

### **Principles to Support Usability**

according to Alan Dix et al.



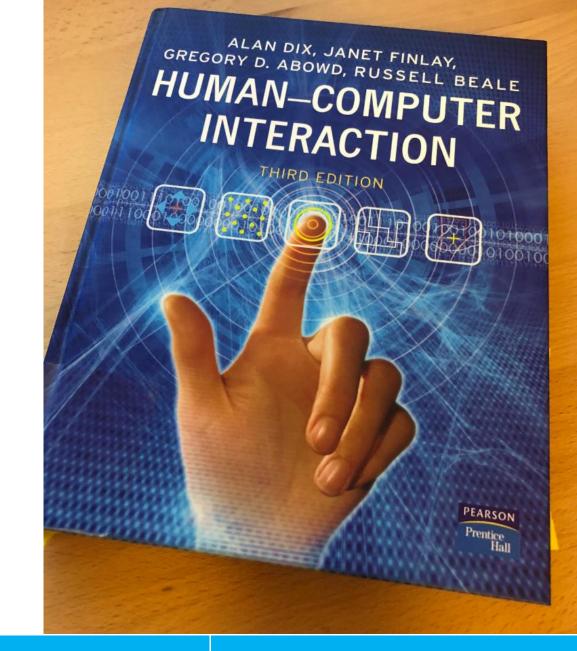
## **Learning Goals**

- Understand ...
  - the principles that support usability according to Dix et al.
  - what points contribute to each of the principles
- Be able to …
  - explain these principles and give examples
  - discuss user interface designs with regard to these principles

### Principles to Support Usability By Dix et al.

- Principle 1: Learnability
- Principle 2: Flexibility
- Principle 3: Robustness





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#### Principles to Support Usability

**Principles to Support Usability Dix et al.** 

The ease with which new users can begin effective interaction and achieve maximal performance.

- Predictability
- Synthesizability
- Familiarity
- Generalizability
- Consistency

Dix, A. J., Finlay, J., Abowd, G. D., & Beale, R. (2003). Human-computer interaction. Pearson Education https://hcibook.com/.

**Principles to Support Usability Dix et al.** 

The ease with which new users can begin effective interaction and achieve maximal performance.

#### Predictability

- Determining effect of future actions based on past interaction history
- Visibility of operations and effects
- Synthesizability
- Familiarity
  - how prior knowledge applies to a new system
  - affordance ('guessability')
- Generalizability
- Consistency

Dix, A. J., Finlay, J., Abowd, G. D., & Beale, R. (2003). Human-computer interaction. Pearson Education https://hcibook.com/.

#### C:\WINDOWS\system32\cmd.exe

C:∖>move test.txt test

C:∖>dir \*.txt Volume in drive C has no label. Volume Serial Number is FCB2-566A

Directory of C:\

25.05.2007 12:36 Ø installDebug.txt 1 File(s) Ø bytes Ø Dir(s) 14,052,261,888 bytes free

:\>cd test

C:\test>dir \*.txt Volume in drive C has no label. Volume Serial Number is FCB2-566A

Directory of C:\test

19.11.2007 16:56 Ø test.txt 1 File(s) Ø bytes 0 Dir(s) 14,052,261,888 bytes free

::\test>







**Principles to Support Usability Dix et al.** 

The ease with which new users can begin effective interaction and achieve maximal performance.

- Predictability
- Synthesizability
  - ability of the user to assess the effect of past operations based on the current state
  - the user should see the changes of an operation
  - immediate vs. eventual feedback
- Familiarity
- Generalizability
- Consistency

**** ***	<b>test</b> Text Document O KB
39999 11     11	test Text Document O KB
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E Text D E D KB	A ocument

Dix, A. J., Finlay, J., Abowd, G. D., & Beale, R. (2003). Human-computer interaction. Pearson Education https://hcibook.com/.

**Principles to Support Usability Dix et al.** 

25 seconds Show from Movie: Star Trek IV: The Voyage Home https://www.youtube.com/watch?v=hShY6xZWVGE

Dix, A. J., Finlay, J., Abowd, G. D., & Beale, R. (2003). *Human-computer interaction*. Pearson Education https://hcibook.com/.

**Principles to Support Usability Dix et al.** 

The ease with which new users can begin effective interaction and achieve maximal performance.

