Recap – last Lecture

- We talked about the basic idea of interactive systems

- We also learned about the historical evolution of the area in brief

- Today, we shall talk about a key concern in designing such systems - usability

Design Concerns

A Definition!

"Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them." (ACM SIGCHI)

Core Concern

- Incorporating humans into the design

Human Factors

Role of Human Factors

- We wish to design for the "laymen" users
  - Who are they?
  - Why to bother about such "characterization"?

Understanding Human Factors

- Let's try to understand the nature of the users and its importance with an example

Example

- What the user is expected to do?

Example

- Input station names
- Check availability
- Book tickets
- Make payments

Example

- Now consider a DBMS manager who performs database querying – **to get the same information from the Railway database**

Example

- Is this user performing *totally different* things than the earlier one?

Example

- Technically, both are performing the same work

Example

- There is the railway database
- Both queries the database
- Both retrieves the information
- Both uses the information

Example

- Difference in "expectations" and "need" of the users

User Classification

- We need to "know the users" in order to design

User Classification

- Generic classification of users
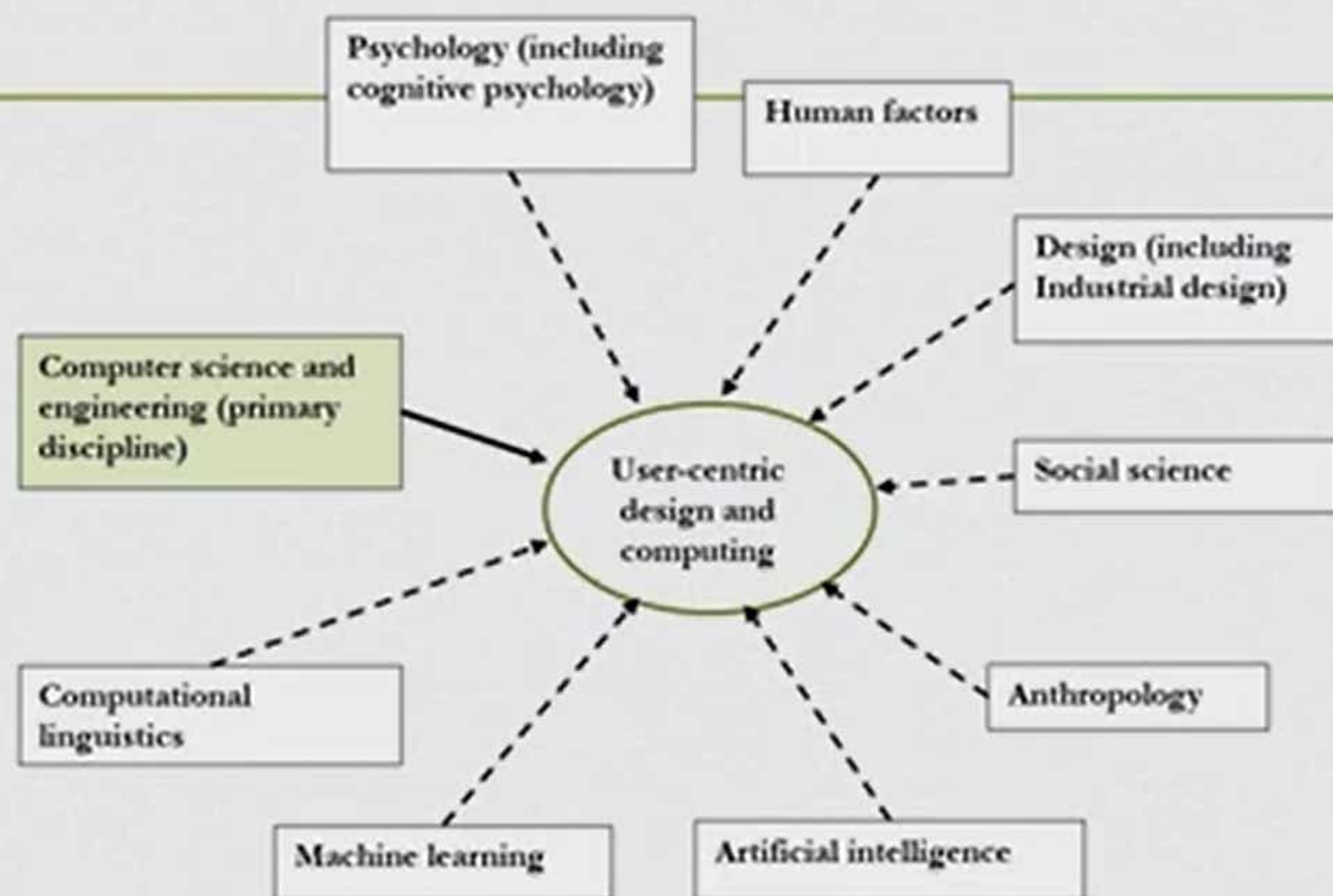 - Novice
  - Intermittent
  - Expert

User Classification

- Example - saving a file with "Ctrl+S" vis-à-vis through menu option in MS Word

Interdisciplinary

- Identifying human factors and incorporate those in the design requires knowledge and expertise in many field of studies

Which Discipline?

