Object action Interface (OAI)
User Interfaces.

Styles of Interaction.
1. Direct manipulation - Eg: mouse.
2. menu - Based manipulation -
3. Form filling
4. Command language.

3 important Tasks :.
• Data entry   • Information Display
• Navigation
⇒ Different menu based options. - try to read.
⤷ widgets - windows + Gadgets
   Eg: List Box , slider , Radio Button, check box
   Button.

Fitt's Law - mT (movement time) $= a + b \log_2 \left(\dfrac{2D}{w} \right)$

movement time is a function of distance & width of target.

⇒ $\log_2 (2D/w) = ID$ called as Index of Difficulty.
⤷ measured in bits.

| $TP = \dfrac{ID}{mT}$ bits/sec.
    through Put

⇒ Virtual reality - use of computer Simulated software for
   better understanding of system to user.

User manuals -
   • It helps in getting instructions & functionality of
     software.

Designing the user Interface.

Shneiderman.

(saathi)
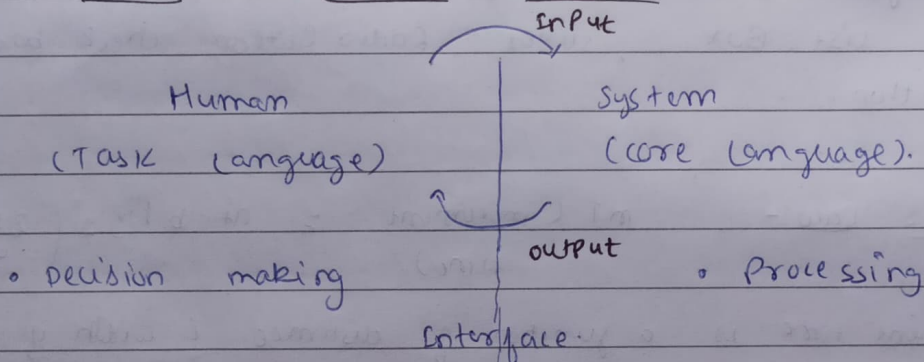
. It has precautions. Do's and Don't's

Input & output devices.

→ Keyword - QWERTY keyboard.
- OCR - Input device , mouse - Input. dev.
- Touch screen mobile - Input/ output. devc
- Joystick - Input. dev.

output device - is a device which shows the result of input or data processing as output to user.
Eg. monitor, Printer, speaker.

→ Normans's Execution evaluation model.

Input

Human	System
(Task language)	(core language).

output

- Decision making   - Processing

Interface.

- Some terms -

→ Domains - the area of work / expertise
→ Tasks - operation to manipulate the concepts of domain.
→ output Goal - Desired output of the task.
→ Intention - specific Path taken to reach goal.
→ Task analysis - Identification of Problem space for user in task, Goal, domain, Intention.

① → Gulf of execution - 2. Gulf of evaluation.
Gulf is basically the gap b/w human and system.
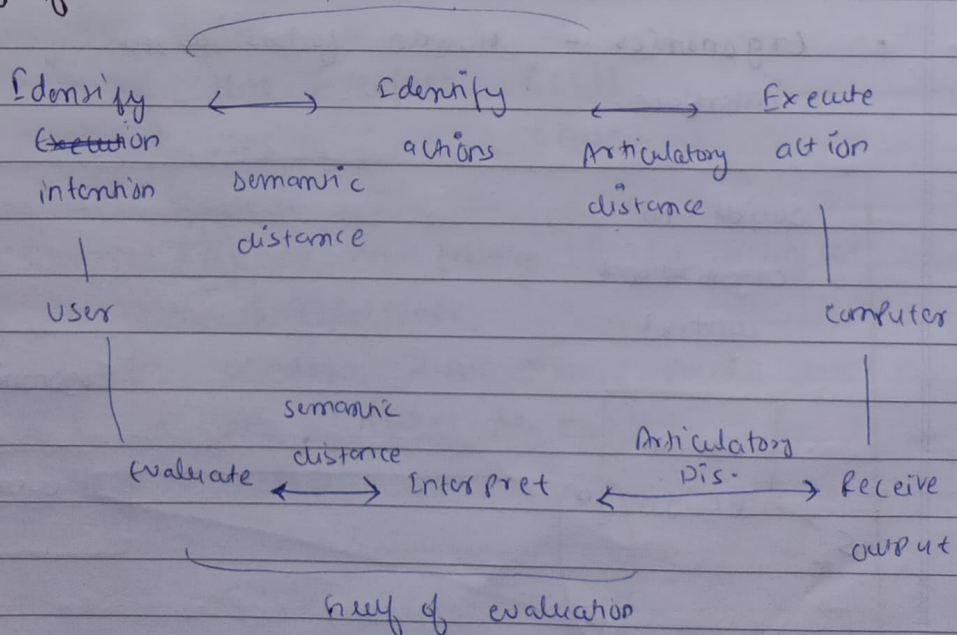It should be minimal.

