HCI Insem1 2023

Always think of:

- Know about how people **interact with things**
- Know about what people **can and can't do**
- Know about the **situations in which people**
- do things
- Know about the **basics of good design**
- Understand people's **goals**

1. Don Norman's principles

Ma Si Cons Afo Di Fee CM

- **Discoverability** increases understanding of the available options and where to perform them.
- **Feedback** communicates the response to our actions or the status of systems.
- **Conceptual models** are simple explanations of how something works.
- **Affordance** is the perceived action of an object.
- **Signifiers** tell us exactly where to act.
- **Mapping** is the relationship between the controls and the effect they have.
- **Constraints** help restrict the kind of interactions that can take place.

https://uxdesign.cc/ux-psychology-principles-seven-fundamental-design-principles-39c420a05f84

INTERACTION TYPES

i. Instructing

instruct a system and tell it what to do; issuing commands and selecting options (e.g. print a file, save a file)

ii. Conversing

interacting with a system as if having a conversation (e.g. search engines, advice-giving systems, help systems, virtual agents)

iii. Manipulating

interacting with objects in a virtual or physical space by manipulating them (e.g. dragging, selecting, opening, closing and zooming actions on virtual objects)

iv. Exploring

moving through a virtual environment or a physical space (e.g. google maps, GPS)

INTERFACE TYPES

Interface type	See also
1. Command-based	
2. WIMP and GUI	
3. Multimedia	WIMP and web
4. Virtual reality	Augmented and mixed reality
5. Information visualization	Multimedia
6. Web	Mobile and multimedia
7. Consumer electronics and appliances	Mobile
8. Mobile	Augmented and mixed reality
9. Speech	
10. Pen	Shareable, touch
11. Touch	Shareable, air-based gesture
12. Air-based gesture	Tangible
13. Haptic	Multimodal
14. Multimodal	Speech, pen, touch, gesture, and haptic
15. Shareable	Touch
16. Tangible	
17. Augmented and mixed reality	Virtual reality
18. Wearable	
19. Robotic	
20. Brain–computer	

What should a Conceptual Model (CM) consist of ?

- Object/Action relationships
- Metaphors or analogies
- the (user-level) concepts to be created and manipulated
- the relationships between concepts,
    - Attributes has-a
    - Specialisations is-a
    - Containment contains
- the mappings between concepts and task domain
- Functions performed and by whom
- Task allocation
- Relationship between functions

- Relative position
- Sequential
- Parallel
- Importance
- How frequent?
- How data is captured, transformed and output?

Dimensions of Usability:

- **Learnability**: Easy to learn Le Me Efc Err Vi Eft Sat
- **Memorability** : Is it recallable after some time
- **Efficiency**: Once learned, is it fast to use?
- **Errors**: Are errors few and recoverable?
- **Visibility**: Is the state of the system visible?
- **Effectiveness**: Can it do the job well and correctly?
- **Satisfaction**: Is the user happy with the interface?

Also remember:

Recognition:

- remembering with the help of a clue

Recall:

- Remembering with no help

2. Jacob Nielsen's principles

Heuristics : **the process by which humans use mental short cuts to arrive at decisions**. Heuristics are simple strategies that humans, animals, organizations, and even machines use to quickly form judgments, make decisions, and find solutions to complex problems.

i. Visibility of system status ViSyS

Users need to be kept informed by the system about what is

going on, through appropriate feedback within reasonable time.

ii. Match between system and the real world

The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real- world conventions, making information appear in a natural and logical order.

MatSyRW

UsCtrFr

iii. User control and freedom

Users often choose system functions which they did not want . (Mouse click due to haste) . This calls for Support undo and redo.

A user need to have to go through tracing too many steps back to regain control.

ConSt

iv. Consistency and standards

Using different words to mean the same action or using different symbols on different pages can be confusing to the user. Users should not have to wonder whether different words, situations, or actions mean the same thing. They should not be in doubt as to what to do next.

ErrPr

v. Error prevention

Prevention of error is best approach. However recovery from error prone actions through a well designed error message should be adopted.

RecRe

vi. Recognition rather than recall

Analogy, metaphor, symbols, sounds, etc are used as design elements in an interface to ease recall thereby eliminating the need for ' thinking while interacting' and memory loads for the user.

FlEfc

vii. **Flexibility and efficiency of use**

The system can cater to both inexperienced and experienced users. As the user becomes proficient - shortcuts can be encouraged. Thereby increasing the efficiency. Allowing the rearranging of the screen elements by the user can also be adopted.

