Analysis & Design

CAP 6117: Mixed Reality Project

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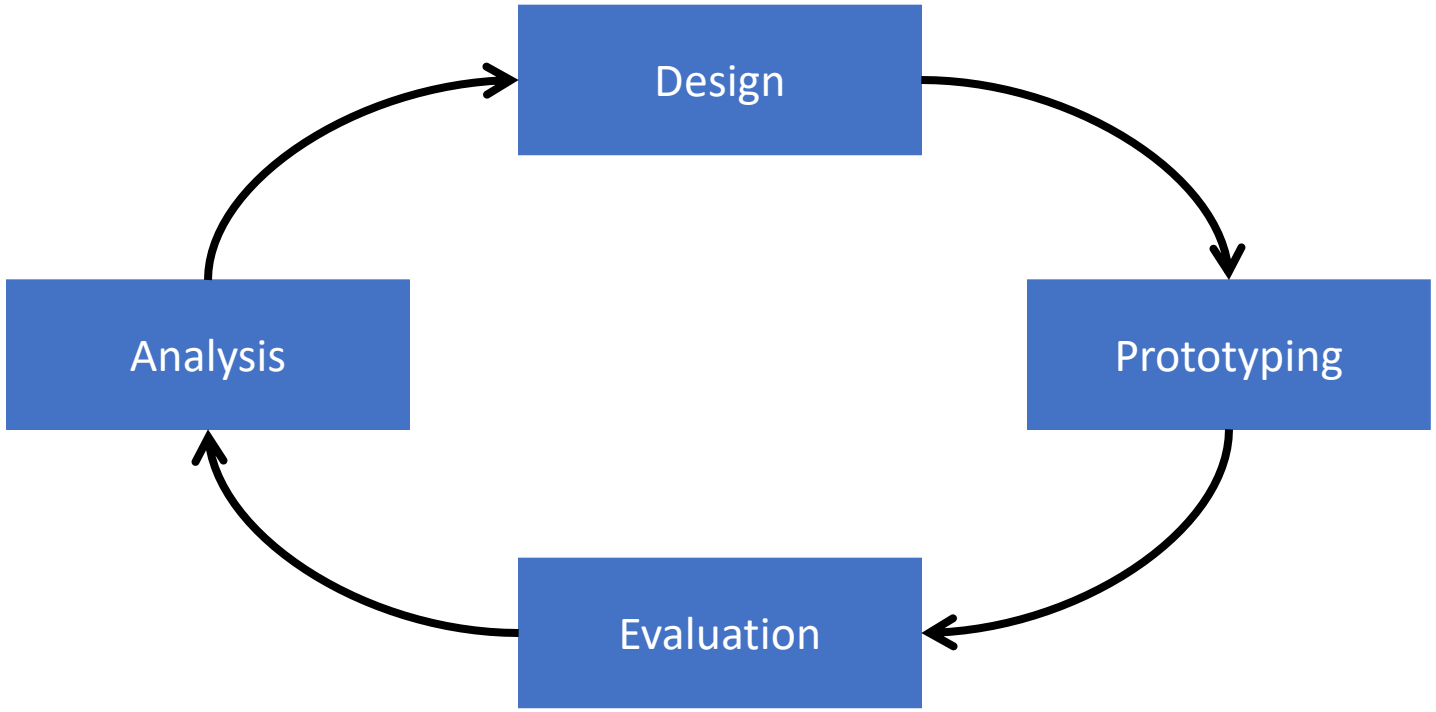
User Experience (UX) Lifecycle

- A framework consisting of a series of stages and corresponding activities that characterize the full evolution of an interaction design, system, or product

- Example Lifecycle: The Wheel by Hartson & Pyla

The Wheel by Hartson & Pyla



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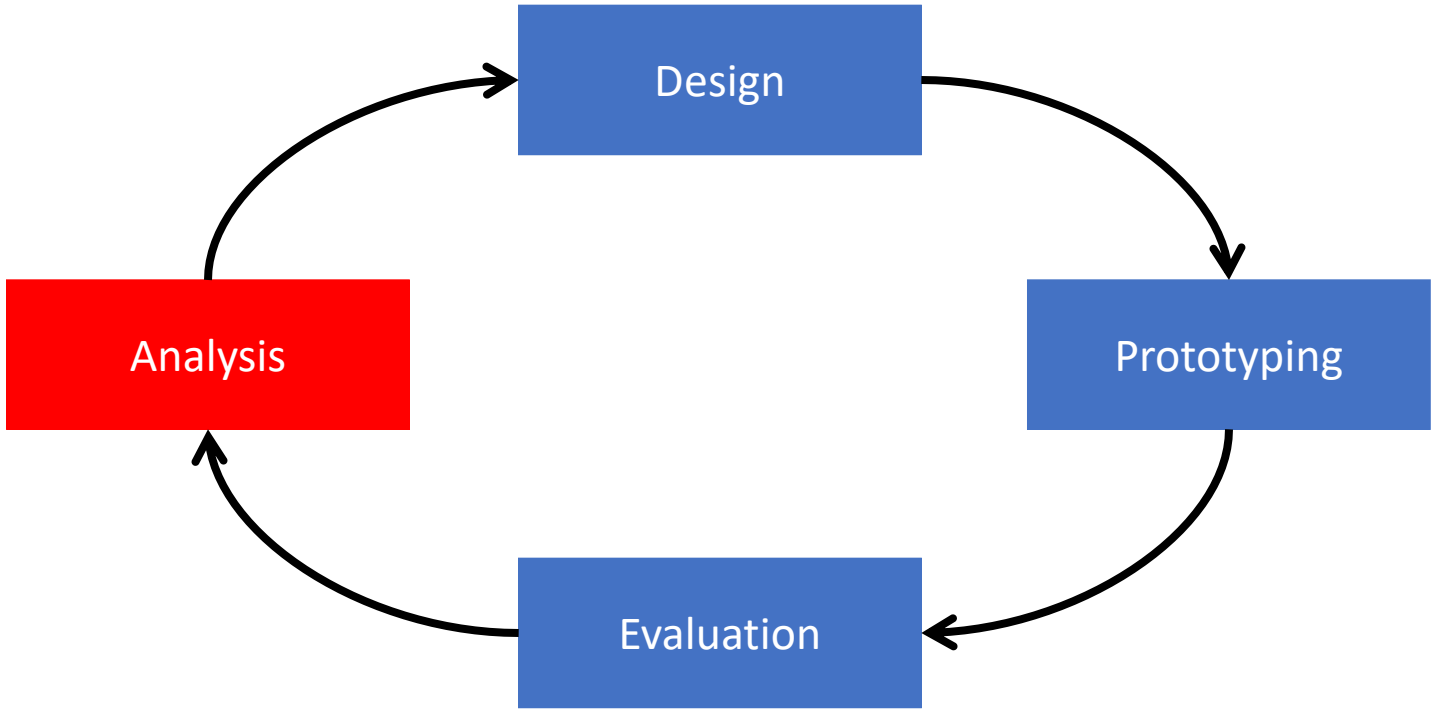