Eg: Like if we have to copy file to a folder. Then if user interface hides the instructions. Then the gulf is more.

→ Gulf of evaluation — Evaluation of output after the result of execution of system.

→ more the gulf worst the System. They should be minimized.

Phases of norman's execution - evaluation model -

1. Establish goal.
2. Forming intention
3. Specifying the action sequence
4. Executing the action
5. Perceiving the system state
6. Interacting the system state
7. Evaluating the system state w.r.t goal & intention.

Gulf of Execution -

Identify ⟷ Identify ⟷ Execute
Execution actions Articulatory action
intention Semantic distance
distance

User | Computer

Semantic distance
Evaluate ⟷ Interpret ⟵ Articulatory Dis. → Receive output

Gulf of evaluation

- In case of smartphones both the distances : Dynamic and articulatory is minimized.
- But semantic dist in Gulf of evaluation & execution remains same because it is our mind to evaluate the output not the system.

Interaction Framework -
- System
- User
- Input
- Output

Presentation

output ↑

System

observation ↑
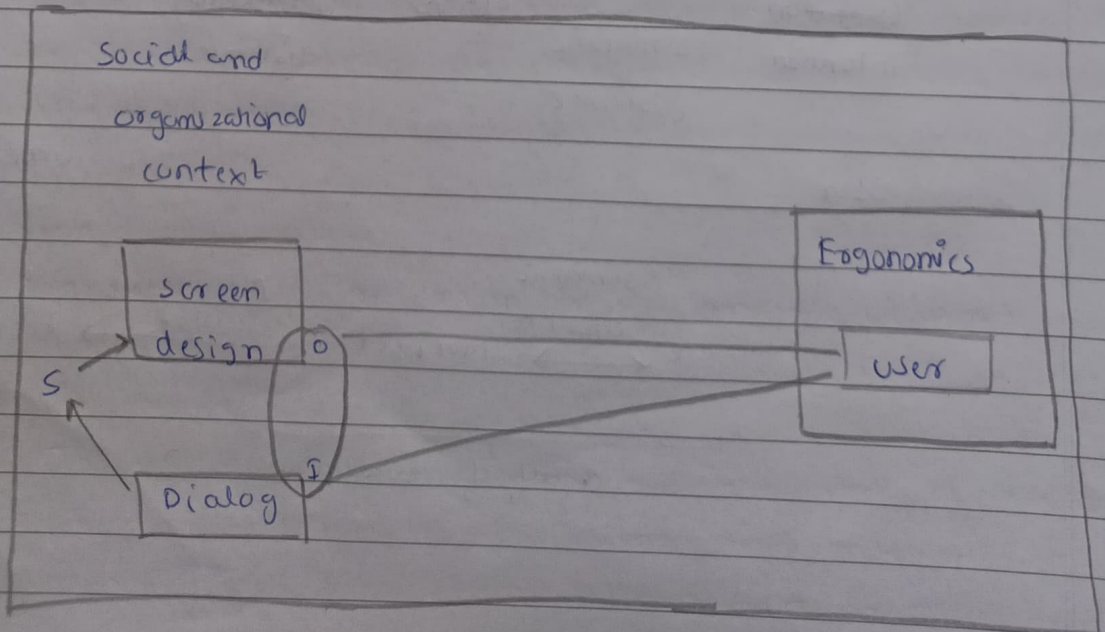
user

Input / articulation
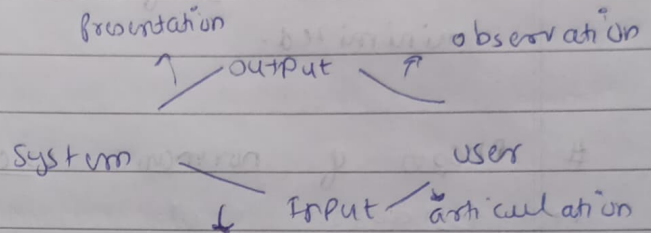
components of Interaction Framework - Performance
- Articulation
- Performance
- Presentation
- Observation

Frameworks and HCI -
- ACM SIGCHI
- Ergonomics - Human factors / aspects of human interface.

Social and
organizational
context

Ergonomics

screen
design

S

user

Dialog

Ergonics Ergonomics - is the study of Physical characteristic of action how we control our design & Physical environment in which interaction takes place and the layout and physical quality of screen.

⇒ 3 Types of alignment of Icons.
- Functional
- Frequency
- Sequential

Physical environment - where system will be used the user will be sitting, standing even the size of the user is taken care.
- All users can see the critical displays.
Eg: Temperature, lighting, colours.