Considering Human in Design

Different Design Perspectives

- The same term (User-Centric Design) can be viewed by different stakeholders in different ways

Different Design Perspectives

- A *designer* is primarily concerned about the design of the interface elements and layouts – the creative design aspects

Taking Humans into the Design

- For a _**(industrial) product designer**_, it might refer to the _form_ (shape, size and look) of the product

Different Design Perspectives

- An ***electronic engineer*** might look at it as adding more features at the hardware level, such as more sensors, smaller chips to reduce size or more power efficient battery

Different Design Perspectives

- We are mostly concerned about the perspective of the ***application software developer***, who needs to follow a development life cycle that takes care of the user characteristics, so as to better match the users' needs and expectations

Usability

Usability

- We require an explicit **<u>measure</u>** to judge our design – if we have taken care of the human factors

The measure is called "Usability"

Usability: Definitions and Standards

- ISO definition (ISO 9241-210:2009) of usability - "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use."

Usability: Definitions and Standards

- Three crucial aspects in the definition

Usability: Definitions and Standards

- The product is meant to be used by a *specified* group of users

- In other words, a usable product **need not be designed "for all"**

Usability: Definitions and Standards

- The product should allow the users to achieve *specified* set of goals

- **Thus, putting every conceivable features in a product not necessarily leads to a usable product**

Usability: Definitions and Standards

- The product should be designed for *specified* context of usage
- **Clearly, a usable product need not be so for "all" usage scenario**

Usability: Definitions and Standards

- Definition reveals **THREE** measures
  - Effectiveness
  - Efficiency
  - Satisfaction

Usability: Definitions and Standards

- Jacob Nielsen [2012] argued that usability alone cannot make a product "useful"

Usability: Definitions and Standards

- An acceptable product should have **two** quality attributes
- One is **usability** and the other is "**utility**"

Usability: Definitions and Standards

- Nielsen proposed **<u>FIVE</u>** quality components of usability

Usability: Definitions and Standards

- **Learnability**: the "ease" with which a first time (novice) user performs "basic" tasks with the system

Usability: Definitions and Standards

- **Efficiency**: The speed at which the users can complete tasks

Usability: Definitions and Standards

- **Memorability**: The "ease" with which an intermittent user, who returns to use the system occasionally (after some gaps), can reestablish "proficiency"

Usability: Definitions and Standards

- **Errors**: The rate at which the users make errors, the "severity" of those errors and "ease" with which the users can recover from errors

Usability: Definitions and Standards

- **Satisfaction**: How pleasant is it to use the design

Usability: Definitions and Standards

- Utility refers to the "functionality" that the design is supposed to serve
  - Measure of the extent to which design supports the "functional needs" (the features) of the users

Usability: Definitions and Standards

- If we compare Nielsen's framework to the ISO definition, we observe "effectiveness" might be mapped to "utility"

Usability: Definitions and Standards

- The ISO definition therefore provided only two measures for usability: the efficiency and satisfaction

Usability: Definitions and Standards

- The five components of usability **offer a more precise measure** - we shall make use of these components in the subsequent lectures

User-Centered Design

User-Centered Design

- Term coined by Shneiderman (1986)

- Objective - **to design products that increase usability**

User-Centered Design

- Indicates **active/passive involvement** of users in the design life cycle

User-Centered Design

- Related terms
  - "Cooperative design" [Greenbaum and Kyng, 1992]
  - "Participatory design" [Schular and Namioka, 1993]
  - "Contextual design" [Beyer and Holtzblatt, 1997]

User-Centered Design

- ISO in its standards prefers to use the term "human-centered design"

Book

- **Bhattacharya, S**. (July, 2019). Human-Computer Interaction: User-Centric Computing for Design, McGraw-Hill India
  - Print Edition: ISBN-13: 978-93-5316-804-9; ISBN-10: 93-5316-804-X
  - E-book Edition: ISBN-13: 978-93-5316-805-6; ISBN-10: 93-5316-805-8

Chapter 2, Sec 2.1 – 2.4.2