

INTERFACE DESIGN

- On interface design, Theo Mandel coins three golden rules:

1. Place the user in control.
2. Reduce the user's memory load.
3. Make the interface consistent.

❖ Place the user in control:

- ☐ Define interaction modes in a way that does not force a user into unnecessary or undesired actions.
- ☐ Provide for flexible interaction.
- ☐ Allow user interaction to be interruptible and undoable.
- ☐ Streamline interaction as skill levels advance and allow the interaction to be customized.
- ☐ Hide technical internals from the casual user.
- ☐ Design for direct interaction with objects that appear on the screen.

❖ Reduce the User's Memory Load:

- ☐ Reduce demand on short-term memory.
- ☐ Establish meaningful defaults.
- ☐ Define shortcuts that are intuitive.
- ☐ The visual layout of the interface should be based on a real-world metaphor.
- ☐ Disclose information in a progressive fashion.

❖ Make the Interface Consistent:

- ☐ Allow the user to put the current task into a meaningful context.
- ☐ Maintain consistency across a family of applications.
- ☐ If past interactive models have created user expectations, do not make changes unless there is a compelling reason to do so.

■ Interface Analysis and Design Models:

- Four different models come into play when a user interface is to be analyzed and designed.
 1. A human engineer (or the software engineer) establishes a **user model**.
 2. The software engineer creates a **design model**.
 3. The end user develops a mental image that is often called the user's **mental model** or the system perception.
 4. The implementers of the system create an **implementation model**.

- User Model:

- To build an effective user interface, “all design should begin with an understanding of the intended users, including profiles of their age, gender, physical abilities, education, cultural or ethnic background, motivation, goals and personality”.
- In addition, users can be categorized as:
 1. **Novices:** No syntactic knowledge of the system and little semantic knowledge of the application or computer usage in general.
 2. **Knowledgeable, intermittent users:** Reasonable semantic knowledge of the application but relatively low recall of syntactic information necessary to use the interface.
 3. **Knowledgeable, frequent users:** Good semantic and syntactic knowledge that often leads to the “power-user syndrome”; that is, individuals who look for shortcuts and abbreviated modes of interaction.

- Mental Model:

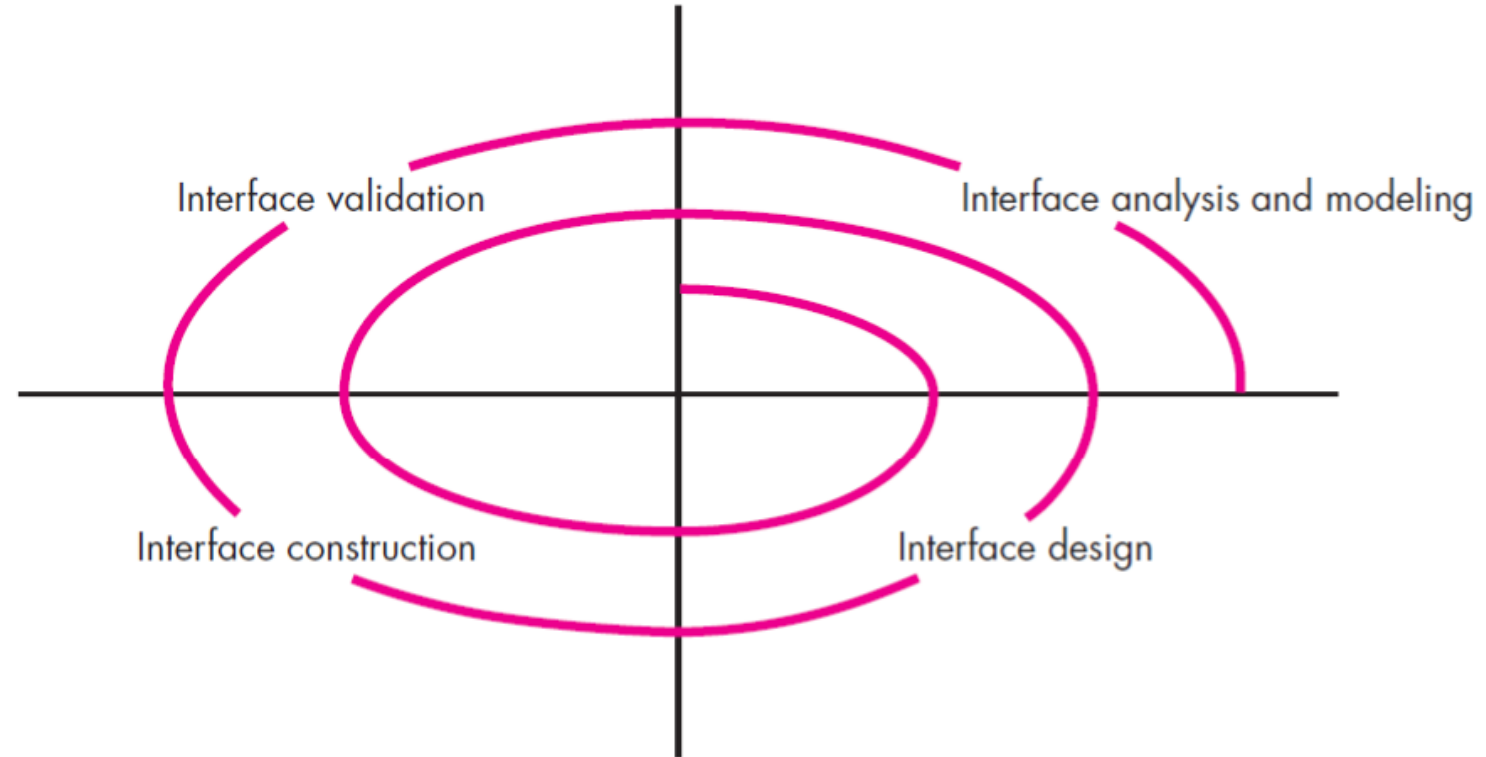
- The user's mental model (system perception) is the image of the system that end users carry in their heads.
- For example, if the user of a particular word processor were asked to describe its operation, the system perception would guide the response.
- The accuracy of the description will depend upon the user's profile (e.g., novices would provide a sketchy response at best) and overall familiarity with software in the application domain.
- A user who understands word processors fully but has worked with the specific word processor only once might actually be able to provide a more complete description of its function than the novice who has spent weeks trying to learn the system.

