

Ch1 - Usability of Interactive Systems

➤ **Goals for requirements analysis**

- **Ensure reliability**
 - ✓ Actions must function as specified
 - ✓ The system should be available as often as possible
 - ✓ Database data displayed must reflect the actual database
 - ✓ Ensure the user's privacy and data security by protecting against unwarranted access, destruction of data, and malicious tampering

- **Promote standardization, integration, consistency, and portability**

Standardization: use pre-existing industry standards where they exist to aid learning and avoid errors (e.g. the W3C and ISO standards)

Integration: the product should be able to run across different software tools and packages (e.g. Unix)

Consistency:

- compatibility across different product versions
- compatibility with related paper and other non-computer based systems
- use common action sequences, terms, units, colors, etc. within the program

Portability: allow for the user to convert data across multiple software and hardware environments

- ***Complete projects on time and within budget***

Late or over budget products can create serious pressure within a company and potentially mean dissatisfied customers and loss of business to competitors.

➤ **Goals for our profession**

- **Potential research topics**
- **Providing tools, techniques, and knowledge for system implementers**
- **Raising the computer consciousness of the general public**

Ch2 - Guidelines, Principles, and Theories

➤ **Guidelines**

- Shared language
- Best practices
- Critics : Too specific, incomplete, hard to apply, and sometimes wrong
- Proponents Encapsulate experience

➤ **Navigating the interface**

➤ **Accessibility guidelines**

- Provide a text equivalent for every non text element
- For any time-based multimedia presentation synchronize equivalent alternatives
- Information conveyed with color should also be conveyed without it
- Title each frame to facilitate identification and navigation

➤ **Organizing the display:** Smith and Mosier (1986) offer five high-level goals

- Consistency of data display
- Compatibility of data display with data entry
- Efficient information assimilation by the user
- Flexibility for user control of data display
- Minimal memory load on the user

➤ **Getting the user's attention**

- | | | | |
|--------------|------------|----------|--------------------|
| 1. Intensity | 2. Marking | 3. Size | 4. Choice of fonts |
| 5. Blinking | 6. Audio | 7. Color | 8. Inverse video |

➤ **Choose an interaction style**

	advantages	disadvantages
• Direct Manipulation	<ol style="list-style-type: none"> 1. Visually presents task concepts 2. Allows easy learn & retention 3. Allows errors to be avoided 4. High subjective satisfaction 	<ol style="list-style-type: none"> I. Hard to program II. Require graphics display and pointing device
• Menu selection	<ul style="list-style-type: none"> ❖ Shortens learning ❖ Reduces keystrokes ❖ Structures decision making ❖ Easy support of error handling 	<ul style="list-style-type: none"> ❖ Presents danger of many menus ❖ May slow frequent users ❖ Consumes screen space ❖ Requires rapid display rate
• Form fillin	<ol style="list-style-type: none"> I. Simplifies data entry II. Requires modest training III. Gives convenient assistance IV. Permits use of for management tools 	<ol style="list-style-type: none"> 1. Consumes screen space
• Command language	<ul style="list-style-type: none"> ❖ Flexible ❖ Appeals to “power users” ❖ Supports user initiative ❖ Allows convenient creation of user-defined macros 	<ul style="list-style-type: none"> ❖ Poor error handling ❖ Requires substantial training ❖ Requires substantial memorization
• Natural language	<ol style="list-style-type: none"> 1. Relieves burden of learning syntax 	<ol style="list-style-type: none"> I. Requires clarification dialog II. May not show context III. May require more keystrokes IV. Unpredictable

➤ **The 8 golden rules of interface design**

1. Strive for consistency: sequences of actions should be required in similar situations should be comprehensible and limited in number.
2. Cater to universal usability: Recognize the needs of diverse users and design that can enrich the interface design and improve perceived system quality.
3. Offer informative feedback: system feedback for frequent and minor actions, the response can be modest, whereas for infrequent and major actions, the response should be more substantial.
4. Design dialogs to yield closure: Sequences of actions should be organized into groups with a beginning, middle, and end.
5. Prevent errors : design the system such that users cannot make serious errors
6. Permit easy reversal of actions: actions should be reversible. This feature relieves anxiety, since the user knows that errors can be undone, and encourages exploration of unfamiliar options.
7. Support internal locus of control : Experienced users strongly desire the sense that they are in charge of the interface and that the interface responds to their actions