Erogonomics contribution to HCI is determining constraints in the we design system and suggest detailed guidence and specific standards.

Interaction styles:
- Command line Interface (CLI)
- Graphical User (GUI).
- Natural language
- Question / Answer / Form felling / Query dialog box
- Form felling & spreadsheet.
- WIMP - Windows Icons Menus Point
- 3-D Interfaces (virutal Reality).
- Toolbar & Pallette

→ (chapter 4)

Parad Paradigms of Interaction:-

i) Time sharing systems: — Context switching b/w tasks on bases of time Quanta.

ii) video display units:-
   Sketch Pad:

iii) Programming tool kits

iv) Personal computing :- Alan Kay visun made hand held PC - Dynabook.

v) The metaphor: - a visual construct denoting some real world entity.

vi) Direct manipulation:- (shneiderman's criteria)
   - visibility of objects of interest.
   - Incremental action at the Interface with rapid feedback on all actions.
   - Reversibility of all actions.
   - Syntactic correct~~on~~ness of all actions.
   - Replacement of complex command with actions to manipulate ~~the~~ directly the visibly option.

- WYSIWYG:- what you see is what you get.

Q) Discuss the ways in which word processor is or is not a direct manipulation interface for editing a document using schinderman's criteria.

Language V/s Action:-
- Programming is an example of language vs Action.
- Hypertex   "   "   "   "
  ↳ "memex".

  The use of such non-linear and associated linking scheme for more than just the storage and retrieval of textual information, the term hypermedia or multimedia

is used for the non-linear storage of all forms of electronic media.

→ **Multi-modality :-** Uses multiple senses of human beings.

→ **Computer supported co-operative work (CSCW):-**
  • This paradigm uses the networking • People can collabrate.
  Ex:- E-mail

→ **WWW :**

→ **Agent based Interfaces :-** Frequently performed tasks can be automated by calling routines using If then else condition.
  Ex:- Spellcheck   [foward / Backward chaining]

→ **Ubiqoutous computing:** Systems are available everytime.

