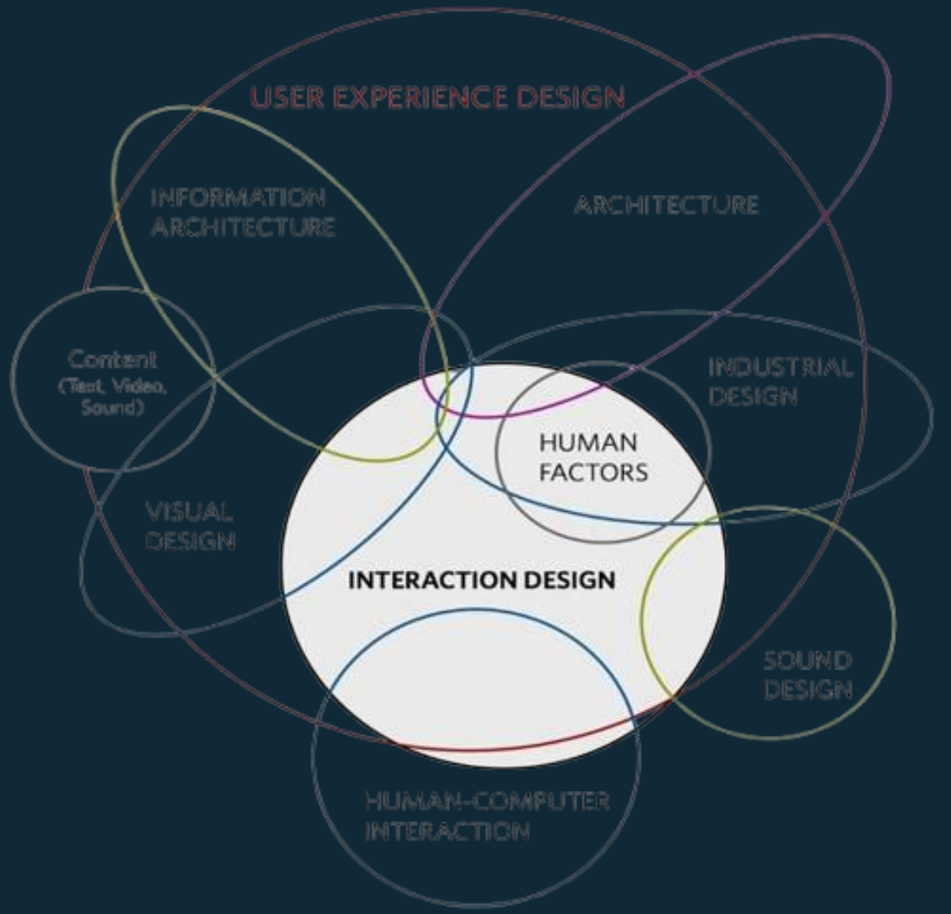
Human Computer Interaction in Health Care

Lecture (3)

User-Centered Design and UX Principles

Asst. Lect. Ali Al-khawaja



Google Class Room

Introduction to User-Centered Design (UCD) Methodology

User-Centered Design in healthcare systems prioritizes the needs of medical professionals and patients throughout the development process. This approach is particularly crucial in clinical settings where interface errors can impact patient safety and outcomes. For example, when designing Electronic Health Record (EHR) systems, UCD involves understanding clinical workflows, specifying requirements based on medical protocols, creating intuitive interfaces for time-sensitive situations, and rigorously evaluating designs through clinical simulations. This methodology has been shown to reduce medical errors, improve efficiency in healthcare delivery, and increase adoption rates of new medical technologies.

User Focus

Places healthcare providers and patients at the center of the design process, considering their unique workflows, cognitive load, and clinical requirements

Iterative Approach

Continuously refines medical interfaces based on feedback from clinicians, nurses, and other healthcare staff during real clinical scenarios

Multidisciplinary Teams

Combines expertise from medical professionals, UX designers, clinical informaticists, and healthcare software engineers to ensure comprehensive solutions

Empirical Measurement

Uses quantitative metrics like task completion rates, error rates in medical data entry, and qualitative feedback from clinical users to drive evidence-based design decisions

The Design Thinking Process in HCI

Design thinking is a problem-solving approach that complements UCD in healthcare HCI. It encourages creative thinking and user-focused solutions. In medical contexts, this process helps designers understand the complex needs of patients, healthcare providers, and administrators, leading to more effective and compassionate healthcare technologies.

