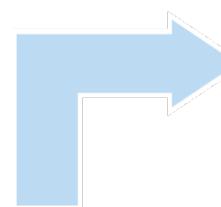
## 1. Understand

Psychological,  
Ergonomic,  
Organizational and  
Social factors



## 2. Develop

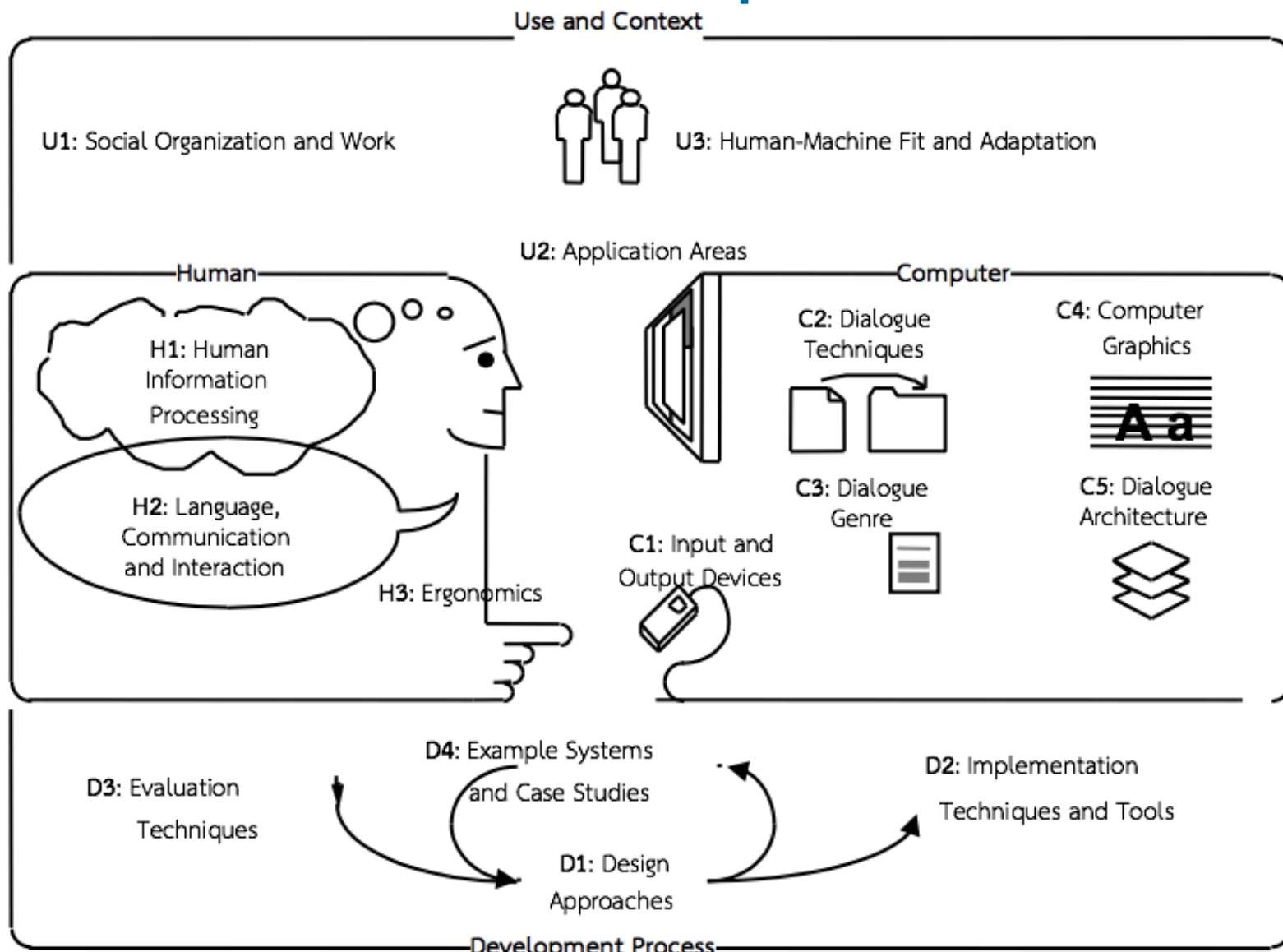
Tools and  
Techniques to help  
designers ensure  
the usability of the  
computer system



## 3. Achieve

Efficient,  
Effectiveness and  
Safe interaction in  
both individual and  
group interactions

