Unit-5
User centered system design

Introduction

User-centered design (UCD) is an **iterative design process** that prioritizes the needs and experiences of users throughout every stage of product development. In UCD, designers collaborate closely with users, employing various research and design techniques to create highly usable and accessible products.

Systems are designed to meet business goals through the fancy features, and technological capabilities of software or hardware tools. However, these system design approaches omit the end user, which is an essential part of the process.

Major key principles of UCD are:

1. Design for the users and their tasks

During development(Design) and this includes the whole period, it is important for the developer to consider the characteristics of the user population, the tasks involved in the real world and the specified environment.

2. Maintain consistency

The users need a system that is easy to learn with minimal and understandable requirements. The behavior of interface elements should be consistent. In fact, consistency will start at the designing phase so as to integrate with the existing components in a computer system. This will determine how users will view your approach and the time taken to learn.

3. Use simple and natural dialogue

The core application of a system should be incorporated with proper interaction to enable a dialogue(Interface) with the user. The user should see only the relevant information that is essential for task completion because each time irrelevant information is added, it puts the user in a more complicated situation. It is advisable for the developer to use plain English and use vocabulary that is relevant to the targeted audience.

4. Reduce unnecessary mental effort by the user

Users like to concentrate on the task at hand and worry less or not at all of the tool in use and its interaction with the designed application. They are more frustrated with complicated interaction with the computer. by which? They are distracted from the main work.

Too much effort invested in learning on the operation part makes them less efficient and prone to error so, Instructions on how to use should be clearly defined and can be retrieved when needed.

5. Provide ample feedback

Users need assurance that their actions have been successfully executed. This can be made evident by a change in the appearance when completion is achieved successfully. If it takes longer, an indicator is useful to show that processing is still in progress, and this keeps the confidence of a user in shape. What is kept away is the information providing status about the internal affairs of the system.

6. Let the user take charge

The user knows what they needs, and the developed system provides the solution. For the user to do what is required, they should be able only to take what is required and leave the rest to support an individual request.

7. Provide information clearly

The arrangement of information is essential to the user while on-screen which enables the user to single out the different elements and data groups. This can be achieved by using boxes, spaces, and visual coding proficiency. Again, developers should not provide more than the necessary information to process a task.

10. Offer Assistance

A user should get all the help needed from a system with minimal use of the document provided. In other words, they should be self-explanatory. Information provided on the window should be in line with the user's tasks. It is important for you to provide tool tips for icon-labeled buttons.

Online help should be related to whatever interaction is provided on the window. Task-oriented should be the tone with a list of steps to be followed.

11. Error-free

Minimize errors by directing the users towards the right way to achieve their goals. Feedback from users should be constrained to prevent error, where necessary to the task.

User center design process enroll following stages

The UCD process is an iterative design process that involves users throughout the design process via a variety of research and design techniques. The process typically consists of four steps:

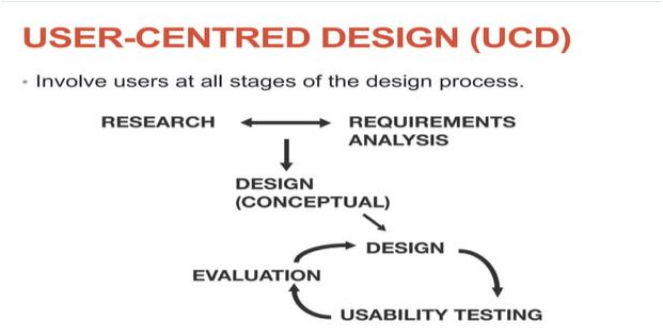
Understanding the user and context of use

Specification of user and business requirements

Creation of design solutions

Evaluation of designs

The UCD process is an iterative process, where design and evaluation steps are built in from the first stage of projects, through implementation. The UCD process always begins by researching and understanding the users who will interact with the system or product



5.2 Understanding Human factor(HF)and Ergonomic

Human factors design has roots in ergonomics, and it's primarily focused on how people interact with technology. It's about making a system usable, especially when it comes to human-computer interaction (HCI). User experience (UX), on the other hand, encompasses everything that users go through when they interact with a product.

Human factors design (or people-centered design), specifically, focuses on improving areas within a product or design where interaction happens. Examples include when you use a touchscreen smartphone and when you perform tasks on your desktop computer.

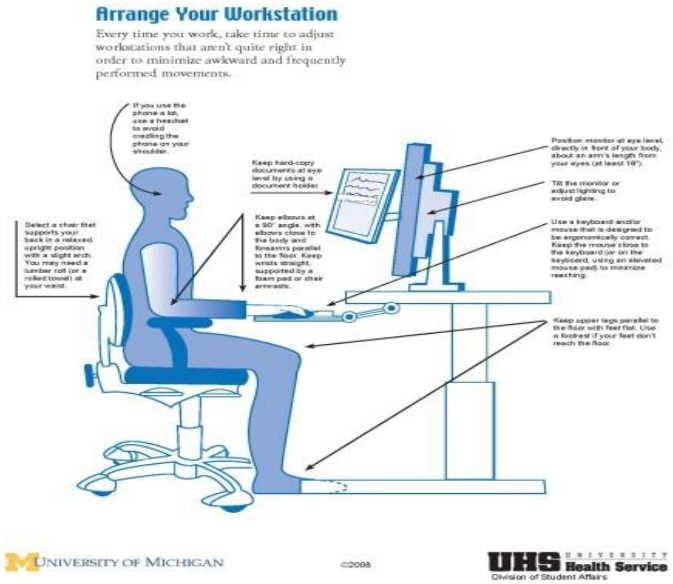
The goal is to reduce the number of mistakes that users make and produce more comfortable interactions with a product. Human factors design is about understanding human capabilities and limitations and then applying this knowledge to product design. It's also a combination of many disciplines, including psychology, sociology, engineering, and industrial design.

