Human-Computer Interaction

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Outline

Introduction What is HCI?

Types of interfaces

Existing technologies

Advances in HCI

Architecture

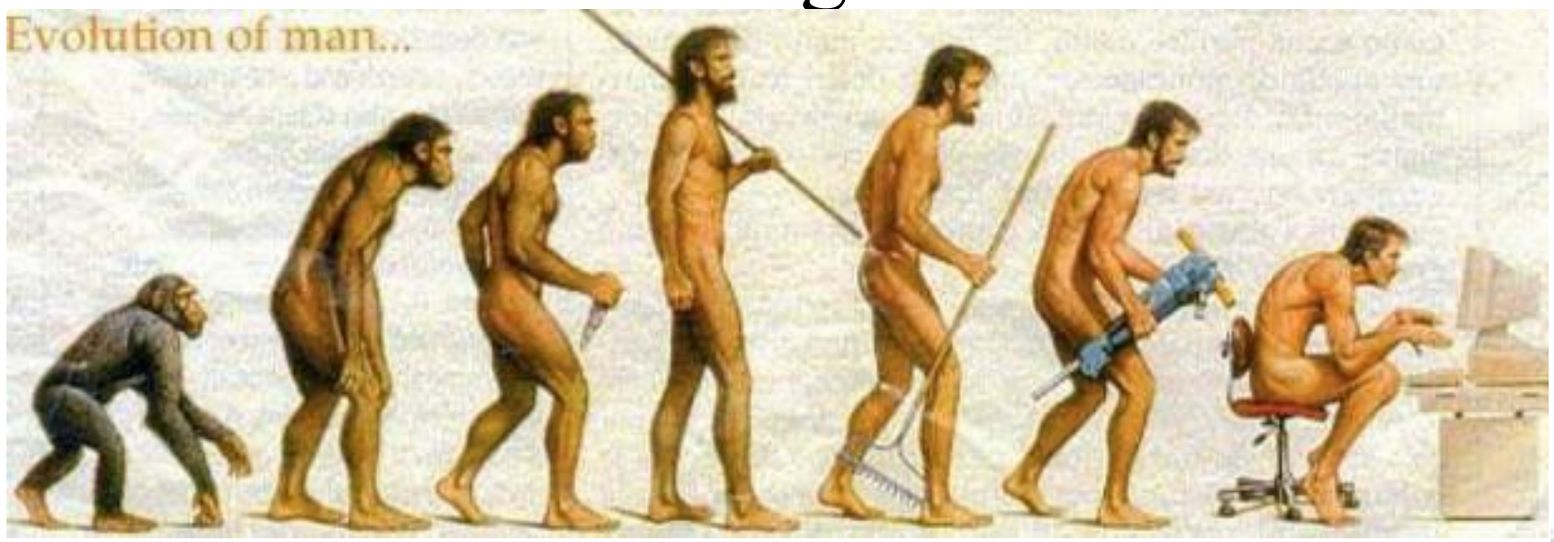
Interaction design

User Experience

Tasks

Human

- a person who tries to accomplish a goal
- the end-user
- the member of an organization



Computer

runs applications (software)

Computer

runs applications (software)locally *versus*

rem

Interface

- A point where two objects meet
- A point where human can tell the computer what todo
- A point where the computer displays the requested information

Interaction

"dialogue" between humans and computers

What is HCI?

Human Computer Interaction

The interaction between user(s) and application(s) is achieved via an interface – **user interface**

- **A process of information transfer**
  - User to Machine
  - Machine to User
- **HCI is also referred to as Man Machine Interaction.**

- **HCI is what the user sees and includes:**
  - The physical controls
  - What the system looks like?
  - How the system accepts input from the user?
  - How the system responds to user input?

Types of Interfaces

A CLI displays a prompt, the user types a command on the keyboard, the computer executes the command and provides textual output.

- **Command Line Interface (CLI)**
- **Menu Driven Interface**

The user has a list of items to choose from, and can make selections by highlighting one.

- **Graphical User Interface (GUI)**

Uses windows, icons, menus and pointers (WIMP) which can be manipulated by a mouse (and often to an extent by a keyboard as well).

