

1.1 Introduction

Alan Cooper (2018), a well-known user experience (UX) guru, bemoans the fact that much of today's software suffers from the same interaction errors that were around 20 years ago. Many interfaces of new products do not adhere to the interaction design principles validated in the 1990s. For example, he notes that many apps do not follow even the most basic of UX principles, such as offering an "undo" option.

1.2 Good and Poor Design

VOICE - MAIL SYSTEM

Used in hotels to communicate between the rooms. It is incredibly confusing and difficult to operate. As we don't know how to send a message, if a message is there for us, how many messages are there for us, what is the password. It takes a lot of steps to access a single message. In conclusion, it has a bad design and poor user interface.



This is an alternate more user friendly system called marble answering machine. The number of marbles that have moved into the pinball-like chute indicates the number of messages. Placing one of these marbles into a dent on the machine causes the recorded message to play. Dropping the same marble into a different dent on the phone dials the caller who left the message.

This alternative uses familiar objects that indicate visually the steps to take, it is aesthetic and enjoyable, has only one step actions and is simple but elegant. . One of the goals was to design a messaging system that represented its basic functionality in terms of the behaviour of everyday objects. But this is not practical in a hotel setting. Marbles can be lost/stolen, It is very basic and does not offer complex tasks. It would be suitable in a home setting with no children. Therefore, when considering the design of an interactive product, it is important to consider where it is going to be used and who is going to use it,

REMOTE CONTROL

Many people design the remote with a dizzying array of small multicoloured and double labelled buttons that are positioned arbitrarily. This makes it difficult for the user to do even the basic of tasks like play/pause.



The TiVo remote to the right has been designed with the user in mind. It has large logically arranged buttons and clear labels. Its peanut shape also fits right into the hand. It also has a playful look with colourful cartoon icons on it. TiVo successfully created it by following a user-centred design process. The design team also resisted the trap of “**buttonitis**” to which so many other remote controls have fallen victim; that is one where buttons breed like rabbits— a button for every new function. They only kept the basic buttons and rest functions can be represented as a part of menu options.

SMART TV

A challenge is to how to enable users to access online content as it contains lot of menus and scrolling. It makes us think if a remote control is best input device to smart Tv's. Other alternatives have been thought of.

1. **On-screen keyboard:** This became a problem when we had to put in long email addresses, passwords or movies as it was very slow and it was easy to overshoot (hitting a wrong character).
2. **Touchpad:** It helps skip the long rows of letters but still typing long things are a pain. Also prone to overshooting.
3. **Voice control:** Via support of Siri, Alex, etc. This helps us reach super specific places like third episode of fifth season of Suits. But it is not secure for putting in passwords.
4. Maybe the use of **biometrics** is the future.



WHAT TO DESIGN ?

Depends on who is using the design and how, where and when is the device going to be used. Also what kind of tasks people are going to do with this design. Ex- online banking will need the interface to be secure, encrypted and easy to navigate. It should also allow the user to find out new services offered without being intrusive.

The Internet of Things (IoT) now means that many products and sensors can be connected to each other via the Internet, which enables them to talk to each other. The interfaces for everyday consumer items, such as which used to be physical and the realm of product design, are now predominantly digitally based, requiring interaction design (called consumer electronics). This digital revolution cuts cost and increases efficiency but learning it, pressing the wrong button, being at the wrong place at self-checkout systems may result in frustrating and even mortifying experiences.

