User Interface Design:
Focusing on Users and Their Tasks

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- Have users work with and give their **feedback** about prototypes, on-line help and draft user manuals

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- Greater attractiveness of the system, so users will be more willing to buy and use it

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d) Are there any features one would never use? Would removing them make the system easier to use?

Characteristics of Users

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- Psychological traits and emotional feelings

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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?

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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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Both utility and usability are essential

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

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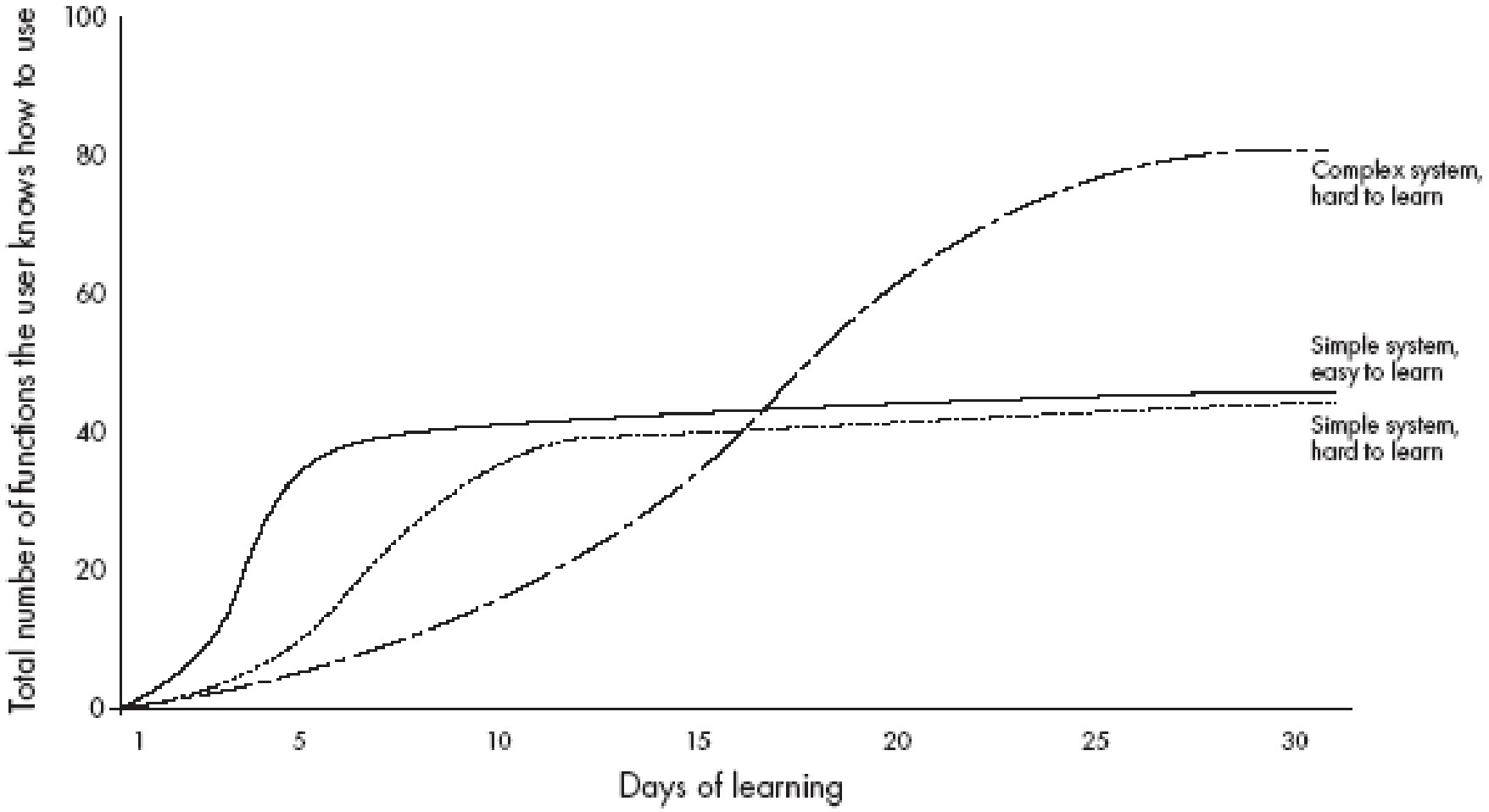
- **Acceptability**: The extent to which users *like* the system.

Different learning curves



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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.