- **Natural Language Interface**

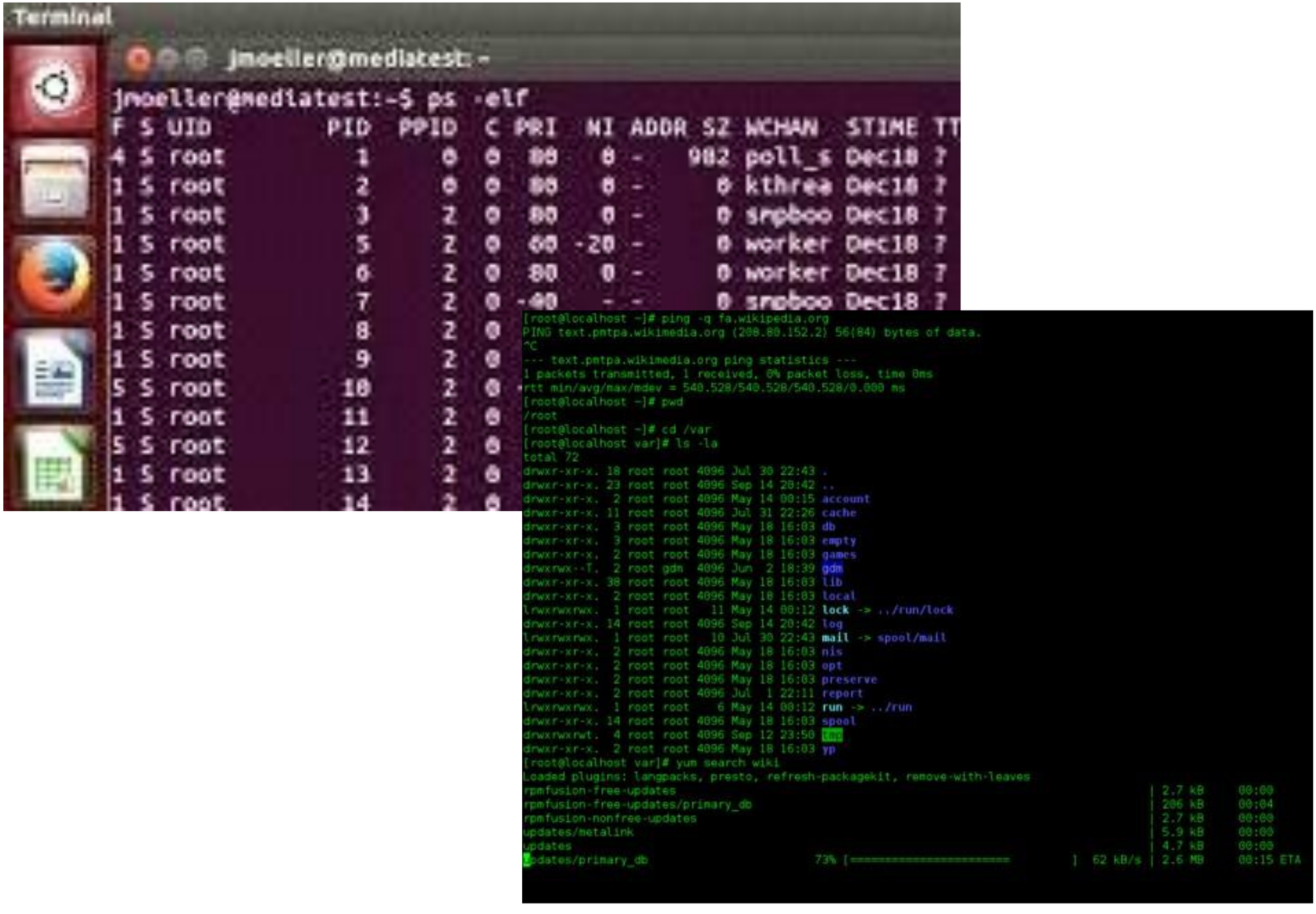
Can range from simple command systems to voice activated text processing. Commands are spoken in “normal” language.

Command Line Interface

- **Advantages**
  - Very flexible with the use of "switches" (options)
  - Good for "expert" users - can quickly access commands
  - Uses the fewest system resources

- **Disadvantages**
  - Requires the user to learn "complex" commands or language
  - "Hidden" features i.e. if the command is unknownwe cannot make use of that feature
  - Not very good for novice users

