

4. HUMAN-COMPUTER INTERACTION



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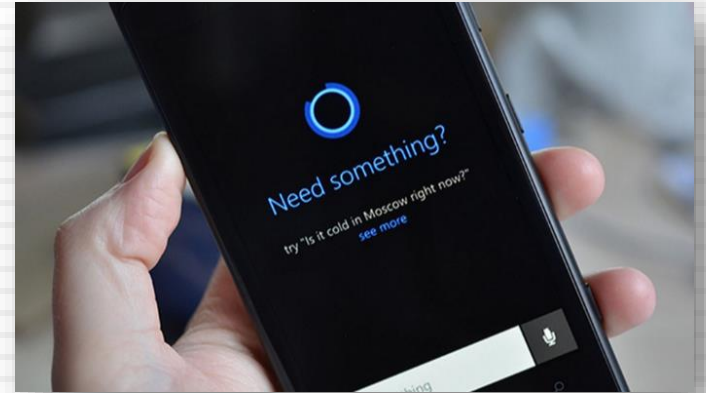
3

4.1: Introduction to HCI

4.1: Introduction to HCI

4.2: HCI Goals

4.3: HCI User Experiences



Objectives

4

- 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

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



Introduction (2): Use without Understanding

6

- 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

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



Introduction (3): Different Technologies

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



Introduction (4): Intuitive

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



HCI Development Goals

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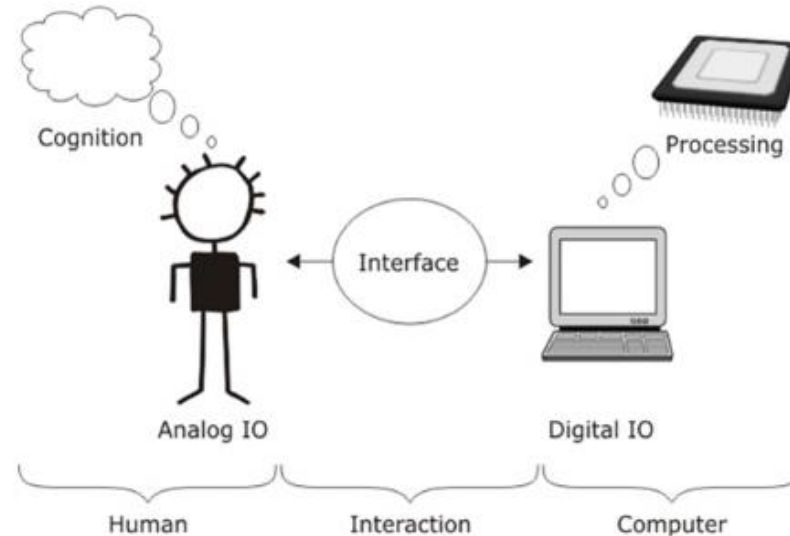
- The major objectives of HCI is to develop computer systems interfaces that are:
 - Easy to learn
 - Easy to use
 - Error free



What is HCI?

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- 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

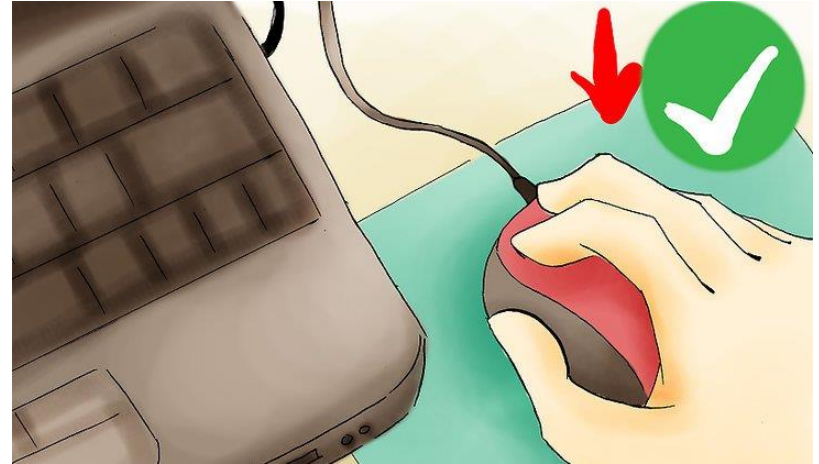
Different User Interfaces

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Touch



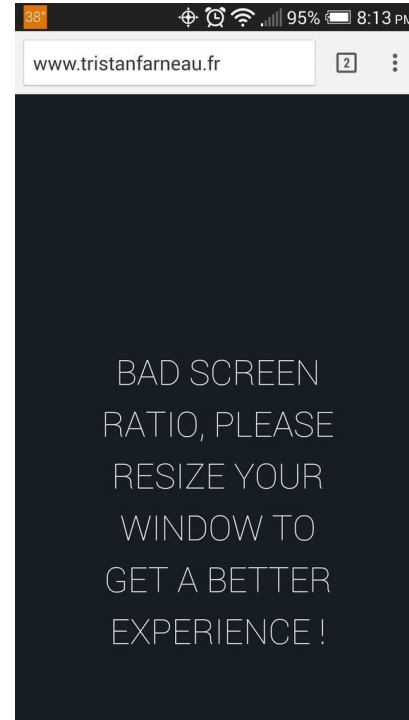
Mouse



What is HCI? (3)

14

- 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

15

- Command line word processing

```
|
| TEXT TASK SELECTION |Ext 340-A|
ID ITEM
a Create Document
b Revise Document
c Paginate Document
d Print Document
e Spelling Tasks
f Merge Documents Tasks
g Merge with File Task
h Create File Description
i Revise File Description
j Document Utilities
k Profile Tasks
l DOS Command Task
z Return to DOS
Type ID letter to choose ITEM: press ENTER: *
```

Evolution of User Interfaces (2)

