4. HUMAN-COMPUTER INTERACTION

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4.1: Introduction to HCI

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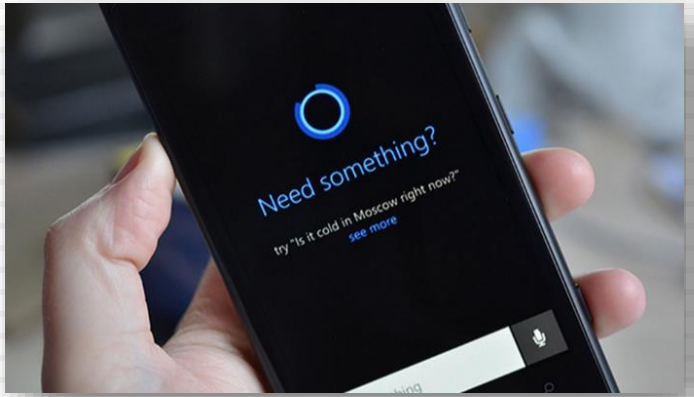
4.2: HCI Goals

4.3: HCI User Experiences



Objectives

- Describe the three parts of HCI
- Understand the goals of HCI
- State the HCI golden rule
- Recall the three disciplines of HCI
- List examples of HCI

Introduction: Technology is Essential

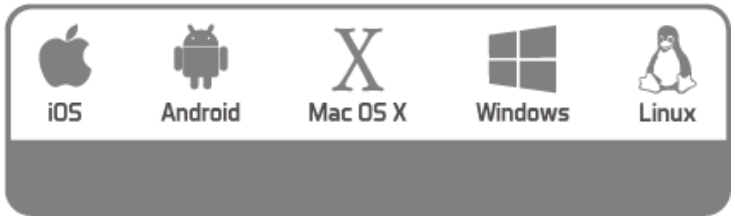
- Interacting with technology has become an essential part of everyday life for the majority of people

Introduction (2): Use without Understanding

- Many computer system users do not need to understand the technology that they use
- The user only needs to know how to operate and interact with the system

Introduction (3): Different Technologies

- There are different types of technology that we all use
  - Computers: Laptops, smartphones



Introduction (3): Different Technologies

- There are different types of technology that we all use
  - Computers: Laptops, smartphones
  - Terminals: Metro tickets, ATMs, pay bills

Introduction (4): Intuitive

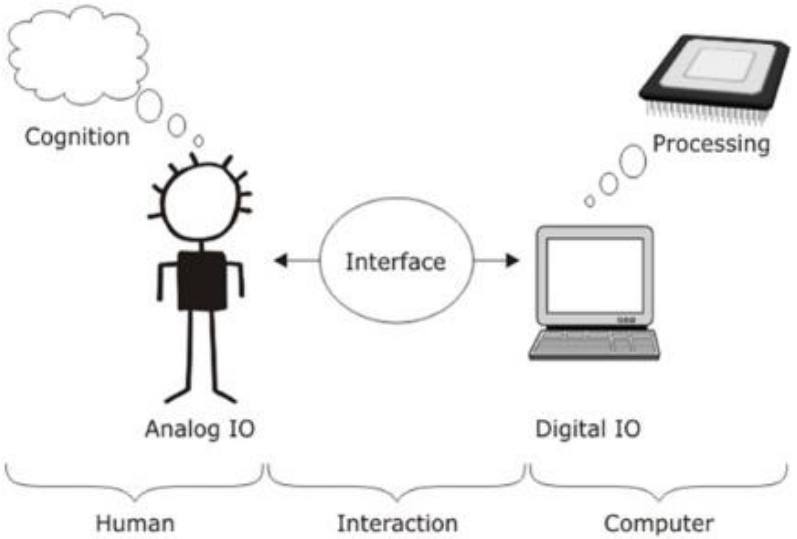
- Computer systems should be intuitive
  - Easy to learn
  - Easy to use
- Computer systems should be error free

HCI Development Goals

- The major objectives of HCI is to develop computer systems interfaces that are:
  - Easy to learn
  - Easy to use
  - Error free

What is HCI?

- HCI studies the **interaction** between **people** (users) and **computers**



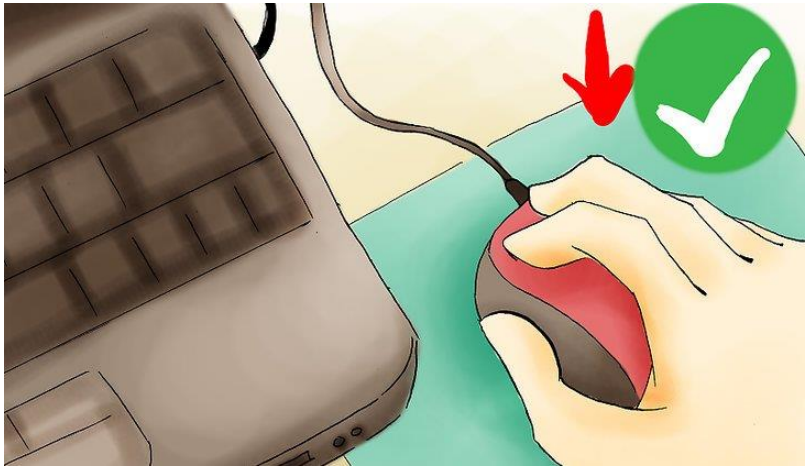
What is HCI? (2)

- HCI consists of three parts:
  - **Human**: an individual user or a group of users
  - **Computer**: mobile device, desktop, terminal, or other device that processes data
  - **Interaction**: any direct or indirect communication between a human and computer
- In HCI, interaction takes place at a user interface

Different User Interfaces

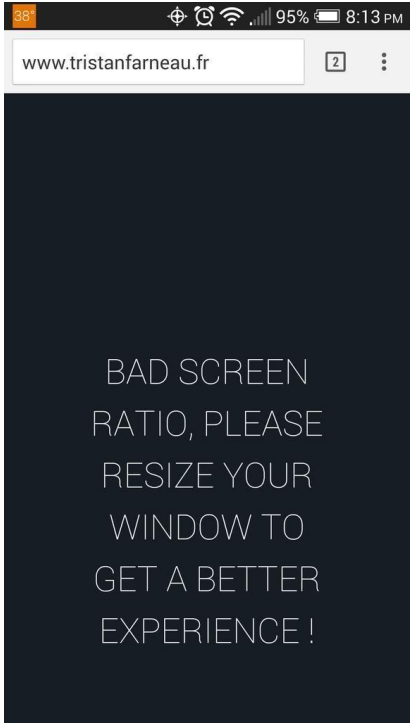
Touch

Mouse



What is HCI? (3)

- The golden rule in HCI is that **people should come first**
- What is the purpose of the computer system?
  - To help a user accomplish a task