Analysis

- *The analysis of the user's current workflow and activities to understand the user's work domain, needs, and desires*

- Also known as **requirements analysis**

Key Aspects of Analysis

- Learning about the **people** themselves
  - Offer convenient and satisfying functionality
- Understanding the current work **process**
  - Offer functionality that meets the needs of the work
- Studying the **environment** that they work in
  - Offer functionality that improves upon the artifacts and tools they currently use

System Concept

- **System Concept:**
  - *An initial vision or mandate for the system or product*
- The reason for development
- Hence, the reason for analysis
- Usually established by upper management and before UX and software engineering begin

System Concept Statement

- **System Concept Statement:**
  - *A concise descriptive summary of the envisioned system or product stating the system concept*
- Typically, 100 to 150 words
- Explains the system to outsiders and helps set focus and scope for system development
- Each word is carefully chosen to be clear and concise

System Concept Statement

- Answers the following questions:
  - What is the system name?
  - Who are the system users?
  - What will the system do?
  - What problem(s) will the system address?
  - What experience will the system provide to the user?

System Concept Statement Example

- QubitVR will be a virtual reality (VR) simulation that will help students of all ages better understand the fundamental concepts of Quantum Information Science (QIS).
- Currently, many students struggle to understand QIS concepts due to the unintuitive nature of quantum mechanics, which do not behave as traditional physics are taught and learned.
- These learning difficulties are often exacerbated by the linear algebra equations used to mathematically represent QIS systems and interactions.

System Concept Statement Example

- QubitVR will address these learning difficulties by using 3D Bloch sphere representations of qubits (i.e., quantum bits) instead of their mathematical representations.
- Additionally, QubitVR will allow students to interact with qubits and modify their superpositions by applying quantum-logic gates, represented by symbolic 3D objects.
- Furthermore, QubitVR will introduce QIS concepts through a series of modules and corresponding assessments pertaining to superpositions, measurements, and entanglement.

Analysis Activities

- **Contextual Inquiry:**
  - *The gathering of detailed data on the work practices of users*
- **Contextual Analysis:**
  - *The identification, sorting, organization, interpretation, consolidation, and communication of contextual inquiry data*
- **Requirements Extraction:**
  - *The process of identifying needs and requirements from the contextual analysis*
- **Model Construction:**
  - *The process of creating models of the users, processes, and environment based on the extracted requirements*

Contextual Inquiry

- **Contextual Inquiry:**
  - *The gathering of detailed data on the work practices of users*
- Also known as **ethnographic observation**
- **Work Practice:**
  - *The pattern of established actions, approaches, routines, conventions, and procedures taken during a job*
- About eliciting work activity data
- **Work Activity:**
  - *The sensory, cognitive, and physical actions made by users during work practice*

Contextual Inquiry

Contextual Analysis

- **Contextual Analysis:**
  - *The identification, sorting, organization, interpretation, consolidation, and communication of contextual inquiry data*
- Accomplished by synthesizing, consolidating, and communicating work activity notes
- **Work Activity Note:**
  - *A simple and succinct statement about a single concept, topic, or issue synthesized from the work activity data*

Contextual Analysis

Requirements Extraction

- **Requirements Extraction:**
  - *The process of identifying needs and requirements from the contextual analysis*
- About developing requirement statements
- **Requirement Statements:**
  - *A statement that describes some feature or functionality required by users for a particular category of tasks, and usually corresponds to one or more work activity notes*