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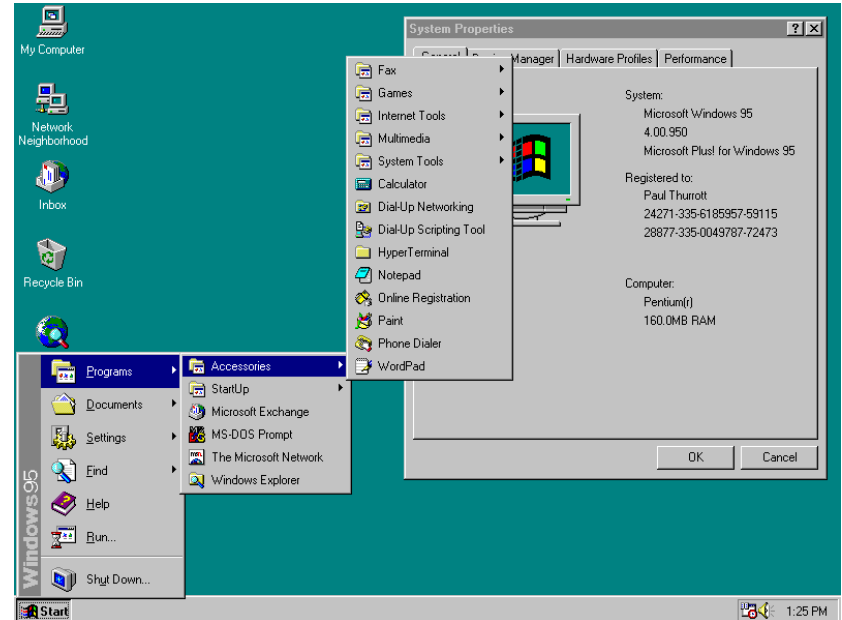
- Command line word processing
- Early GUIs
 - ▣ Macintosh Finder



Evolution of User Interfaces (3)

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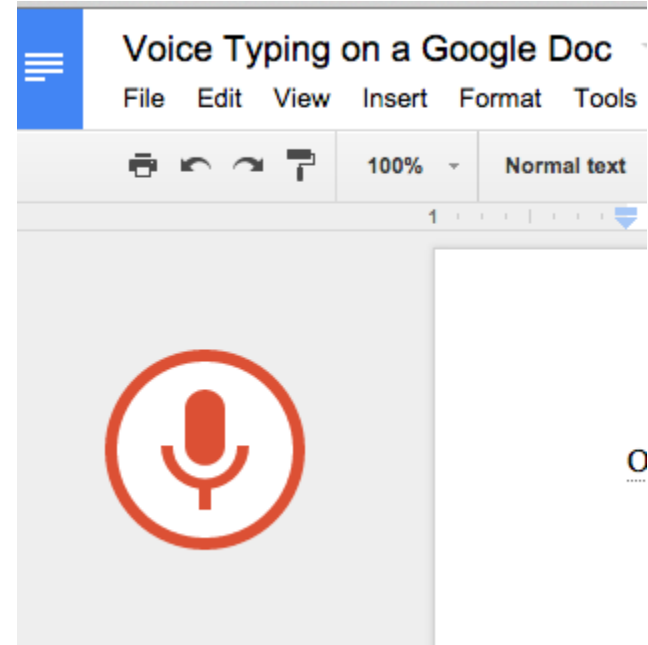
- Command line word processing
- Early GUIs
 - ▣ Macintosh Finder
 - ▣ Windows 95



Evolution of User Interfaces (4)

18

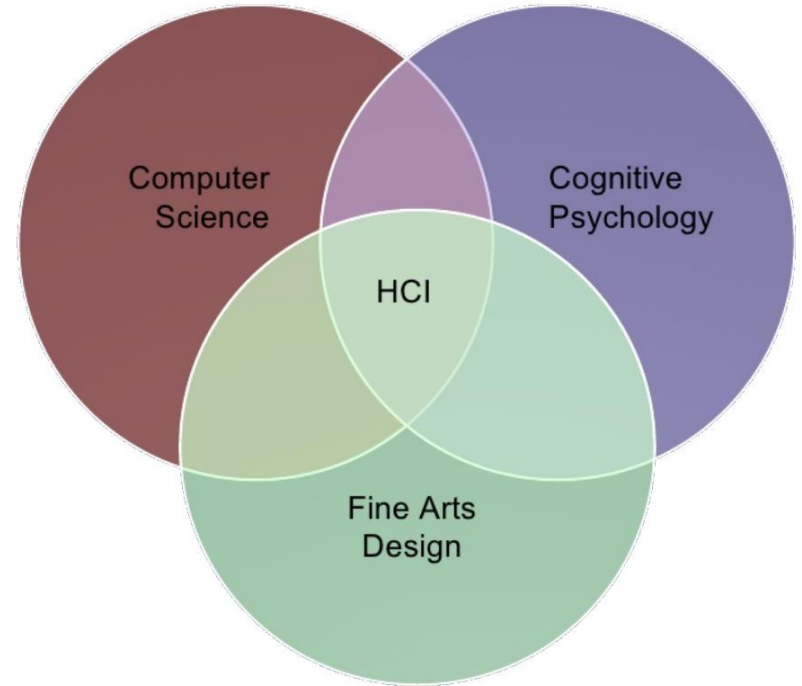
- Modern day
 - ▣ Mouse: Desktop, laptop
 - ▣ Touch: Laptop, mobile
 - ▣ Voice: All
 - ▣ Gesture: Mobile
- The Future
 - ▣ Thought Computing?