Usability Principles

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

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- Icons

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- Images

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- Icons
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- Diagrams and abstract graphics

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- Colours

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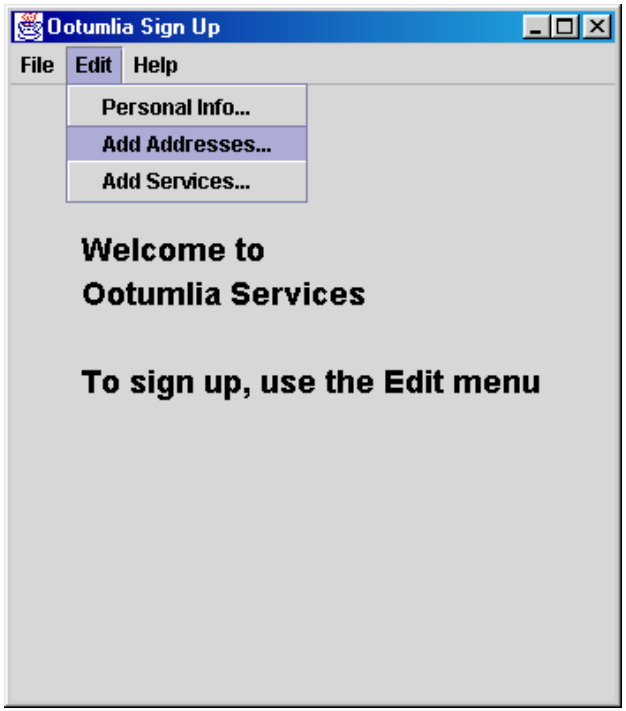
- Animations and video

Example



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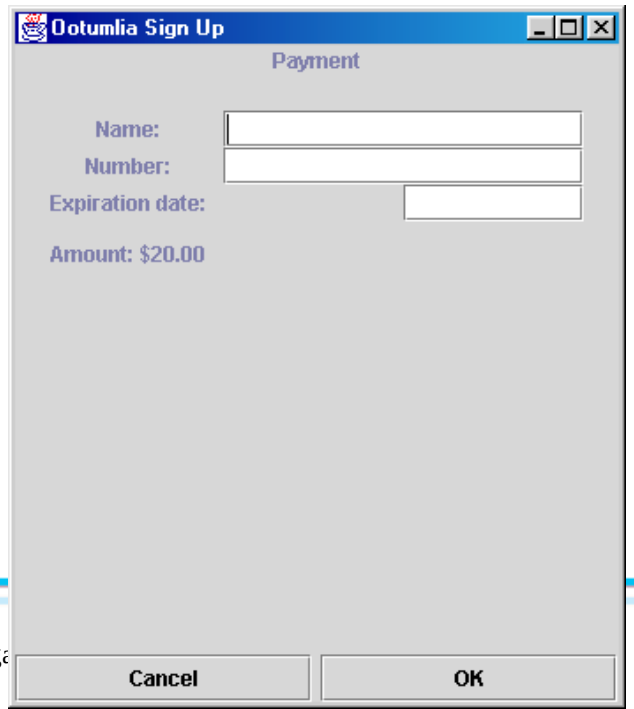

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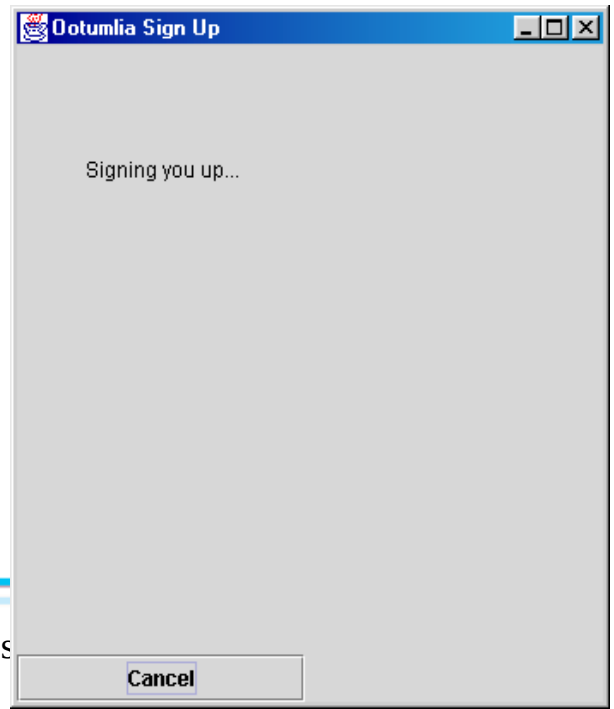

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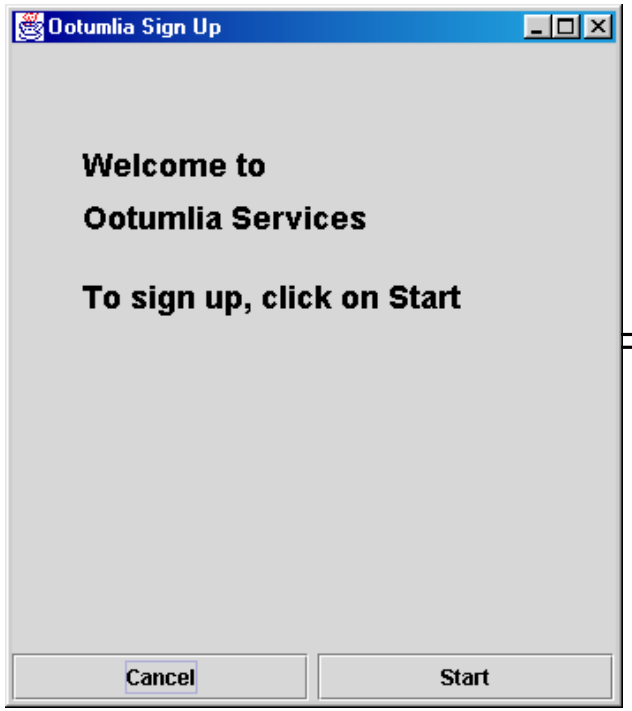
Issues with Example