- Implementation Model:

- The implementation model combines the outward manifestation of the computer based system (the look and feel of the interface), coupled with all supporting information (books, manuals, videotapes, help files) that describes interface syntax and semantics.
- When the implementation model and the user's mental model are coincident, users generally feel comfortable with the software and use it effectively.
- To accomplish this “melding” of the models, the design model must have been developed to accommodate the information contained in the user model, and the implementation model must accurately reflect syntactic and semantic information about the interface.

- The Process:
- The analysis and design process for user interfaces is iterative and can be represented using a spiral model as shown in below Figure.

The user
interface
design process



➤ Interface analysis:

- Interface analysis focuses on the profile of the users who will interact with the system.
- Skill level, business understanding, and general receptiveness to the new system are recorded; and different user categories are defined.
- For each user category, requirements are elicited.
- Once general requirements have been defined, a more detailed task analysis is conducted.

➤ Interface design:

- The goal of interface design is to define a set of interface objects and actions (and their screen representations) that enable a user to perform all defined tasks in a manner that meets every usability goal defined for the system.

➤ Interface construction:

- Interface construction normally begins with the creation of a prototype that enables usage scenarios to be evaluated.
- As the iterative design process continues, a user interface tool kit may be used to complete the construction of the interface.

➤ Interface validation:

- Interface validation focuses on:
 1. The ability of the interface to implement every user task correctly, to accommodate all task variations, and to achieve all general user requirements.
 2. The degree to which the interface is easy to use and easy to learn, and
 3. The users' acceptance of the interface as a useful tool in their work.

COMPONENT-LEVEL DESIGN

- What is Component?
- A component is a modular building block for computer software.
- More formally, the OMG Unified Modeling Language Specification defines a component as “a modular, deployable, and replaceable part of a system that encapsulates implementation and exposes a set of interfaces.”

❖ An Object-Oriented View:

- In the context of object-oriented software engineering, a component contains a set of collaborating classes.
- Each class within a component has been fully elaborated to include all attributes and operations that are relevant to its implementation.
- As part of the design elaboration, all interfaces that enable the classes to communicate and collaborate with other design classes must also be defined

Elaboration of
a design
component