WHAT TO CONSIDER BEFORE DESIGNING A PRODUCT

1. Considering what people are good and bad at
2. Considering what might help people with the way they currently do things
3. Thinking through what might provide quality user experiences
4. Listening to what people want and getting them involved in the design
5. Using user-centered techniques during the design process

GOOD DESIGN

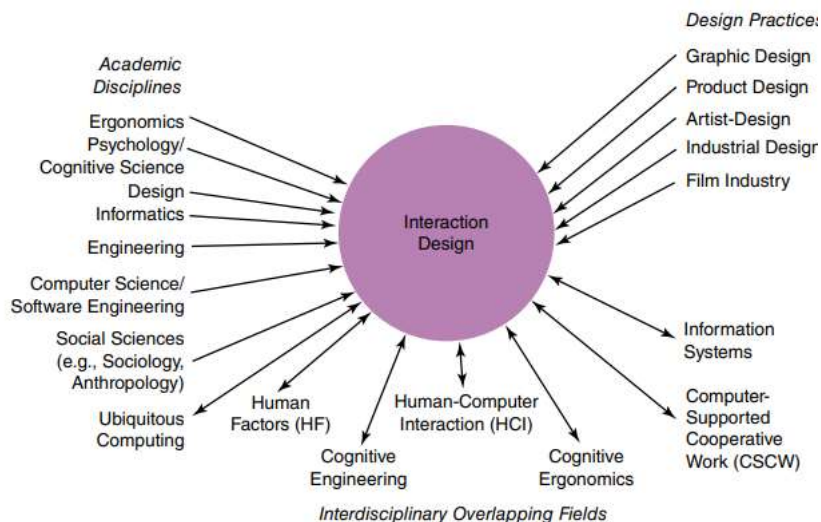
1. It has three key features: It is simple, accessible and useful
2. **Simple:** First interaction with the interface should be simple and it should let the user go into more details over time. If we bombard users with details in the start, they would get frustrated.
3. **Accessible:** It should be available to everyone who needs to use the design..
4. **Useful:** It should allow the user to accomplish the task it was designed for
5. **Amazon's patent:** "it's just a click away" revolutionized e-commerce industry by enhancing accessibility
6. Making a design simple and useful is to stick to well-known conventions.

ARE COMMUNICATION AND INTERACTION SAME?

Communication is a subset of interaction. Communication involves passing along of information. Interaction may involve passing of information or not. Interaction is basically giving some effect by using my actions. If I express something with my eyes or make some sounds that is also interaction but I have to make the other person take some information from me to call it communication. If I just look at somebody and that person looks at me, that is also interaction.

1.3 What is Interaction Design?

1. **Designing interactive products to support the way people communicate and interact in their everyday lives.**
2. It is about creating user experiences that enhance and augment the way people work, communicate, and interact.
3. **Terry Winograd:** designing spaces for human communication and interaction
4. **John Thackara:** the why as well as the how of our daily interactions using computers
5. Also called Interface design (UI), software design, user-centered design, product design, web design, user experience design, and interactive system design. Interaction design is the umbrella term for everything related.
6. Industry me UX kehte hai. UX: User Xperience



Many of these fields overlap. The main differences between **interaction design** and the other approaches in the figure are which methods they use to study, analyse, and design products. Another way they vary is in terms of the scope and problems they address. For ex-

1. **Information systems:** concerned with the application of computing technology in business, health, and education.
2. **Ubiquitous computing:** concerned with the design, development, and deployment of pervasive computing technologies (for example, IoT) and how they facilitate human experiences and interactions

Historically, HCI only focused on the design and usability of computing systems, while ID was seen as being broader, concerned with the theory, research, and practice of designing user experiences for every domain. Now, strength of HCI lies in human centredness and usability concern and how it makes a system accessible, usable and acceptable. ID is applying traditional approaches to design that emphasizes research, insight and critical reflection and along with UX is concerned with development of novel apps, visualisations, auditory displays and responsive environments. And we try to bring the best of both to create a good design.

A Critical Reflection (also called a reflective essay) is a **process of identifying, questioning, and assessing our deeply-held assumptions** – about our knowledge, the way we perceive events and issues, our beliefs, feelings, and actions.

To be able to create engaging user experiences, people need to know about emotions, aesthetics, desirability, and the role of narrative in human experience but also about the business side, technical side, manufacturing side, and marketing side. This is not a one man job hence ID is carried out by multidisciplinary teams containing people from all fields of science, commerce and humanities.