1. **Empathize**

   Understand users' needs and challenges in healthcare settings

2. **Define**

   Clearly articulate the problem to be solved

3. **Ideate**

   Generate innovative solutions for healthcare interfaces

4. **Prototype**

   Create low-fidelity models of potential solutions

5. **Test**

   Evaluate prototypes with real users in clinical environments

Key Concept: Usability in Healthcare HCI

Definition

Usability refers to the ease of use and learnability of a human-made object. In healthcare HCI, it's crucial for ensuring that medical systems can be effectively used by healthcare professionals, often in high-stress situations.

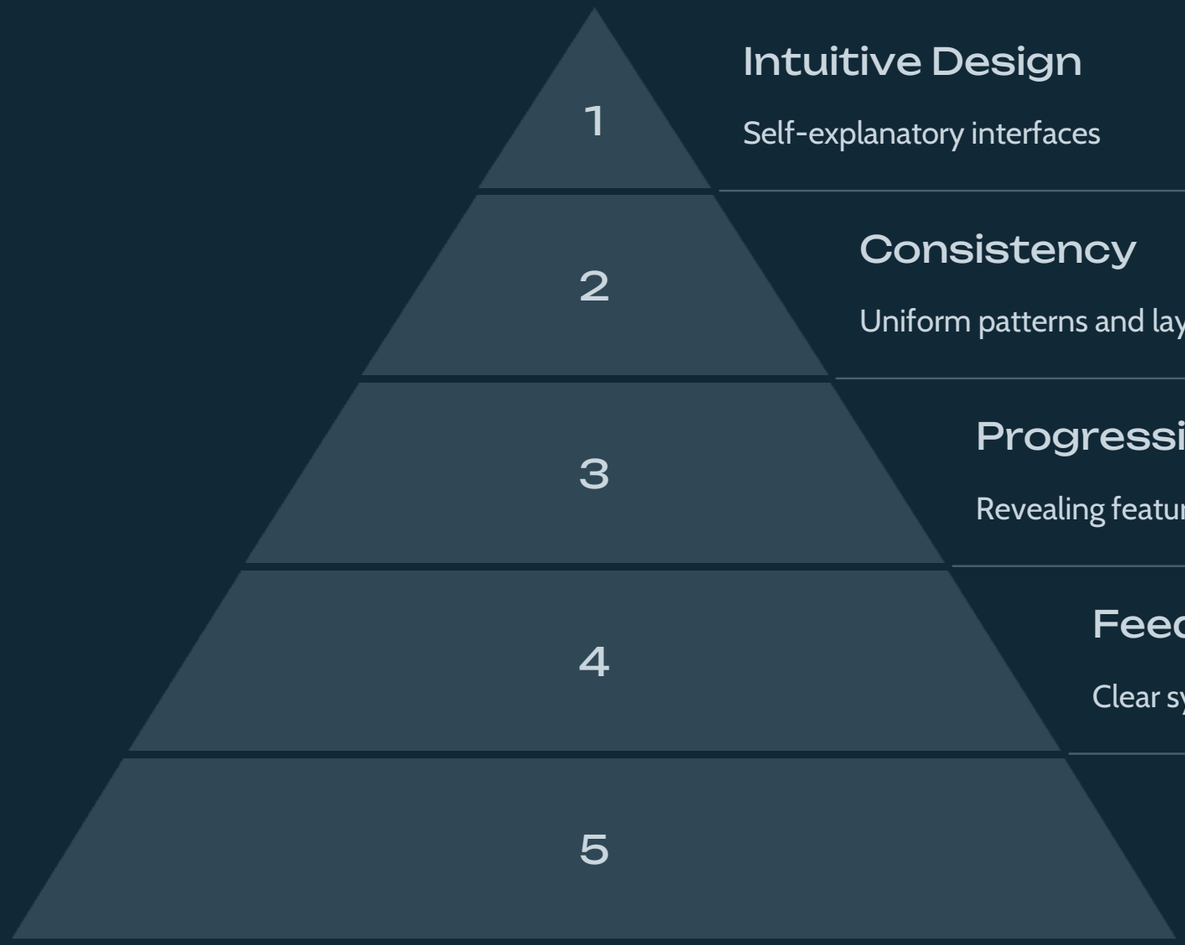
Importance in Healthcare

High usability in medical interfaces can lead to reduced errors, improved efficiency, and better patient outcomes. It's especially critical in emergency situations where every second counts.

