

Introduction to Human Computer Interaction (HCI)

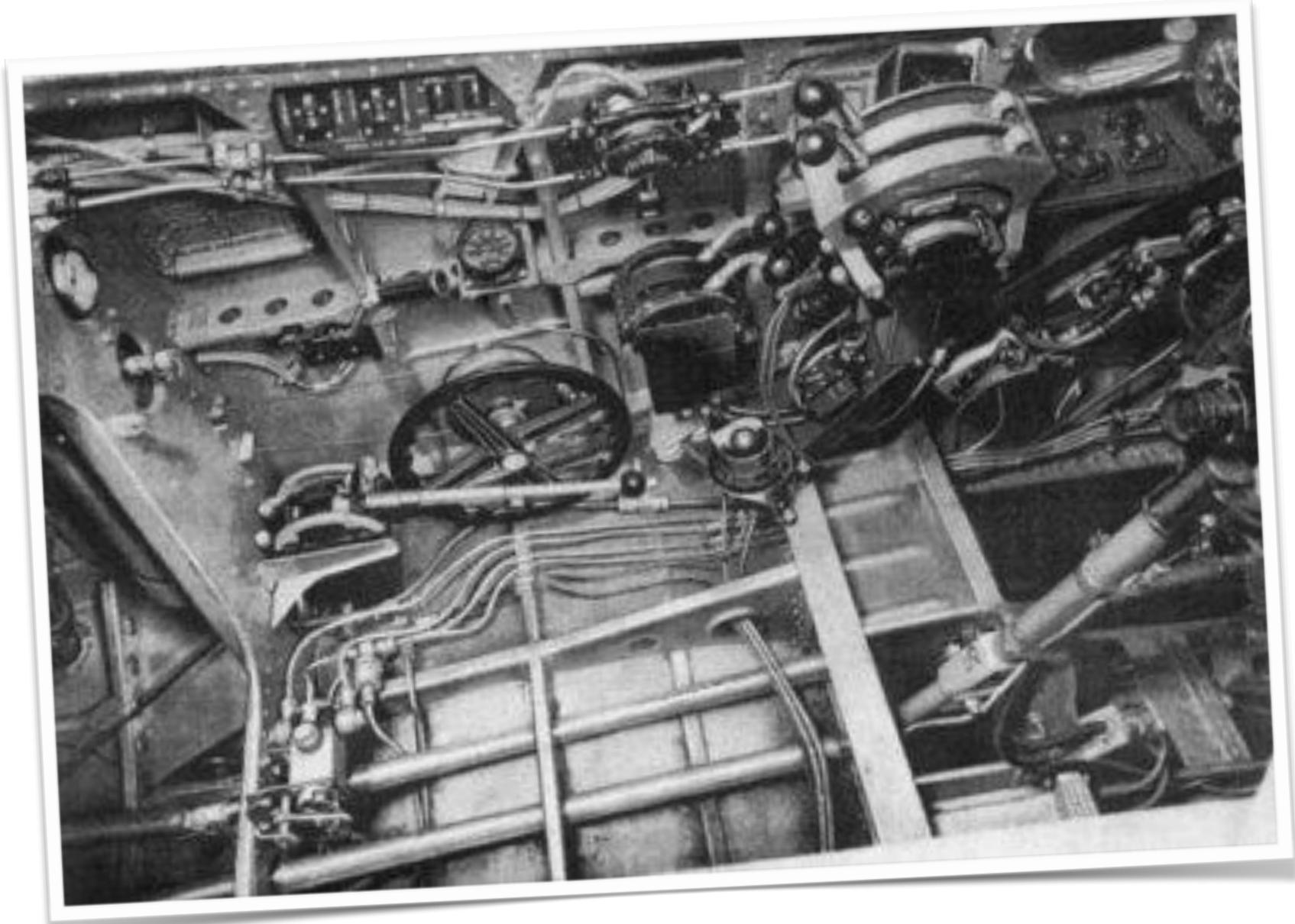