Example Requirement Statements

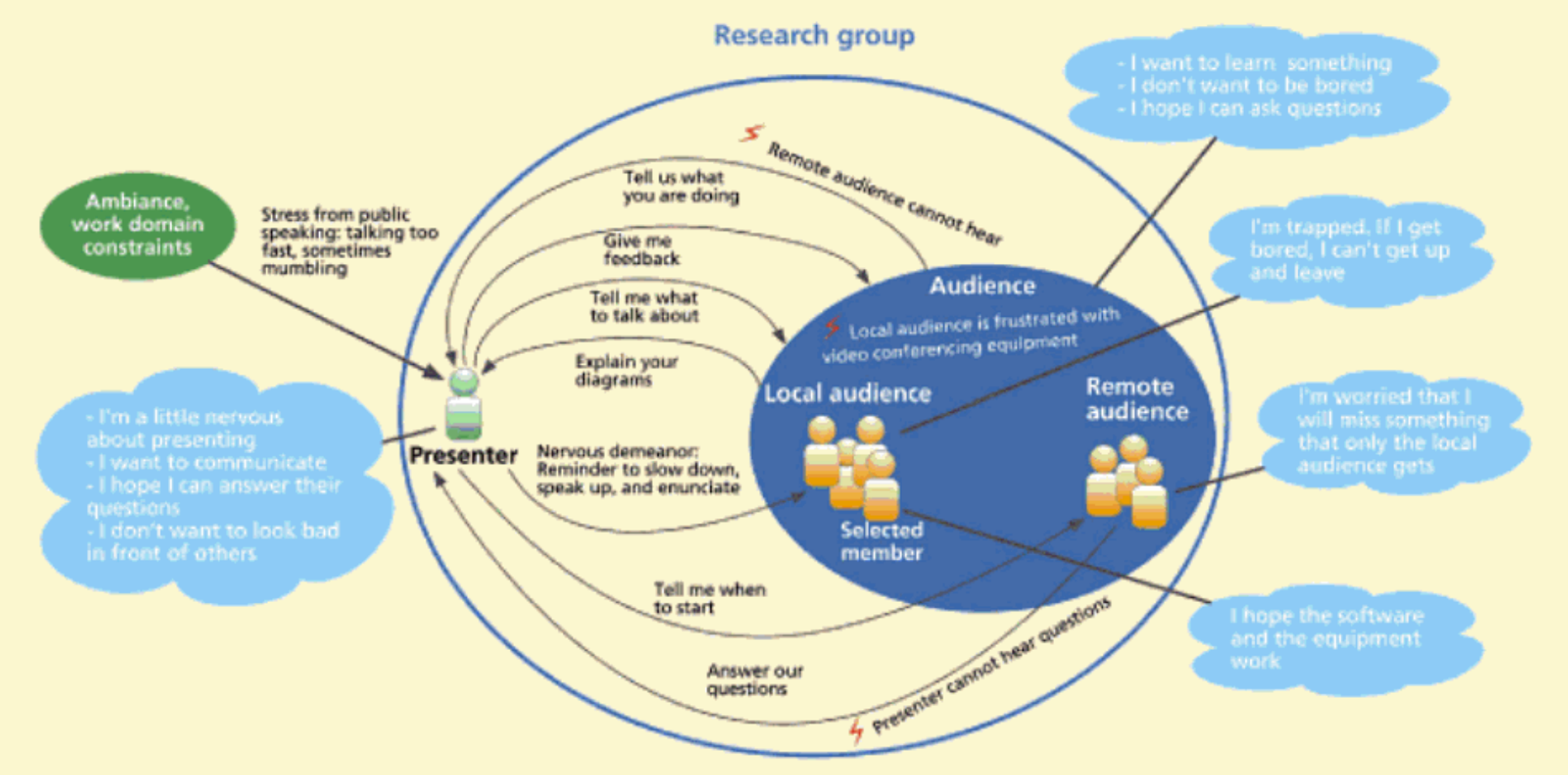
- Bloch spheres will be used to represent qubits instead of their linear algebra representations.
- Students must be able to modify the superpositions of qubits by applying quantum-logic gates.
- Students must be introduced to the concepts of superpositions, measurements, and entanglement.

Model Construction

- **Model Construction:**
  - *The process of creating models of the users, processes, and environment based on the extracted requirements*
- Three types of models:
  - User models
  - Usage models
  - Work environment models