- Predictability
- Synthesizability
- Familiarity

### Generalizability

 extending specific interaction knowledge to new situations

### Consistency

 likeness in input/output behavior arising from similar situations or task objectives



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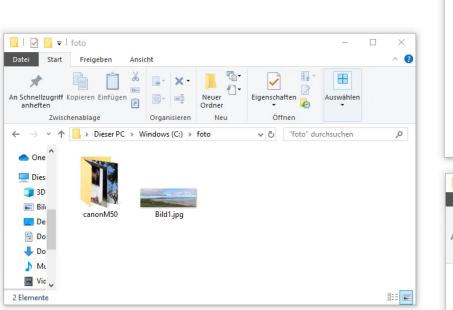
Dix, A. J., Finlay, J., Abowd, G. D., & Beale, R. (2003). *Human-computer interaction*. Pearson Education https://hcibook.com/.

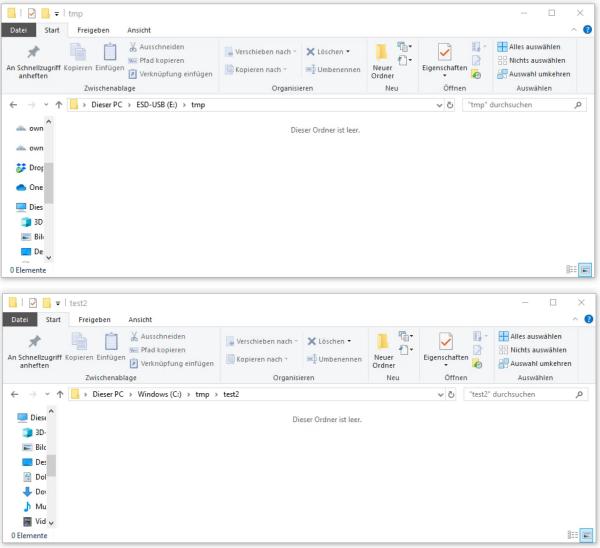
#### 25 seconds

Show from Movie: Star Trek IV: The Voyage Home https://www.youtube.com/watch?v=hShY6xZWVGE

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### **Example: Predictability, Consistency**

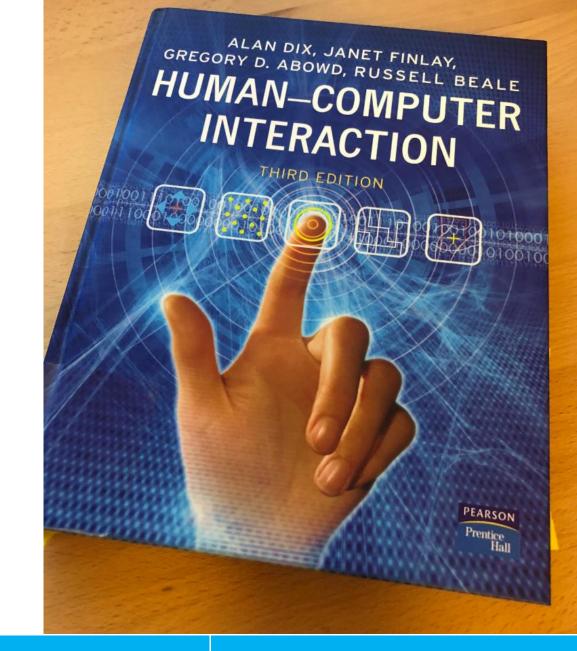




### Principles to Support Usability By Dix et al.

- Principle 1: Learnability
- Principle 2: Flexibility
- Principle 3: Robustness





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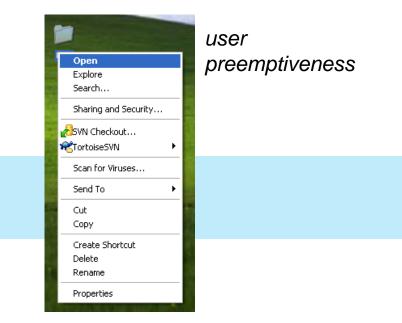
#### Principles to Support Usability

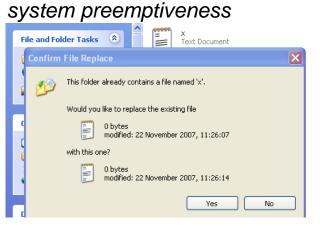
**Principles to Support Usability Dix et al.** 

The multiplicity of ways the user and system exchange information.