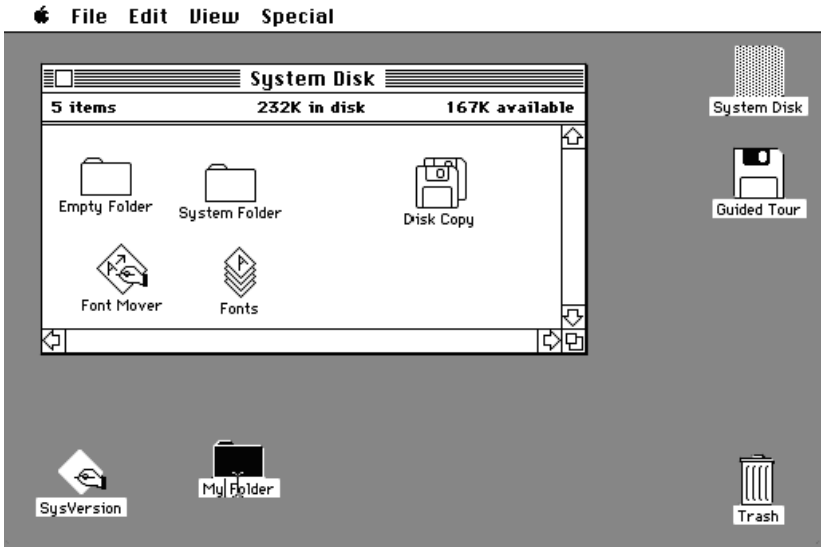


Evolution of User Interfaces

- Command line word processing

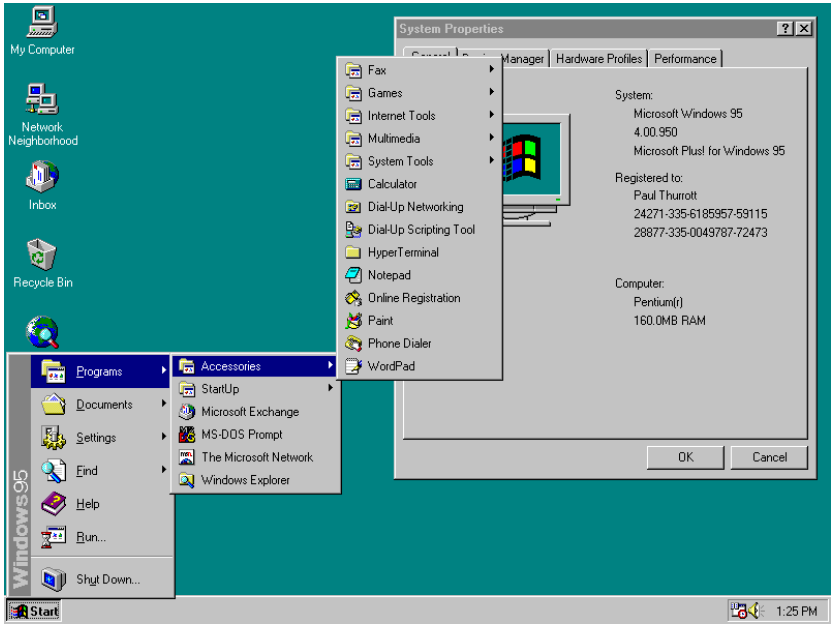
Evolution of User Interfaces (2)

- Command line word processing
- Early GUIs
  - Macintosh Finder



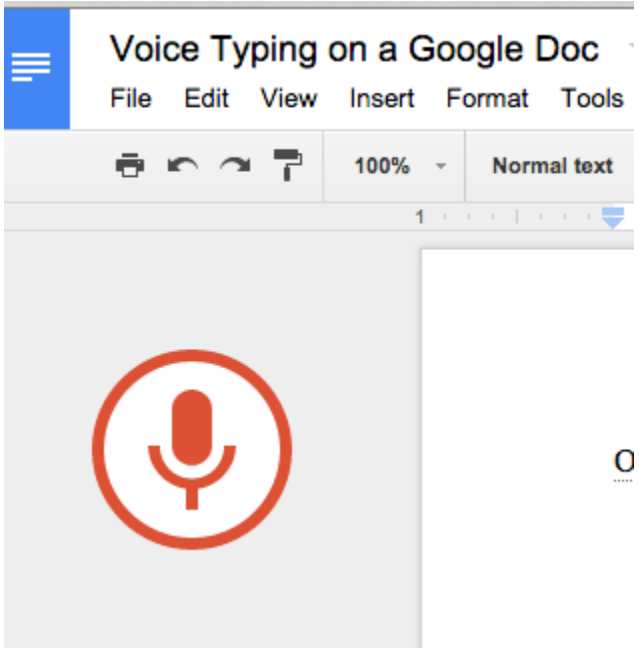
Evolution of User Interfaces (3)

- Command line word processing
- Early GUIs
  - Macintosh Finder
  - Windows 95



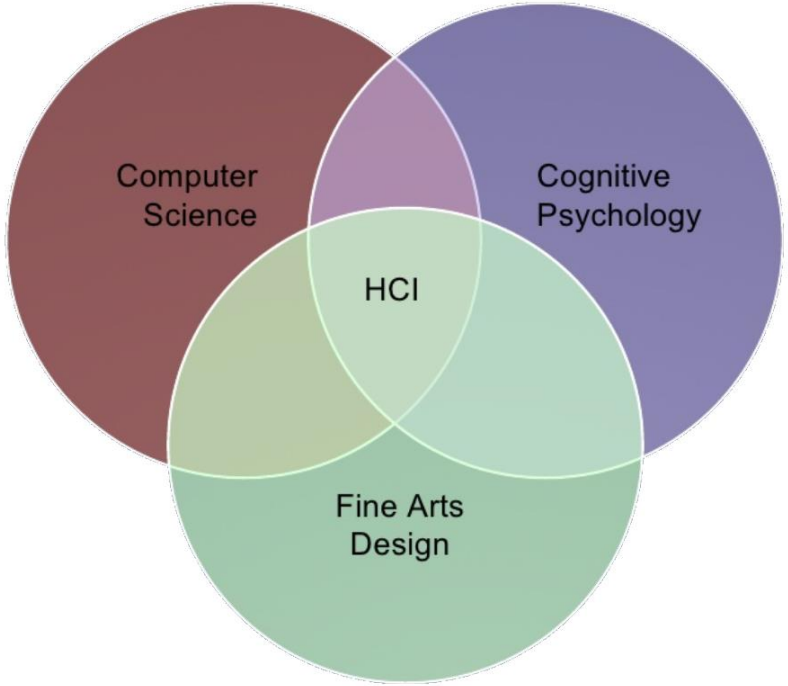
Evolution of User Interfaces (4)

- Modern day
  - Mouse: Desktop, laptop
  - Touch: Laptop, mobile
  - Voice: All
  - Gesture: Mobile
- The Future
  - Thought Computing?