Command Line Interface

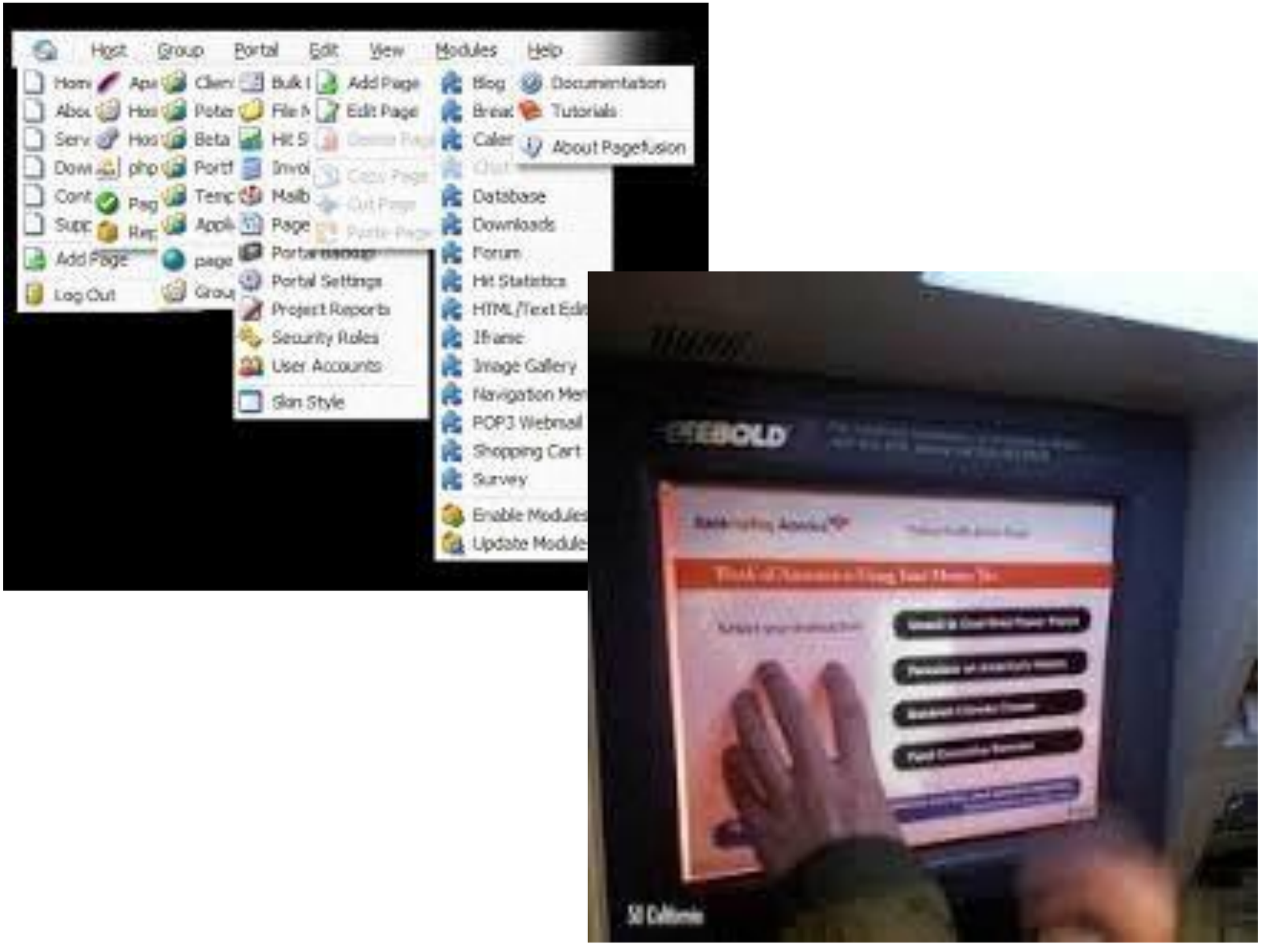


Menu Driven Interface

- **Advantages**
  - No need to learn complex commands/language
  - Easier for a novice to learn/use
  - Ideal when there are a limited number of options (efficient)

- **Disadvantages**
  - Can be frustrating for experienced users i.e. the command they want to use is buried 5 levels deep.
  - User interface may be limited by screen space and number of options available.

Menu Driven Interface



Graphical User Interface

Advantages

- Most suitable interface for inexperienced ornovice users
- Many generic packages for a GUIwill share common features