- Dialogue initiative
  - freedom from system imposed constraints on input dialogue
  - user preemptiveness: user initiates dialog
  - system preemptiveness: system initiates dialog
- Multithreading
- Task migratability
- Substitutivity
- Customizability







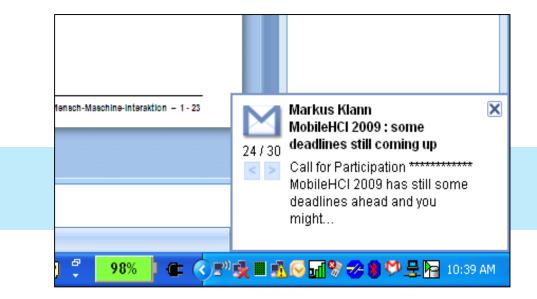
Principles to Support Usability

#### **Principles to Support Usability Dix et al.**

The multiplicity of ways the user and system exchange information.

- Dialogue initiative
- Multithreading
  - system supports user interaction for several tasks at a time
    - <u>concurrent multimodality</u>: simultaneous communication of information pertaining to separate tasks
    - interleaving multimodality: permits temporal overlap between separate tasks, dialog is restricted to a single task
- Task migratability
- Substitutivity
- Customizability

Dix, A. J., Finlay, J., Abowd, G. D., & Beale, R. (2003). Human-computer interaction. Pearson Education https://hcibook.com/.



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Slide adapted from Dr. Paul Holleis

**Principles to Support Usability Dix et al.** 

# The multiplicity of ways the user and system exchange information.

- Dialogue initiative
- Multithreading
- Task migratability
  - passing responsibility for task execution between user and system, e.g. spell checking
- Substitutivity
- Customizability

#### Dix, A. J., Finlay, J., Abowd, G. D., & Beale, R. (2003). *Human-computer interaction*. Pearson Education https://hcibook.com/.

Spelling							
Not in Dictionary <u>:</u>	migratability						
Change <u>t</u> o:	irritability	Ignore	Ignore All				
Suggestions:	irritability	Change	Change All				
		Add	Suggest				
Add <u>w</u> ords to:	CUSTOM.DIC 💌	AutoCorrect	Close				

Tack migrata hility

#### Principles to Support Usability

## **Principle 2: Flexibility**

#### **Principles to Support Usability Dix et al.**

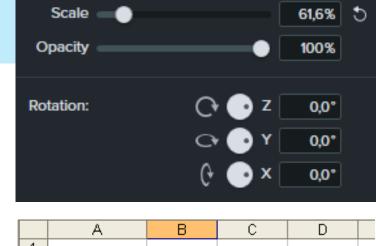
The multiplicity of ways the user and system exchange information.

- Dialogue initiative
- Multithreading
- Task migratability

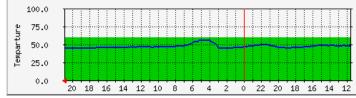
#### Substitutivity

- allowing equivalent values of input and output to be substituted for each other
- representation multiplicity
- equal opportunity: blurs the distinction between input and output
- Customizability

Dix, A. J., Finlay, J., Abowd, G. D., & Beale, R. (2003). Human-computer interaction. Pearson Education https://hcibook.com/.



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1					
2	Summand 1	1	2	1	
3	Summand 2	2	2	2	
4	Summand 3	3	3	3	
5	Total sum	6	7	6	
C C					



Slide adapted from Dr. Paul Holleis

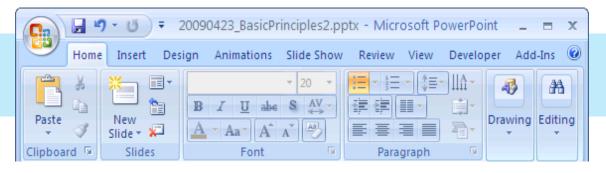
**Principles to Support Usability Dix et al.** 

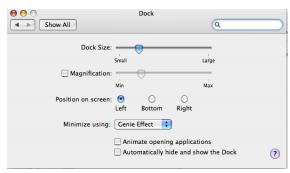
The multiplicity of ways the user and system exchange information.

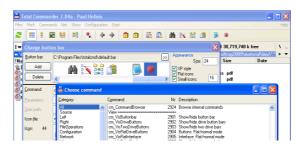
- Dialogue initiative
- Multithreading
- Task migratability
- Substitutivity
- Customizability
  - modifiability of the user interface by the user (adaptability) or system (adaptivity)
  - <u>adaptability (anpassbar)</u>: users ability to adjust the form of input and output
  - adaptivity (adaptive): automatic customization of the user interface by the system



Image: State of the state







2019-06-26 - Basics and Principles of HCI.pptx - PowerPoint

## **Principle 2: Flexibility**

#### **Principles to Support Usability Dix et al.**

The multiplicity of ways the user and system exchange information.

