

Unit II Design and Software Process

What is Design?

Design is defined as achieving Goals within constraints and encompasses work tasks data design, architectural design, interface design and component-level design and create a design model or design specification.

What are the steps for Interaction Design process?

- ☐ Requirements
- ☐ Analysis and Design
- ☐ Iteration and prototyping
- ☐ Implementation and Deployment.

What are the classifications of evaluation techniques?

Cognitive walkthrough,Heuristic evaluation ,Review based ,Model based

What are the advantages and disadvantages of Prototyping Model?

Advantages:

- ☐ It produces the products quickly and thus saves the time and solves the waiting problem in waterfall model.
- ☐ It minimizes the cost and product failure.
- ☐ It is possible for the developers and client to check the function of preliminary implementations of system models before committing to a final system.
- ☐ It obtains feedback from clients and changes in system concept.

Disadvantages:

- ☐ It ignores quality, reliability maintainability and safety requirements. Customer satisfaction is not achieved.

What are the Levels of Interaction?

Widgets, Screen design, Navigation design, Other apps and operating system

What are the two things you need in order for prototyping methods to work?

1. To understand what is wrong and how to improve.

Unit II Design and Software Process

2. A good start point.

What are the activities in the waterfall model of the software life cycle?

1. Requirements specification ,
2. Design ,
3. Construction ,
4. Integration and Testing
5. Installation and Maintenance.

What is the Emphasis for usability engineering?

The emphasis for usability engineering is in knowing exactly what criteria will be used to judge a product for its usability. The ultimate test of a product's usability is based on measurements of users' experience with it. Therefore, since a user's direct experience with an interactive system is at the physical interface, focus on the actual user interface is understandable.

What are the Criteria by which measuring method can be determined?

1. Time to complete a task
2. Per cent of task completed
3. Per cent of task completed per unit time
4. Ratio of successes to failures
5. Time spent in errors
6. Per cent or number of errors
7. Per cent or number of competitors better than it

What are the possible ways to set measurement levels in a usability specification?

1. Existing system or previous version
2. competitive systems
3. carrying out the task without use of a computer system
4. an absolute scale
5. your own prototype
6. user's own earlier performance
7. each component of a system separately
8. a successive split of the difference between best and worst values observed in user tests

What are the three main goals of Evaluation?

1. To assess the extent and accessibility of the system's functionality.

Unit II Design and Software Process

2.To assess users' experience of the interaction.3.To identify any specific problems with the system.

Define Design rationale.

Design rationale is the information that explains why a computer system is the way it is, including its structural or architectural description and its functional or behavioral description.

What is the beneficial to have access to the design rationale?

- 1.design rationale provides a communication mechanism among the members of a design team so that during later stages of design and/or maintenance it is possible to understand what critical decisions were made, what alternatives were investigated .
2. Accumulated knowledge in the form of design rationales for a set of products can be reused to transfer what has worked in one situation to another situation which has similar needs.

What is Design space Analysis?

The design space is initially structured by a set of questions representing the major issues of the design. Since design space analysis is structure oriented, it is not so important that the questions recorded are the actual questions asked during design meetings.

What is key to an effective design space analysis?

The key to an effective design space analysis using the QOC(Questions,Options and Criteria) notation is deciding the right questions to use to structure the space and the correct criteria to judge the options.

What are the principles to support Usability?APRIL/MAY 2018

Learnability – the ease with which new users can begin effective interaction and achieve maximal performance

Flexibility – the multiplicity of ways in which the user and system exchange information. Robustness – the level of support provided to the user in determining successful achievement and assessment of goals.

Define Usability and Effectiveness.

Usability- The effectiveness, efficiency and satisfaction with which specified users achieve specified goals in particular environments.

Unit II Design and Software Process

Effectiveness -The accuracy and completeness with which specified users can achieve specified goals in particular environments.

Define Standards.

Standards for interactive system design are usually set by national or international bodies to ensure compliance with a set of design rules by a large community. Standards can apply specifically to either the hardware or the software used to build the interactive system.

Define Efficiency and Satisfaction.

Efficiency -The resources expended in relation to the accuracy and completeness of goals achieved.

Satisfaction- The comfort and acceptability of the work system to its users and other people affected by its use

Define HCI Patterns.

A pattern is an invariant solution to a recurrent problem within a specific context. Patterns address the problems that designers face by providing a ‘__solution statement’. 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.

Define Universal Design principles.

It is the process of designing products so that they can be used by as many people as possible in as many situations as possible.

Explain in detail about Evaluation Techniques with respect to HCI.

In Human-Computer Interaction (HCI), evaluation techniques are crucial for assessing the usability and effectiveness of interactive systems. They help identify potential problems, ensure user needs are met, and guide design improvements throughout the development process. These techniques can be broadly categorized into expert-based evaluations and user-based evaluations.

Expert-based evaluation:

- [Heuristic Evaluation:](#)

Unit II Design and Software Process

Experts (ideally usability specialists) evaluate the interface against established usability principles (heuristics) to identify potential usability issues.

- **Cognitive Walkthrough:**

Experts simulate how users would perform tasks, step-by-step, to assess the interface's learnability and ease of use.