- **Disadvantages**

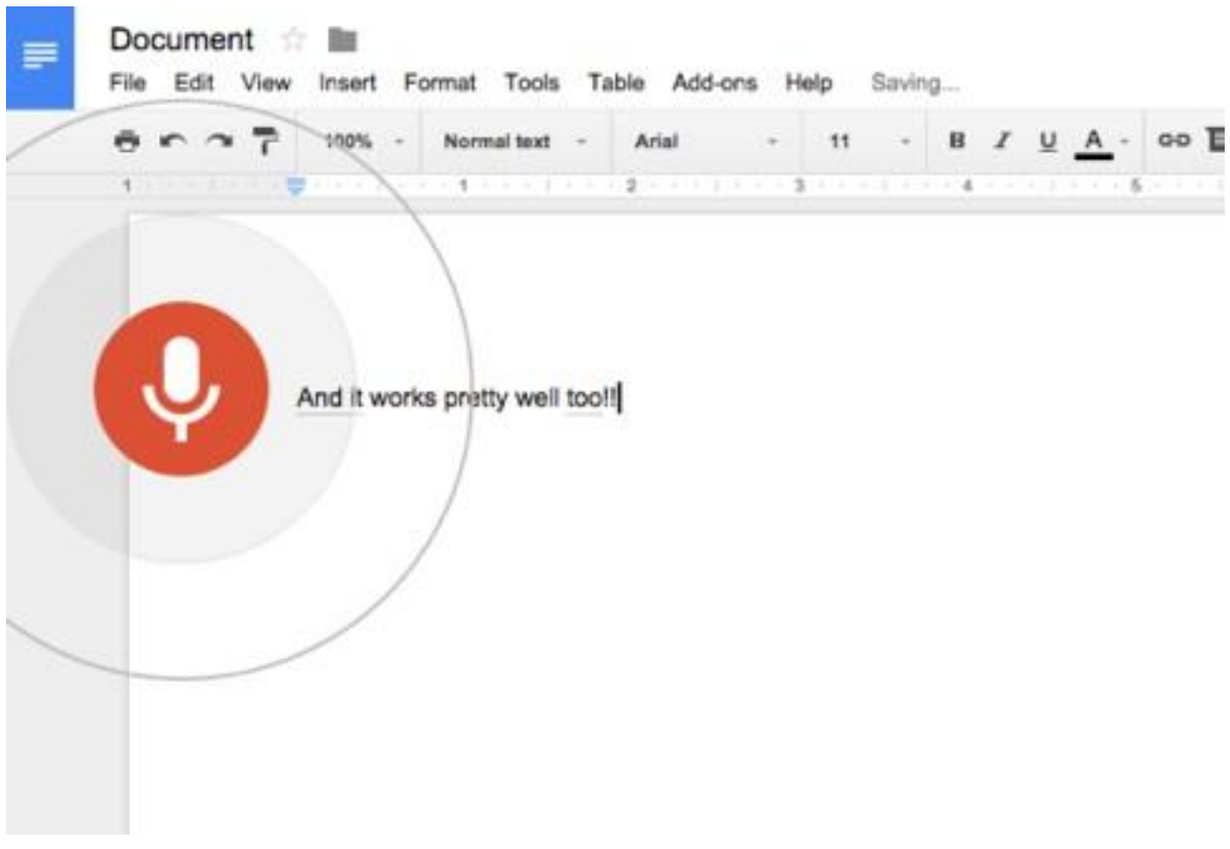
- GUIs use more system resources than other types of interface

Graphical User Interface

Natural Language Interface

- **Advantages**
  - No training required
  - Can be quicker than keyboard entry
  - Hands-free
  - Can be used by the disabled
- **Disadvantages**
  - Emerging technology – still contains “bugs”
  - Difficulty in dealing with homonyms
  - Difficult torecognize all the different ways of saying things (and regional dialects)

Natural Language Interface



Architecture

- Architecture of any HCI systems is identified by:
  - Number of inputs and outputs inthe system
  - Diversity of inputs and outputs interms of modality
  - Workings of these diverse input and output for interaction purpose

- Basedon different configuration and design of interface, HCI systems can be divided into:
  - Unimodal HCI system

Unimodal HCI System

- An interface mainly relies on number and diversity of its inputs and outputs which are communication channels that enable users to interact with computer via this interface.

- A system that is based on only one modality is called *unimodal.*

- Based on the nature of different modalities, they can be divided into three categories:

Audio Based HCI

- It deals with information acquired by different audio signals.
- The information gathered from audio signals can be more trustable, helpful and in some cases unique providers of information.
- Key components:

  - Microphone
  - ASR (automated speech recognition) and NLU (natural language understanding) software
- The main research areas of Audio based HCI are divided into:
  - Speech Recognition
  - Speaker Recognition
  - Auditory Emotion Analysis

Sensor Based HCI

- It has the wide range of applications in our day-to-day life.
- The common feature in every application is that at least one physical sensor is used between machine and human to provide interaction.
- Some of the sensors range from being to primitive :
  - Pen-Based Interaction
  - Motion Tracking Sensors/Digitizers
  - Haptic Sensors
  - Pressure Sensors

Visual Based HCI

- It is also called as machine vision which is the observation of an environment using cameras.
- In this, different aspects of human responses can be recognised visual signals.
- Detection, identification and tracking of a real life entity and its translation into meaningful machine/computer input.
- The main research areas of visual based HCI are:
  - Facial Expression Analysis
  - Body Movement tracking and Gesture recognition
  - Gaze Detection