- 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)



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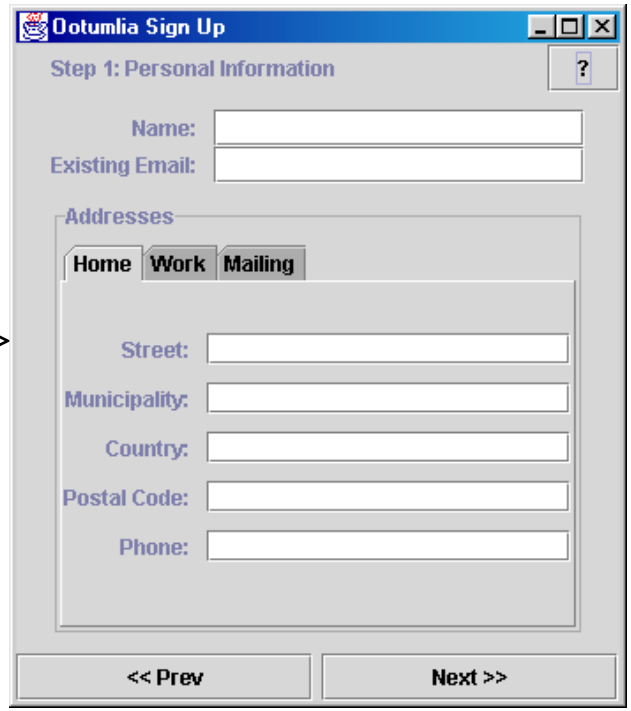

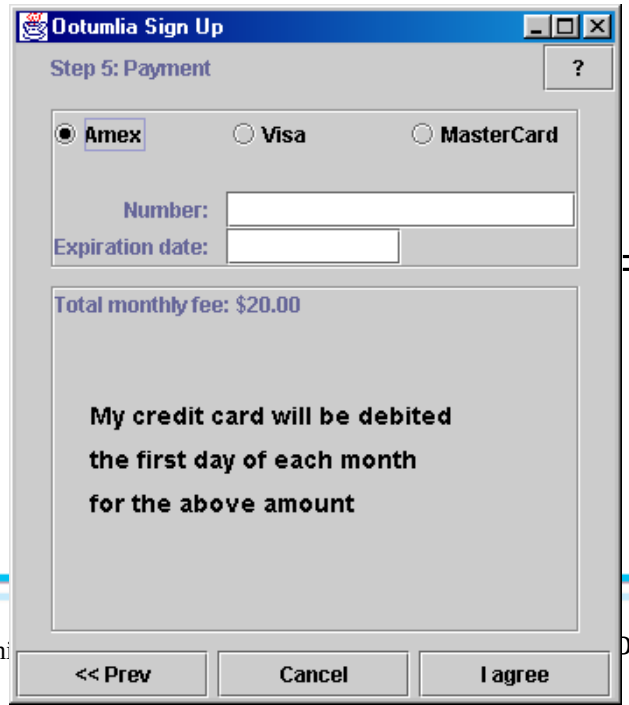

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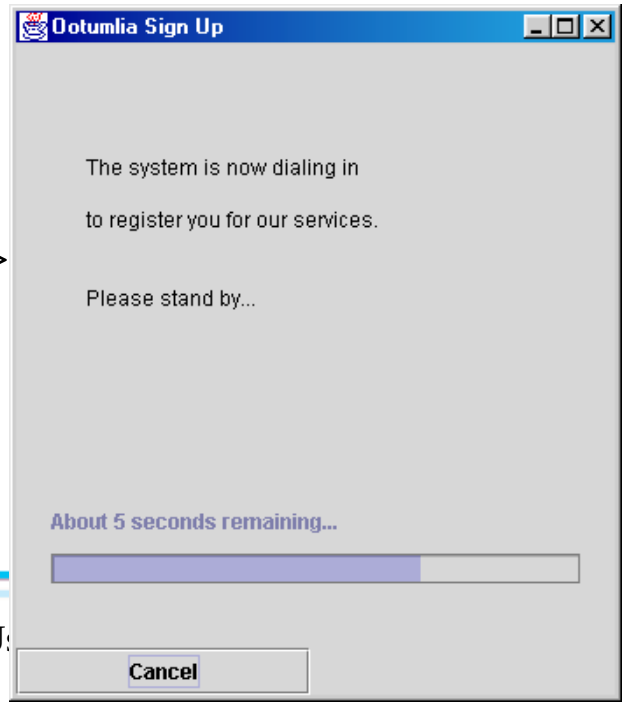

Evaluating User Interfaces

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.*