→ **Sensor based & context aware:-**
  Atmosphere conditions like - Temp., pressure ..
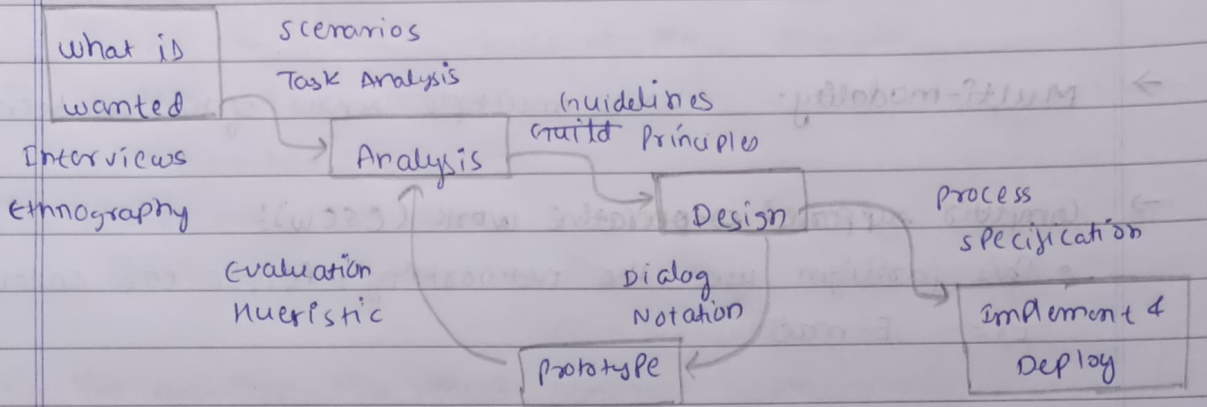 Ex:- Smart cities.

Interaction Design
• Goals - The final output which we require.
• Constraint - Finanical, time, resource, environmental
• Trade off - To reach the goals within the specified constraint.
→ system has to be robust - overcome the failure.

material - it consists of human, user, computer system.

Design process -

ISO 9241 - Standard for HCI
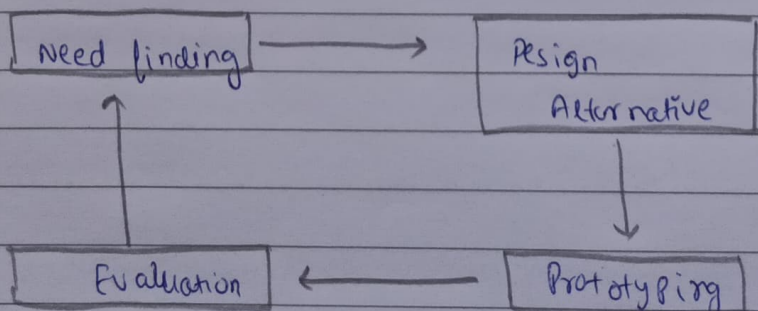
Design process -

- A user can be a part of design in the form of

  User, Tester, Design Partner, Informant.

Interaction Design -

1) Discoverability - You have to figure out what can be done and how it can be done.

2) Simplicity - only relevant information should be reflected.

3) Affordance - user have to figure out what can be done by looking at properties of object.

4) mapping - use of url user oriented terms rather than system oriented terms.

5) Perceptability - user have to perceive that something has informed happened by clicking or changing state of system.

6) consistency - Eg: Hyperlinks - All links in blue color. It should be consisted. consistent.

7) structure -

6) Flexibility - multiple ways of doing one task.

    Eg: searching

9) Ease of use - minimal fatigue to user. Eg: minimal mouse clicks of user are required to do a task.

10) Error Prevention - Eg: confirming Password while making a new password.

11) Tolerance - Reduce the cost of penalize user. Eg: undo, redo

12) Audience specific -

13) Customizable - Eg: Font-size, minimize or maxi window size. Light / Dark mode.

14) Feedback - it is relevant only when it is informative and immediate..

15) Trouble shooting - User manuals → what can be done if system goes wrong.

\# UCD - user centered Design -

```
┌──────────────┐         ┌──────────────┐
│ Need finding │ ──────→ │ Design       │
└──────────────┘         │ Alternative  │
       ↑                 └──────────────┘
       │                        │
       │                        ↓
┌──────────────┐         ┌──────────────┐
│ Evaluation   │ ←────── │ Prototyping  │
└──────────────┘         └──────────────┘
```

Date __/__/____

- Design alternatives- avoid tunnel vision.
- Prototype - It is shown to user how the final product will be made. Eg: Paper prototype.
  - ↳ Horizontal prototype - It is a shallow representation of entire system.
  - ↳ vertical prototype- A detailed representation of a particular module.

- Evaluation- It can be qualitative or quantitative.
  Qualitative- Live demonstration of a prototype.
  Quantitative - all metrics like accuracy, throughput, learnability.