Chapter Four: Design Rules and User Support

2014 E.C.

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Design rules

❑ Designing for maximum usability is the goal of interactive systems design.

❑ Design rules

  ➢ Are rules a designer should follow in order to increase the usability of the eventual software product

  ➢ Provide designers with the ability to determine the usability of their design decisions.

Design Rules…

- Three types of design rules
  - **Principles –** Collections of statements that advice the designer on how to proceed (e.g., "know the user"). Abstract design rules.
    - "an interface should be easy to navigate"
  - **Standards –** Are specific design rules and measurable with limited application e.g. ISO 9241

  - **Guidelines –** Collections of tests that can be applied to an interface to determine if it is   satisfactory
  - Advice on how to achieve principle

    e.g., provide an average response time of less than 1sec.

Principles

➢ Principles tend to be very general and would apply pretty much across different technologies and systems.

❑ **Three main categories of principles**

  ◦ **Learnability:** The ease(simplicity) with which new users can begin effective interaction and achieve maximal performance

  ◦ **Flexibility:** The multiplicity of ways the user and system exchange information

  ◦ **Robustness /strength :** The level of the system to cope up with different conditions during execution for successful achievement and assessment of goals.

    • ability of system to remain functioning under disturbances

Principles affecting Learnability

A. **Predictability**

- Determining effect of future actions based on past interaction history

- i.e. The user's ability to determine the effect of future interactions

- Assumes that the user has some mental model of how the system behaves

- Examples : 0, 3, 6, …. next number?

B. **Familiarity:** How pervious knowledge applies to new system e.g. Guessability, affordance

C. **Consistency:** e.g. consistency in command naming and other functionalities

Principles affecting Flexibility

A. Multithreading

- Ability of system to support user interaction for more than one task at a time or Concurrent tasks

B. Substitutivity

- Allowing equivalent values of input and output to be substituted for each other

- E.g. Enter an input for length in meter(1m, 1 meter, 1) or (100cm, 100centimeter, 100)

C. Customizability

- Modifiability of the user interface by user or system

Principles affecting Robustness

A. **Observability**

- ❑ Ability of user to evaluate the internal state of the system from its perceivable representation

B. **Recoverability**

- ❑ Ability of user to take corrective action once an error has been recognized
- ❑ forward/backward recovery.

Principles affecting Robustness …

C. Responsiveness

- ❑ Measures the rate of communication between the system and the user.

  - Response time - duration of time needed by the system to express state changes to the user.