- **Model-based evaluation:**

Using cognitive models (like GOMS) to predict user performance and identify potential usability problems based on task analysis.

User-based evaluation:

- **Usability Testing:**

Users interact with the system while their actions, feedback, and performance are observed and recorded.

- **Think-Aloud Protocols:**

Users verbalize their thoughts while performing tasks, providing insights into their cognitive processes.

- **Questionnaires and Surveys:**

Users provide feedback on their experience through structured questionnaires, often used to gather quantitative data on usability and satisfaction.

- **Interviews:**

Users are interviewed to gather detailed qualitative feedback on their experience with the system.

- **A/B testing:**

Comparing the performance of two different versions of an interface to see which performs better based on user behaviour and metrics.

- **Field Studies:**

Observing users in their natural environment to understand how they use the system in real-world contexts.

- **Eye Tracking:**

Analysing where users look on the interface to understand their attention patterns and identify potential usability issues related to visual design.

Unit II Design and Software Process

- **Physiological Measurements:**

Using tools like heart rate monitors or brainwave sensors to assess user's emotional and cognitive responses to the interface.

Goals of Evaluation:

- **Assess functionality and usability:**

Ensuring the system does what it's supposed to do and that users can easily accomplish their tasks.

- **Identify usability problems:**

Pinpointing specific issues that hinder user performance, satisfaction, and efficiency.

- **Evaluate user experience:**

Understanding how users feel about the system, including their satisfaction, frustration, and emotional response.

- **Inform design decisions:**

Using evaluation results to guide design improvements and ensure the system meets user needs.

Choosing the right technique:

The selection of evaluation techniques depends on factors like the stage of design, available resources, the type of information needed, and the level of objectivity desired. It is often beneficial to combine multiple techniques to gain a comprehensive understanding of the system's usability.

Explain in detail about Scenarios and usage of Scenarios.

In human-computer interaction (HCI), scenarios are detailed narratives that describe how a user interacts with a system to achieve a specific goal. They outline the user's motivations, actions, and the context of interaction, providing a user-centered perspective for design and evaluation. Scenarios help designers understand user needs, identify potential usability issues, and create more effective and user-friendly interfaces.

Elaboration:

1. Definition and Importance:

- A scenario in HCI is a narrative that describes a specific user-system interaction.

Unit II Design and Software Process

- It focuses on the user's goals, actions, and the context of use, rather than abstract system descriptions.
- Scenarios are crucial for understanding user needs, empathizing with users, and designing solutions that meet those needs.

2. Usage of Scenarios:

- **Design and Development:**

Scenarios guide the design process by providing a concrete understanding of how users will interact with the system. They help designers make informed decisions about interface elements, functionality, and overall user experience.

- **Usability Testing:**

Scenarios are used as test cases in usability evaluations. By observing users interacting with the system based on a specific scenario, designers can identify usability problems and areas for improvement.

- **Communication and Collaboration:**

Scenarios provide a shared understanding of user needs among stakeholders, including designers, developers, product managers, and clients. They facilitate communication and collaboration by providing a common language and reference point.

- **Early Problem Detection:**

Scenarios can be used early in the design process to identify potential usability issues and ensure that the system is designed to meet user needs effectively.

- **Contextual Understanding:**

Scenarios help designers understand the context in which users will be using the system, including the environment, tasks, and other factors that may influence their interaction.

3. Types of Scenarios:

- **User Scenarios:** Focus on the user's perspective, describing their goals, motivations, and actions.
- **Task Scenarios:** Focus on the tasks that users need to perform with the system.
- **Use Case Scenarios:** Describe how the system will be used in specific situations, often involving multiple actors and interactions.

4. Example:

- **Scenario:**

Unit II Design and Software Process

A user wants to book a flight online.

- **User Persona:**

A frequent traveler, aged 35, who is comfortable using online booking platforms.

- **Scenario Description:**

The user opens the airline's website, enters their departure and destination cities, travel dates, and number of passengers. They then browse through the available flights, compare prices and times, and select a suitable flight. Finally, they enter their payment information and confirm the booking.

- **Usage:**

This scenario can be used to test the usability of the flight booking website, identify potential pain points in the booking process, and ensure that the website is designed to meet the user's needs.

By using scenarios effectively, HCI professionals can create more user-friendly, efficient, and enjoyable technology experiences for everyone.

In HCI, Explain in detail about interaction design process.

The interaction design (IxD) process in Human-Computer Interaction (HCI) focuses on creating user-friendly and intuitive digital products and systems by understanding how users interact with technology and designing effective interfaces. The process typically involves five key stages: discovering user needs, analyzing those needs, designing a potential solution, prototyping it, and finally, implementing and deploying the solution.

Detailed Explanation of the Interaction Design Process:

1. 1. Discovering User Needs:

This crucial first step involves understanding who the users are, what their goals are, and how they currently interact with similar products or systems. This stage often employs user research methods such as:

- **Interviews:** Talking directly with users to gather their perspectives, needs, and pain points.
- **Surveys:** Collecting data from a larger group of users to understand general trends and preferences.