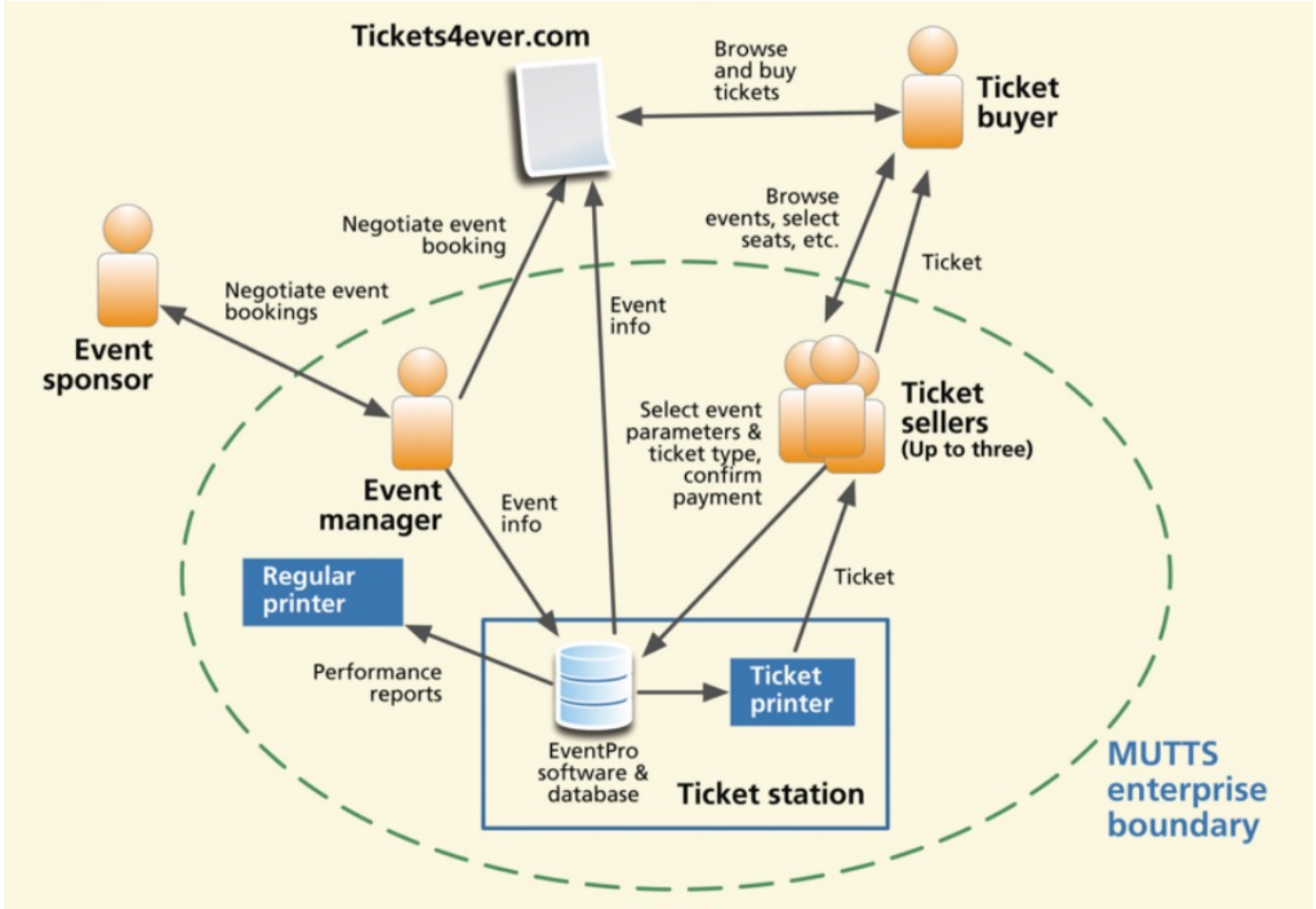
User Model Example

- Captures the communal aspects of the workplace



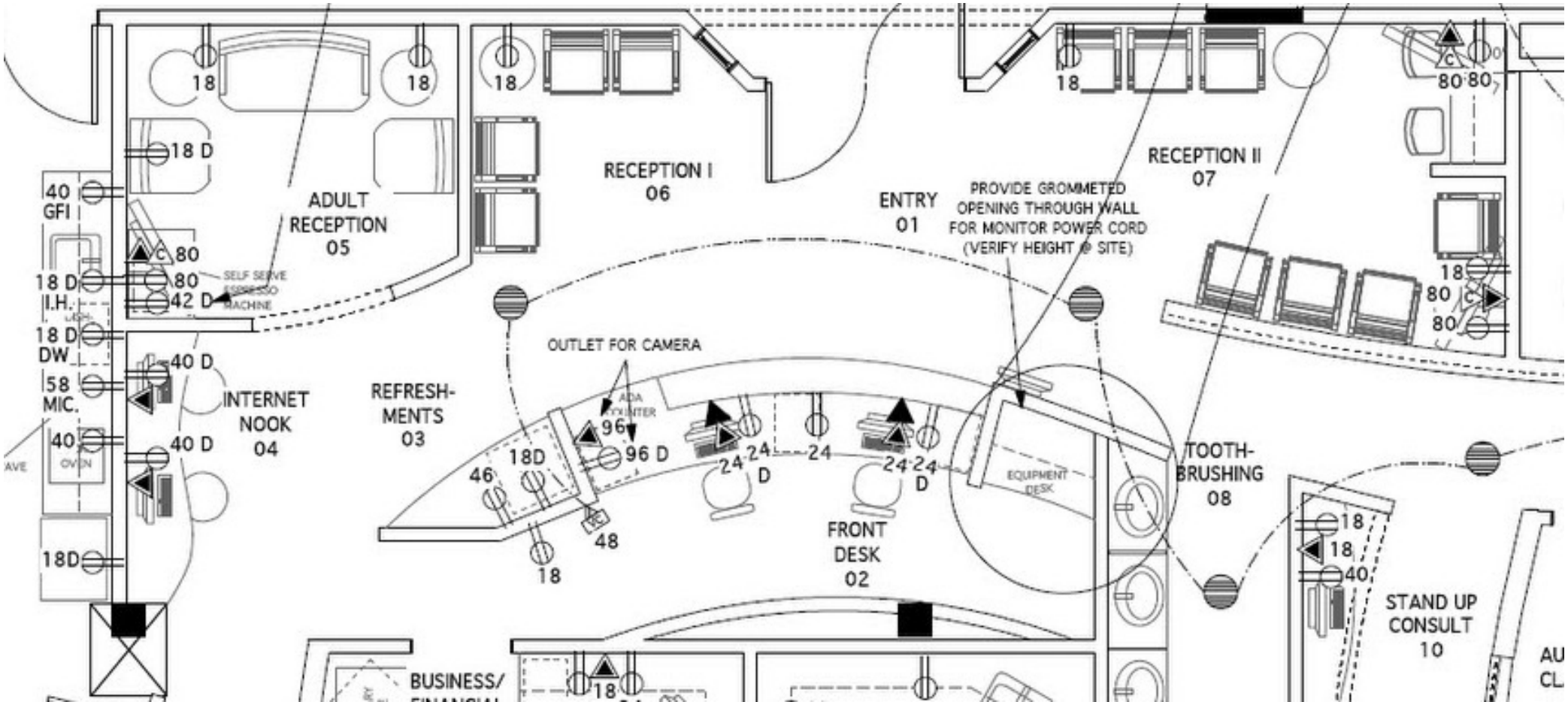
Usage Model Example

- Emphasizes communication and information flow



Work Environment Model Example

- Shows the physical environment for work



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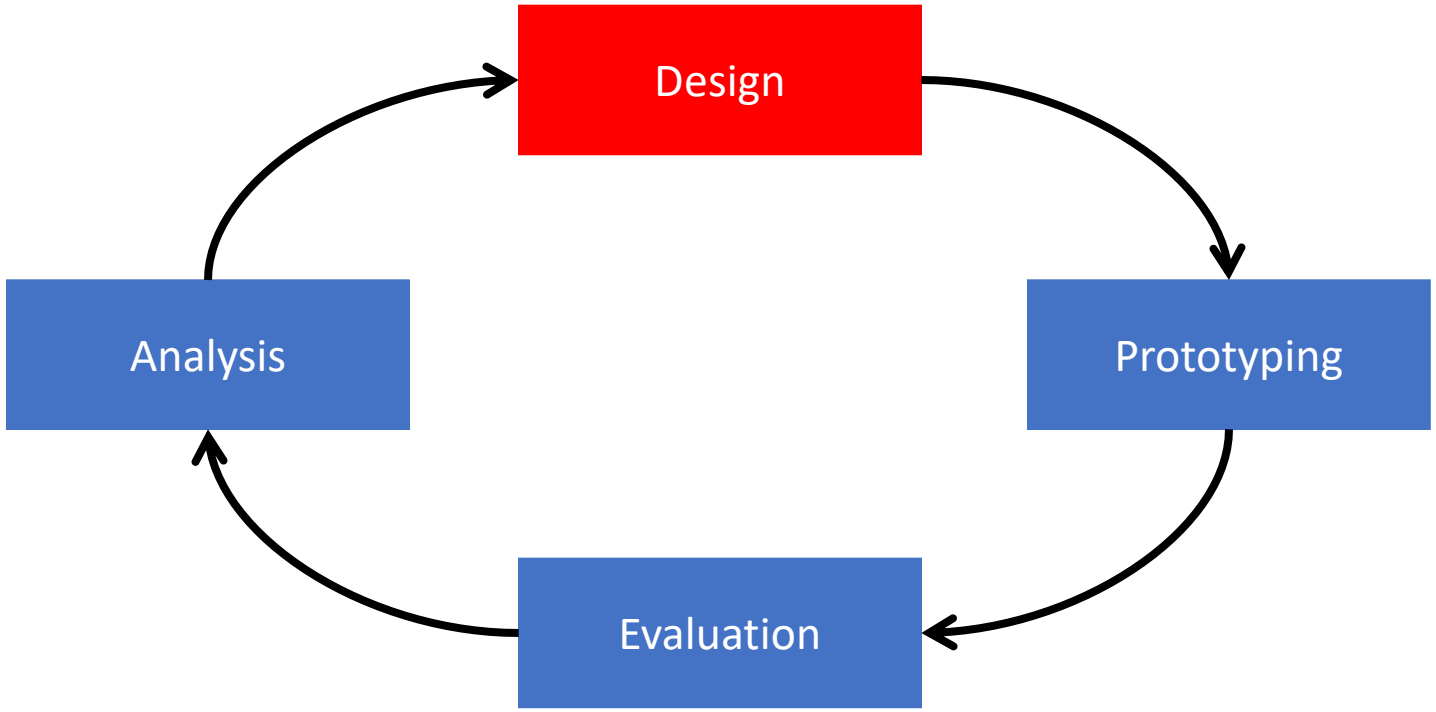