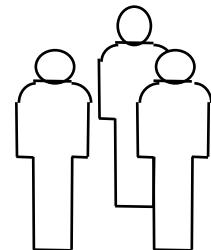
# Overview: Map of HCI



# Overview: Map of HCI

## ❖ Use and context of computers

*Problems of fitting computers, their uses, and the context of use together*



### Social organization and work

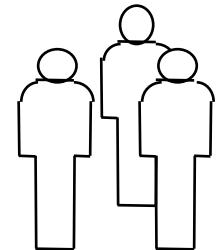
humans are interacting social beings

considers models of human activity: small groups, organizations, socio-technical systems

quality of work life...

# Overview: Map of HCI

## ❖ Use and context of computers (continued)



### Application areas

- characteristics of application domains, e.g. individual vs group work
- popular styles
  - document production, communications, design, tutorials and help, multi-media information kiosks, continuous control (cockpits, process control), embedded systems (copiers, home appliances)

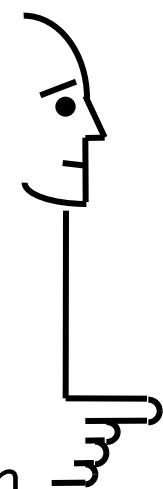
### Human-machine fit and adaptation

- improve the fit between the designed object and its use
  - how systems are selected and adopted; how users improvise routine systems; how systems adapt to the user (customization); how users adapt to the system (training, ease of learning); user guidance (help, documentation, error-handling)

# Overview: Map of HCI

## ❖ Human characteristics

*To understand the human as an information-processing system, how humans communicate, and people's physical and psychological requirements*



### Human information processing

- characteristics of the human as a processor of information
  - memory, perception, motor skills, attention, problem-solving, learning and skill acquisition, motivation, conceptual models, diversity...

### Language, communication and interaction

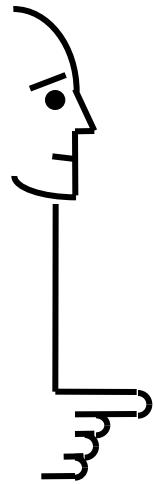
- aspects of language
  - syntax, semantics, pragmatics; conversational interaction, specialized languages

# Overview: Map of HCI

## ❖ Human characteristics (Continued)

### Ergonomics

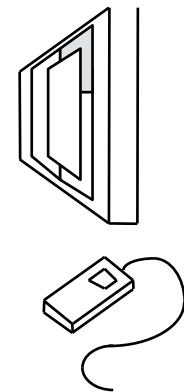
- anthropometric and physiological characteristics of people and their relationship to workspace and the environment
  - arrangement of displays and controls; cognitive and sensory limits; effects of display technology; fatigue and health; furniture and lighting; design for stressful and hazardous environments; design for the disabled...



# Overview: Map of HCI

## ❖ Computer system and interface architecture

*The specialized components computers have for interacting with people*



### Input and output devices

- mechanics and characteristics of particular hardware devices, performance characteristics (human and system), esoteric devices, virtual devices

### Dialogue techniques

- the basic software architecture and techniques for interacting with humans
  - e.g. dialog inputs and outputs; interaction styles; issues

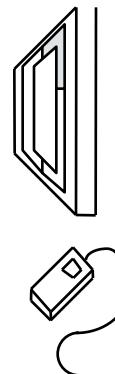
# Overview: Map of HCI

## ❖ Computer system and interface architecture (Continued)

### Dialog genre

- The conceptual uses to which the technical means are put
  - e.g. interaction and content metaphors, transition management, style and aesthetics

### Computer graphics



- basic concepts from computer graphics that are especially useful to HCI

### Dialogue architecture

- software architecture and standards for interfaces
  - e.g., screen imaging; window managers; interface toolkits; multi-user architectures, look and feel, standardization and interoperability

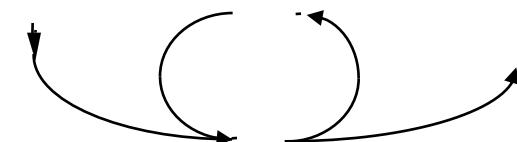
# Overview: Map of HCI

## ❖ The Development Process

*The construction and evaluation of human interfaces*

### Design approaches

- the process of design
  - e.g. graphical design basics (typography, color, etc); software engineering; task analysis; industrial design...