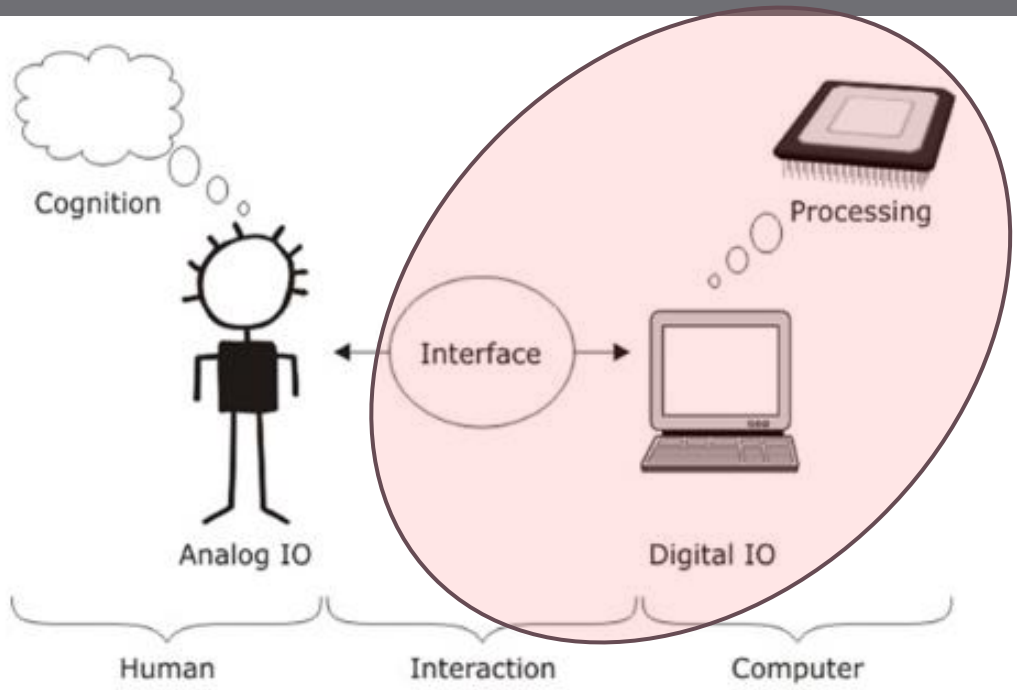
The Intersection of HCI

- The intersection of three disciplines (i.e. major fields of study)
  - Computer Science
  - Cognitive Psychology
  - Fine Arts Design



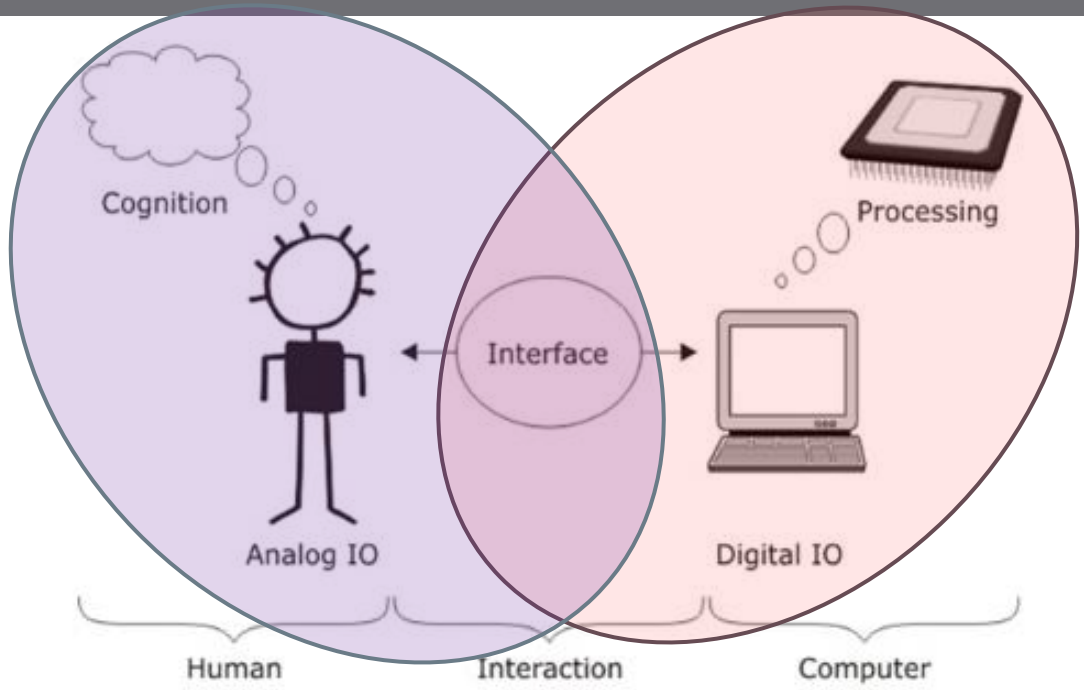
The Intersection of HCI (2)

- Computer Science
  - Designs the software that interacts with the hardware



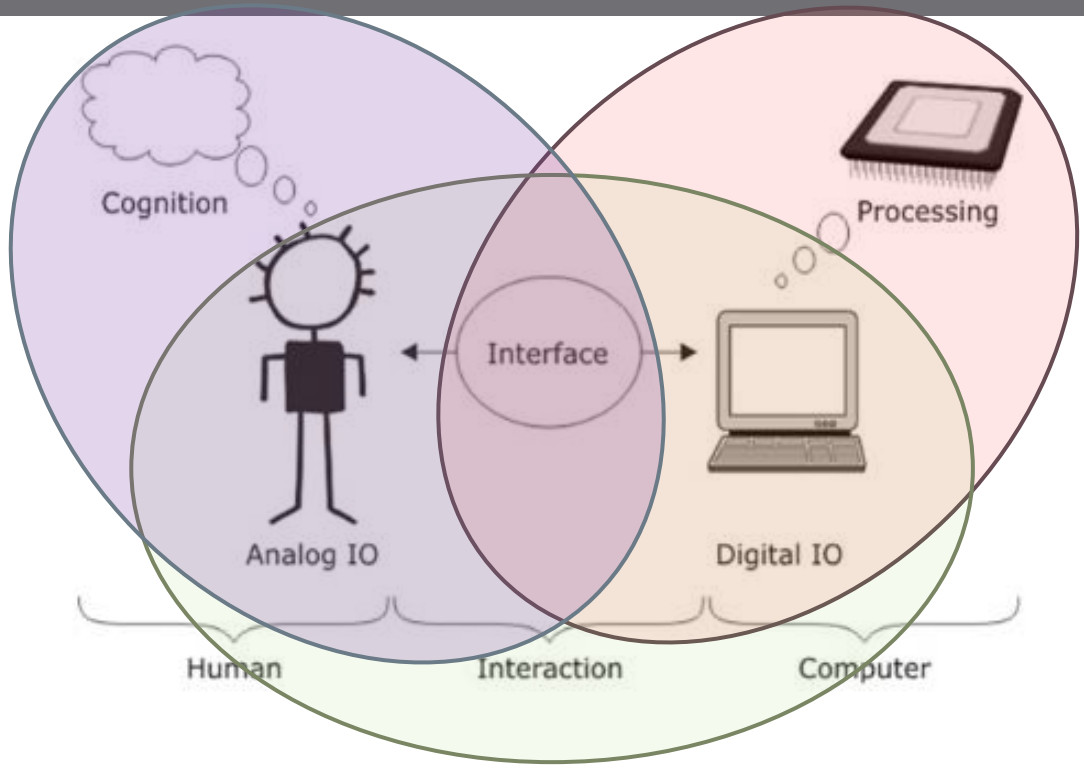
The Intersection of HCI (3)