The Intersection of HCI

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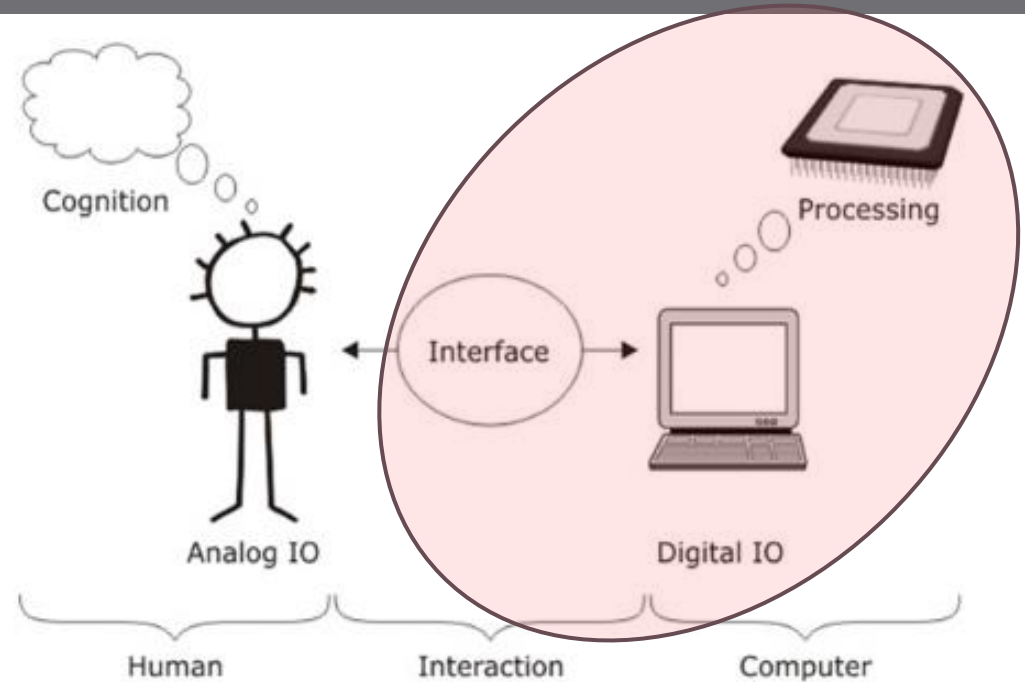
- The intersection of three disciplines (i.e. major fields of study)
 - ▣ Computer Science
 - ▣ Cognitive Psychology
 - ▣ Fine Arts Design



The Intersection of HCI (2)

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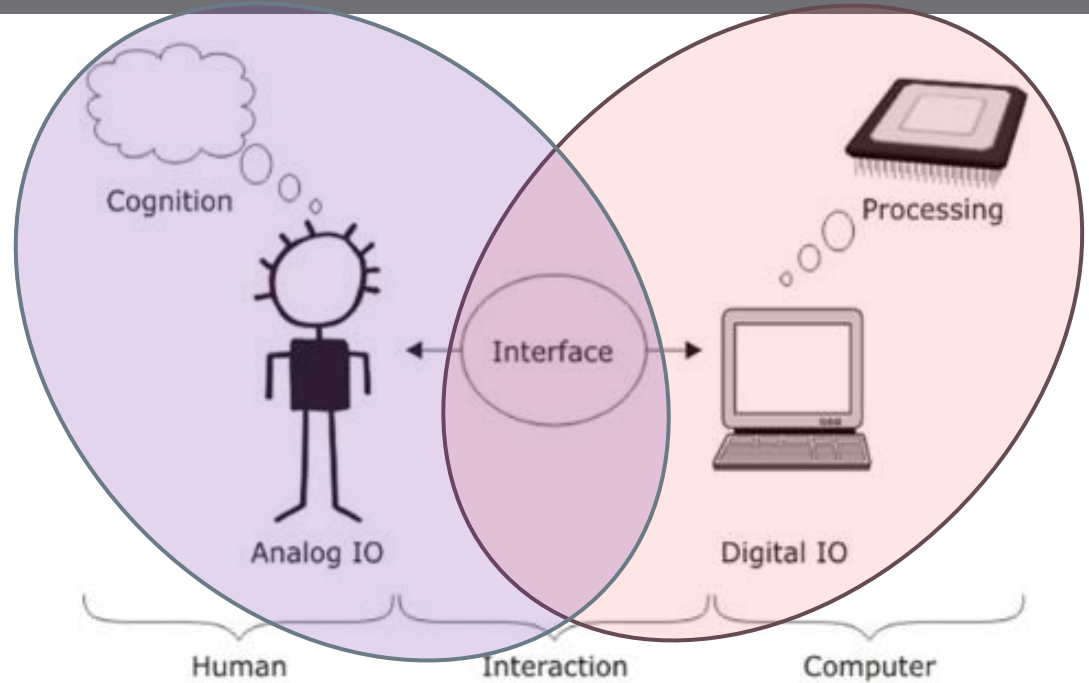
- Computer Science
 - ▣ Designs the software that interacts with the hardware



The Intersection of HCI (3)

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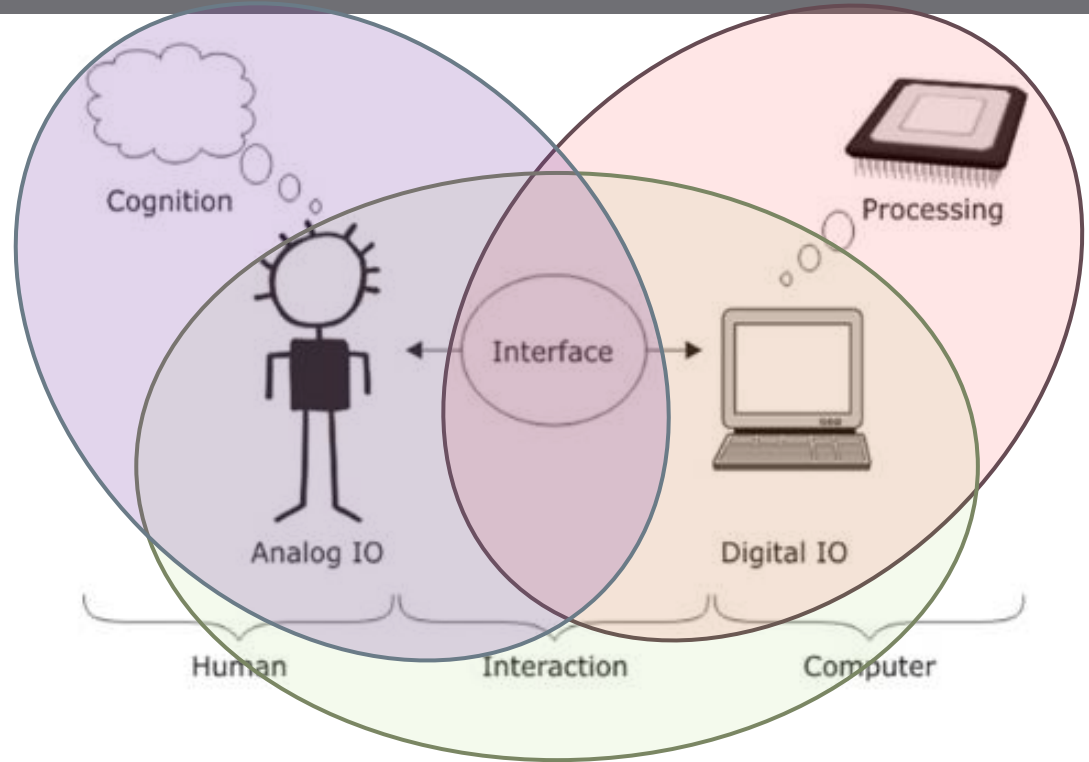
- Cognitive Psychology
 - ▣ Examines how the mind processes information