### Implementation techniques and tools

- tactics and tools for implementation, and the relationship between design, evaluation and implementation
  - e.g. prototyping techniques, dialog toolkits, object-oriented methods, data representation and algorithms

# Overview: Map of HCI

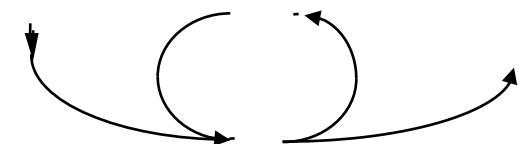
## ❖ The Development Process (Continued)

### Evaluation techniques

- philosophy and specific methods for evaluation
  - e.g. productivity, usability testing, formative and summative evaluation

### Example systems and case studies

- classic designs to serve as example of interface design genres



# Principles to ensure good HCI

❖ Two principles to ensure good HCI:

## ★ Visibility

- Having visible controls and good mapping with their effects
- We can see what we do, response is turned back immediately

## ★ Affordance

- Suggesting functionality
- The properties of objects - what sorts of operations and manipulations can be done to a particular object.  
e.g.      Doors afford opening.

A chair affords support.

★ **Perceived affordance** is very important !!! - what a person thinks can be done with the object.

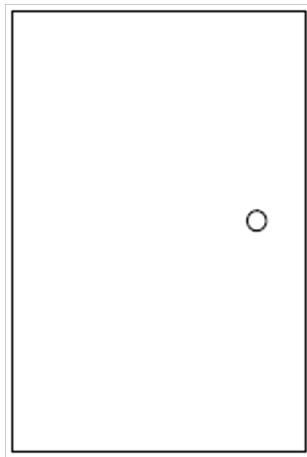
# Principles to ensure good HCI



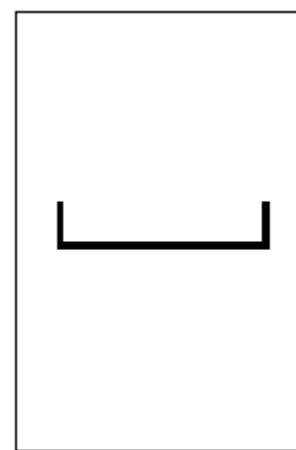
Does the design of the door suggest that it should be pushed open or pulled?

# Principles to ensure good HCI

- ❖ Ambiguous door designs:



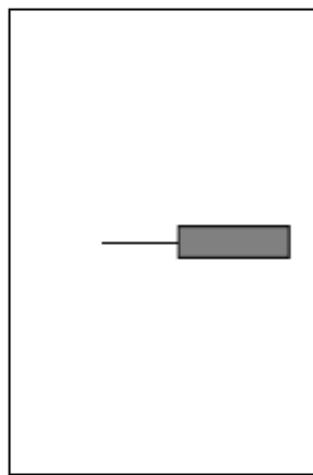
A knob affords turning,  
but do you push or pull?



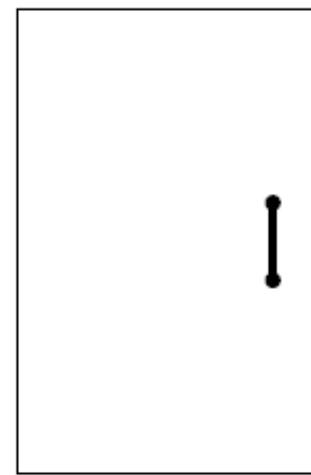
A horizontal bar affords  
pushing, but which side  
do you push on?

# Principles to ensure good HCI

- ❖ Good use of affordances in door designs:



A flat panel affords pushing and the broadness indicates which side to push.



A vertical handle affords grasping and pulling.

# Principles to ensure good HCI

- ❖ An example of ambiguous affordances in door design.



The vertical handles mounted on both sides of the door suggest grasping and pulling. Unfortunately, from one side, the door has to be pushed! Note the signs above the handles.

# Principles to ensure good HCI

- ❖ Good use of affordances in the same hotel.



This door is well designed. The vertical handle correctly suggests pulling, the flat bar correctly suggests pushing.

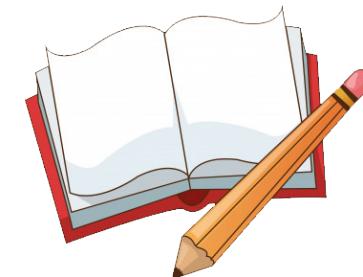
# Principles to ensure good HCI

“Affordances are the range of possible (physical) actions by a user on an artifact.”

