User Interface Design:
Focusing on Users and Their Tasks
User Centered Design

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- Have users work with and give their feedback about prototypes, on-line help and draft user manuals
The importance of focusing on users

• Reduced training and support costs
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- Reduced time to learn the system
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- Greater attractiveness of the system, so users will be more willing to buy and use it
Questions to Consider Regarding Software and Its Users

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b) What aspects are the most difficult to learn? Are there aspects that are ignored because they are too complex?
c) Could it be used more quickly?
d) Are there any features one would never use? Would removing them make the system easier to use?
Characteristics of Users

Software engineers must develop an understanding of the users

- Goals for using the system
Characteristics of Users

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- Goals for using the system
- Potential patterns of use
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- Psychological traits and emotional feelings
Imagine you were planning to develop the following types of software projects. What different kinds of users should you anticipate? Consider the preceding issues.

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- An air-traffic control system
  — used by highly trained air-traffic controllers/managers
  — perhaps also by pilots, airport administrators, and government aviation authorities
  — used intensively throughout working day
  — used while under stress
  — would these users be worried about the software replacing them?
• A GPS-based auto navigation system
• A GPS-based auto navigation system
  — used by anyone who drives a car, and also by people sitting in passenger seat
  — users might speak different languages, and might have disabilities (deafness for example)
  — they would not necessarily have any knowledge of navigation or computers
• A microwave oven
• A microwave oven
  —used by practically anyone, including children
  —should be as accessible as possible to the disabled
• A payroll system
A payroll system
—configuration and data-entry aspects would be used by people with expertise in HR and finance
—outputs might be used by all employees
—can't assume computer expertise of anyone
—would HR and finance people worry about software replacing them?
Basics of User Interface Design

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• Do *iterative* UI prototyping to address the use cases.

• Results of prototyping will enable you to finalize the requirements.
Usability vs. Utility

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- This is *usability*.

*Both utility and usability are essential*

- They must be measured in the context of particular types of users.
Aspects of usability

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• **Acceptability**: The extent to which users *like* the system.
Different learning curves
Some basic terminology of user interface design

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- **Encoding techniques**: Ways of encoding information so as to communicate it to the user.
Usability Principles

1. Always test with users.
   - Usability guidelines have exceptions; you can only be confident that a UI is good if you test it successfully with users.
7.4 Usability Principles

2: Base UI designs on users’ *tasks*.

- Perform use case analysis to structure the UI.
7.4 Usability Principles

3: Ensure that the sequences of actions to achieve a task are as *simple* as possible.

- Reduce the amount of reading and manipulation the user has to do.
- Ensure the user does not have to navigate anywhere to do subsequent steps of a task.
Usability Principles

4: Ensure that the user always knows what he or she can and should do next.

- Ensure that the user can see what commands are available and are not available.
- Make the most important commands stand out.
Usability Principles

5: Provide good feedback including effective error messages.

- Inform users of the progress of operations and of their location as they navigate.
- When something goes wrong explain the situation in adequate detail and help the user to resolve the problem.
Usability Principles

6: Ensure that the user can always get out, go back or undo an action.

• Ensure that all operations can be undone.
• Ensure it is easy to navigate back to where the user came from.
Usability Principles

7: Ensure that response time is adequate.

• Users are very sensitive to slow response time
  — They compare your system to others.
• Keep response time less than a second for most operations.
• Warn users of longer delays and inform them of progress.
Usability Principles

8: Use *understandable encoding techniques*. 

- Choose encoding techniques with care.
- Use labels to ensure all encoding techniques are fully understood by users.
Usability Principles

9: Ensure that the UI’s appearance is *uncluttered*.

- Avoid displaying too much information.
- Organize the information effectively.
10: Consider the needs of different groups of users.

- Accommodate people from different locales and people with disabilities.
- Ensure that the system is usable by both beginners and experts.
Usability Principles

11: Provide all necessary help.

• Organize help well.
• Integrate help with the application.
• Ensure that the help is accurate.
Usability Principles

12. Be consistent.

- Use similar layouts and graphic designs throughout your application.
- Follow look-and-feel standards.
- Consider mimicking other applications.
Some encoding techniques

- Labeling: Text and fonts
Some encoding techniques

- Labeling: Text and fonts
- Icons
Some encoding techniques

- Labeling: Text and fonts
- Icons
- Images
Some encoding techniques

- Labeling: Text and fonts
- Icons
- Images
- Diagrams and abstract graphics
Some encoding techniques

- Labeling: Text and fonts
- Icons
- Images
- Diagrams and abstract graphics
- Colours
Some encoding techniques

• Labeling: Text and fonts
• Icons
• Images
• Diagrams and abstract graphics
• Colours
• Grouping and bordering
Some encoding techniques

- Labeling: Text and fonts
- Icons
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- Diagrams and abstract graphics
- Colours
- Grouping and bordering
- Spoken words
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- Spoken words
- Music and other sounds
Some encoding techniques

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- Spoken words
- Music and other sounds
- Animations and video
Example

Welcome to Ootumlia Services

To sign up, use the Edit menu

Payment

Name: 
Number: 
Expiration date: 
Amount: $20.00

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Chapter 7: Focusing on Users and Their Tasks

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Issues with Example

- Forces user to select menu item to enter information: violates **Simplicity**
- “Add Addresses” and “Type” not clear: violates **Understandable coding**
- What to do after filling form not clear: violates **What to do next**
- No way to undo entering of data: violates **Get out, undo**
- Use of modal dialogs forcing OK/Cancel: violates **Simplicity**
Issues with Example

• Duplicate buttons: violates **Uncluttered display**
• Order of OK/Cancel buttons not the same: violates **Consistency**
• Is payment amount monthly? violates **Understandable coding**
• “Signing you up”: violates **Provide feedback**
• Help offered only in first page: violates **Provide help**
Example (better UI)

Welcome to Ootumlia Services

To sign up, click on Start

Step 5: Payment

- Amex
- Visa
- MasterCard

Number: [field]
Expiration date: [field]

Total monthly fee: $20.00

My credit card will be debited the first day of each month for the above amount

The system is now dialing in to register you for our services.

Please stand by...

About 5 seconds remaining...
Evaluating User Interfaces

Heuristic evaluation

1. Pick some use cases to evaluate.
2. For each window, page or dialog that appears during the execution of the use case—Study it in detail to look for possible usability defects.
3. When you discover a usability defect write down the following information:
   —A short description of the defect.
   —Your ideas for how the defect might be fixed.
Evaluating User Interfaces

Evaluation by observation of users

- Select users corresponding to each of the most important actors
- Select the most important use cases
- Write sufficient instructions about each of the scenarios
- Arrange evaluation sessions with users
- Explain the purpose of the evaluation
- Preferably videotape each session
- Converse with the users as they are performing the tasks
- When the users finish all the tasks, de-brief them
- Take note of any difficulties experienced by the users
- Formulate recommended changes
Difficulties and Risks in UI Design

• Users differ widely
  — Account for differences among users when you design the system.
  — Design it for internationalization.
  — When you perform usability studies, try the system with many different types of users.

• User interface implementation technology changes rapidly
  — Stick to simpler UI frameworks widely used by others.
  — Avoid fancy and unusual UI designs involving specialized controls that will be hard to change.
Difficulties and Risks in UI Design

- User interface design and implementation can often take the majority of work in an application:
  - Make UI design an integral part of the software engineering process.
  - Allocate time for many iterations of prototyping and evaluation.

- Developers often underestimate the weaknesses of a GUI
  - Ensure all software engineers have training in UI development.
  - Always test with users.
  - Study the UIs of other software.