8. Reduce short term memory load: **limited capacity for information processing in short-term memory**

➤ **Prevent errors**

Make error messages specific, positive in tone, and constructive

- Mistakes and slips (Norman, 1983)
- Correct actions
 - Gray out inappropriate actions
 - Selection rather than freestyle typing
 - Automatic completion
- Complete sequences
 - Single abstract commands
 - Macros and subroutines

➤ **Automation and human control**

Successful integration:

- Users can avoid (Routine, tedious, and error prone tasks)
- Users can concentrate on (Making critical decisions, coping with unexpected situations, and planning future actions)

Goals for autonomous agents

- knows user's likes and dislikes
- responds to novel situations
- makes proper inferences
- performs competently with little guidance

➤ **Stages of action models : Norman's seven stages of action**

1. Forming the goal
2. Forming the intention
3. Specifying the action
4. Executing the action
5. Perceiving the system state
6. Evaluating the outcome
7. Interpreting the system state

Four principles of good design

1. State and the action alternatives should be visible
2. Should be a good conceptual model with a consistent system image
3. Interface should include good mappings that reveal the relationships between stages
4. User should receive continuous feedback

Norman's contributions: Context of cycles of action and evaluation.

- **Gulf of execution: Mismatch between user intentions and the allowable actions**
- **Gulf of evaluation: Mismatch between system representation and the users expectations**

Ch3 - Managing Design Processes

➤ **The Four Pillars of Design**

- User Interface Requirements
- Words, icons, and graphics
- Input and output devices
- Guidelines documents and processes
- Ethnographic Observation
- Screen-layout issues
- Action sequences
- Training

➤ **Ethnographic Observation**

✚ **Preparation**

- Set initial goals and prepare questions
- Gain access and permission to observe/interview.
- ✦ **Field Study**
- Establish rapport with managers and users
- Observe/interview users in their workplace and collect
- ✦ **Analysis**
- Reduce and interpret the data
- Quantify data and compile statistics.
- ✦ **Reporting**
- Consider multiple audiences and goals.
- Understand organization policies and work culture.
- Familiarize yourself with the system and its history.
- Follow any leads that emerge from the visits
- Subjective/objective quantitative/qualitative data.
- Refine the goals and the process used.
- Compile the collected data in numerical, textual, and multimedia databases.
- Prepare a report and present the findings.

Ch4 - Evaluating interface Designs

- **Expert Reviews** : There are a variety of expert review methods to choose from:
 - Heuristic evaluation
 - Consistency inspection
 - Guidelines review
 - Cognitive walkthrough
 - Metaphors of human thinking
 - Formal usability inspection

➤ **Step-by-Step Usability Guide**

1. Plan
2. Analyze
3. design
4. Test & Refine

➤ **Survey Instruments**

Written user surveys are a familiar, inexpensive and generally acceptable companion for usability tests and expert reviews.

- Keys to successful surveys
 - ❖ Clear goals in advance
 - ❖ Development of focused items that help attain the goals.
- Survey goals can be tied to the components of the Objects and Action Interface model of interface design.
- Users could be asked for their subjective impressions about specific aspects of the interface such as the representation of:
 - ❖ task domain objects and actions
 - ❖ syntax of inputs and design of displays
- Other goals would be to ascertain
 - users background (age, gender, origins, education, income)
 - experience with computers (specific applications or software packages, length of time, depth of knowledge)
 - job responsibilities (decision-making influence, managerial roles, motivation)
 - personality style (introvert vs. extrovert, risk taking vs. risk averse, early vs. late adopter, systematic vs. opportunistic)
 - reasons for not using an interface (inadequate services, too complex, too slow)
 - familiarity with features (printing, macros, shortcuts, tutorials)
 - their feeling state after using an interface (confused vs. clear, frustrated vs. in-control, bored vs. excited).

➤ **Acceptance Test**

For large implementation projects, the customer or manager usually sets objective and measurable goals for hardware and software performance.

- If the completed product fails to meet these acceptance criteria, the system must be reworked until success is demonstrated.
- Rather than the vague and misleading criterion of "user friendly," measurable criteria for the user interface can be established for the following:

- ✓ Time to learn specific functions
- ✓ Rate of errors by users
- ✓ Human retention of commands over time
- ✓ Speed of task performance
- ✓ Subjective user satisfaction

In a large system, there may be eight or 10 such tests to carry out on different components of the interface and with different user communities.

- Once acceptance testing has been successful, there may be a period of field testing before national or international distribution.