- Dialogue initiative
- Multithreading
- Task migratability
- Substitutivity
- Customizability
  - modifiability of the user interface by the user (adaptability) or system (adaptivity)
  - adaptability (anpassbar): users ability to adjust the form of input and output
  - <u>adaptivity (adaptive)</u>: automatic customization of the user interface by the system

#### Öffnen

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	OneDrive - Persönlich nhenze@gmail.com	C: » Users » Niels Henze » Dropbox » lectures-even more » GHCI Gestern	20.00.2019 10.29
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		2019-06-04-PaperWriting.pptx C: » Users » Niels Henze » Dropbox » lectures-even more » Forschungsse	19.06.2019 11:53
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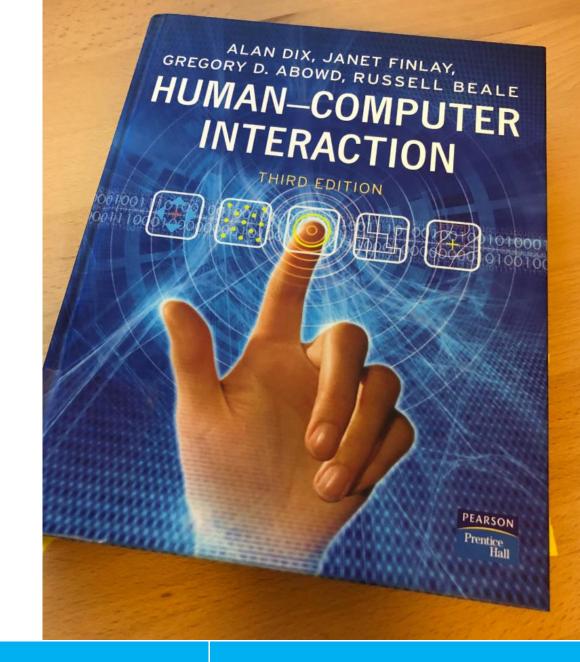
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### Principles to Support Usability By Dix et al.

- Principle 1: Learnability
- Principle 2: Flexibility
- Principle 3: Robustness





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Principles to Support Usability

### **Principle 3: Robustness**

**Principles to Support Usability Dix et al.** 

The level of support provided to the user in determining successful achievement and assessment of goal-directed behaviour.

- Observability
- Recoverability
- Task conformance
- Responsiveness

Dix, A. J., Finlay, J., Abowd, G. D., & Beale, R. (2003). Human-computer interaction. Pearson Education https://hcibook.com/.

#### Principles to Support Usability

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### **Principle 3: Robustness**

#### **Principles to Support Usability Dix et al.**

The level of support provided to the user in determining successful achievement and assessment of goal-directed behaviour.

### Observability

- ability of the user to evaluate the internal state of the system from its perceivable representation
- Recoverability
- Task conformance
- Responsiveness



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### **Principle 3: Robustness**

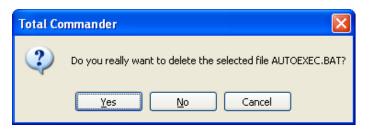
**Principles to Support Usability Dix et al.** 

The level of support provided to the user in determining successful achievement and assessment of goal-directed behaviour.

- Observability
- Recoverability
  - ability of the user to correct a recognized error
  - reachability (states): forward (redo) / backward (undo) recovery
  - commensurate effort (more effort / steps for deleting a file than for moving it)
- Task conformance
- Responsiveness

Dix, A. J., Finlay, J., Abowd, G. D., & Beale, R. (2003). Human-computer interaction. Pearson Education https://hcibook.com/.





### **Principle 3: Robustness**

**Principles to Support Usability Dix et al.** 

The level of support provided to the user in determining successful achievement and assessment of goal-directed behaviour.

- Observability
- Recoverability

### Task conformance

- degree to which system services support all of the user's tasks
- task completeness
- task adequacy
- Responsiveness



Dix, A. J., Finlay, J., Abowd, G. D., & Beale, R. (2003). *Human-computer interaction*. Pearson Education https://hcibook.com/.