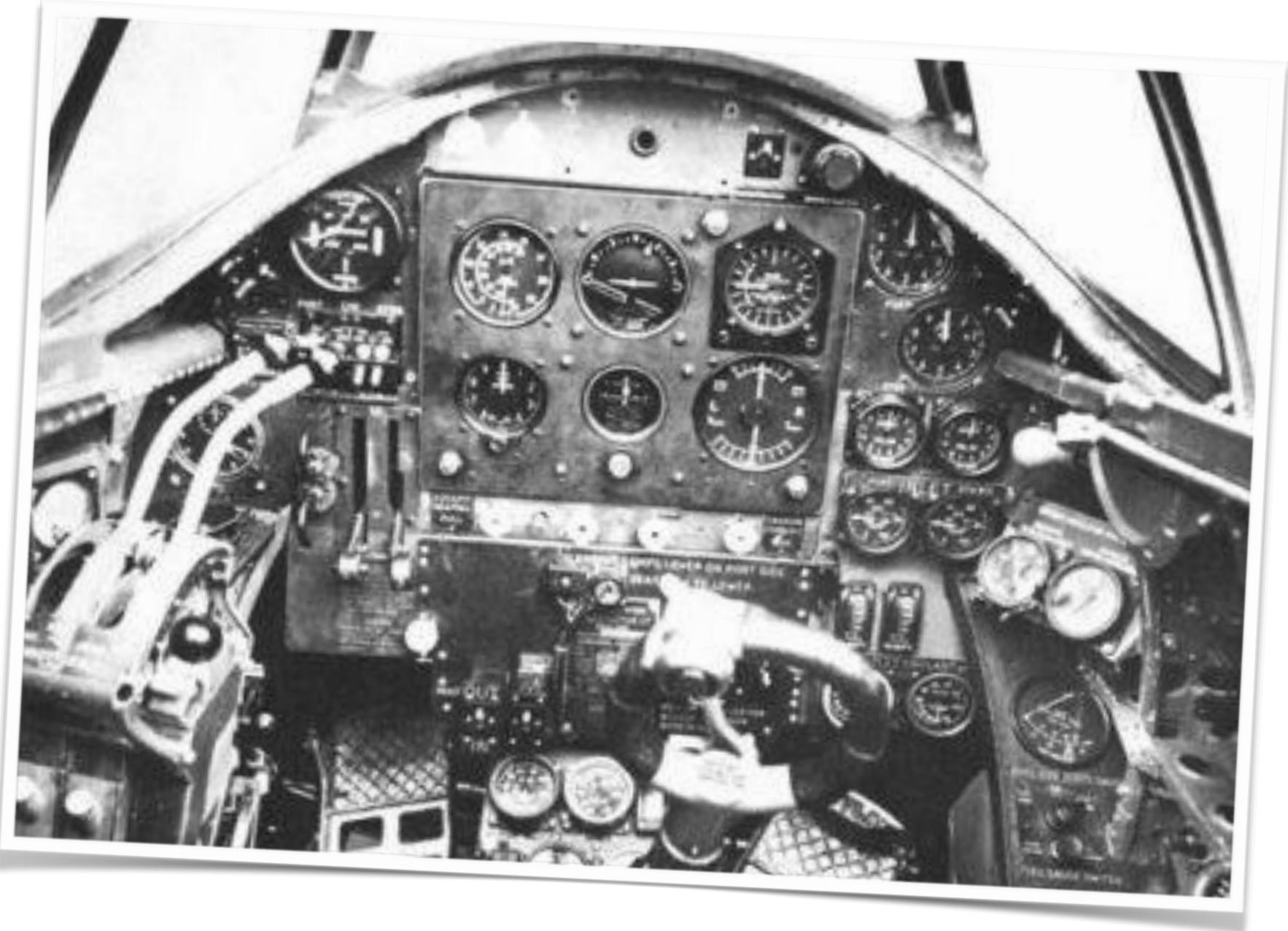
Chapter 1