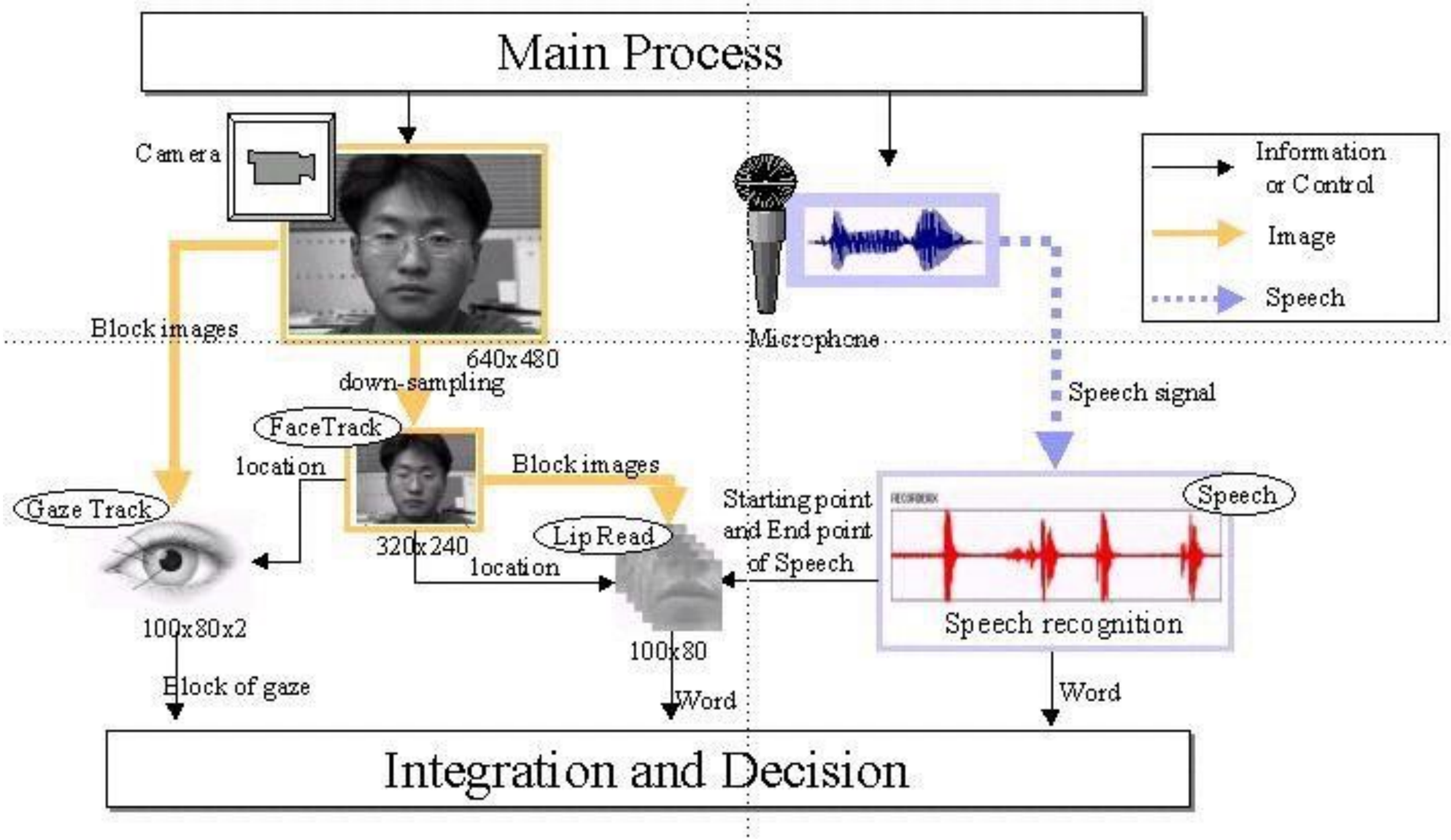
Multimodal HCI System

- Combination of multiple modalities, or usage of more than one independent channel signals for the interaction between a user and a machine is termed as multimodal human computer interaction system (MMHCI).