Usability in healthcare HCI goes beyond mere convenience. It can be a matter of life and death. For example, a well-designed emergency room interface can help doctors quickly access critical patient information, potentially saving lives in time-sensitive situations.

Key Concept: Learnability in Medical Systems

Learnability is crucial in healthcare systems where staff turnover can be high and time for training is often limited. A learnable system reduces the cognitive load on healthcare professionals, allowing them to focus more on patient care. It also helps in quick adoption of new technologies, which is essential in the rapidly evolving field of medical informatics.



Intuitive Design

Self-explanatory interfaces

Consistency

Uniform patterns and layouts

Progressive Disclosure

Revealing features as needed

Feedback

Clear system responses

Help and Documentation

Accessible guidance

Key Concept: Efficiency in Healthcare Interfaces

Efficiency in healthcare HCI is about maximizing the output while minimizing the input required from users. In medical settings, efficient interfaces can significantly impact patient care by allowing healthcare providers to spend more time with patients and less time navigating complex systems. For instance, an efficient Electronic Health Record (EHR) system can help doctors quickly access and update patient information, leading to more informed decision-making and improved care coordination.

Time-Saving

Minimizes time spent on system interaction

Accuracy

Reduces errors in data entry and retrieval

Automation

Streamlines repetitive tasks

Workflow Integration

Aligns with clinical processes

Key Concept: User Satisfaction in Medical Interfaces

User satisfaction in healthcare HCI goes beyond mere preference. It can significantly impact the quality of care provided. Satisfied users are more likely to engage fully with the system, leading to more accurate data entry, better utilization of features, and ultimately, improved patient outcomes.

Emotional Response

Positive feelings towards the system enhance user engagement and adoption rates. In healthcare, this can lead to better compliance with using essential tools and technologies.

Perceived Usefulness

When users find the system helpful in their daily tasks, they're more likely to utilize it fully, leading to improved patient care and operational efficiency.

Stress Reduction

Interfaces that reduce cognitive load and frustration can significantly impact the well-being of healthcare professionals, potentially reducing burnout.

UX Design Principles for Desktop Interfaces in Healthcare

1

Clear Information Hierarchy

Organize content to prioritize critical information

2

Consistent Layout

Maintain uniformity across different screens and modules

3

Effective Use of Screen Real Estate

Optimize layout for large displays common in healthcare settings

4

Quick Access to Frequently Used Functions

Implement shortcuts and customizable dashboards

5

Robust Search Functionality

Enable quick retrieval of patient data and medical information

Desktop interfaces in healthcare often need to display complex information and support multitasking. Effective UX design for these interfaces focuses on clarity, efficiency, and the ability to quickly access and input information. For example, a well-designed EHR system might use a consistent color-coding scheme to highlight different types of patient information, making it easier for healthcare providers to quickly find what they need.

UX Design Principles for Mobile Interfaces in Healthcare

Touch-Optimized Interface

Design for finger-based interaction with appropriately sized touch targets. This is crucial for healthcare professionals who may need to use the interface while moving or in unconventional postures.

Responsive Design

Ensure the interface adapts to different screen sizes and orientations. This allows for seamless use across various devices, from smartphones to tablets, which is essential in dynamic healthcare environments.

Offline Functionality

Implement features that work without constant internet connectivity. This is vital in healthcare settings where network access may be limited or unreliable, ensuring continuous access to critical information.

Mobile interfaces in healthcare need to balance comprehensive functionality with the constraints of smaller screens and on-the-go use. They should prioritize the most critical functions and information, making them easily accessible with minimal navigation. For instance, a mobile app for patient monitoring might use large, easy-to-read graphs and prominent alert notifications to ensure important changes in patient status are immediately noticeable.