The Intersection of HCI (4)

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



The Intersection of HCI (5)

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Physical Interface



Virtual Interface



HCI is not about

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- ❑ 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

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



Introduction to HCI Summary

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- 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

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- 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?

29

- 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)

30

In other words:

- Make technology easy to use
- Create usable systems



What is usability?

31

- 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?

32

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



Why is usability important? (2)

33

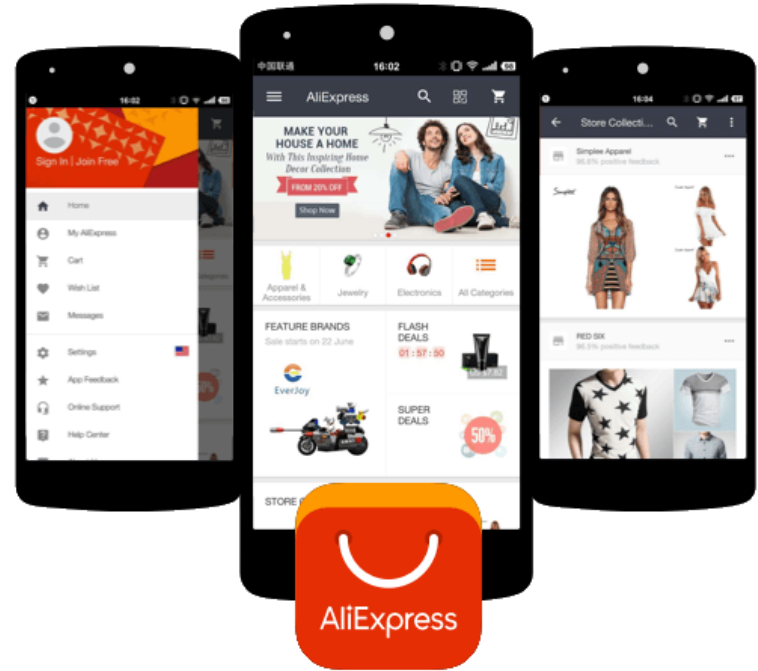
- Most users have a choice
 - ▣ Users will seek a system they can use



Why is usability important? (3)

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



Why is usability important? (4)

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- Computer becomes the interface between the customer and business



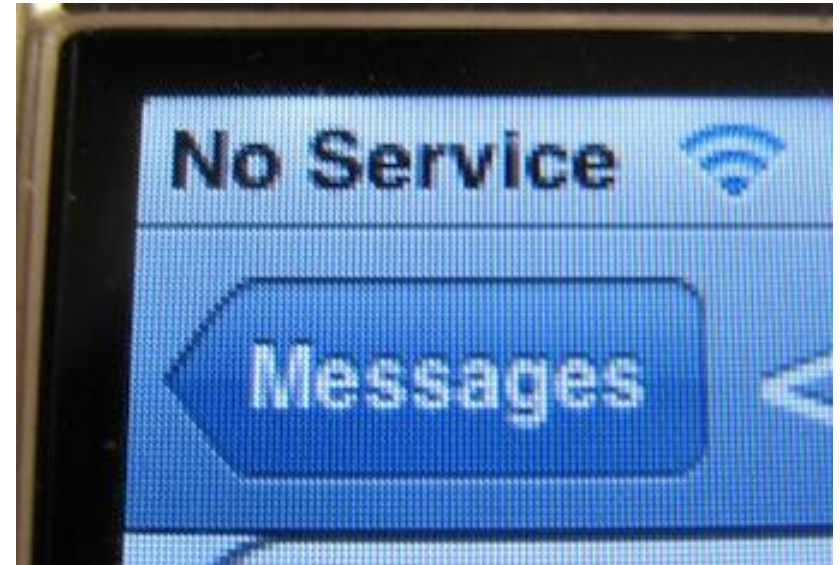
**Banking
customer**



**Banking
customer**

Why is usability important? (5)

36



Why is usability important? (6)

37

- 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

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- Are annoying, embarrassing, frustrating, and even deadly

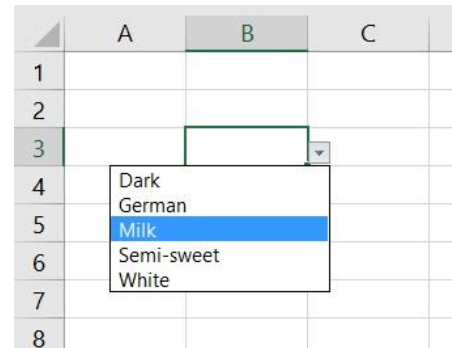


Difficult-to-use systems (2)

39

- 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



	A	B	C
1			
2			
3			
4			
5			
6			
7			
8			

Difficult-to-use systems (3)

40

- 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

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- 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

44

- 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

45

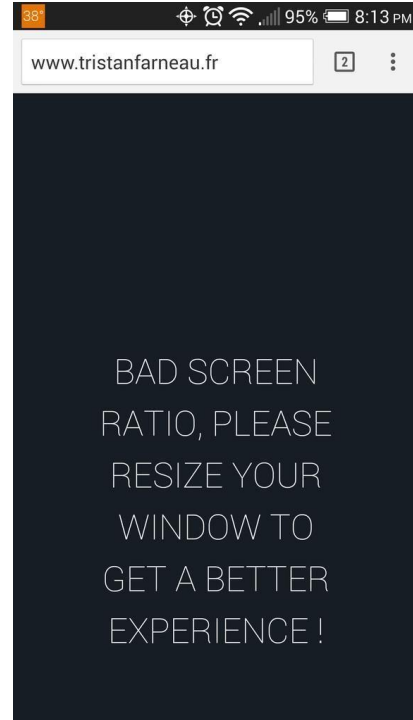
- Designers can have specific **requirements** how they **want** others to **use** their software
- However, users do not always agree



