
Human Computer Interaction

Usability and User Centered Design

Lecture # 9a

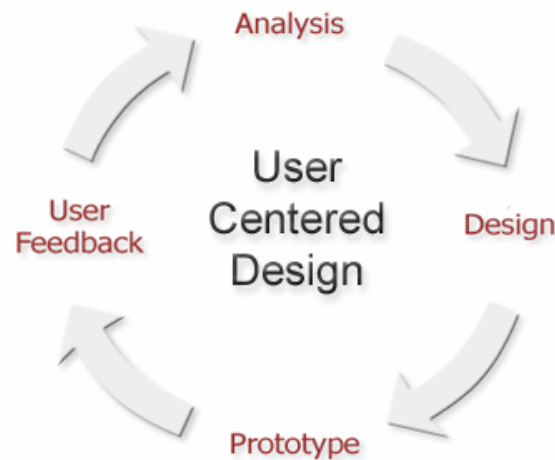
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Usability

- Usability: how well users can use the system's functionality
- Dimensions of usability
 - **Learnability**: is it easy to learn?
 - **Efficiency**: once learned, is it fast to use?
 - **Memorability**: is it easy to remember what you learned?
 - **Errors**: are errors few and recoverable?
 - **Satisfaction**: is it enjoyable to use?

User Centered Design - UCD

- UCD is a design philosophy in which the needs, wants, and limitations of the **end user** of a product are given **extensive attention** at each stage of the design process



User Centered Design - UCD

- Eight steps in UCD
 - Step 1: Define the context
 - Step 2: Describe the user
 - Step 3: Task analysis
 - Step 4: Function allocation
 - Step 5: Basic Design
 - Step 6: Mockups & prototypes
 - Step 7: Usability Testing
 - Step 8: Iterative test & redesign

User Centered Design - UCD

- Define the Context (1)
 - Identifying the usage of the system
 - E.g. Develop a kiosk for a zoo to provide practical information (e.g. how to get from location A to location B) as well as content to enrich the experience
 - Market
 - Whether this is a need for the system to justify its development

User Centered Design - UCD

- Describe the User (2)
- The important characteristics of the users of the system
 - Physical attributes (e.g. age, gender, size, reach, etc.)
 - Perceptual abilities (e.g. vision, hearing, touch, etc.)
 - Cognitive abilities (e.g. memory span, reading level, expertise level, etc.)
 - Personal traits (e.g. likes/dislikes, patience, etc.)
 - Cultural and international diversity (e.g. languages, culture, ethics, etc.)
 - Special population (e.g. disabilities, elders, minors, etc.)

User Centered Design - UCD

- Task Analysis (3)
 - Analyzing the way users perform the tasks in using the system
 - Observe/Imagine users doing what they do
 - List each task
 - Break tasks down into subtasks

User Centered Design - UCD

- Function Allocation (4)
 - Decide who or what is best suited to perform each task
 - E.g. System remembers login Id and reminds the user, but the user remembers the password

User Centered Design - UCD

- Basic Design (5)
 - Summary of the components and their basic design (**Be Innovative!**)
 - “Brainstorming”
 - Cross-check with design requirements, human factors references, hardware specifications, budgets, laws/regulations, etc.
 - Ensure that the design will support the requirements and comply with the constraints

User Centered Design - UCD

- Mockups & Prototypes (6)
 - Rapidly mock up the system for testing with potential users
 - Pen and paper or whiteboard to start
 - Iterate, iterate, iterate!!
 - Increasingly functional
 - Implement a detailed prototype of the system
 - Prototyping is the process of quickly putting together a working model of the system in order to test various aspects of its design
 - Various prototyping tools are available
 - Visual Basic.NET, Flash, Dreamweaver etc.