Design

- *The creation of the conceptual design, interaction behavior, and look-and-feel of the product*

- Thinking of technology-based solutions and enhancements to improve the user experience
- Steered by common design guidelines

Design Activities

- **Design Thinking:**
  - *An approach to creating a product to evoke a particular user experience*
- **Conceptual Design:**
  - *The communication of a mental model of a design vision through a theme, notion, or metaphor*
- **Design Production:**
  - *The refinement of a design through multiple iterations, each more refined than the previous*

Design Thinking

- **Design Thinking:**
  - *An approach to creating a product to evoke a particular user experience*
- Three primary tools for design thinking:
  - User personas
  - Ideation
  - Sketching

User Personas

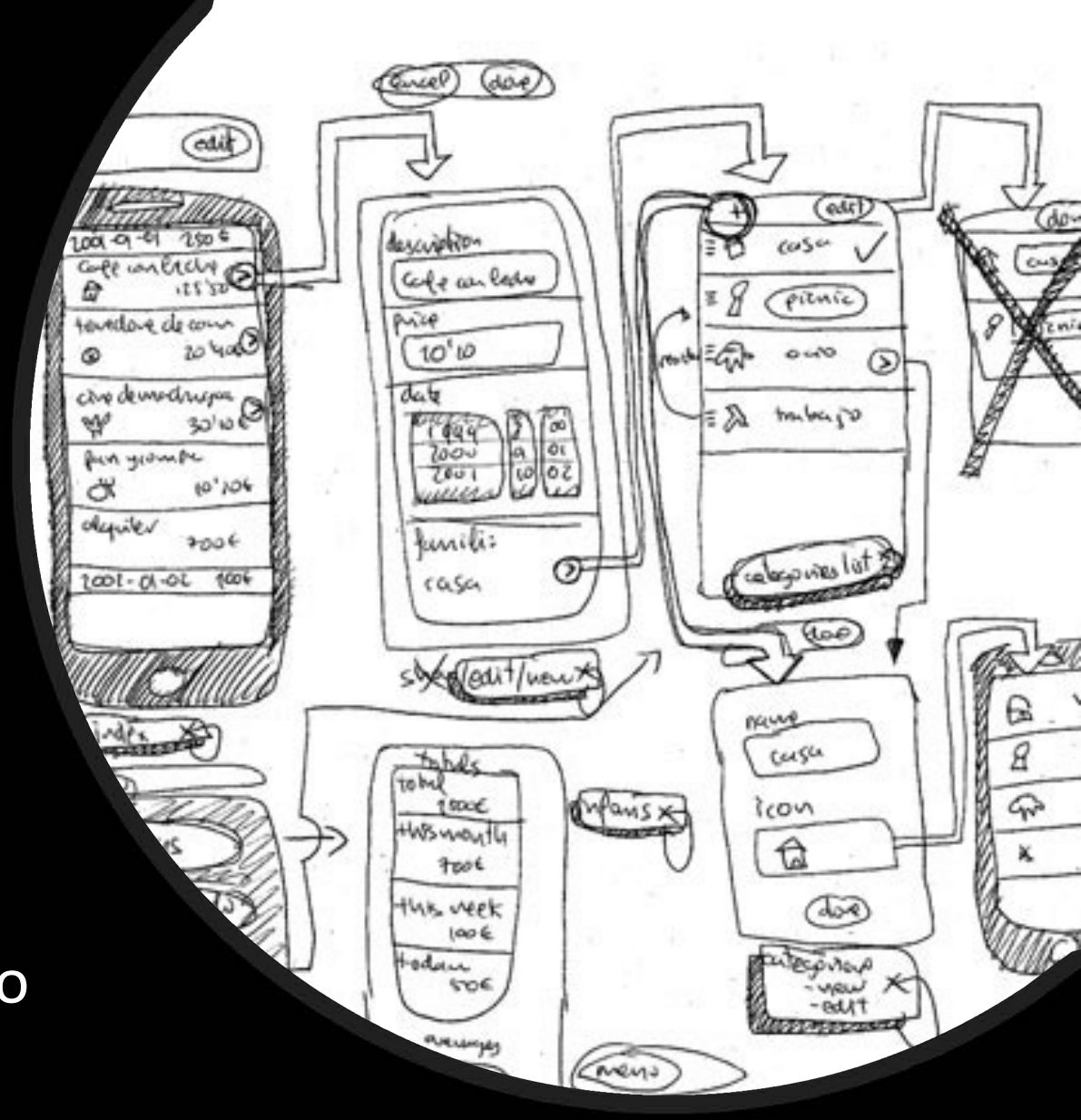
- **User Persona:**
  - *A pretend or "hypothetical archetype" user*
- Each represents a specific person in a specific work role with specific user class characteristics
- **User Class:**
  - *A description of the relevant characteristics of the user population who can take on a specific work role*
- Each persona is a story and description of a specific individual who has a name, a life, and a personality.