What is HCI?

- In the past, man-machine interaction (MMI)
- HCI is the study of people & computing and the way they influence each other
- Human + Computer + Interaction
- Usability is the main concept in HCI
- Usability is concerned with making systems safe, easy to learn and easy to use

Cockpit WW II



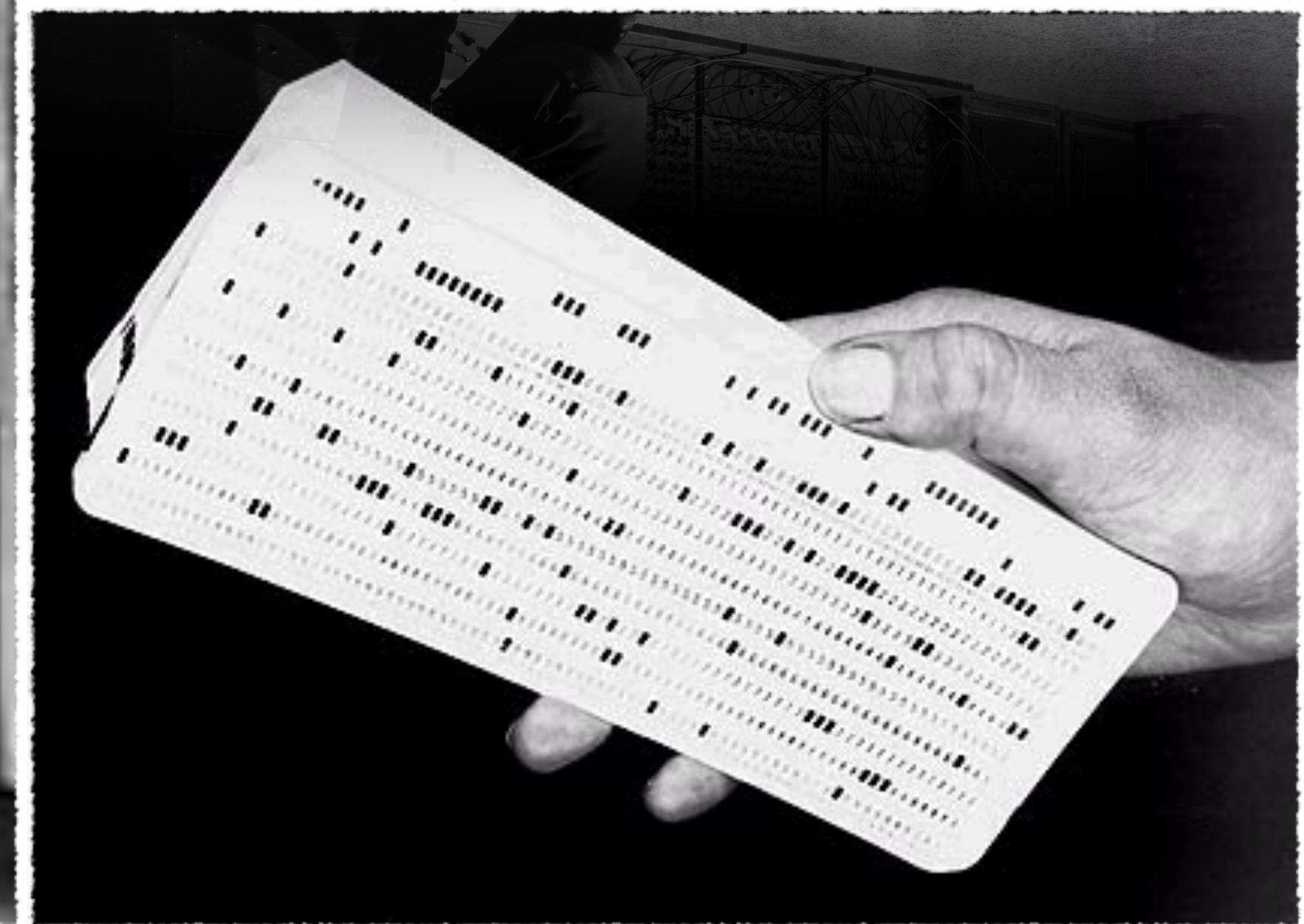
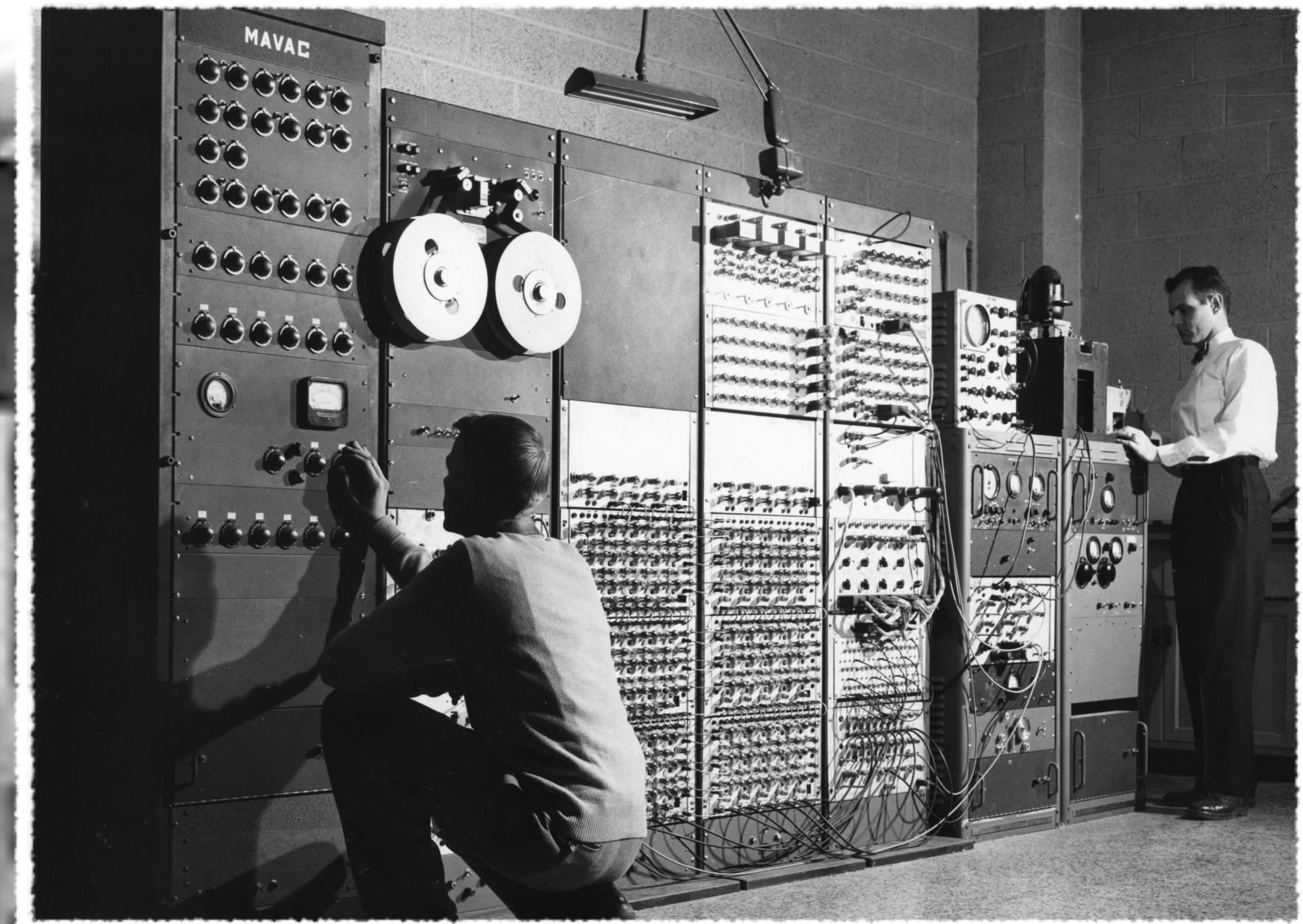
The Goals of HCI