- Cognitive Psychology
  - Examines how the mind processes information



The Intersection of HCI (4)

- Fine Arts Design
  - Creates the graphical or visual elements that the people use to interface with the device



The Intersection of HCI (5)

Physical Interface

Virtual Interface

HCI is **not** about

- Not about making the interface look pretty
- Not about only desktop computers
- Not something that would be nice to do but usually there's no time for it

HCI is about

- Understanding the
  - user
  - user's tasks
  - the environment
- UI requirements and analysis
- Evaluating the system

Introduction to HCI **Summary**

- HCI is the **interaction** between **humans** and **computers**
- HCI strives to create systems that are easy to learn, easy to use, and error free
- The golden rule of HCI is: **People should come first**
- HCI is the at the interaction of three disciplines
  - Computer Science, Cognitive Psychology, & Fine Arts Design

4.2: HCI Goals

4.1: Introduction to HCI

4.2: HCI Goals

4.3: HCI User Experiences

Objectives

- State the goal of HCI
- Describe usability
- Explain why usability is important
- Show examples of difficult-to-use systems

What is the goal of HCI?

- The goal of HCI is to improve the interaction between users and computer by making computers more user-friendly and receptive to the user's needs

What is the goal of HCI? (2)

In other words:

- Make technology easy to use
- Create usable systems

What is usability?

- A usable system is
  - Intuitive - Quick and easy to learn
  - Efficient to use
  - Easy to remember how to use
  - Allows rapid recovery from errors

Why is usability important?

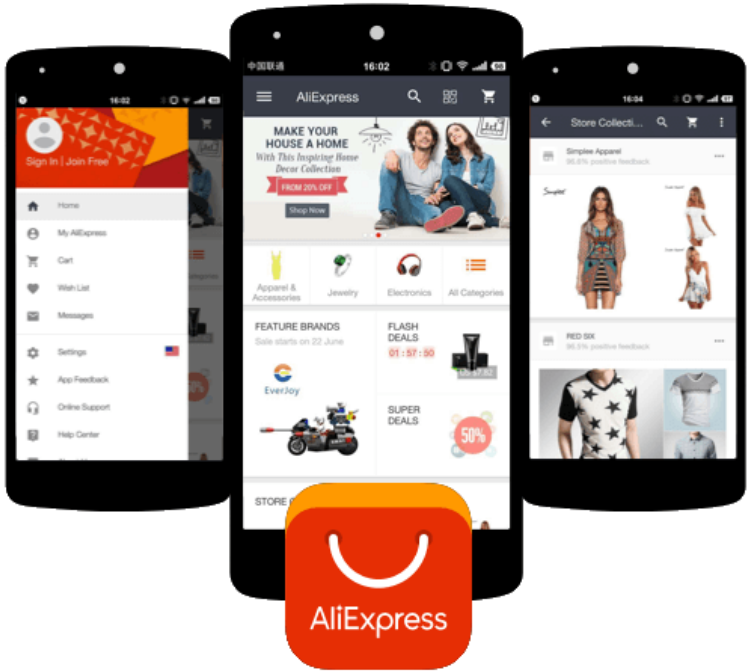
- Creates satisfied users who
  - Use the system to accomplish a task
  - Become loyal customers

Why is usability important? (2)

- Most users have a choice
  - Users will seek a system they can use

Why is usability important? (3)

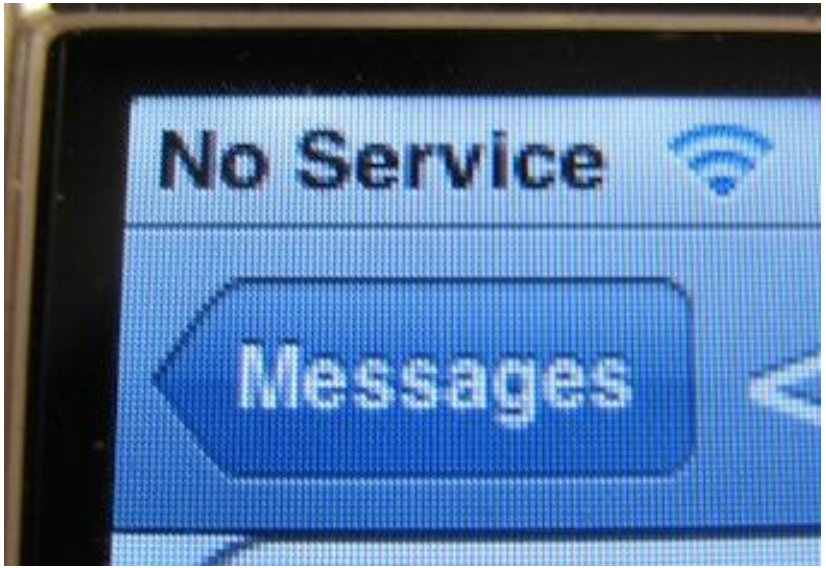
- Returning users
  - Loyalty and user trust
  - Without users, the system will not be used



Why is usability important? (4)

- Computer becomes the interface between the customer and business

Why is usability important? (5)

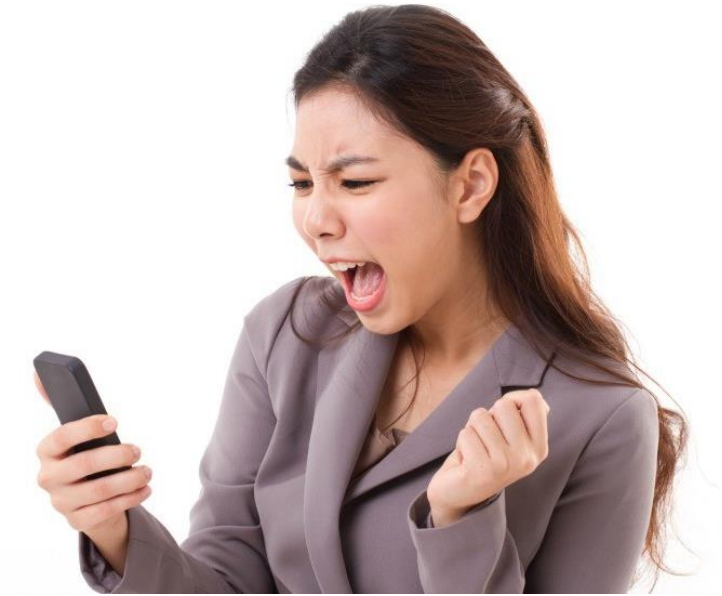


Why is usability important? (6)