“Perceived Affordances are the actions a user perceives to be possible.”

Norman, 1999

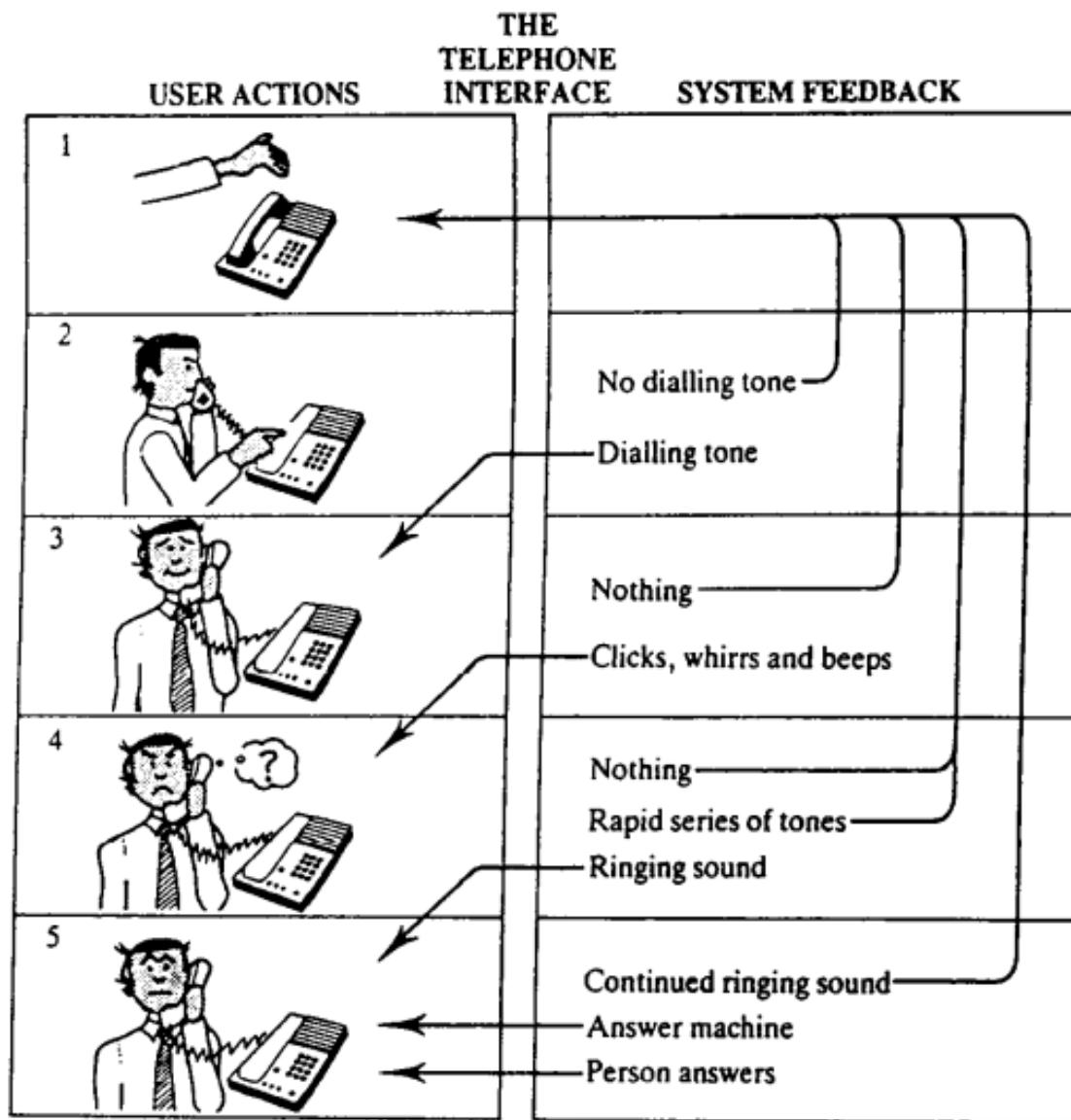
Aesthetics sometimes conflict with good affordance and the appearance of the object takes precedence over its use.



# The challenge of HCI

- ❖ Two important challenges to HCI designer:
  - How to keep abreast of changes in technology
  - How to ensure that their designs offer good HCI as well as harnessing the potential functionality of the new technology
- ❖ These challenges become apparent in the design of everyday appliances.