#### Principles to Support Usability

### **Principle 3: Robustness**

**Principles to Support Usability Dix et al.** 

The level of support provided to the user in determining successful achievement and assessment of goal-directed behaviour.

- Observability
- Recoverability
- Task conformance
- Responsiveness
  - how the user perceives the rate of communication with the system
  - preferred: short durations and instantaneous responses
  - stability and indication of response time

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Dix, A. J., Finlay, J., Abowd, G. D., & Beale, R. (2003). *Human-computer interaction*. Pearson Education https://hcibook.com/.

# **Principles to Support Usability**

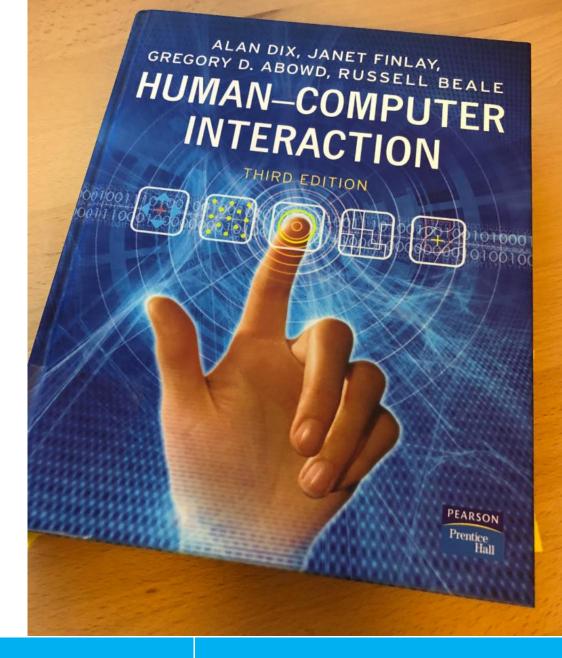
By Dix et al.

- Learnability
  - Predictability
  - Synthesizability
  - Familiarity
  - Generalizability
  - Consistency
- Flexibility
  - Dialogue initiative
  - Multithreading
  - Task migratability
  - Substitutivity
  - Customizability

Dix, A. J., Finlay, J., Abowd, G. D., & Beale, R. (2003). *Human-computer interaction*. Pearson Education, p260ff, https://hcibook.com/.



- Robustness
  - Observability
  - Recoverability
  - Responsiveness
  - Task conformance



### **Conversation with Alan Dix**

https://youtu.be/n8S6ZgZzgbo

### Albrecht Schmidt

Principles to Support Usability

Alan Dix

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Albrecht Schmidt

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## Did you understand this block?

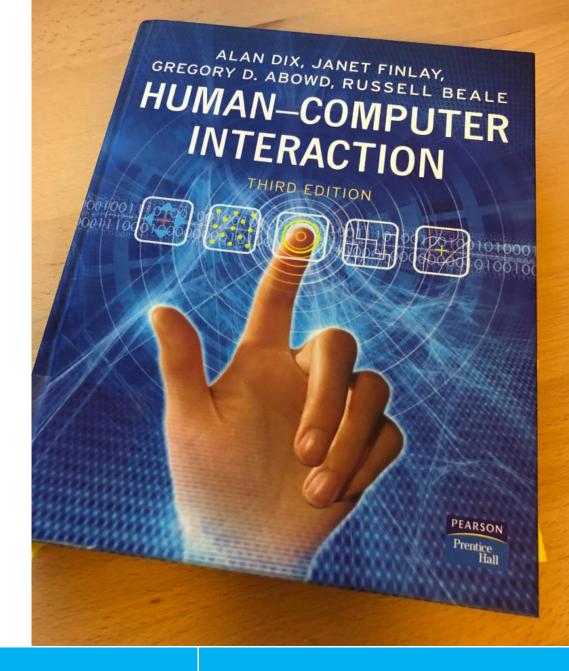
**Can you answer these questions?** 

- What are the 3 principles to support usability according to Alan Dix et al.?
- Give an example for robustness?
- How did our expectations for learnability change over the last 20 years?
- How does recoverability contribute to robustness?
- What two forms of customizability can be discriminated? Give an example for each.
- How does predictability improve learnability? How is predictability achieved?



### Reference

 Dix, A. J., Finlay, J., Abowd, G. D., & Beale, R. (2003). Human-computer interaction. Pearson Education, pp.260ff <u>https://hcibook.com/</u>



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