AeMin

viii. Aesthetic and minimalist design

Relevancy, simplicity, minimum amount of labels, un cluttered graphics result in efficient communication dialogue between the user and the interface unnecessary superfluous elements need to be dropped.

ix. Help users recognize, diagnose, and recover from errors

RecDiRec

Preventing a user who is about to make a error would be a good

approach. Gentle wording of error messages, constructive suggestions, reeducating the user- all can contribute to a happy

confident user who is not afraid of being caught unawares or penalized.

HeDoc

x. **Provision of Help and documentation**

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Help quarries need to be answered promptly without the user having to go through an elaborate eliminating list

3. Models of interaction

a. Mental vs Conceptual model
https://uxdesign.cc/understanding-mental-and-conceptual-models-in-product-design-7d69de3cae26

b. Gulf of Execution and Gulf of Evaluation

Gulf of execution

Gulf of execution is the degree of ease with which a user can understand the current state of a system. It is the difference between the intentions of the users and what the system allows them to do.

For example, a person can look at a light switch and easily tell what the current state of the system is (i.e., whether the light is on or off) and how to operate the switch. This means that the gulf of execution is small. Norman states that, in order to design the best interfaces, the gulf must be kept as small as possible.

Gulf of evaluation

Gulf of evaluation is the degree of ease with which a user can perceive and interpret whether or not the action they performed was successful. This gulf is small when the system provides information about its state in a form that is easy to receive, interpret, and matches the way the person thinks of the system.

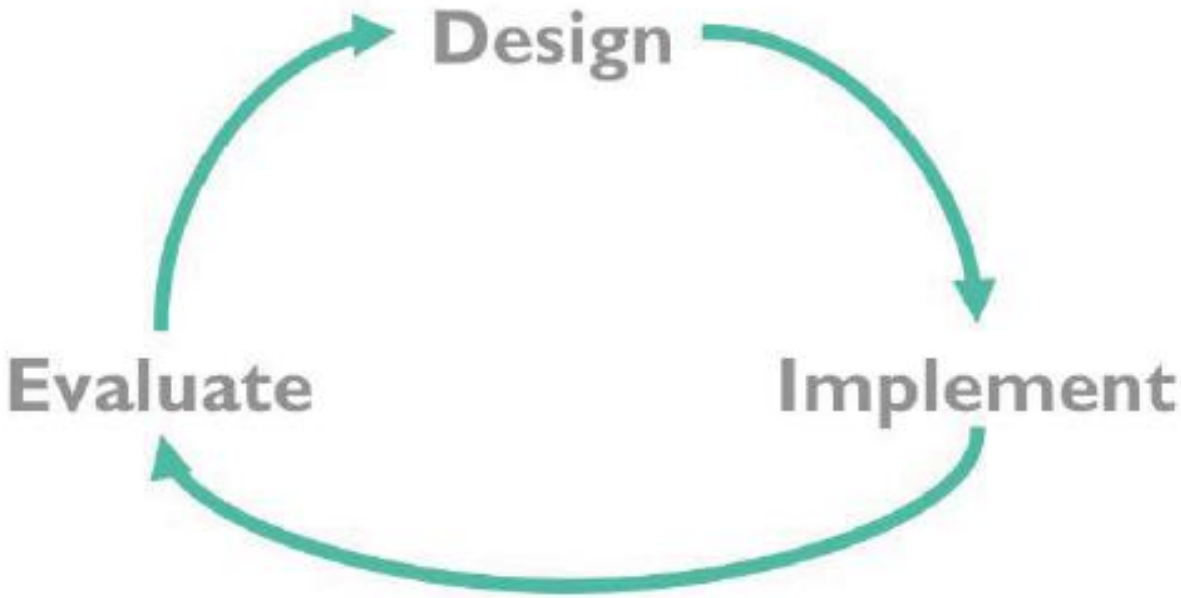
Consider the same light switch example; if a person looks at a light switch, the gulf of evaluation is very small since, with one switch, the user will immediately know if their action was successful. An example of a large gulf of evaluation is when an application has a spinning wheel to show a "loading" state after the user performs an action. The wheel alone is not enough for the user to interpret the progress that the system is making in response to their action. The gulf can be shortened by having a loading bar instead.