User Centered Design - UCD

- Usability Testing (7)
 - Get real (or representative) users to perform tasks, using the prototype
 - Testing results are used to guide the iterative evaluation and redesign of the system

User Centered Design - UCD

- Iterative Test & Redesign (8)
 - Repeat cycles of testing and reworking the system, subject to cost/time constraints

Design Touch Screen Zoo Information Kiosk

Touch Screen Zoo Information Kiosk

- Define the Context (1)
 - Identifying the usage of the system
 - Provide general information about the zoo (e.g. zoo hours, exhibits, shows, etc.)
 - Provide information about each animal
 - Provide and print zoo map
 - Weather reporting
 - Create and print a personalized itinerary
 - Benefits to justify its development
 - Enhance visitor's experience (having fun as well as being educated)
 - Can rapidly update information (general, animals, etc.)
 - Reduce cost (fewer employees are needed)

Touch Screen Zoo Information Kiosk

- Describe the User (2)

- The important characteristics of the users of the system

- Physical attributes

- Age: a wide range (13 – 70)
 - Gender: no limitation

- Perceptual attributes

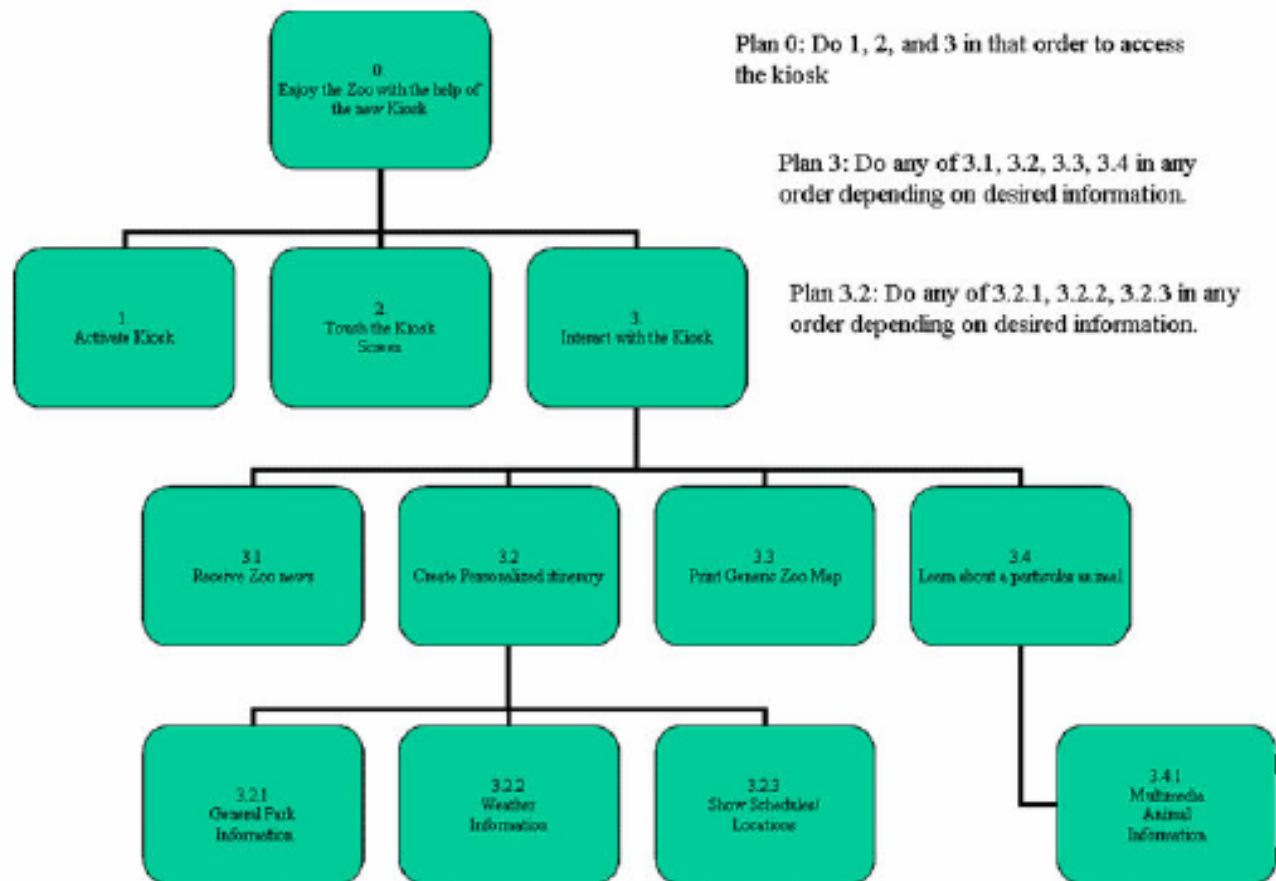
- Vision: normal
 - Touch: normal

- Cognitive attributes

- Reading level: Understanding of English at a high enough level to recognize and follow on-screen commands