- Increase individual & organizational productivity
- Improve safety & Reduce health hazards
- Reduce costs associated with the development of user interfaces

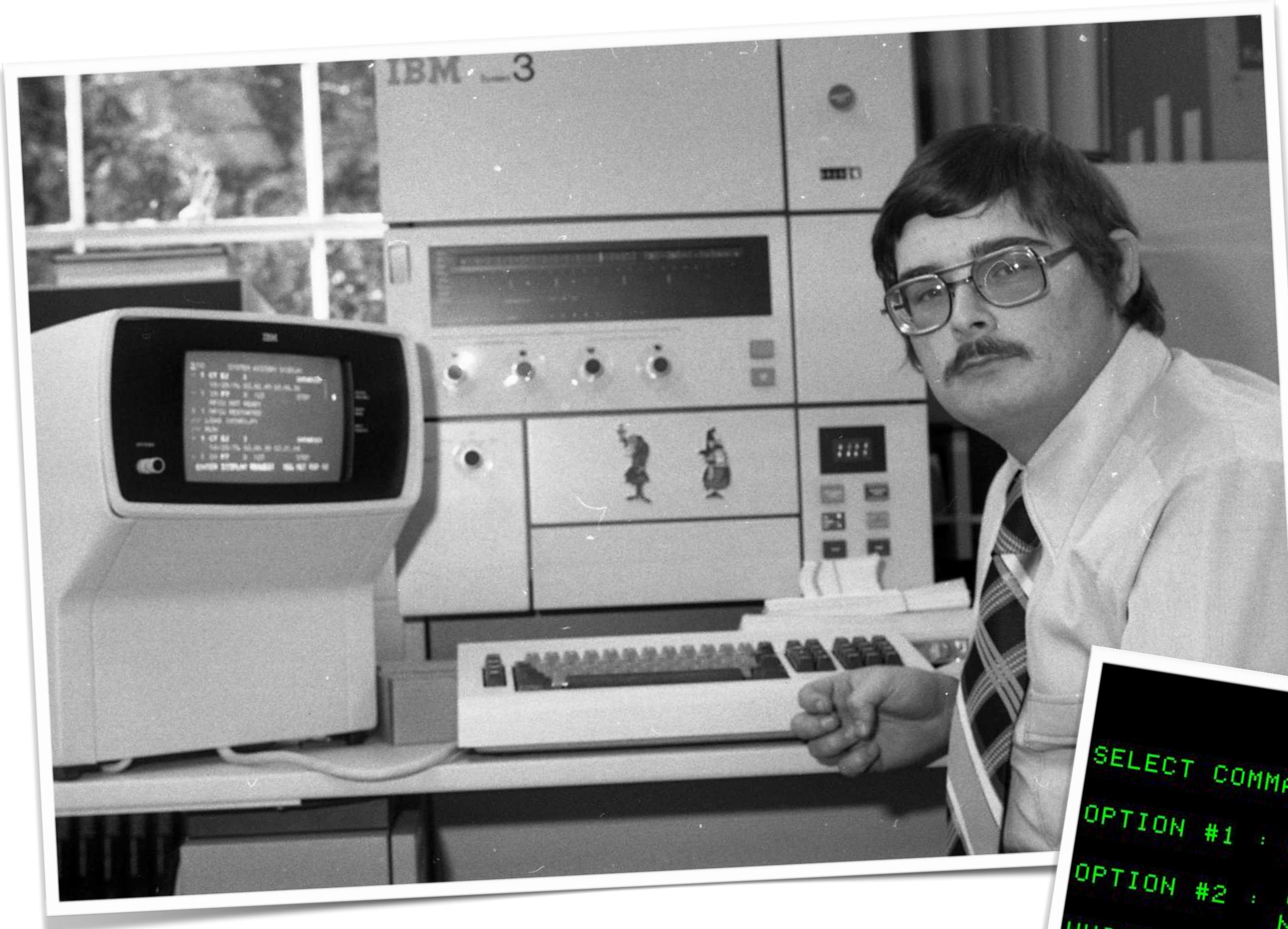
Computer

In the 1950/60s:

- Computing resources were expensive
- Computers operated by highly trained professionals

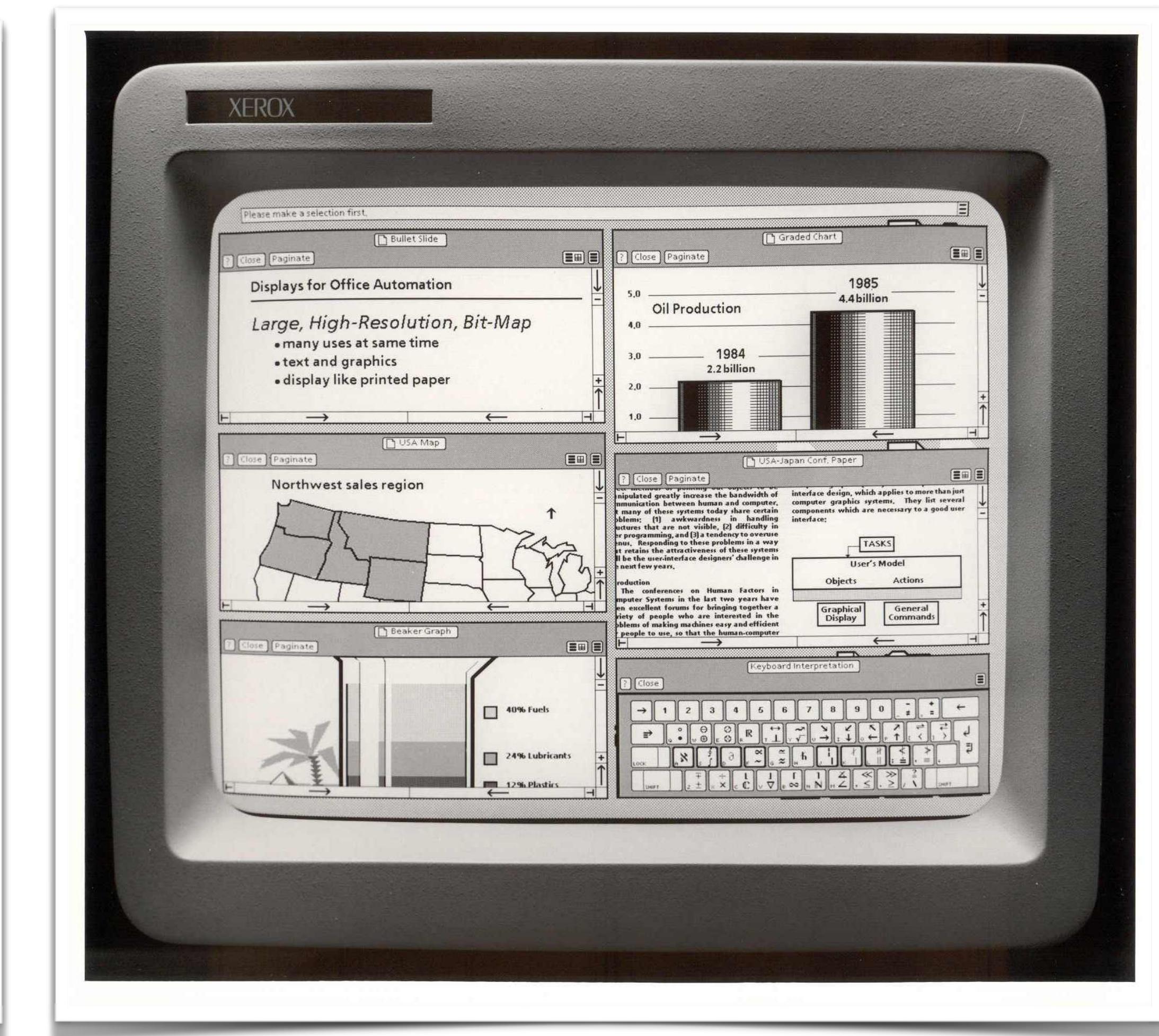


1970s: Personal computer & Command Line Interface (CLI)