So many people bring with them a lot of ideas but also lot of costs and conflict in ideas. Also same words may mean different things in different fields so miscommunication may occur. The more disparate the team members—in terms of culture, background, and organizational structures—the more complex this is likely to be.

INTERACTION DESIGN CONSULTANCIES

The presence or absence of good interaction design can make or break a company. Getting noticed in the highly competitive field of web products requires standing out. Being able to demonstrate that your product is easy, effective, and engaging to use is seen as central to this.

1. Cooper: From research and product to goal related design
2. Nielsen Norman Group: Help companies enter the age of the consumer, designing human centered services
3. IDEO: creates services for companies pioneering new ways to provide value to their customers.

4. Madgex: Job Board Software
5. Cogapp: Digital Media
6. Cxpartners: Mobile Design
7. Bunnyfoot, Dovetailed: smaller consultancies promoting diversity, interdisciplinarity, and scientific user research, having psychologists, researchers, interaction designers, usability, and customer experience specialists on board.
8. Holition: publishes an annual glossy booklet as part of its UX Series (Javornik)

1.4 The User Experience

It refers to how a product behaves and is used by people in the real world. It encompasses all aspects of the end user's interaction with the company, its services, and its products. One cannot design a user experience, only design for a user experience. I.e. not all features of a design can cater to user experience as we humans have our limitations. It is not enough that we build products that function, that are understandable and usable, we also need to build joy and excitement, pleasure and fun, and yes, beauty to people's lives.

While designing we need to consider usability, functionality, aesthetics, content, look and feel, and emotional appeal of the interface and health, social interaction, goals, shared values, age, ethnicity, disability, occupation, education, family status, etc. of the user.

Pragmatic Aspects: how simple, practical, and obvious it is for the user to achieve their goals

Hedonic Aspects: how evocative and stimulating the interaction is to them

1.5 The Understanding Users

An organizing tool will be made differently for someone who goes to school, for someone who runs a company and for someone who is trying to fly a rocket to space. What works for one user group may be totally inappropriate for another. Children books contain cartoons as children enjoy them. Putting them in adult books will just annoy the adults. Conversely adults can read long paragraphs of information where children find it boring. Getting to know about the users also help us rectify incorrect assumptions. For example, people often make the text big in devices for old people while in reality they can interact with small text as well as a teenager. And out consideration out of assumption might be taken as insensitive to them as we are reminding them that they are getting old. Cultural differences are also a thing like date format is written DDMMYY in some parts and MMDDYY in other parts of the world. Designers need to be aware of these differences otherwise this can create confusion and frustration.

1.6 Accessibility and Inclusiveness

Extent to which an interactive product is accessible by as many people as possible. The focus is on people with disabilities. Inclusive design is an overarching approach where designers strive to make their products and services accommodate the widest possible number of people. Device should be made so it can be used by all regardless of their disability, education, age or income.

Technologies that are now mainstream once started out as solutions to accessibility challenges. For example, SMS was designed for hearing-impaired people before it became a mainstream technology. Furthermore, designing for accessibility inherently results in inclusive design for all.

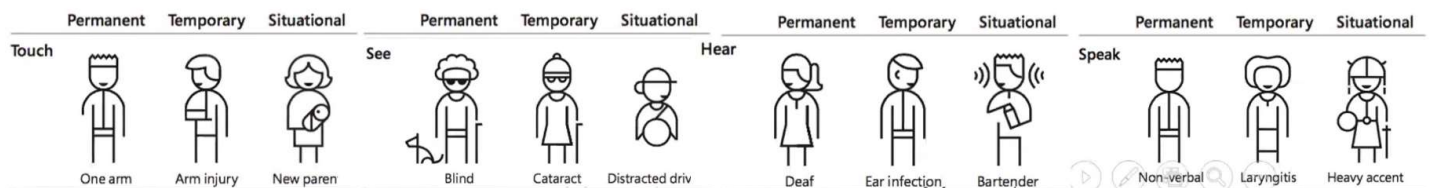
Accessibility has two ways. First, if we start from an inclusive design. Second, if we keep inventive assistive technology to our main not inclusive design. For any of the above, we need to know what impairments the user has.