D. Task conformance

- ❑ Degree to which system services support all of the tasks the user wishes to perform
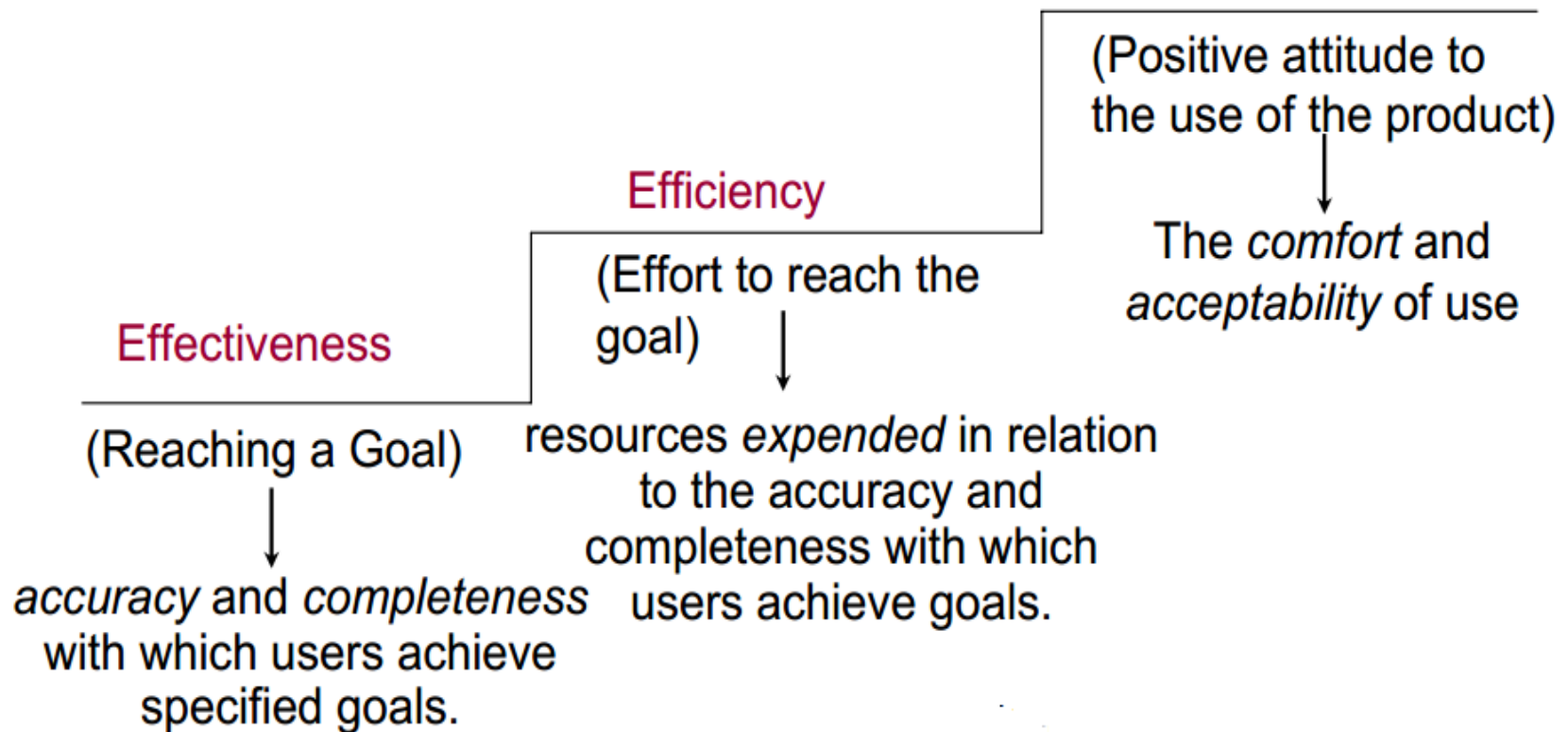
  - task completeness - the coverage issue

Standards

❑ HCI standards are more suitable for hardware than software (more common)

❑ Set by national or International bodies to ensure fulfilment with a set of design rules by a large community standards

❑ e.g. ISO, International Telecommunication Union(ITU), Institute of Electrical and Electronics Engineers(IEEE)

❑ International Organization for Standardization (ISO) is a nongovernmental organization that comprises standards bodies from more than 160 countries ,

❑ With one standards body representing each member country.

❑ For example, the **American National Standards Institute(ANSI)** represents the United States

❑ ISO 9241 defines usability as
  ◦ **Effectiveness** - accuracy and completeness
  ◦ **Efficiency** - the resources (time, memory) expended
  ◦ **Satisfaction** - comfort and acceptability

Standards

Usability according to ISO 9241-11:
Usability can be measured by the extent to which users reach their goals dependent on values like effectiveness, efficiency, and satisfaction.

Satisfaction

(Positive attitude to the use of the product)

The *comfort* and *acceptability* of use

Efficiency

(Effort to reach the goal)

resources *expended* in relation to the accuracy and completeness with which users achieve goals.

Effectiveness

(Reaching a Goal)

accuracy and *completeness* with which users achieve specified goals.

Guidelines

❑ Guidelines tend to be more specific to a device or system and general in application.

❑ More suggestive and general

❑ Many textbooks and reports full of guidelines

❑ Applicable during early and later life cycle activities

❑ Example

◦ Shneiderman's 8 Golden Rules

◦ Norman's 7 Principles

◦ Nielsen's Ten Heuristic Principles [Reading Assignment]

Shneiderman's 8 Golden Rules

1. **Strive for consistency:** lay-out, terminologies, command usage, etc.