# The challenge of HCI



- ❖ The interface between a person and telephone



# The challenge of HCI

## Exercise

- Think about the new functionality available with modern telephones
- Try to identify what tasks someone would like to perform using the telephone. Then make a note of the controls and sorts of feedback provided by the telephone when the controls are activated.
- How do these map on to your initial list of user actions?
- What are the main weaknesses in the design?

# The challenge of HCI



## Homework

- Take a photograph of some appliances that you think they have ambiguous design.
- How would you think these appliances can be modified?

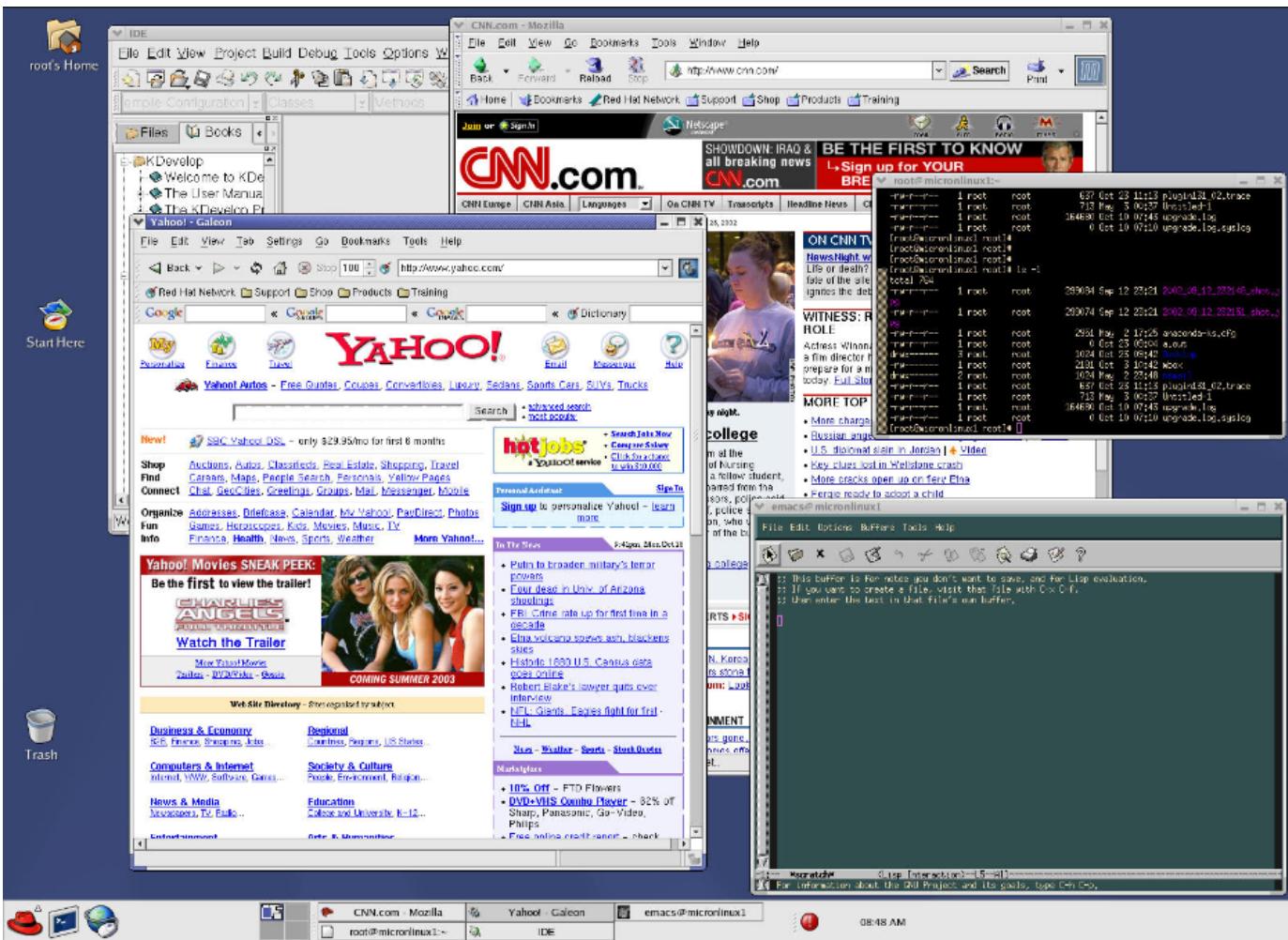
# Examples of successful diverse applications