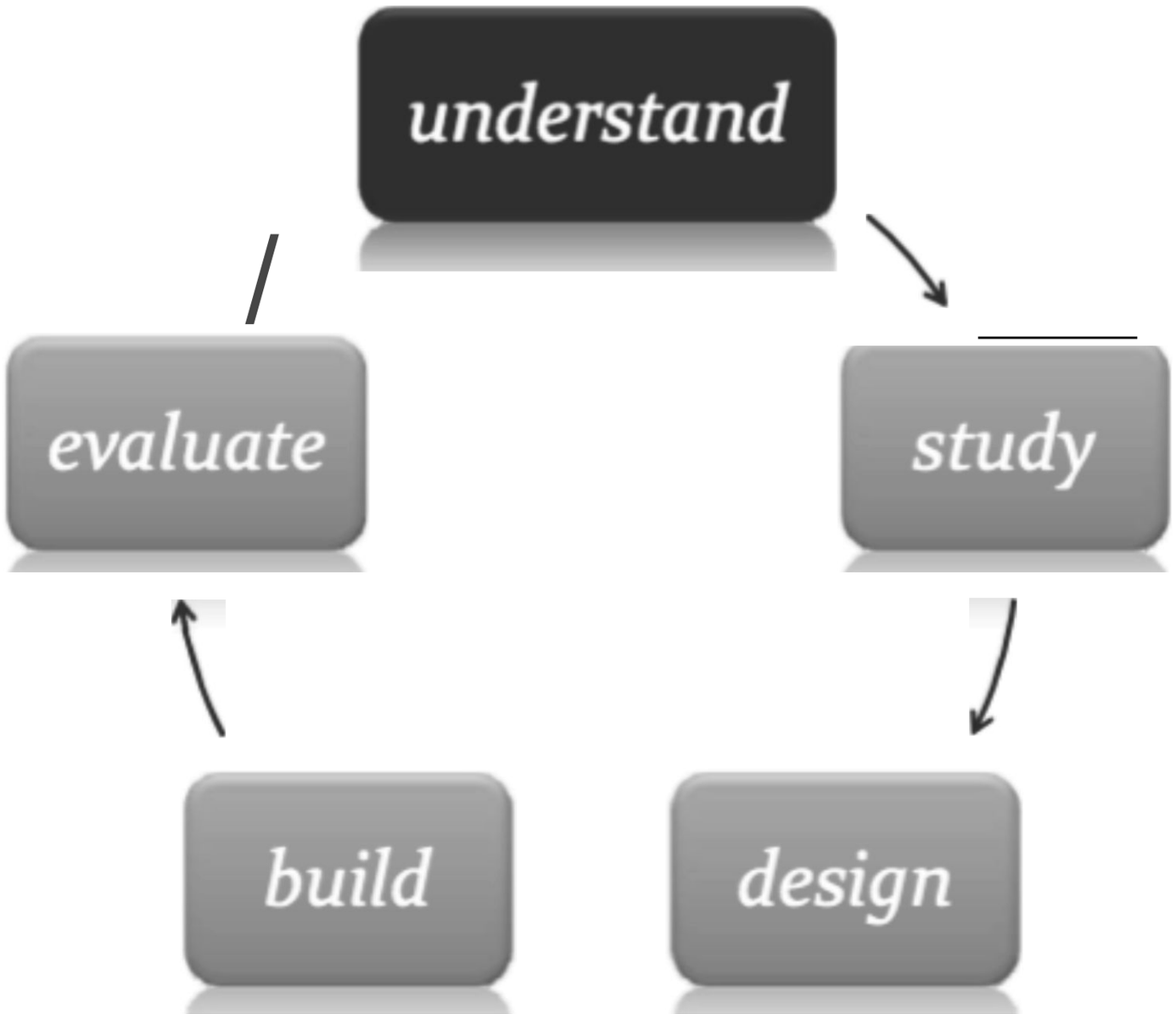
- A multimodal interface acts as a facilitator of human- computer interaction via two or more modes of input.

- It is easy to use by disabled, illiterate people.