Ideation

- *An active, creative, exploratory, highly iterative, fast-moving collaborative group process for forming ideas for design*

Sketching

- **Sketching:**
  - *The rapid creation of free-hand drawings expressing preliminary design ideas, focusing on concepts rather than details*
- Sketches convey ideas better than words
- Sketches are quick and inexpensive to create
- Sketches can be modified in real time



Conceptual Design

- About connecting the designer's mental model and the user's mental model
- **Mental Model:**
  - *An explanation of someone's thought process about how something works*
- Conceptual design is where you establish a concept – a theme, notion, or metaphor – to communicate the design vision

Conceptual Design Tools

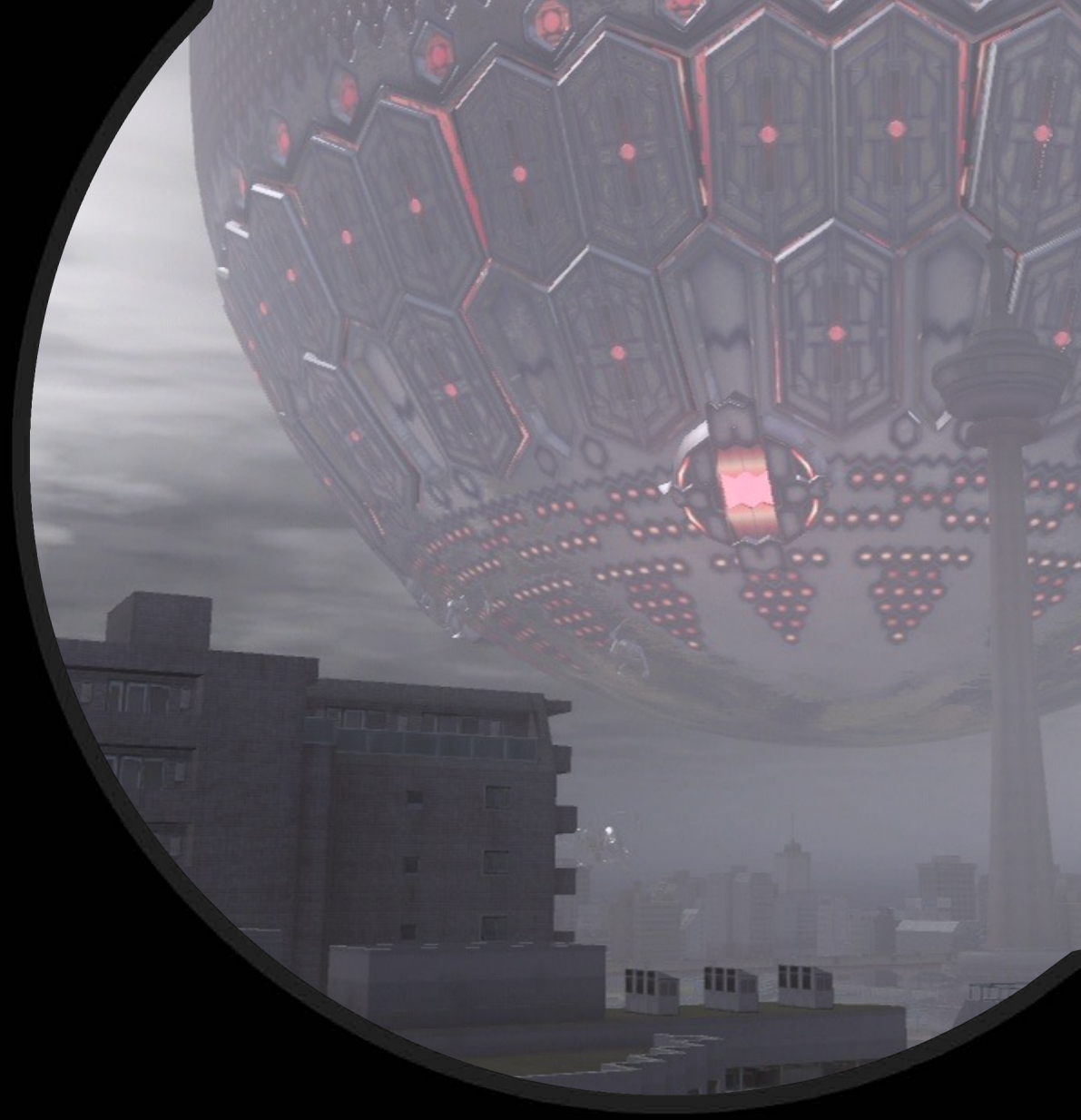
- Metaphors
- Design scenarios
- Sequence models
- Storyboards
- Physical mockups
- Representative videos

Metaphors

- **Metaphor:**
  - *An analogy to explain unfamiliar concepts using familiar or conventional knowledge*
- Different perspectives for metaphors
  - Ecological perspective
  - Interaction perspective
  - Emotional perspective

Ecological Metaphors

- Used to describe the broader system structure
- Example: iTunes as a mother ship
  - For iPods, iPhones, and iPads
  - Manages all operations for adding, removing, or organizing media content
  - Results are synced to all devices



Interaction Metaphors

- Used to simulate real-world interactions
- Example: reading a book on an iPad
  - As the user moves a finger across the display, the screen appears as a real paper page turning

Emotional Metaphors

- Used to evoke emotion in users
- Example: Garmin handheld GPS
  - “Like an old pair of boots and your favorite fleece, GPSMAP 62ST is the ideal hiking companion.”

Design Scenarios

- **Scenario:**
  - *A written outline giving details of a storyline plot and individual scenes of the story*
  - Focuses on the needs, goals, and concerns of users
- Design scenarios
  - Used during design for brainstorming and to communicate concepts to stakeholders
  - Different from usage scenarios used during analysis
- Usage scenarios
  - Describe key usage situations of a real-world product, particularly critical incidents and barriers (i.e., problems interfering with normal operations)