- ❖ Some popular operating systems: Mac OS



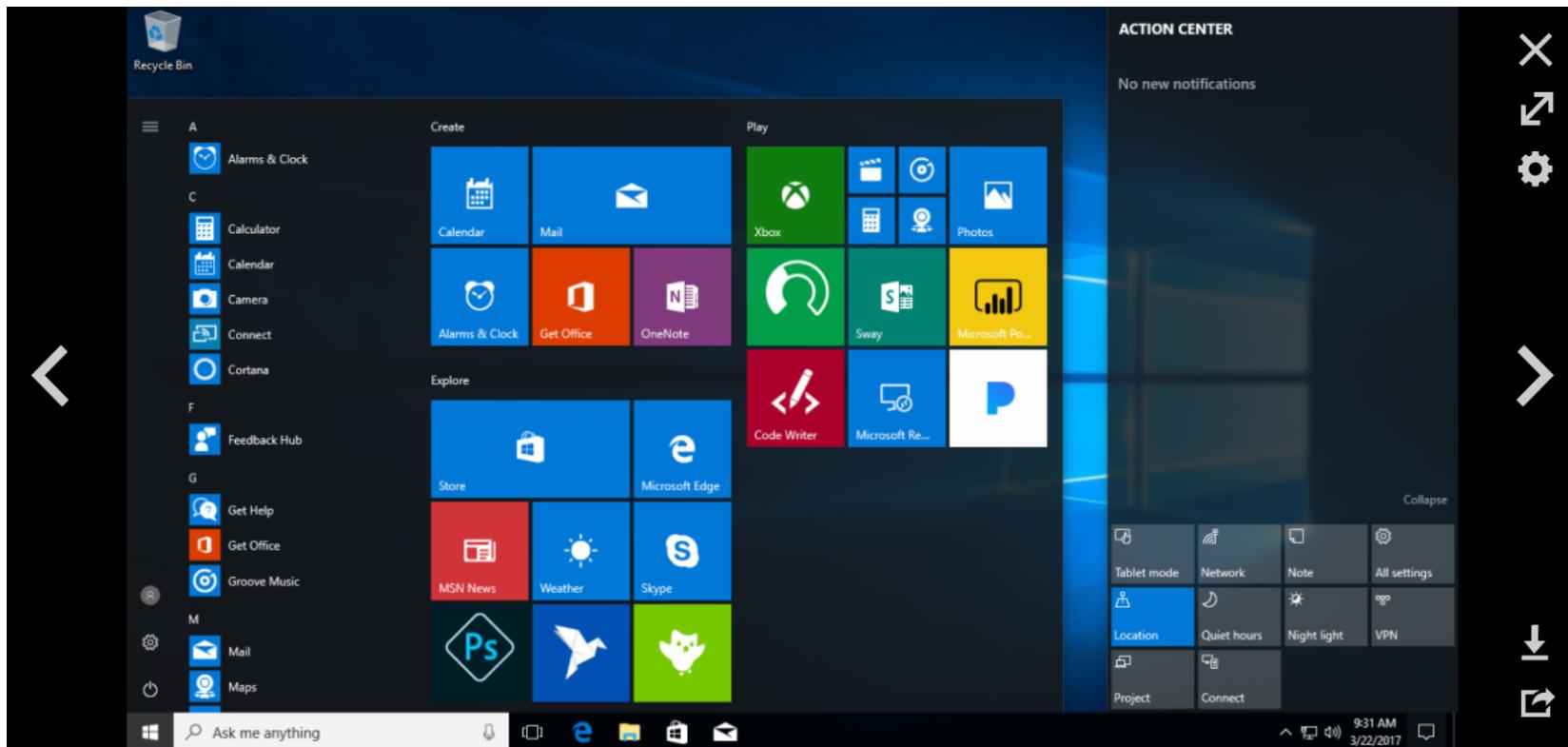
# Examples of successful diverse applications