Challenges in Implementing UCD in Healthcare HCI

Regulatory Compliance

Navigating complex healthcare regulations and data privacy laws

Diverse User Base

Designing for users with varying levels of technical proficiency

Integration with Legacy Systems

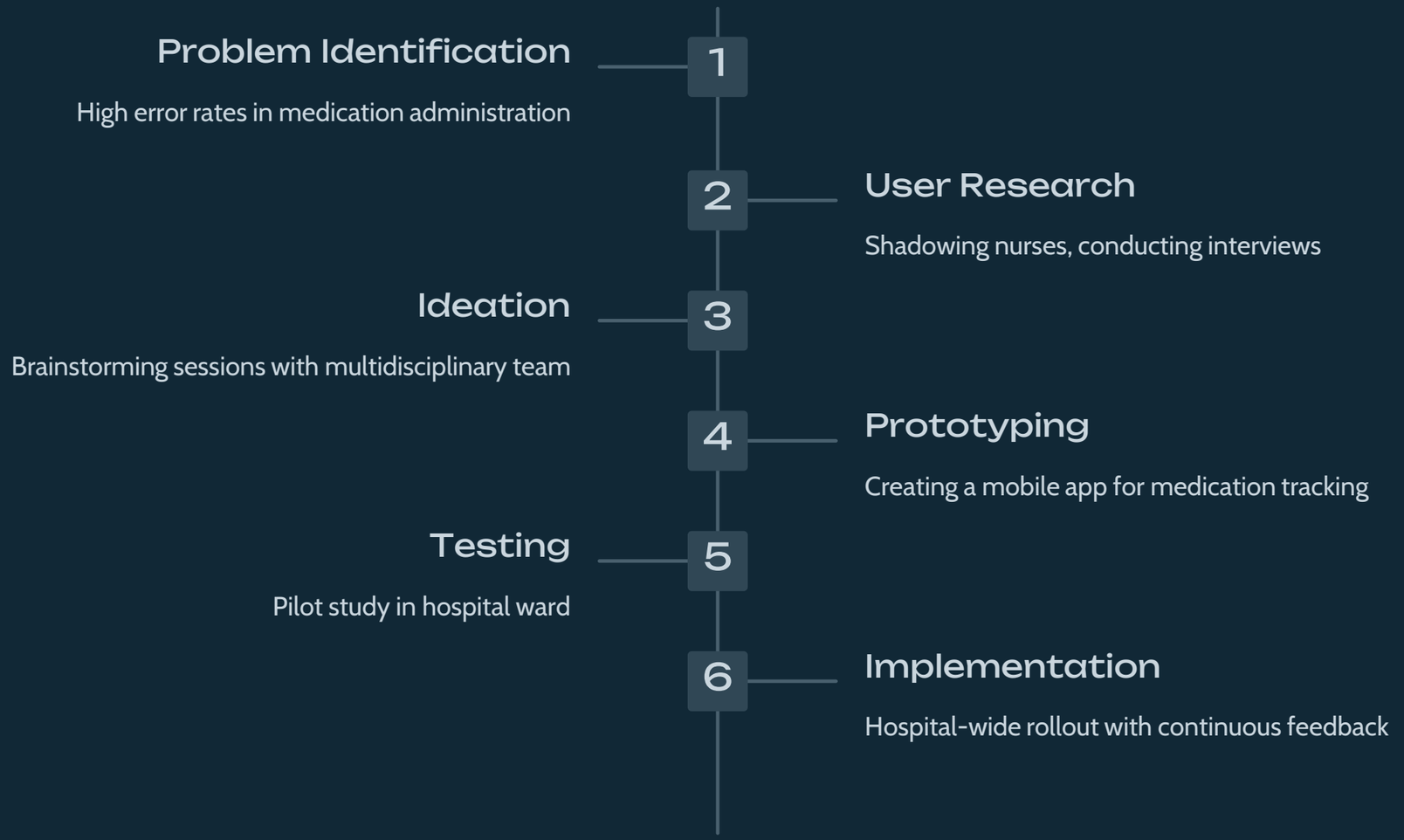
Ensuring compatibility with existing healthcare infrastructure

Time and Resource Constraints

Balancing thorough UCD processes with urgent healthcare needs

Implementing UCD in healthcare HCI comes with unique challenges. The highly regulated nature of healthcare means designs must comply with stringent privacy and security standards. Additionally, healthcare systems often need to cater to a wide range of users, from tech-savvy young doctors to older patients with limited digital literacy. Overcoming these challenges requires a deep understanding of both UCD principles and the healthcare domain.

Applying UCD in Healthcare: A Case Study



This case study illustrates how UCD principles were applied to develop a medication tracking app for nurses. By involving end-users throughout the process, the resulting app significantly reduced medication errors and improved efficiency. The iterative nature of UCD allowed for continuous improvements based on real-world usage and feedback.

Homework

- Write the 4 UCD pillars (list only).
- Apply Design Thinking: write one sentence for any two stages (you choose) for improving an EHR.
- Write two usability metrics (list only).

Deliverable: One page (Word/PDF) OR a photo of handwritten answers.

Note: Submit the homework via Google Classroom under the corresponding assignment. Upload the required file(s) before the deadline.


Any Questions?