Unit II Design and Software Process

- **Observations:** Watching users interact with existing systems or in natural settings to understand their behavior.
- **Data Analysis:** Examining existing data to identify patterns and insights about user behavior.

2. 2. Analyzing User Needs:

Once user needs are discovered, they are analyzed to identify core problems and opportunities for design. This stage involves:

- **Defining the Problem:** Clearly articulating the specific problems that the design needs to address.
- **Prioritizing Needs:** Determining which needs are most important to address based on user feedback and business goals.
- **Identifying Opportunities:** Recognizing potential areas where the design can improve user experience and achieve business objectives.

3. 3. Designing a Solution:

This stage involves generating ideas and creating the initial design of the system or product. It includes:

- **Brainstorming:** Generating a wide range of potential solutions to the identified problems.
- **Conceptual Design:** Developing high-level concepts for the user interface and interaction flow.
- **Detailed Design:** Specifying the details of the interface, including layout, navigation, and visual design.

4. 4. Prototyping:

This stage involves creating tangible or interactive representations of the design to test and refine it. Prototypes can range from low-fidelity paper mockups to high-fidelity interactive simulations.

- **Low-fidelity prototypes:** Simple, quick prototypes used for early testing and feedback.
- **High-fidelity prototypes:** More detailed prototypes that closely resemble the final product and allow for more realistic user testing.
- **User Testing:** Gathering feedback from users on the prototype to identify areas for improvement.

5. 5. Implementing and Deploying:

The final stage involves developing the actual product based on the refined prototype and deploying it to users. This includes:

- **Coding and Development:** Building the software or hardware based on the design specifications.
 - **Testing:** Thoroughly testing the product to ensure it functions correctly and meets user needs.
 - **Deployment:** Releasing the product to the target audience.
-

In HCI, Explain in detail about the usability engineering and principles to support Usability

.

Usability engineering in Human-Computer Interaction (HCI) focuses on designing and testing user interfaces to ensure they are easy to use, efficient, and satisfying for users. It involves an iterative process, incorporating user feedback throughout the design lifecycle, to create intuitive and effective interfaces. Key principles supporting usability include learnability, flexibility, and robustness, with a focus on making systems easy to learn, use in various ways, and resilient to errors.

Detailed Explanation:

Usability engineering is a crucial aspect of HCI, aiming to bridge the gap between human capabilities and computer systems. It emphasizes understanding user needs and designing interfaces that align with those needs, leading to a more positive and productive user experience.

Key Concepts:

- **Usability:**

Refers to the ease of use and learnability of a system, often measured by effectiveness, efficiency, and user satisfaction, [according to Scribd](#).

- **Usability Engineering:**

A framework for evaluating and optimizing digital products and services for usability. It involves an iterative design process, incorporating user feedback at various stages.

- **[Human-Computer Interaction \(HCI\)](#):**

Unit II Design and Software Process

A multidisciplinary field that studies the design and use of computer technology, focusing on the interfaces between humans and computers.

Principles Supporting Usability:

1. 1. Learnability:

The system should be easy to learn and understand. This includes providing clear instructions, intuitive navigation, and recognizable patterns.

2. 2. Flexibility:

The system should accommodate different user needs and preferences. This involves offering customization options, shortcuts, and various interaction methods.

3. 3. Robustness:

The system should be resilient to errors and unexpected situations. This includes providing helpful error messages, allowing users to recover from mistakes, and minimizing the potential for errors in the first place.

4. 4. Visibility of System Status:

Users should be aware of what the system is doing and what actions are available to them at any given time, [according to the Nielsen Norman Group](#).

5. 5. Match Between System and Real World:

The interface should use familiar concepts and language, making it easier for users to understand and interact with the system.

6. 6. User Control and Freedom:

Users should feel in control of the system and be able to undo actions, navigate freely, and customize the interface to their preferences, according to the Nielsen Norman Group.

7. 7. Consistency and Standards:

Consistent design patterns and terminology reduce user confusion and improve learnability, according to the Nielsen Norman Group.

8. 8. Error Prevention:

Designing the interface to minimize the likelihood of errors, such as using clear prompts, providing confirmation options, and limiting input options.

9. 9. Recognition Rather Than Recall:

Users should be able to recognize information and options rather than relying on memory.

10.10. Aesthetic and Minimalist Design:

A clean and uncluttered interface improves usability by reducing cognitive load and distractions.

Benefits of Usability Engineering:

- **Increased User Satisfaction:** Easier to use systems lead to more positive user experiences.
- **Improved Efficiency:** Users can complete tasks more quickly and effectively.
- **Reduced Training Costs:** Easier to learn systems require less training time and resources.
- **Enhanced Productivity:** Users can be more productive when using user-friendly systems.
- **Increased User Adoption:** Intuitive and easy-to-use systems are more likely to be adopted and used by a wider audience.
- **Reduced Development Costs:** By addressing usability issues early in the design process, usability engineering can help reduce the need for costly rework later on.

User Experience (UX)



By applying these principles and engaging in usability engineering, designers can create user interfaces that are not only functional but also enjoyable and effective for users.