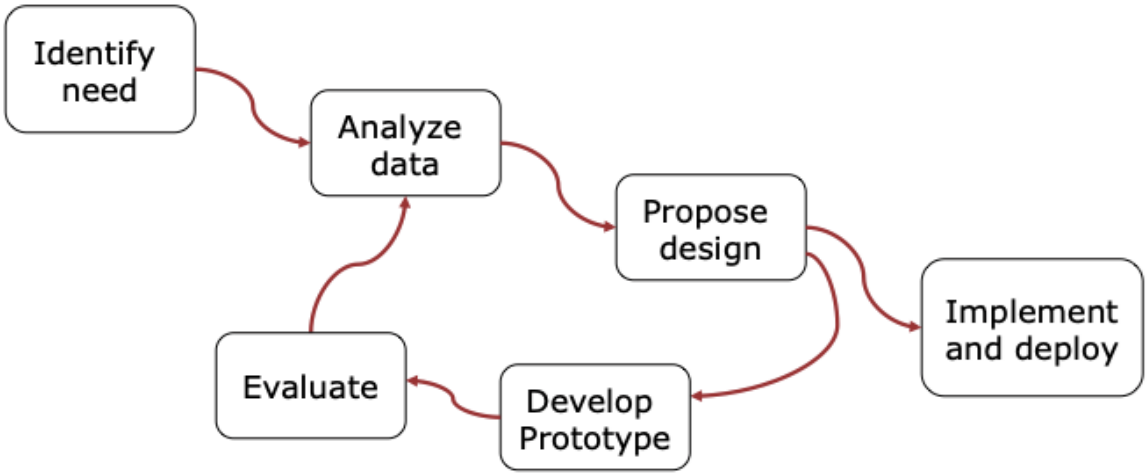
To reduce this bridge, ask the following questions:

a. Bridge gulf of execution by:
   i. Signifiers, constraints,
   ii. mapping, conceptual model
b. Bridge gulf of evaluation by:
   i. Feedback, conceptual model
   ii. Help users answer the 7 questions from the fig above

4. Introduction to User Centered Design (UCD)

a. Methods and procedures in UCD

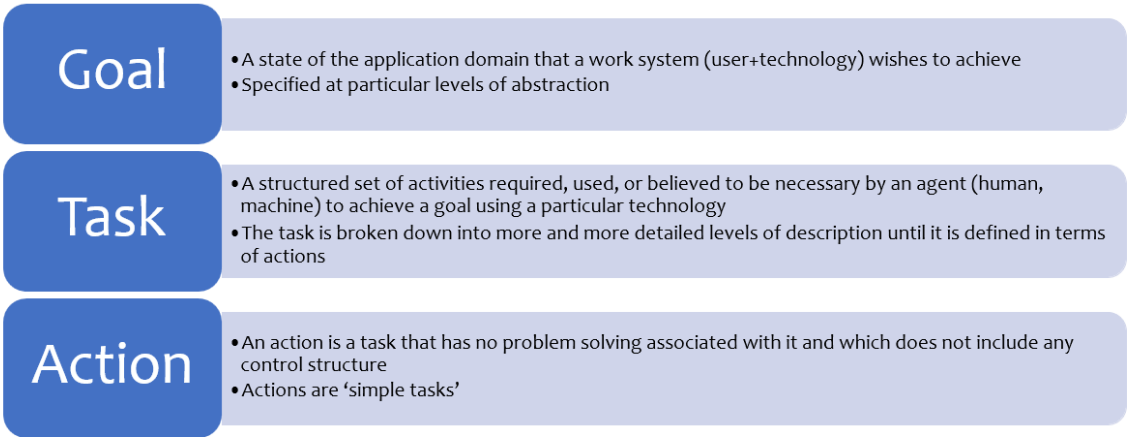




5. TASK ANALYSIS

What is a Tasks?

- «A **task** is a **goal** together with some ordered set of **actions.**» (Benyon)



a. **Differences between task analysis and & other techniques**
b. **Types of Task analysis techniques**

Task decomposition – Splitting tasks into sub-tasks and their ordering.

Knowledge-based techniques – Any information and instructions that users need to know, and how that knowledge is organized

Entity-relationship-based analysis – identify actors, objects, relationships and their actions

Ethnography – Observation of users' behavior in the use context.

Protocol analysis – Observation and documentation of actions of the user. This is achieved by authenticating the user's thinking. The user is made to think aloud so that the user's mental logic can be understood.

c. Uses of Task analysis
d. Use case examples of task analysis

6. Model based design

a. KLM

Physical Motor Operators

Keystroke

Button press or release with mouse

Point with mouse

Draw line with mouse

Home hands between mouse and keyboard

Mental operator

- Core thinking process **(M)** [Decision Making]
- Encode as sequence of steps
    i. K, B, P, H, D (if any)
    ii. Mental operator time(M)
    iii. ∑ (Operator times)