The unpleasant experiences (2)

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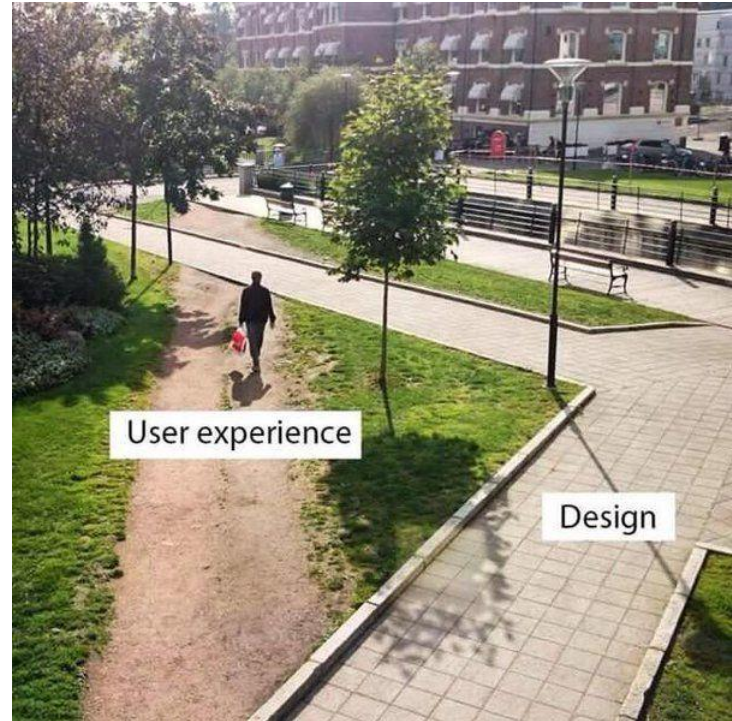
- Recall this image?
- This website is about the designer, not the user
 - ▣ Users can access my site if they do so under my requirements, which are...



The easy path

47

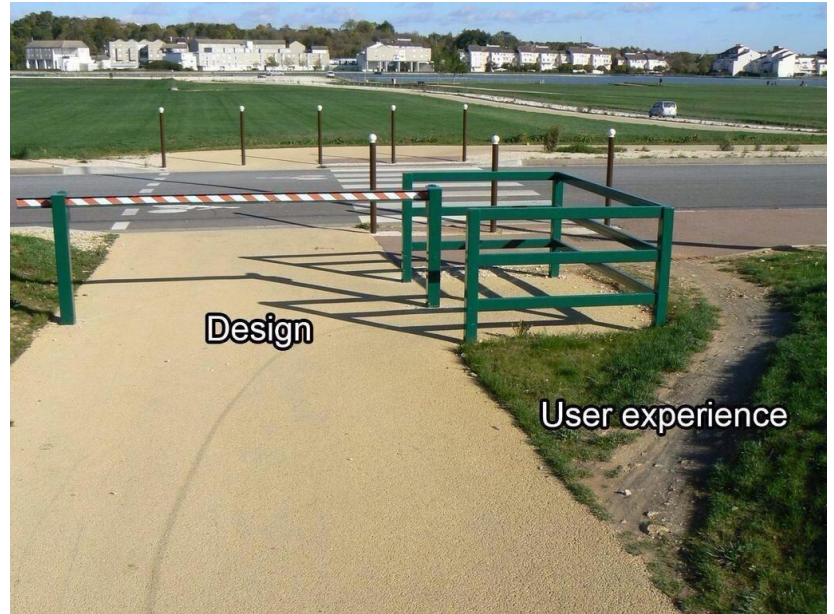
- Users take the path of least resistance
- Designers and users do not always agree



Users break rules

48

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



HCI wants to avoid...

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- Impossible circumstances



HCI wants to avoid

50

- ❑ Impossible circumstances
- ❑ Conflicting messages



HCI wants to avoid

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- ❑ Impossible circumstances
- ❑ Conflicting messages
- ❑ Contradictory labels



thisisbroken.com

HCI wants to avoid

52

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



HCI wants to avoid obvious mistakes

53

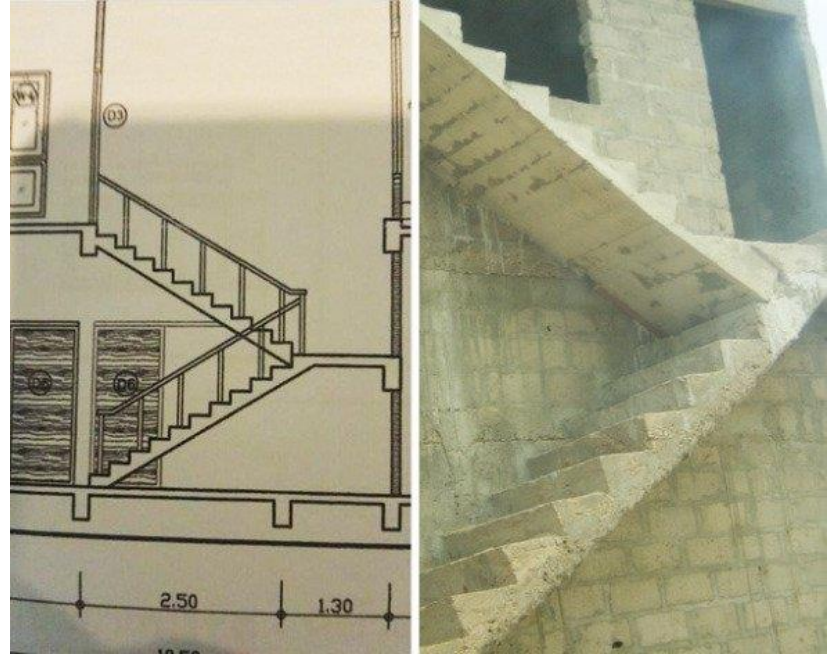
- The painters had the template the wrong way



