

HUMAN-COMPUTER INTERACTION THIRD EDITION DIX FINLAY ABOWD BEALE

# chapter 7

## design rules

- design rules
- Designing for maximum usability  
– the goal of interaction design
- Principles of usability  
– general understanding
  - Standards and guidelines  
– direction for design
  - Design patterns  
– capture and reuse design knowledge

- types of design rules
- principles
    - abstract design rules
    - low authority
    - high generality
  - standards
    - specific design rules
    - high authority
    - limited application
  - guidelines
    - lower authority
    - more general application
- increasing generality
- Guidelines
- Standards
- increasing authority

- Principles to support usability
- Learnability  
the ease with which new users can begin effective interaction and achieve maximal performance
- Flexibility  
the multiplicity of ways the user and system exchange information
- Robustness  
the level of support provided the user in determining successful achievement and assessment of goal-directed behaviour

- Principles of learnability
- Predictability  
– determining effect of future actions based on past interaction history  
– operation visibility
- Synthesizability  
– assessing the effect of past actions  
– immediate vs. eventual honesty

- Principles of learnability (ctd)
- Familiarity  
– how prior knowledge applies to new system  
– guessability; affordance
- Generalizability  
– extending specific interaction knowledge to new situations
- Consistency  
– likeness in input/output behaviour arising from similar situations or task objectives

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## Principles of flexibility

**Dialogue initiative**

- freedom from system imposed constraints on input dialogue
- system vs. user pre-emptiveness

**Multithreading**

- ability of system to support user interaction for more than one task at a time
- concurrent vs. interleaving; multimodality

**Task migratability**

- passing responsibility for task execution between user and system

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## Principles of flexibility (ctd)

**Substitutivity**

- allowing equivalent values of input and output to be substituted for each other
- representation multiplicity; equal opportunity

**Customizability**

- modifiability of the user interface by user (adaptability) or system (adaptivity)

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## Principles of robustness

**Observability**

- ability of user to evaluate the internal state of the system from its perceivable representation
- browsability; defaults; reachability; persistence; operation visibility

**Recoverability**

- ability of user to take corrective action once an error has been recognized
- reachability; forward/backward recovery; commensurate effort

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## Principles of robustness (ctd)

**Responsiveness**

- how the user perceives the rate of communication with the system
- Stability

**Task conformance**

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

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## Using design rules

**Design rules**

- suggest how to increase usability
- differ in generality and authority

Guidelines

Standards

increasing generality

increasing authority

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## Standards

- set by national or international bodies to ensure compliance by a large community of designers standards require sound underlying theory and slowly changing technology
- hardware standards more common than software high authority and low level of detail
- ISO 9241 defines usability as effectiveness, efficiency and satisfaction with which users accomplish tasks

## Guidelines

- more suggestive and general
- many textbooks and reports full of guidelines
- abstract guidelines (principles) applicable during early life cycle activities
- detailed guidelines (style guides) applicable during later life cycle activities
- understanding justification for guidelines aids in resolving conflicts

## Golden rules and heuristics

- "Broad brush" design rules
- Useful check list for good design
- Better design using these than using nothing!
- Different collections e.g.
  - Nielsen's 10 Heuristics (see Chapter 9)
  - Shneiderman's 8 Golden Rules
  - Norman's 7 Principles

## Shneiderman's 8 Golden Rules

1. *Strive for consistency*
2. *Enable frequent users to use shortcuts*
3. *Offer informative feedback*
4. *Design dialogs to yield closure*
5. *Offer error prevention and simple error handling*
6. *Permit easy reversal of actions*
7. *Support internal locus of control*
8. *Reduce short-term memory load*

## Norman's 7 Principles

1. *Use both knowledge in the world and knowledge in the head.*
2. *Simplify the structure of tasks.*
3. *Make things visible: bridge the gulfs of Execution and Evaluation.*
4. *Get the mappings right.*
5. *Exploit the power of constraints, both natural and artificial.*
6. *Design for error.*
7. *When all else fails, standardize.*

## HCI design patterns

- An approach to reusing knowledge about successful design solutions
- Originated in architecture: Alexander
- A pattern is an invariant solution to a recurrent problem within a specific context.
- Examples
  - Light on Two Sides of Every Room (architecture)
  - Go back to a safe place (HCI)
- Patterns do not exist in isolation but are linked to other patterns in *languages* which enable complete designs to be generated

## HCI design patterns (cont.)

- Characteristics of patterns
  - capture design practice not theory
  - capture the essential common properties of good examples of design
  - represent design knowledge at varying levels: social, organisational, conceptual, detailed
  - embody values and can express what is humane in interface design
  - are intuitive and readable and can therefore be used for communication between all stakeholders
  - a pattern language should be generative and assist in the development of complete designs.

## Summary

### Principles for usability

- repeatable design for usability relies on maximizing benefit of one good design by abstracting out the general properties which can direct purposeful design
- The success of designing for usability requires both creative insight (new paradigms) and purposeful principled practice

### Using design rules

- standards and guidelines to direct design activity