Multimodal HCI System



HCI: process

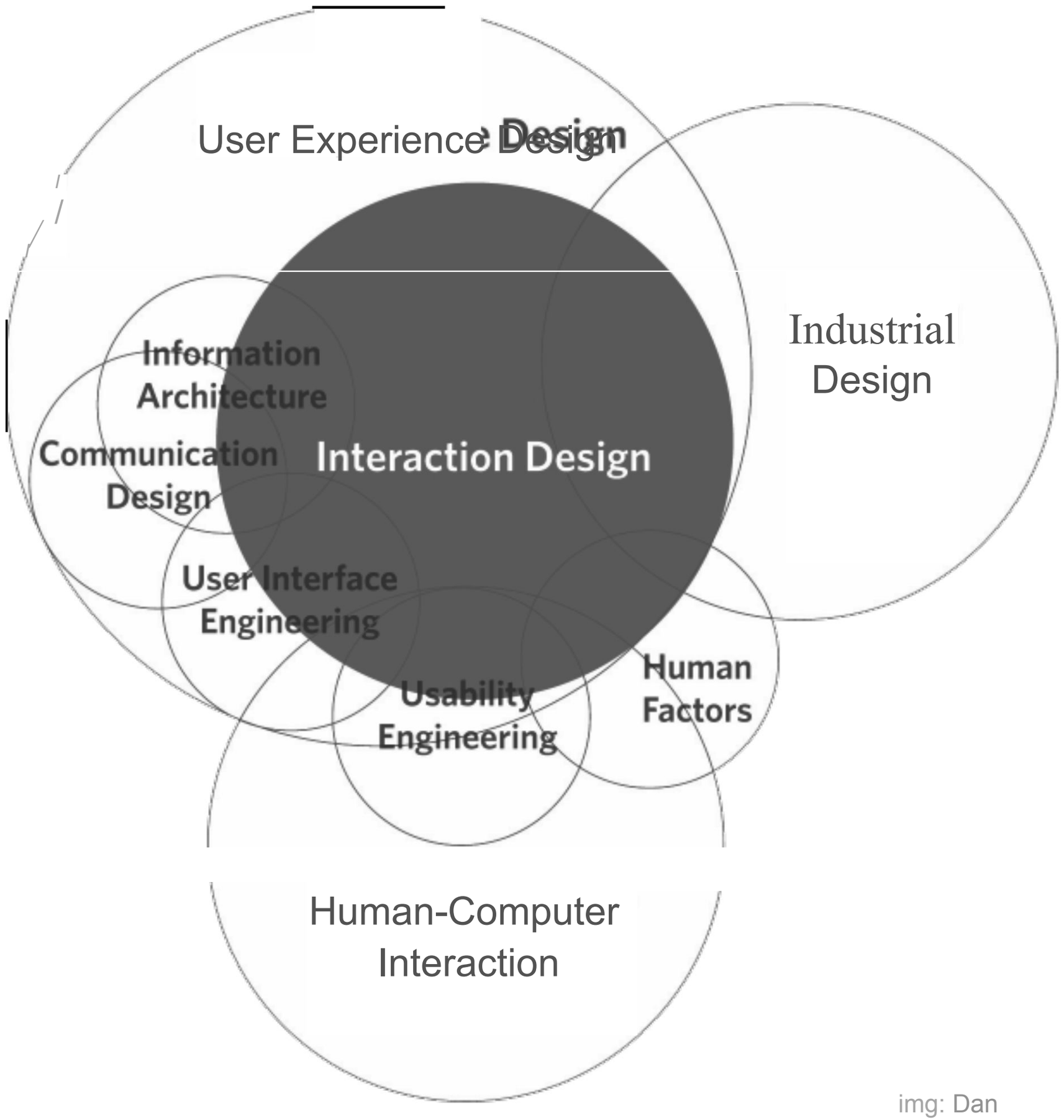


What are the most important aspects regarding the UI design?

Interaction design

"Designing interactive products to support the waypeople communicate and interact in their everyday and working lives."

Sharp, Rogers & Preece,2007



img: Dan Saffer

Cognitive Psychology

Neuroscience

Computer Science

HCI

Ergonomics
(Human Factors)

Artificial Intelligence

Engineering

Linguistics

Design

Philosophy

Anthropology

Sociology

User Experience UX

User experience is the totality of the effect or effects felt by a user as a result of interaction with, and the usage context of, a system, device, or product, including the influences, and ability, emotional impact during interaction, andsavoring the memory after interaction.

Usability

is the pragmatic component of user experience, including effectiveness, efficiency, productivity, ease-of-use, learnability, retainability, and the pragmatic aspects of user satisfaction.

Usefulness

Usefulness is the component of the UX to which system functionally gives the ability to use the system or product to accomplish the goals of work (or play).

Functionality

Functionality is power to do work (to play) seated in the non-user-interface computational features and capabilities.

Emotional Impact

Emotional impact is the affective component of UX that influences user feelings. Emotional impact includes such effects as pleasure, fun, joy of use, aesthetics, desirability, pleasure, novelty, originality, sensations, coolness, engagement, appeal and can involve deeper emotional factors such self-identity, a