- Besides in Back to the Future, how many cars have you seen with doors like that?
- A good experiment, but not easy to use

Difficult-to-use systems

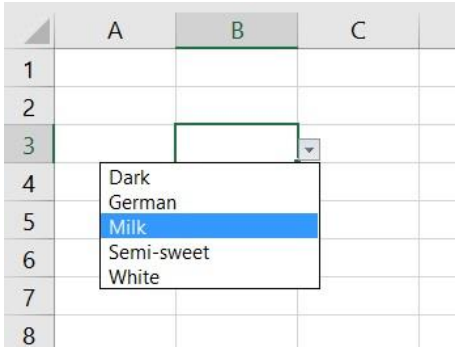
- Are annoying, embarrassing, frustrating, and even deadly



Difficult-to-use systems (2)

- Are annoying, embarrassing, frustrating, and even deadly
- Increase mistakes in data entry and system operation

Item	Color (r/b/bl/g)	Size (s/m/l)
T-shirt	r	M
T-shirt	Blue	La
Socks	gr	x



Difficult-to-use systems (3)

- Are annoying, embarrassing, frustrating, and even deadly
- Increase mistakes in data entry and system operation
- Cause system failure

HCI Goals **Summary**

- The goal of HCI is to create usable computer systems
- A usable system is easy to learn and use, and recovers rapidly from errors
- Users like systems that they can use
- Users avoid difficult to use systems

4.3: HCI User Experiences

4.1: Introduction to HCI

4.2: HCI Goals

4.3: HCI User Experiences

Objectives

- Notice how users want to use systems
- List examples of obstacles that prevent usability
- Think of how these systems could be improved

Recall HCI's goals

- The golden rule in HCI is that *people should come first*

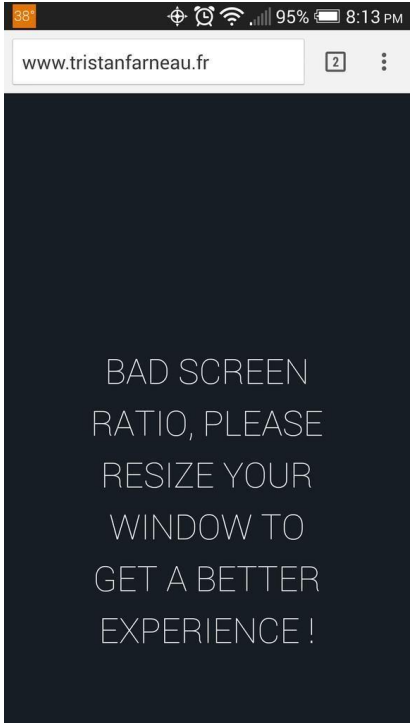
- HCI Goals
  - Make technology easy to learn and use
  - Create usable systems
  - Allows rapid recovery from errors

The unpleasant experiences

- Designers can have specific **requirements** how they **want** others to **use** their software
- However, users do not always agree

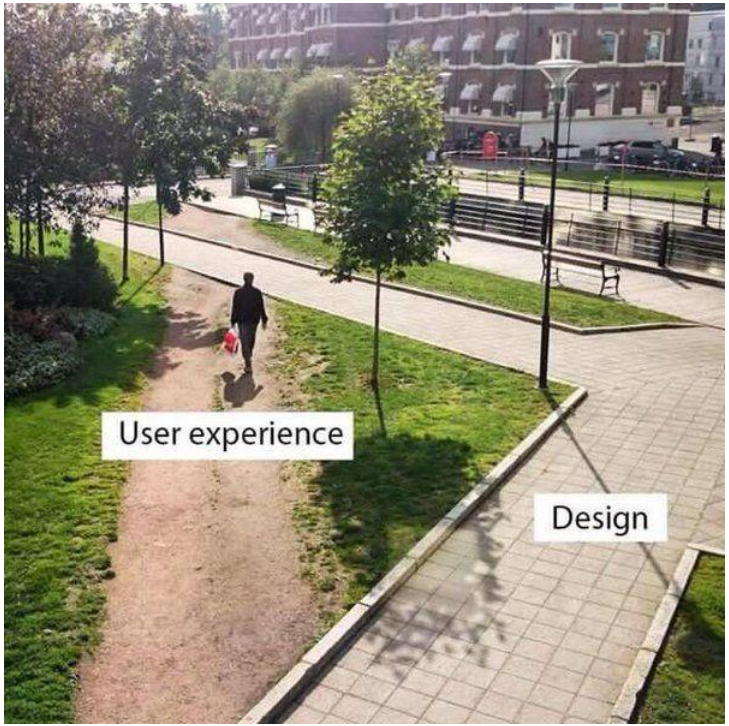
The unpleasant experiences (2)

- Recall this image?
- This website is about the designer, not the user
  - Users can access my site if they do so under my requirements, which are…



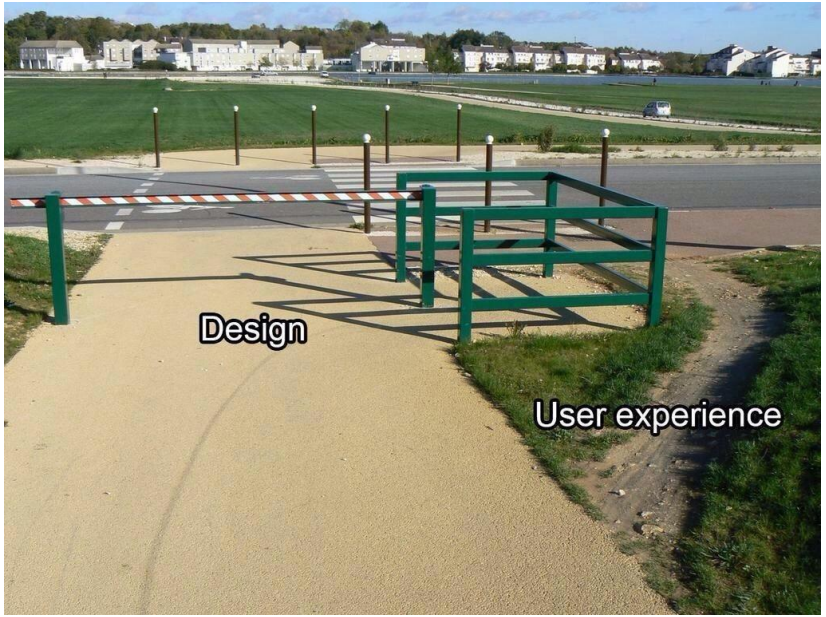
The easy path

- Users take the path of least resistance
- Designers and users do not always agree