- ❖ Some popular operating systems: Linux RedHat



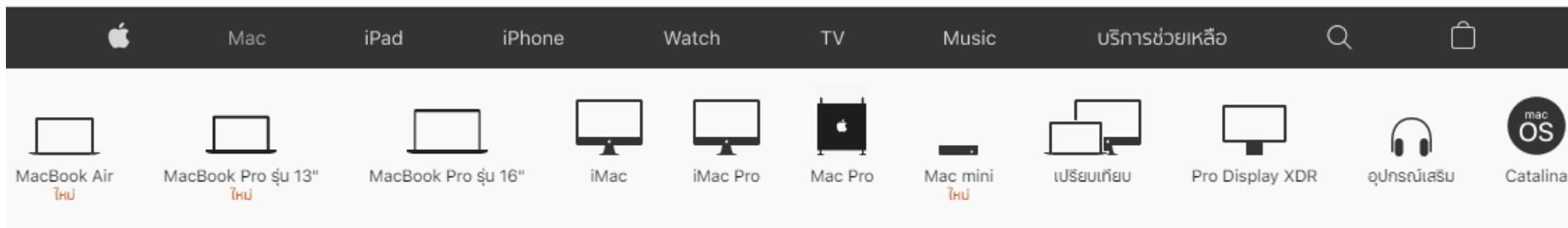
# Examples of successful diverse applications

- ❖ Some popular operating systems: Microsoft Windows 10



# Examples of successful diverse applications

- ❖ Examples of popular websites: Apple store website



ใหม่  
รุ่น 13 นิ้ว

MacBook Pro  
ทรงพลัง พร้อมลุย

ซื้อ

ดูเพิ่มเติม >



# Examples of successful diverse applications

- ❖ Examples of popular websites: Lazada shopping website

The screenshot shows the Lazada homepage with a search bar and various navigation links. Below the search bar, there are sections for 'Related Categories' (Mobiles) and 'Brand' filters (Apple, Nubia, Samsung, Huawei, Motorola, ASUS, Microsoft, Sony). The main content area displays a grid of smartphone products, each with a price, rating, and a 'View Details' button. A promotional banner for 'Welcome Discount For New Users!' is visible in the top right.

Product	Price	Rating	Location
Apple iPhone 11 (โทรศัพท์มือถือ)	\$23,990.00	★★★★★ (1287)	Samut Prakan
Haiku Star2 หน้าจอใหญ่ 6.0 นิ้ว 16GB รองรับระบบ 3G/4G เครื่องศูนย์แท้ รับ...	\$1,499.00	★★★★★ (208)	Bangkok
HUAWEI Y9 Prime 2019 * หน่วยความจำ RAM: 4 GB ROM...	\$5,299.00	★★★★★ (71)	Samut Prakan
Xiaomi Redmi Note 8 (4+64/128G) รับ...	\$4,999.00	★★★★★ (526)	Bangkok

# Examples of successful diverse applications

- ❖ Examples of user experience with application: Amazon go

<https://youtu.be/Xvg4x8h9Yr0>



Image Credit: SounderBruce / Wikipedia

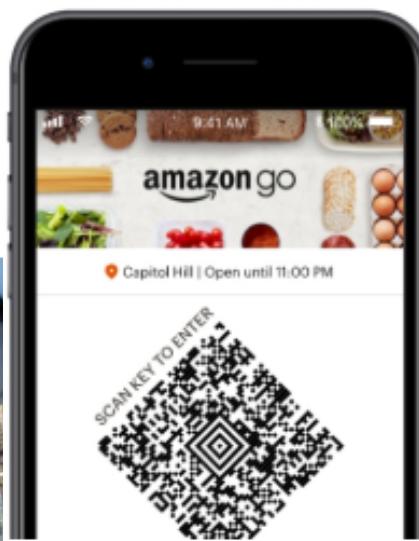
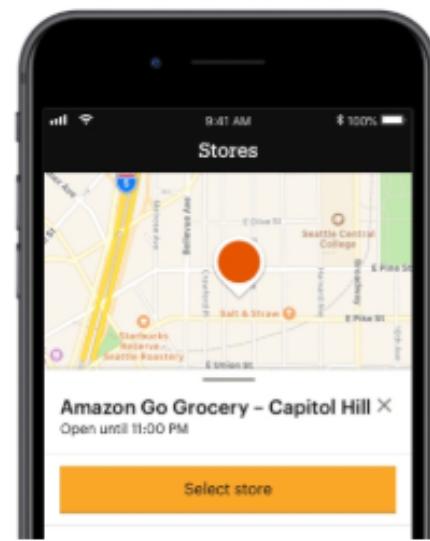


Image Credit: Amazon.com





## Questions and Answers