2. **Enable frequent users to use shortcuts:** recognize the requirements of diverse users and technology. For instance add features for beginner e.g. shortcuts

3. **Offer informative feedback:** for every user action, offer relevant feedback and information . (e.g. Fill in form $\rightarrow$ submit $\rightarrow$ Confirmation)

4. **Design dialogs to yield closure:**

Cont…

5. **Offer error prevention and simple error handling**

   ◦ prevention and (clear and informative guidance to) recovery; error management

6. **Permit easy reversal of actions:** to relieve anxiety and encourage exploration, because the user knows s/he can always go back to previous states

7. **Support internal locus of control:** make the user feel that she/he is in control of the system, which responds to his/her instructions/commands.

8. **Reduce short-term memory load:** make menus and UI elements/items visible, easily available/retrievable.

Norman's 7 Principles

1. Use both knowledge in the world and knowledge in the head.

   ◦ The systems should provide the necessary knowledge within the environment

   ◦ And their   operation should be transparent to support the user in building an   appropriate mental model of what is going on.

2. Simplify the structure of tasks.

3. Make things visible

4. Get the mappings right - intentions to controls & actions to event

5. Exploit the power of constraints

6. Design for error: Design recovery for the system

7. When all else fails, standardize. If there are no natural mappings then arbitrary mappings should be standardized

Guidelines for general interaction

- Be consistent.

- Offer significant feedback.

- Ask for authentication of any non-trivial critical action.

- Authorize easy reversal of most actions.

- Excuse mistakes.

- Classify activities by function and establish screen geography accordingly.

- Deliver help services that are context sensitive.

- Use simple action verbs or short verb phrases to name commands

- Reduce the number of input actions required of the user.

- Interaction should be flexible.

HCI design patterns

❑ One way to approach design is to learn from examples that have proven to be successful in the past:

✓ So to reuse the knowledge of what made a system - or paradigm - successful.

❑ **Patterns:** are an approach to capturing and reusing this knowledge - of abstracting the essential details of successful design so that these can be applied again and again in new situations.

❑ It is approach of reusing knowledge about successful design solutions

Cont…

❑ Reasons to use design patterns

◦ Teaching beginners some best practices and common approaches

◦ Reducing time and costs in the design and development lifecycle

◦ Making more usable designs

◦ Eliminate wasted time spent for reinventing.

◦ Ensuring users have a **consistent** and **predictable** experience within an application or service

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

- Are sensitive , readable and can be used for communication between all stakeholders

User support

❑ There is often an implicit assumption properly designed interactive system can be used by anybody with little or no help or training, but it is far from true.

❑ So, designing help into an interactive system is important

❑ Types of user support:

  ◦ **Quick reference, Task specific help, Full explanation, Tutorial**

❑ Each type may be on-line and off-line (documentation)

❑ User Supportd are provided by help and documentation

  ◦ **Help -** (problem-oriented) and

    • **Command assistance:** User requests help on particular command. E.g. DOS help

  ◦ **Documentation -** (system-oriented)

# Quick Reference

❑ Quick reference is used primarily as a reminder to the user of the details of tools

❑ It is basically familiar with and has used before.

❑ It may be used to find a particular command option, or to remind the user of the syntax of the command.