Touch Screen Zoo Information Kiosk

■ Task Analysis (3)



Touch Screen Zoo Information Kiosk

- Function Allocation (4)
 - User makes selections on the screen
 - Machine processes the commands

Touch Screen Zoo Information Kiosk

- Design (5)



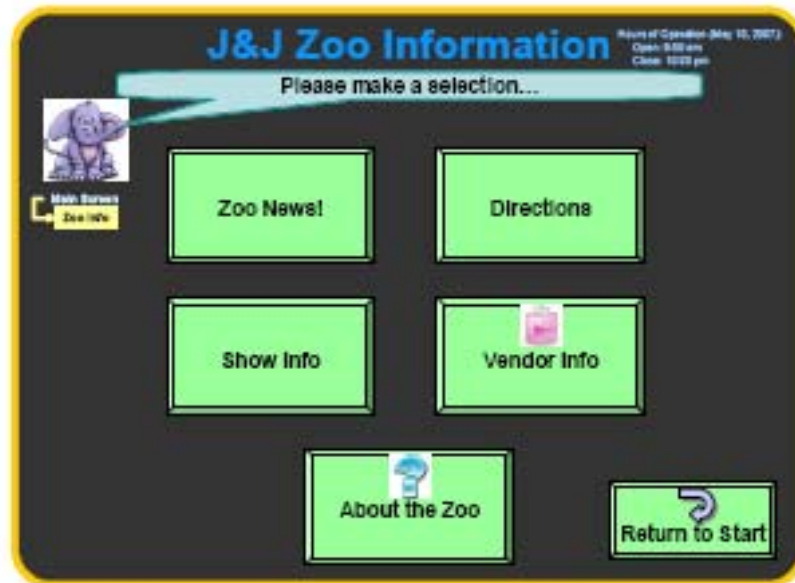
Idle Screen



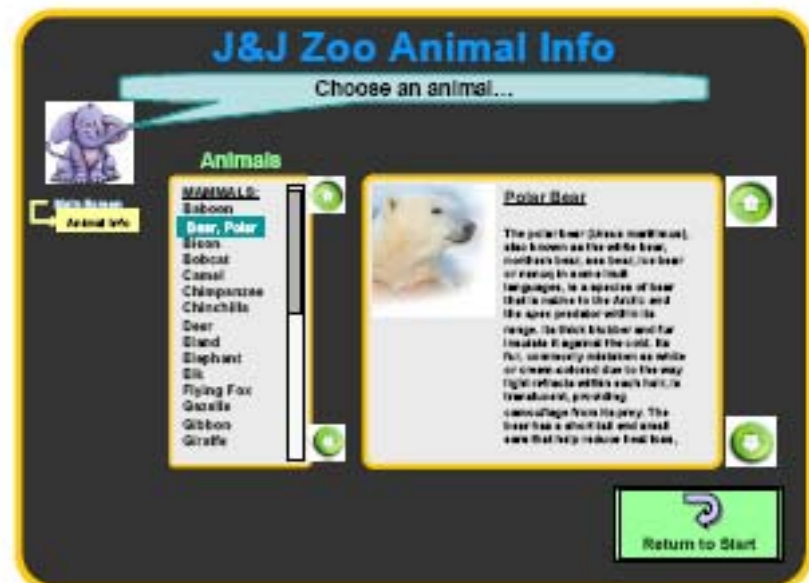
Main Screen

Touch Screen Zoo Information Kiosk

■ Design (5) Contd...



Zoo Information Screen



Animal Info Screen

Touch Screen Zoo Information Kiosk

- Mock-up & Prototype (6)
- Usability Evaluation (7)
 - People who have been to zoos participated in the usability evaluation experiment
 - Each participant performed a set of tasks (predetermined by the experimenters) on the prototyped design, and their task performances, including the number of clicks and number of errors, were recorded
 - After the tasks, each participant filled out a questionnaire to rate his/her satisfaction with different features of the design
 - Evaluation data was analyzed

Touch Screen Zoo Information Kiosk

- Iterative Test & Redesign (8)
 - Based on the evaluation outcome, plans to improve the design were made

References

- HCI Paradigms and User Centred Design,
Yan Liu, Wright State University