Human Factors (HF):
HF design has its roots in ergonomics and focuses on how people interact with technology. It aims to make systems usable by considering human capabilities, limitations, and behavior.
HF is especially crucial in human-computer interaction (HCI). It ensures that interfaces, devices, and software are designed to accommodate users effectively.
In summary, HF emphasizes understanding human needs, cognitive processes, and physical interactions to create better user experiences.

Ergonomics:

It is derived from the Greek word **ergon** and **nomos**,where **ergon** means work and **nomos** (Natural law).
Ergonomics is the science of designing products, systems, and environments to fit the people who use them.
It considers factors such as posture, comfort, safety, and efficiency.
In the context of UCD, ergonomics plays a vital role in shaping the physical aspects of products (e.g., chair design, keyboard layout) to enhance usability.
" *Ergonomics is the study of people in their working environment."*
It deal fit the person make the work, not the person fit the work.I.e deal with health and productivity.
Make key element to understand human factor

Liveware: user, person you and I.
Hardware: physical,your device and tools
Software:entire non-physical
Environment: situation in which where (LHS) system interact.



User-Centered Design (UCD):

UCD is an approach that prioritizes users throughout the design process.

It involves understanding user needs, involving users in design decisions, and evaluating designs based on user feedback.

UCD integrates principles from HF and ergonomics to create intuitive, efficient, and satisfying user experiences.

HF, ergonomics, and UCD collectively contribute to creating products and systems that align with human capabilities and enhance usability. By considering these factors, designers can develop solutions that meet real user needs and expectations.

5.3 Situational Assessment: Area of concern

"Situational assessment plays a crucial role in understanding users' needs, behaviors, and the context in which they interact with a product or system" SA can enrolls with following concern area.

Designing for Situation Awareness:

In a scenario-based approach, augmented with personas, situational awareness is explored within the context of emergency situations. The goal is to understand how environmental factors can trigger situational disabilities and impact different stakeholders, including command and control centers, first responders, and affected members of the public1.

By considering personas representing archetypical characteristics and roles, designers gain insights into how situational disabilities affect awareness. This approach emphasizes the importance of universal design of information and communication technology (ICT) for emergency management, benefiting not only people with disabilities and the elderly but everyone

User-Centered Design (UCD) and Situation Awareness:

UCD is a distinct design philosophy that focuses on creating systems that enhance user experience and situation awareness.

For complex interfaces, such as the Water Detection System, UCD ensures that design decisions align with users' cognitive processes and context

Practical Implications:

When designing interfaces for emergency response or critical systems, consider:

Contextual factors: Understand the environment, tasks, and users' mental models.

Information presentation: Provide relevant and timely information to enhance situational awareness.

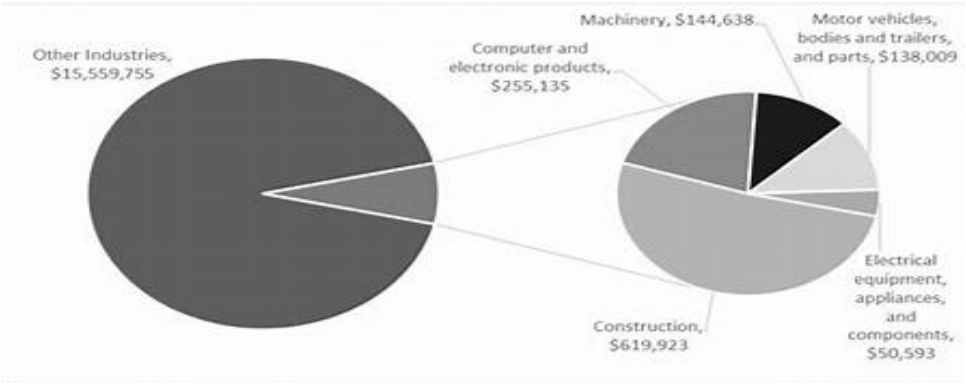
Feedback mechanisms: Enable users to assess their actions and adjust accordingly.

Usability testing: Involve end users in evaluating prototypes to refine design elements

5.4 Complex system Development

A complex system is a sophisticated structure, device, or other entity that consists of many components that interact with one another; there are often many logical dependencies between the components, and there are many variables that affect their intricate interactions.

It deal how we can development this system.



Actually it enables project managers to reduce project complexity and control the consequences of complexity. In doing so, it overviews the intersection between projects and innovation, noting how the field's lack of empirical analysis on using innovative approaches for managing complex projects is affecting practitioners and researchers. It lists the three challenges involved in managing complex systems development projects, adding that the traditional project success criteria (time, cost, scope) are unsatisfactory for gauging the success of complex projects.

5.5 SE, HF and Ergonomic action(Home task)