1. Sensory: Loss of vision/hearing fully or partially
2. Physical: Loss of functions to one or more parts of the body
3. Cognitive: Loss of memory/cognitive function

Within any one of above, there is a complex range. For example, a person might have only peripheral vision, be color blind, or have no light perception and each of them require a different design approach. We can also classify:

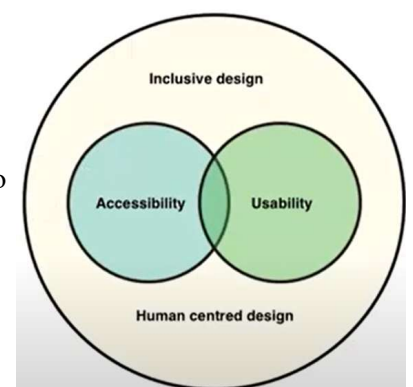
1. Permanent (for example, long-term wheelchair user)
2. Temporary (such as after an accident or illness)
3. Situational (for instance, a noisy environment means a person can't hear)

On the right we see fashionable leg cover for amputees with prosthetic leg.



ACCESSIBLE VS INCLUSIVE DESIGN

1. Accessibility is a subset of inclusivity.
2. Accessible design focuses on making the design usable by a person with certain disability. Inclusive design is a much bigger spectrum which focuses on making design available to all ages, genders, abilities, etc.
3. Accessible focuses on people with permanent disability while inclusive also includes temporary situational and even no disability.
4. Accessible focuses on the end product, like how they will make the design usable to a person with this and this disability without any thoughts about future upgrades or how it will affect other people. Inclusive design is more a methodology which aims at improving design at all steps of the way to include everyone.
5. Microsoft defines accessibility to be the qualities that make an experience open to all and inclusivity as a design methodology that enables and draws on the full range of human diversity.
6. All languages on mobile support inclusivity while text to speech supports accessibility.



1.7 Usability and User Experience Goals

Traditionally, usability goals are concerned with meeting specific usability criteria, such as efficiency, whereas user experience goals are concerned with explicating the nature of the user experience, for instance, to be aesthetically pleasing. The difference b/w them is not clear cut as usability is fundamental to user experience. HCI earlier was only concerned with usability but now it has broadened to include user experience too.

USABILITY GOALS

1. **Effectiveness:** how easily our design produces a desired result
2. **Efficiency:** ability of our design to accomplish the result with the least amount of time and resources. The marble machine by not having complex mechanism was very efficient and it also had high utility. Amazon "one click" option is very efficient too.
3. **Safety:** How safe it is to use it. Safety not only involves physical safety. It also involves minimising situations where the user takes the wrong step. For example not putting backspace and close key together. It also involves allowing user to undo their mistakes with ease. 'Making sure' dialog boxes are great example of this.
4. **Utility:** How easily the product can be used by us
5. **Learnability:** How easy it is to learn. People don't like to learn new things. So it will be a waste if a product provides a range of functionality that the majority of users are unable to spend the time learning how to use.
6. **Memorability:** How easy it is to remember how to use it. A user if returning to our product after a long time should have basic idea of how to use it by memory. This can be done by categorizing all functions into groups.

USER EXPERIENCE GOALS

1. This is very subjective. Listening to music in shower is refreshing, in car is enjoyable, on loud speakers is thrilling and on shuffle is serendipitously enjoyable (The excitement of what will come next).
2. Attention, pace, play, interactivity, conscious and unconscious control, style of narrative, and flow in the right manner contribute to UX goals.
3. The concept of flow refers to a state of intense emotional involvement that comes from being completely involved in an activity, like Instagram where time flies.
4. Csikszentmihalyi described flow as "starting off with the appetizers, moving on to the salads and entrées, and building toward dessert and not knowing what will follow."
5. UX can also improve by *micro-interactions* like sound of deleting an app, turning a knob, getting a message which gives pleasure to us even after repeating it many times like a fidget.