Users break rules

- Users don't always follow the rules
- They find a way around barriers they do not agree with



HCI wants to avoid…

- Impossible circumstances

HCI wants to avoid

- Impossible circumstances
- Conflicting messages

HCI wants to avoid

- Impossible circumstances
- Conflicting messages
- Contradictory labels

HCI wants to avoid

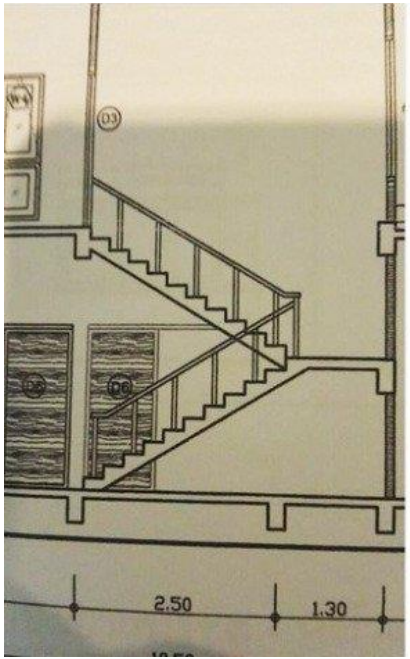
- Impossible circumstances
- Conflicting messages
- Contradictory labels
- Paths that lead to obstacles

HCI wants to avoid obvious mistakes

- The painters had the template the wrong way

HCI wants to avoid (2)

- Construction workers built the staircase according to one view of the picture



Importance of consistency

- Familiarity
- The accepted norm
- Placement of button
- Alignment of the physical and virtual elements

Quality control fail

- Which buttons do you press?
- Do you use text or the color and braille symbol?

Vertical vs Horizontal

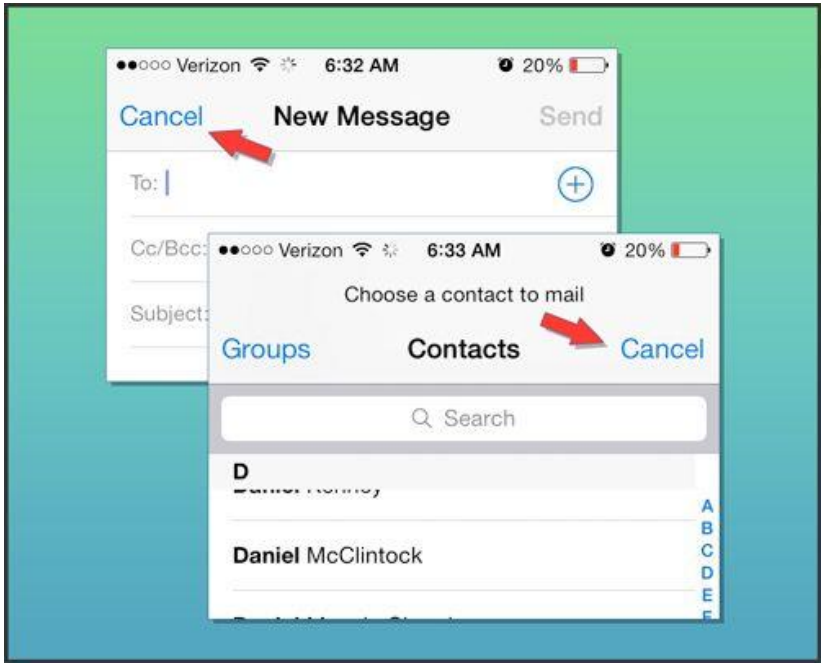
- How many people press 5 when want to go the second floor?

Vertical vs Horizontal

- A better solution for horizontal alignment
- Offset the vertical alignment so users know what way to read

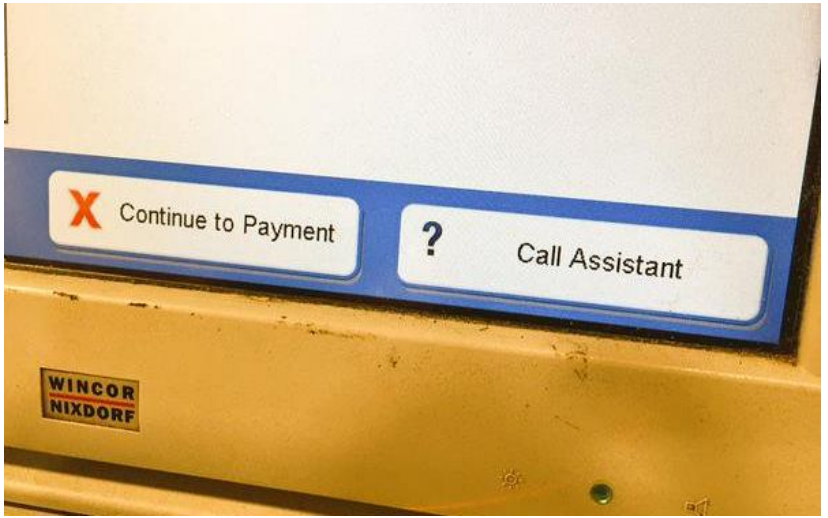
Change of Cancel button placement

- Existing users will be pressing the cancel button when they want to send the message



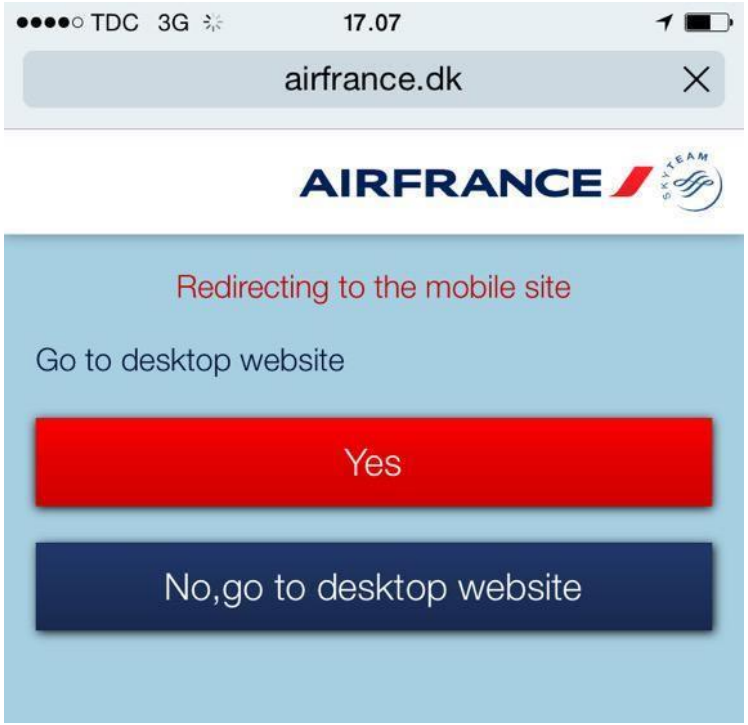
Unconventional practices

- The red **X** is reserved for an error
- The position of the button with the red X is the usual position for the Cancel button