HCI wants to avoid (2)

54

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



Importance of consistency

55

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



Quality control fail

56

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

Red = Cancel
X = Cancel
Enter = Acept



Vertical vs Horizontal

57

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



Vertical vs Horizontal

58

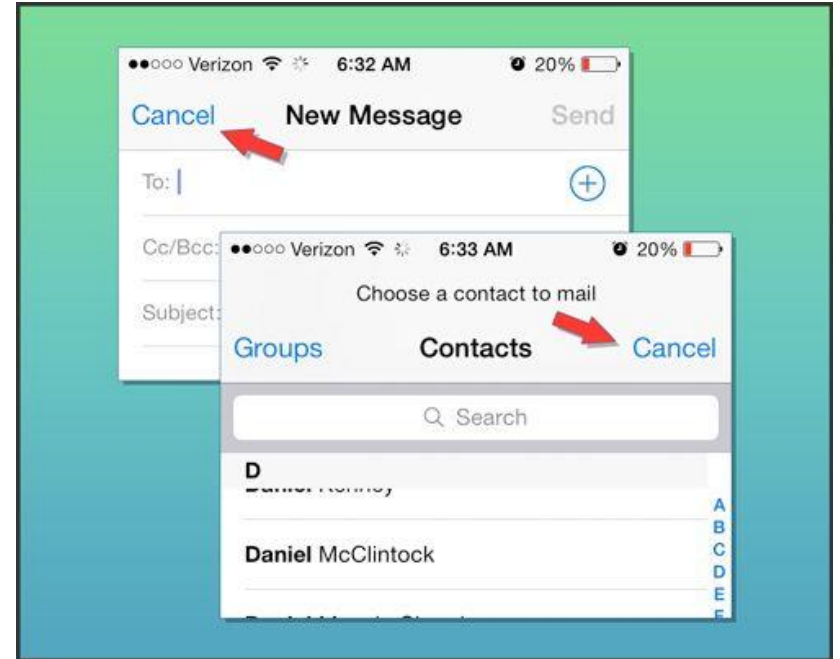
- A better solution for horizontal alignment
- Offset the vertical alignment so users know what way to read



Change of Cancel button placement

59

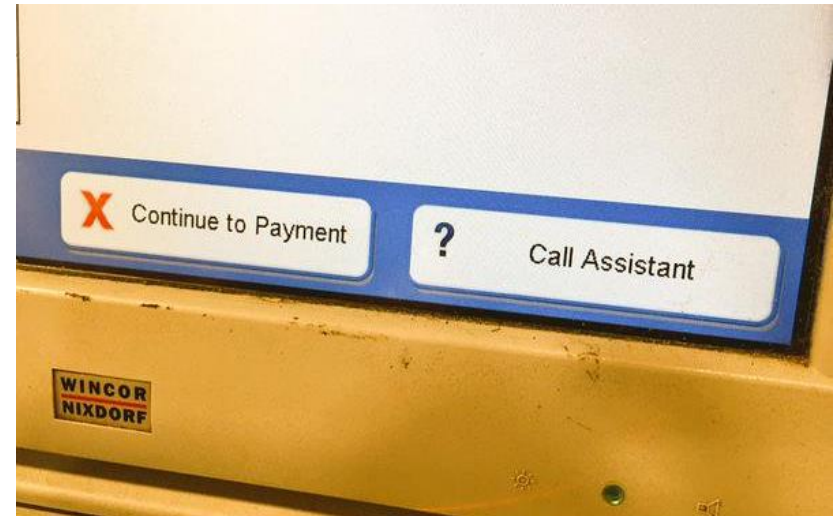
- Existing users will be pressing the cancel button when they want to send the message



Unconventional practices

60

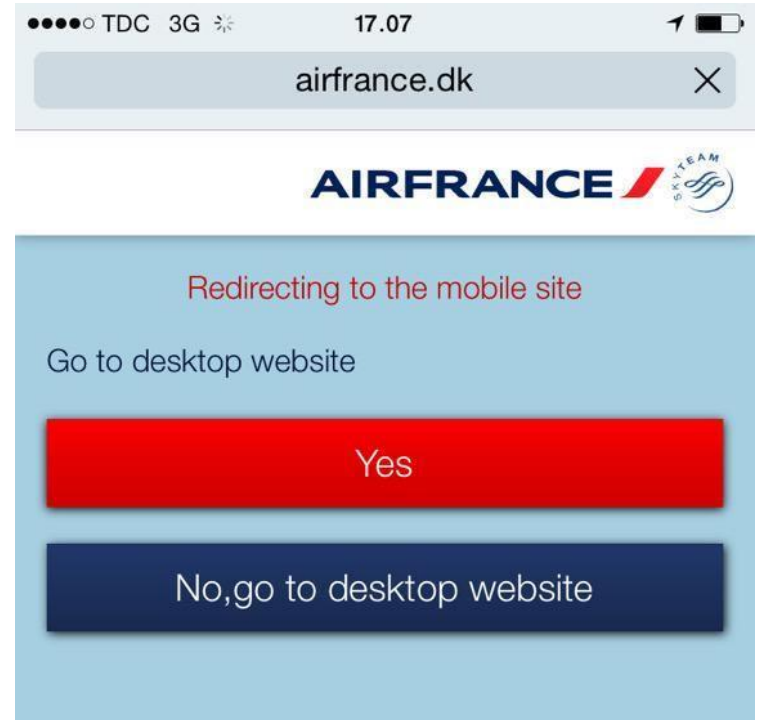
- The red **X** is reserved for an error
- The position of the button with the red X is the usual position for the Cancel button