Sometimes usability and UX can conflict. For example, it may not be possible or desirable to design a process control system that is both safe and fun.

BAD UX

Some sites follow UX too much over usability, always giving offers, offering a free hotel room if you book a flight, showing fun pictures to lead you to a new page where they persuade you to buy a product. Some sites even put automatic items in your cart which have to be deselected by the user to not get unnecessary expenses. This sneaky ad on approach is called *dark patterns*. Adding cost to a user's purchase without being asked annoys the hell out of the user. Also while unsubscribing, we are taken to so many pages, asked to put in our email, then asked why we are doing it and in the end, it says, "your email preferences have been saved" without any unsubscribing confirmation. Also the already ticked boxes of getting new updates when you make an account on a new website. All of this is bad UX. The key to good UX is to nudge people in subtle and pleasant ways with which they can trust and feel comfortable.

DESIGN PRINCIPLES

1. Design principles are used by interaction designers to aid their thinking when designing for the user experience.
 2. These are generalizable abstractions to orient designers toward thinking about different aspects of their designs.
 3. They are do and don'ts of ID which tell us what to and what not to provide at the interface.
 4. They are derived from a mix of theory-based knowledge, experience and common sense.
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1. **Visibility (Findability):** The more visible functions are, the more likely it is that users will be able to know what to do next. In automated systems this is a big issue. Faucet doesn't work if you are wearing black clothing was written in a visual sensor faucet. This is a bad design as it doesn't tell you what to do if you really are wearing black clothes. These days incredibly visible devices like knobs, buttons and switches have been replaced by invisible and ambiguous activating zones where people have to guess what to do to activate the system. Like in many elevators, you have to swipe your hotel card in an invisible slit before pressing the button.

2. **Feedback:** Every action of the user should have a certain immediate feedback so user knows what he is doing at every part of the process. Basically all of user's actions should have consequences. Like every click of user, every button he presses, every inch he moves his mouse, something should happen on the system which indicates what he did otherwise the user will be lost.
3. **Constraints:** The design concept of constraining refers to determining ways of restricting the kinds of user interaction that can take place at a given moment. This is done by making those unavailable options look passive by painting them grey or do a ding dong sound when the user clicks on them. This prevents the user from making a mistake. For example in connecting a headphone to computer, it has two different wires for audio and microphone and we had to connect them in two different similar looking ports. This created a visibility and constraint problem.
4. **Consistency:** a consistent interface is one that follows rules, such as using the same operation to select all objects. For example, a consistent operation is using the same input action to highlight any graphical object on the interface, such as always clicking the left mouse button. This increases trust of the user on system and makes the system incredibly easy to use. This is why base functionality and keyboard shortcuts in all the computers are same. This is a real pain. For example keeping all knife in one place is consistent but the painting ones belong with the paints, pocket knife in pocket, hunting knife in the garage. Cooking knife in drawers, special occasion knives in a storage space so we see it easily breaks down as system becomes complex. **External/Internal do in class.**
5. **Affordance:** Giving a clue so user knows what a certain thing does. A door invites us to pull it. A mouse wheel invites us to scroll it. Icons should be designed to afford clicking, scrollbars to afford moving up and down, and buttons to afford pushing. Physical world elements have real affordance like grasping a thin object, etc. Computer world has perceived affordance which is essentially learned conventions. It does not give a clue, we end up learning it up naturally.

APPLYING DESIGN PRINCIPLES

One of the challenges of applying more than one of the design principles in interaction design is that trade-offs can arise among them. For example

1. The more you try to constrain an interface, the less visible information becomes.
2. The more an interface is designed to afford through trying to resemble the way physical objects look, the more it can become cluttered and difficult to use.
3. The more an interface is designed to be aesthetic, the less usable it becomes.
4. Trying to design an interface to be consistent with something can make it inconsistent with something else.
5. Sometimes inconsistent interfaces are actually easier to use than consistent interfaces.