Unconventional practices

- Red is commonly used to indicate an error or cancel

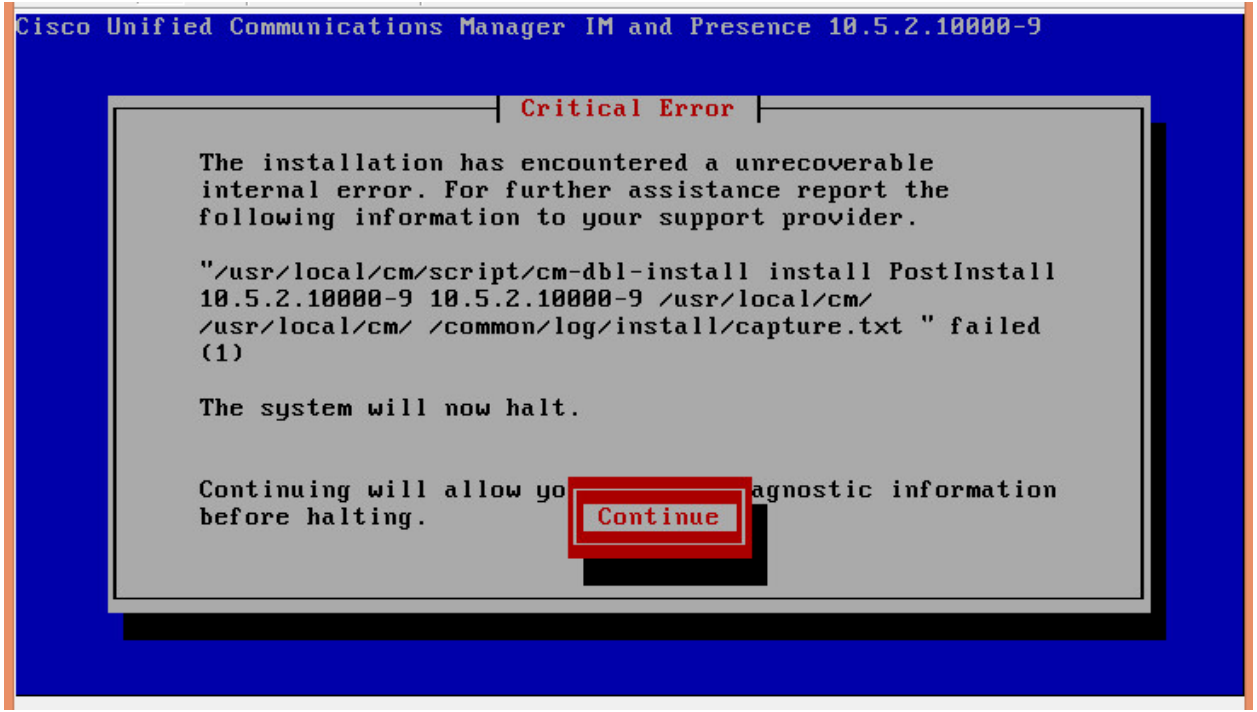


Simple error handling

- Errors are unavoidable
- Users will use the system in unexpected ways
- Developers should plan for the unexpected and gracefully fail, and then recover if possible

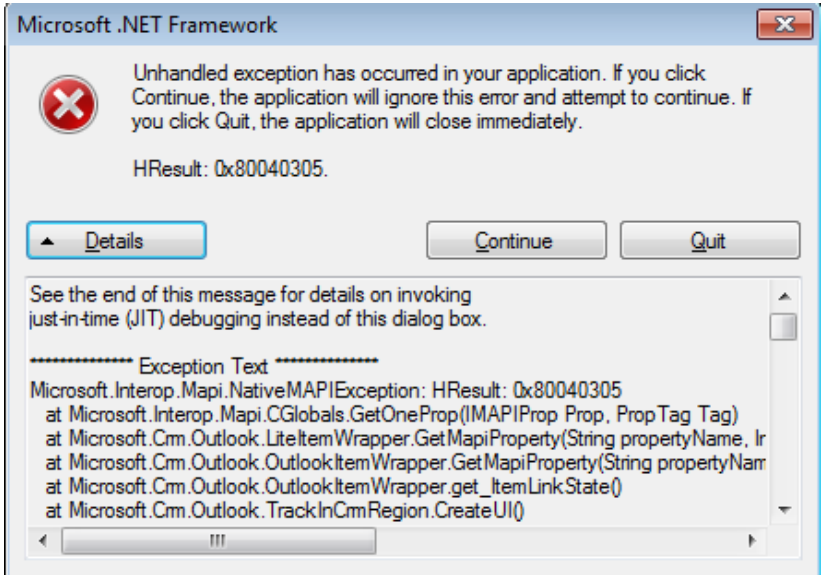
No reboot option

Unrecoverable system error



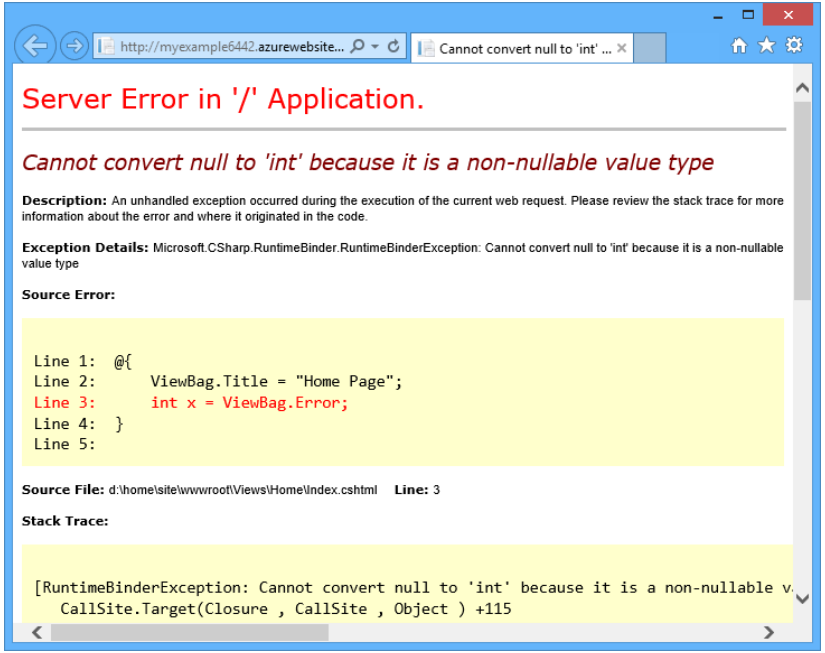
Messages for developers

- Unhelpful text
- Developers needs to see this, not users
- How do you handle this?