Storyboards

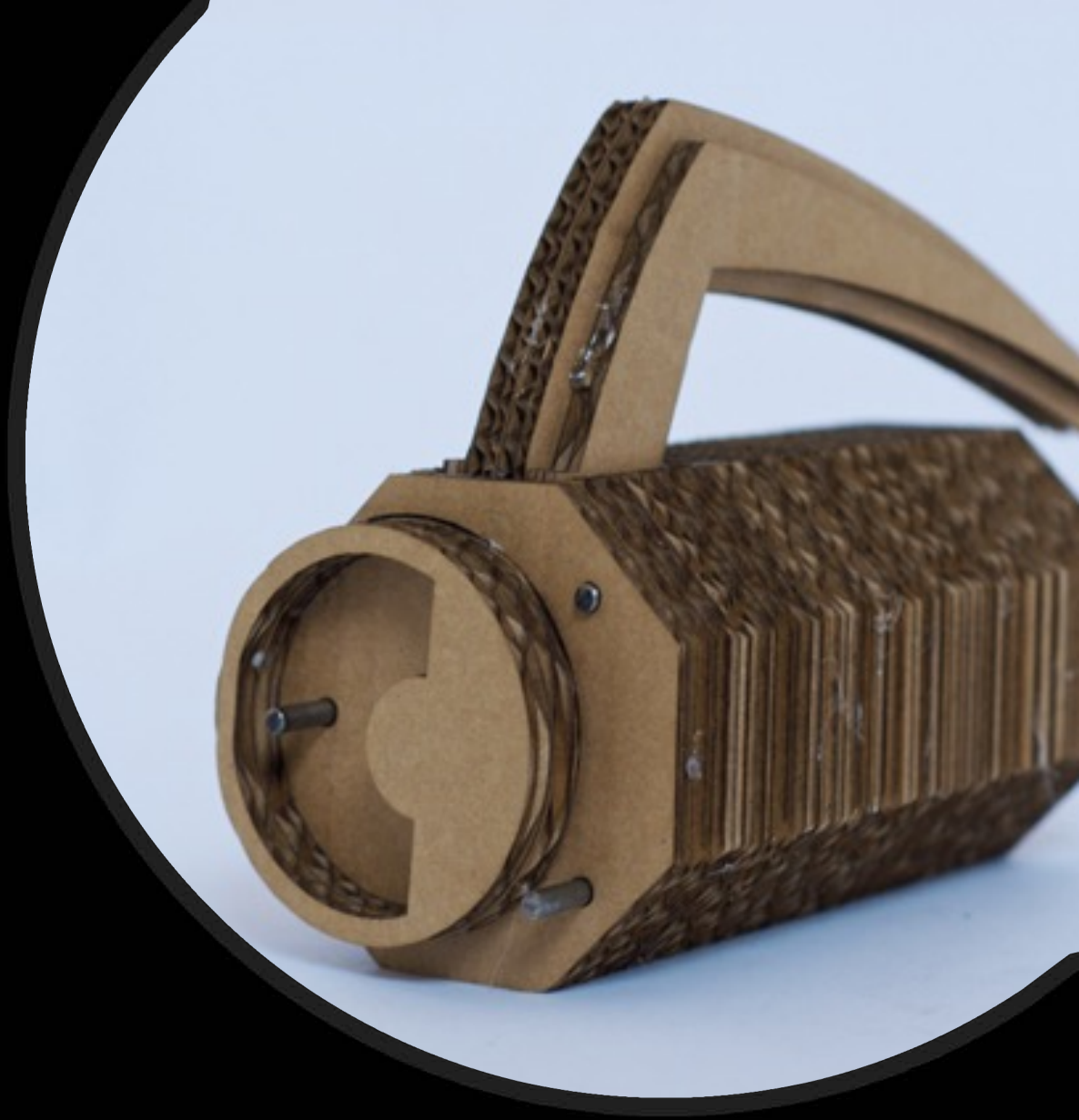
- **Storyboard:**
  - *A sequence of visual "frames" illustrating the interplay between a user and an envisioned system*
- Bring the design to life in freeze-frame sketches of stories of how people will work with the system
- Could be thought of as a comic-book style illustration of a design scenario, with dialogue showing sequences of flow from frame to frame

Storyboard Elements

- Hand-sketched pictures annotated with words
- The entire work practice; for example, include telephone conversations with agents or roles outside the system
- Sketches of devices and screens
- Any connections with system internals; for example, flow to and from a database
- Physical user actions
- Cognitive user actions in thought balloons

Physical Mockups

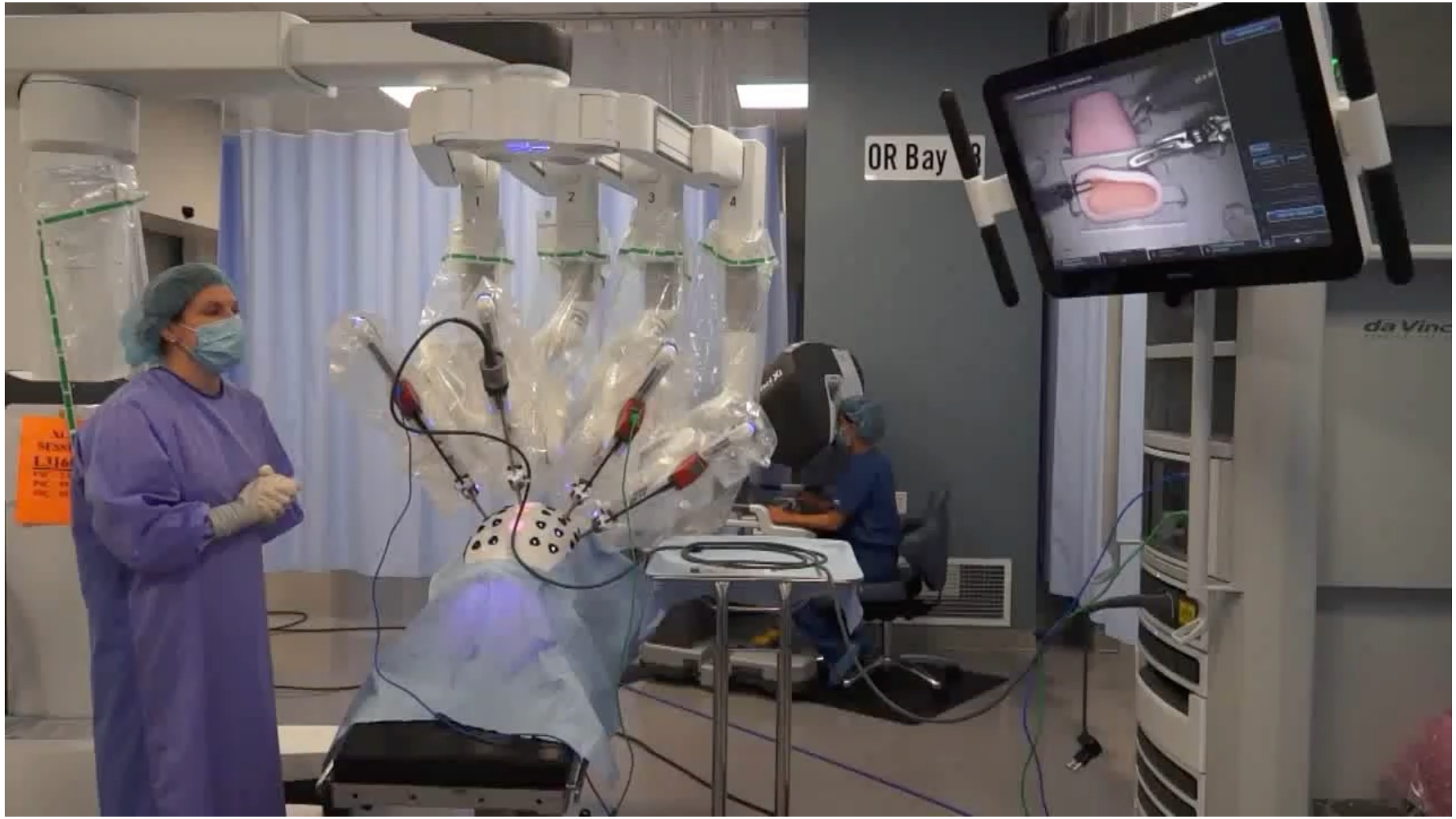
- **Physical Mockup:**
  - *A tangible, three-dimensional, physical prototype or model of a device or product*
- Usually, can be held
- Often crafted rapidly out of materials at hand
- Used during exploration and evaluation to simulate physical interaction