Unconventional practices

61

- Red is commonly used to indicate an error or cancel



Simple error handling

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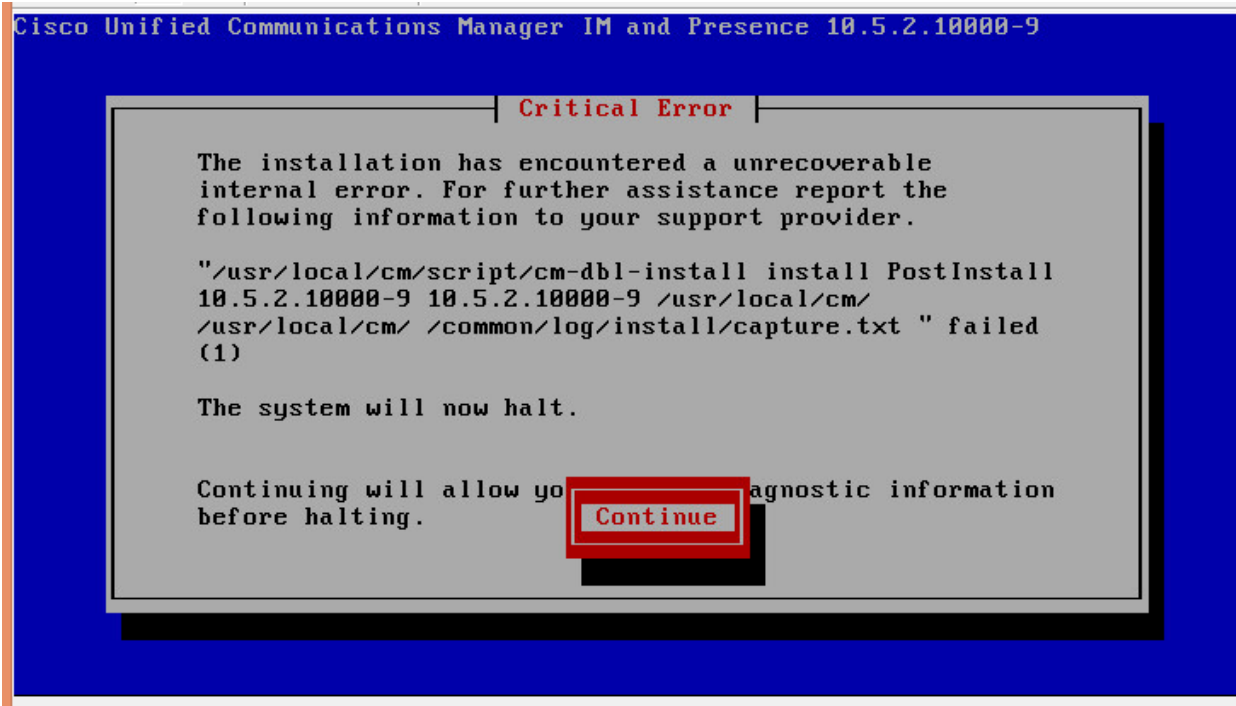
- ❑ Errors are unavoidable
- ❑ Users will use the system in unexpected ways
- ❑ Developers should plan for the unexpected and gracefully fail, and then recover if possible

No reboot option

63



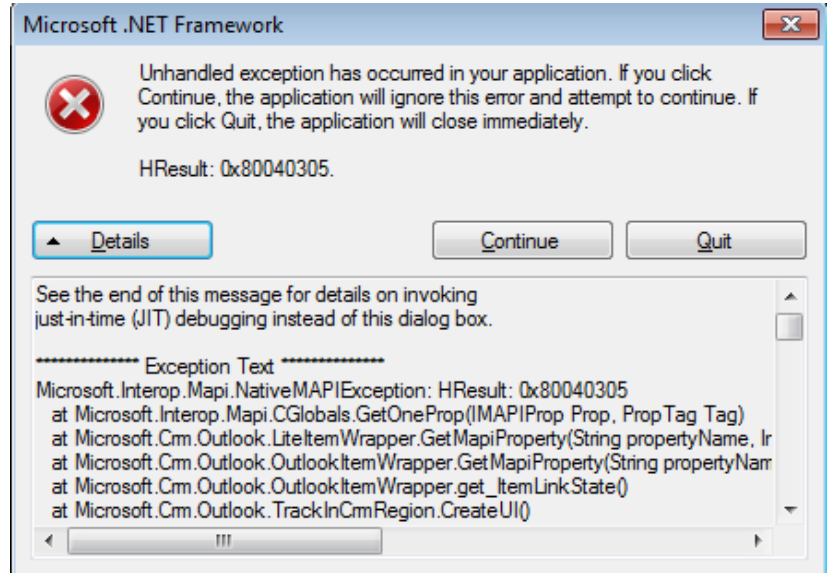
Unrecoverable system error



Messages for developers

65

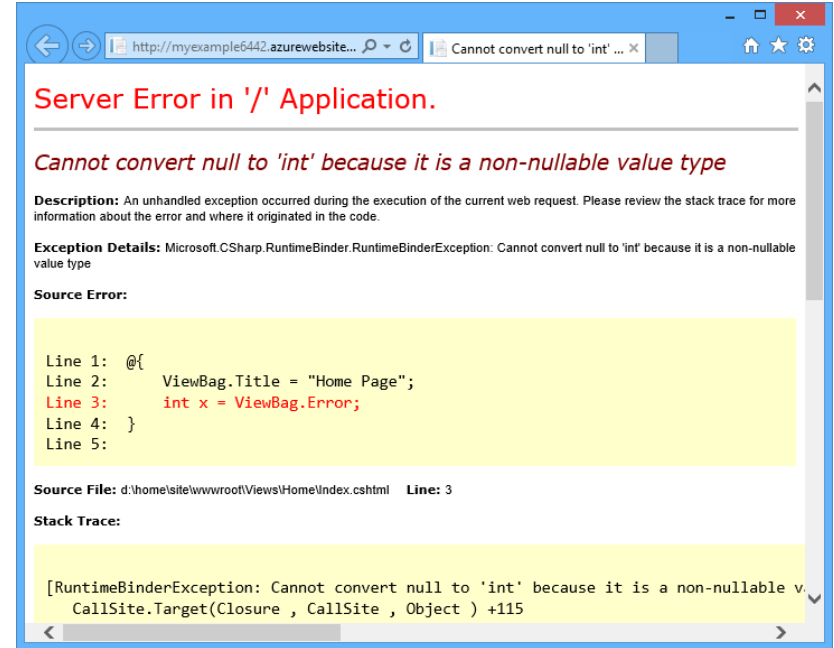
- Unhelpful text
- Developers needs to see this, not users
- How do you handle this?