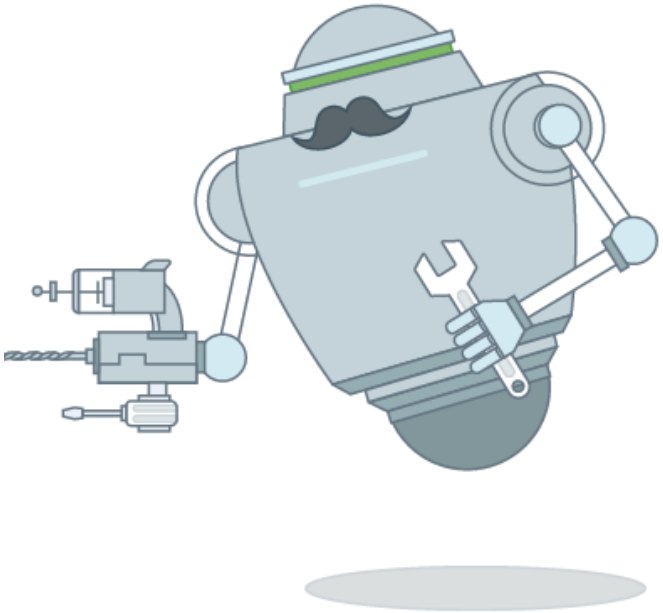


Messages for developers (2)

- Have you visited a webpage and see an ASP error page instead?
- A user should not see this error message



A better error message



Something went wrong

Try that again, and if it still doesn't work, let us know.

Our status page is currently reporting a status of All Systems Operational.

VIEW STATUS PAGE LET US KNOW

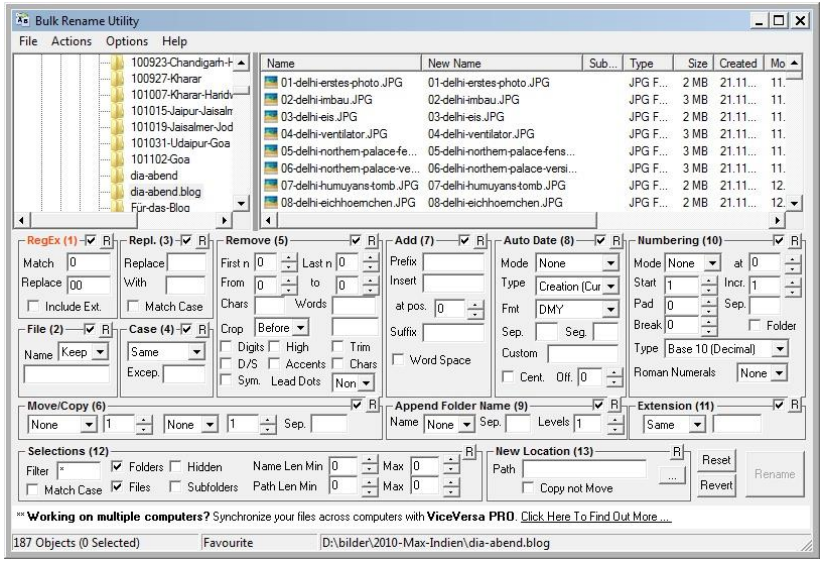
Create usable systems

- A usable system is:
  - Quick and easy to learn
  - Efficient to use
  - Easy to remember how to use
  - Allows rapid recovery from errors

Overly complex requirements

Difficult Password Requirements

Busy User Interface



Simplification

Old Instructions

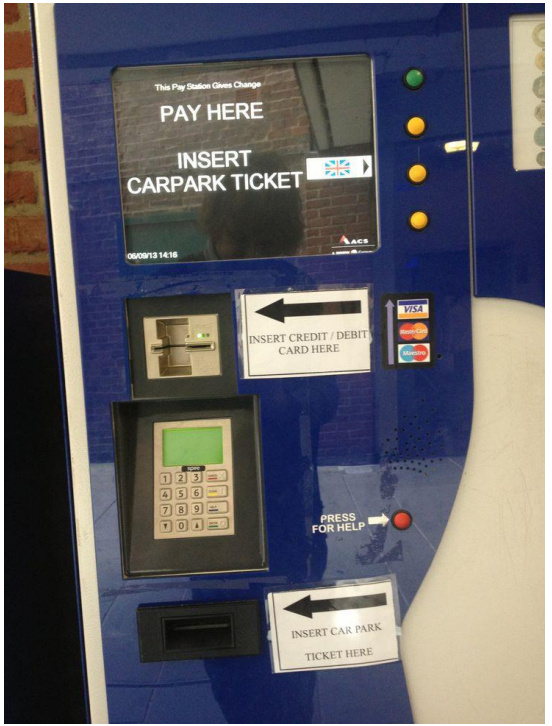
New Instructions

Lacks logical flow

- This parking meter does not have linear process flow
- Users of the Latin and Cyrillic alphabets naturally read upper-left to lower-right

Not user friendly

- This parking meter was so confusing that someone had to tape on printouts.



Not user friendly (2)

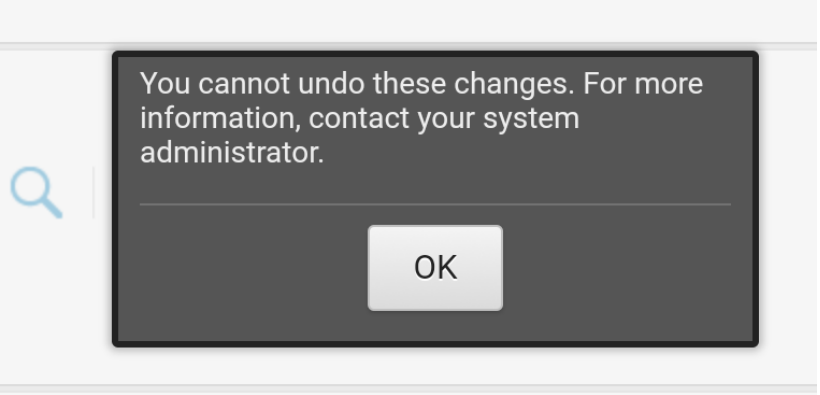
- This parking meter was so confusing that someone had to tape on printouts.
- Notice the payment arrow points to the screen

Which is which?

- What are the button pairs?
- Is the right square going to take you up or down?

Reversal of action

- This operation prevented the user from undoing the previous changes



User Experiences **Summary**

- Systems are created to help people
- However, users face many obstacles due to system requirements
  - Avoidable and unavoidable
- HCI strives to create ways for people to use the systems that easy

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