Representative Videos

- **Representative Video:**
  - *A video of some real-world activities or interactions that represents the desired activities and interactions of the envisioned system*
- Most relevant to virtual reality applications that attempt to replicate some real-world activities
- Also, relevant to augmented reality applications that will augment such real-world activities

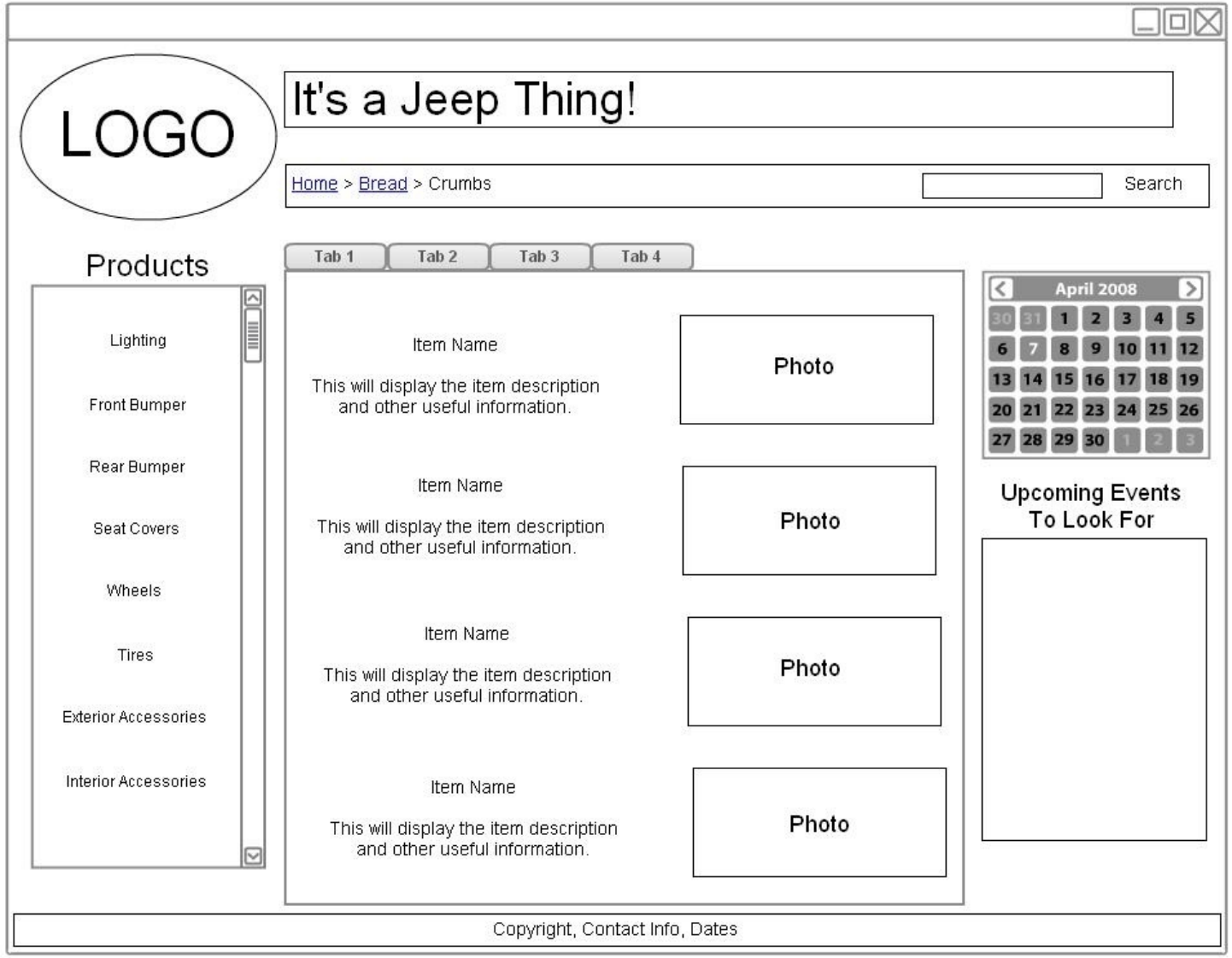
Representative Video



Design Production Tools

- **Design Production:**
  - *The refinement of a design through multiple iterations, each more refined than the previous*
- Two tools for refining designs
  - Wireframes
  - Style Guides

Example Wireframe



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Reminders

Upcoming Classes

- **Next Tuesday:**
  Pitch Development

- **Next Thursday:**
  NO CLASS (UCF vs. SCSU)

Questions?