❑ Example: **Word 2007 Screen**
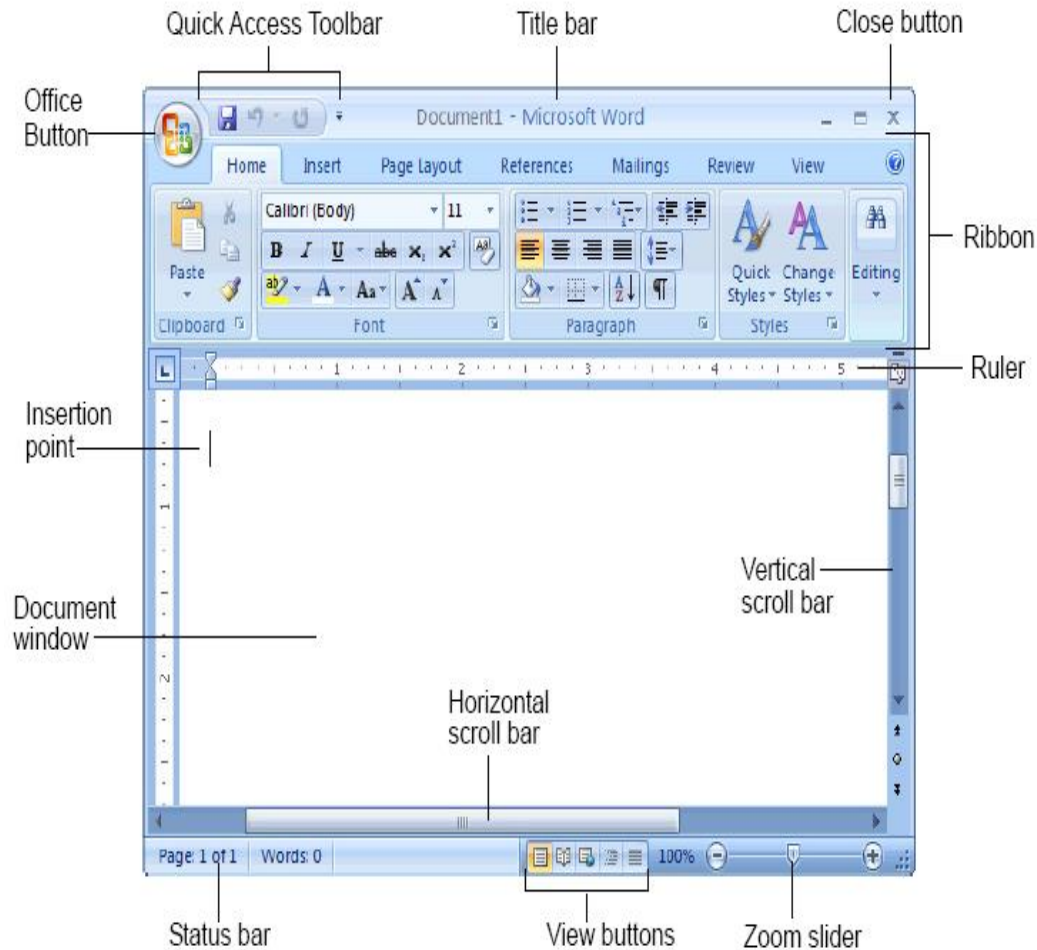
Task Specific Help

❑ Task specific help is required when the user has encountered a problem in performing a particular task

❑ or when he is uncertain how to apply the tool to his particular problem.