Messages for developers (2)

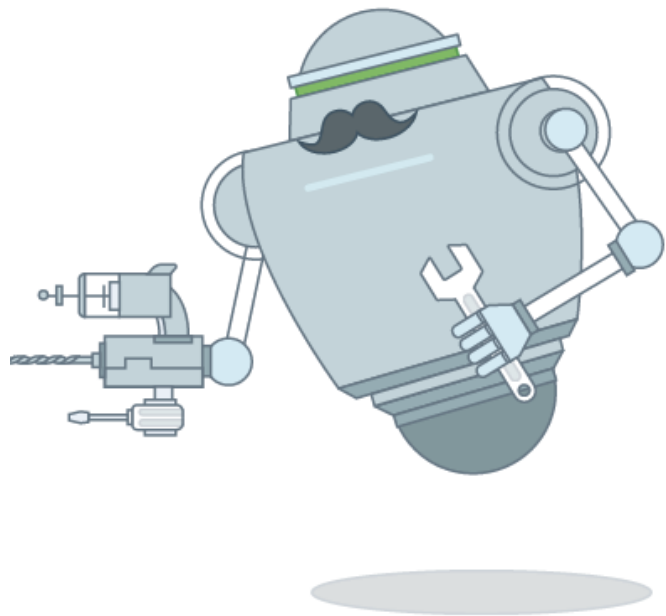
66

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



A better error message

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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

68

- 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

69

Difficult Password Requirements



The page at <https://runess.adp.com> says:

Your password must be 8 to 20 characters and may include upper or lowercase letters (A-Z and a-z), numbers (0-9), spaces, and special characters. You must use at least one letter and one number. You cannot use the same character in four or more consecutive positions (for example, AAAa is valid, but AAAA is not valid) and you cannot use four or more sequential characters, in ascending or descending order, in a row (for example, ABCD and 4321 are not allowed).

OK

Busy User Interface

The screenshot shows the Bulk Rename Utility window with a file list and a complex configuration panel. The file list shows files being renamed with sequential numbers. The configuration panel includes options for Regular Expressions, Replacements, File operations, Case, Move/Copy, Append Folder Name, Extension, and Selections.

Name	New Name	Sub...	Type	Size	Created	Mo
100923-Chandigarh+						
100927-Kharar						
101015-Jaipur-Jaisalr						
101019-Jaisalmer-Jod						
101031-Udapur-Goa						
101102-Goa						
dia-abend						
dia-abend.blog						
Fjrdas-Blo						
01-delhi-erstes-photo.JPG	01-delhi-erstes-photo.JPG		JPG F...	2 MB	21.11...	11
02-delhi-imbau.JPG	02-delhi-imbau.JPG		JPG F...	3 MB	21.11...	11
03-delhi-eis.JPG	03-delhi-eis.JPG		JPG F...	2 MB	21.11...	11
04-delhi-ventilator.JPG	04-delhi-ventilator.JPG		JPG F...	3 MB	21.11...	11
05-delhi-northern-palace-fe...	05-delhi-northern-palace-fens...		JPG F...	3 MB	21.11...	11
06-delhi-northern-palace-ve...	06-delhi-northern-palace-versi...		JPG F...	3 MB	21.11...	11
07-delhi-humuyans-tomb.JPG	07-delhi-humuyans-tomb.JPG		JPG F...	2 MB	21.11...	12
08-delhi-eichhoemchen.JPG	08-delhi-eichhoemchen.JPG		JPG F...	2 MB	21.11...	12

RegEx (1) **Repl. (3)** **Remove (5)** **Add (7)** **Auto Date (8)** **Numbering (10)**

Match [0] Repl. [00] With [] First n [0] Last n [0] Prefix [] Insert [] at pos. [0] Suffix [] Word Space []

File (2) **Case (4)** **Move/Copy (6)** **Append Folder Name (9)** **Extension (11)**

Name [Keep] Same [] Excep. [] Digits [] High [] Trim [] D/S [] Accents [] Chars [] Sym. [] Lead Dots [] Non []

Mode [None] Type [Creation (Cur)] Start [1] Inct [1] Pad [0] Sep. [] Break [0] Folder [] Type [Base 10 (Decimal)] Roman Numerals [None] Cent. Off. [0]

Filter [*] Folders [] Hidden [] Name Len Min [0] Max [0] Path Len Min [0] Max [0] Path [] Copy not Move []

187 Objects (0 Selected) Favourite D:\bilder\2010-Max-Indien\dia-abend.blog

Simplification

70

Old Instructions



New Instructions



Lacks logical flow

71

- 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

72

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



Not user friendly (2)

73

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



Which is which?

74

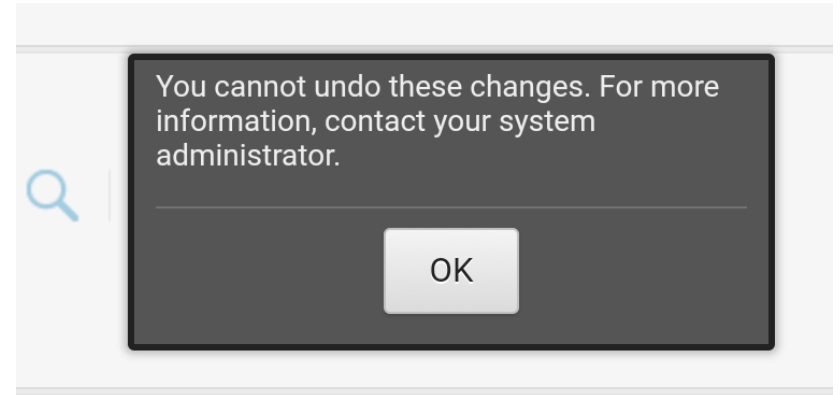
- What are the button pairs?
- Is the right square going to take you up or down?



Reversal of action

75

- This operation prevented the user from undoing the previous changes



User Experiences Summary

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- 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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