Pokemon Go

remember

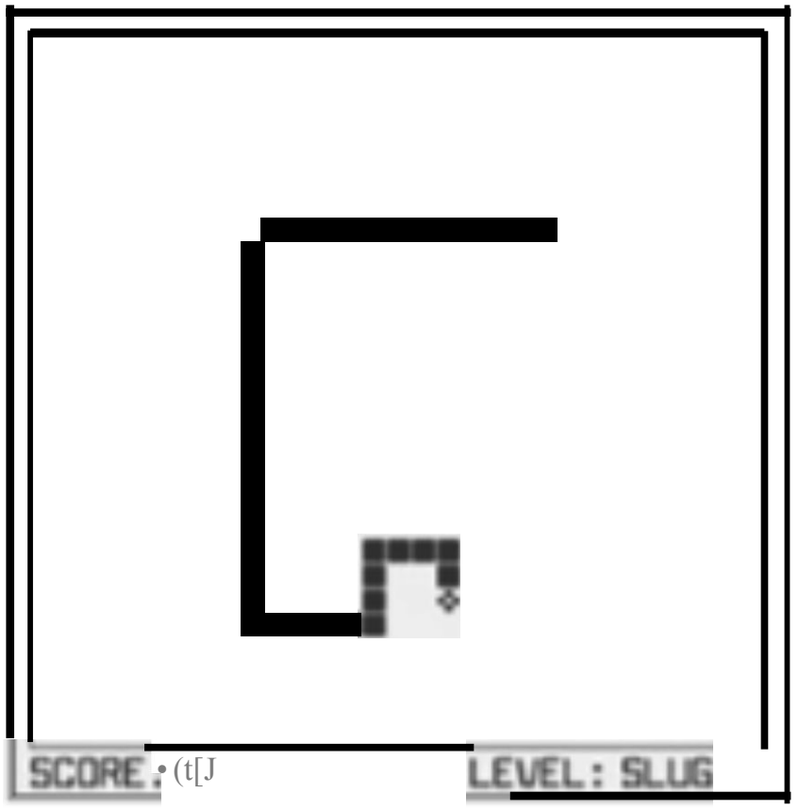
"The applications that are easy to use are designed to be **familiar**."

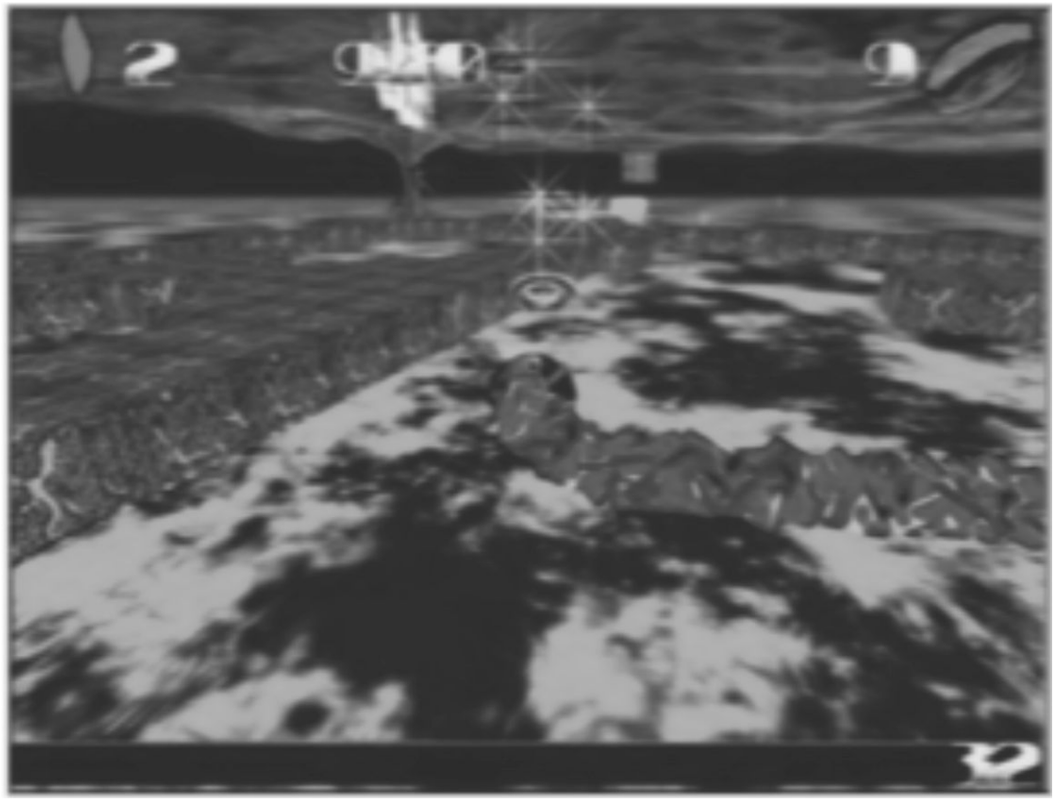
Jenifer Tidwell

remember

Keep the i p e l simple

...th e most engaging in erface of a game?





1

Make Blog

Make a personal blog

- Wordpress
- Tumblr
- Blogger
- Medium

2

Upload personal statement

Your Blog Post #1

- Lenght: 1000 words or less
- Who I am, and what I have been through
- What I like to learn
- Things that I like

3

Upload Your Images

Your Blog Post #2

- Upload images of yourself or about yourself
- Pick your 3 favorites
- Tell us why the pic is your favorite