❑ The help that is offered is directly related to what is being done.
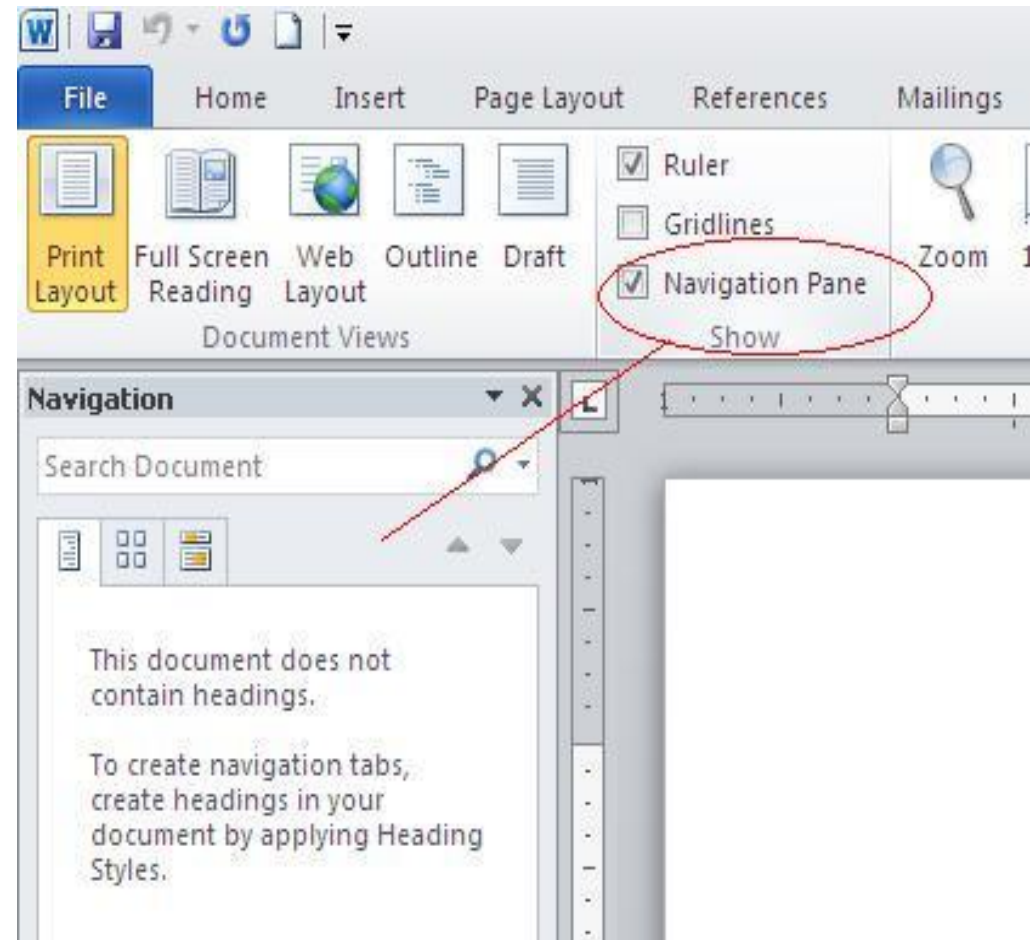
Full Explanation

❑ The more experienced or interested user may require a full explanation of a tool or command to enable him to understand it more fully.

❑ This explanation will almost certainly include information that the user does not need at that time.

Tutorial

❑ This is particularly aimed at new users of a tool and provides step-by-step instruction

❑ Perhaps it give support by working examples of how to use the tool.

Requirements for user support

- **Availability**
  - The user needs to be able to access help at any time during his interaction with the system
  - Continuous access concurrent to main application
- **Accuracy and completeness**
  - Help matches and covers actual system behaviour
  - It may seem obvious to state that the assistance provided should be accurate and complete
- **Consistency**
  - The help provided by each of these must be consistent with all the others and within itself
  - It should be consistent in terms of content, terminology and style of presentation
  - Online help should also be consistent with paper documentation
- **Robustness**
  - It is important that the help system itself should be robust, both by correct error handling and predictable behavior
- **Flexibility**
  - Allows user to interact in a way appropriate to experience and task

Designing User Support

❑ User support **is not an 'add on'** - it should be designed integrally with system.

❑ Should concentrate on content and context of help rather than technological issues

❑ **Effective presentation requires**

◦ Clear, familiar, consistent language

◦ Instructional rather than descriptive language

◦ Avoidance of blocks of text

◦ Clear indication of summary and example information

❑ There are implementation & presentation issues

Designing User Support…

Presentation Issues

❑ How is help requested?

- ◦ Command
- ◦ Button
- ◦ Function (on/off)
- ◦ Separate application

❑ How is help displayed?

- ◦ New window, whole screen, split screen,
- ◦ Pop-up boxes, hint icons

Implementation Issues

❑ What resources are available

- ◦ Screen space
- ◦ Memory capacity
- ◦ Speed

❑ Structure of help data

- ◦ Single file
- ◦ File hierarchy
- ◦ Database

Thanks…