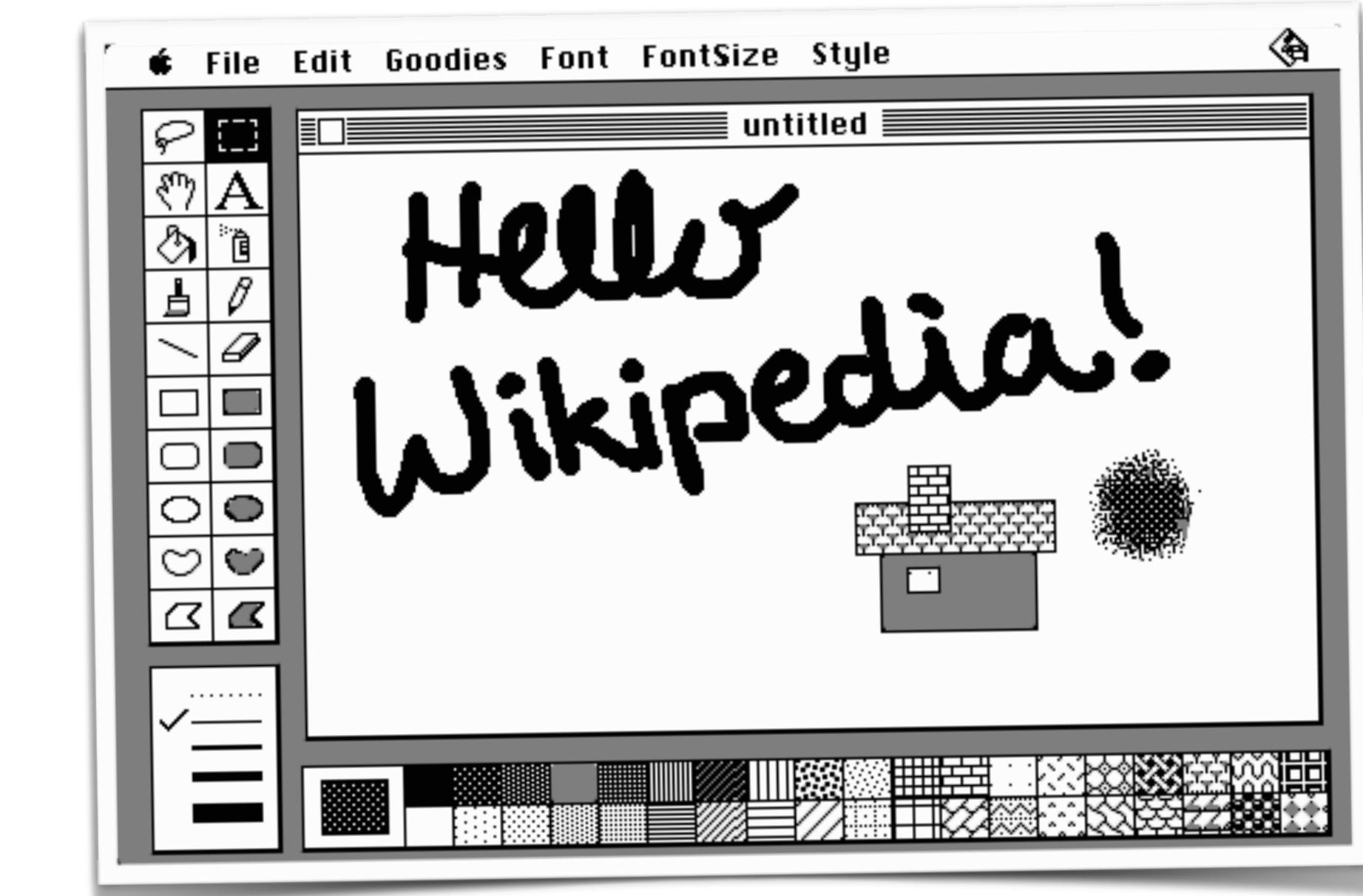
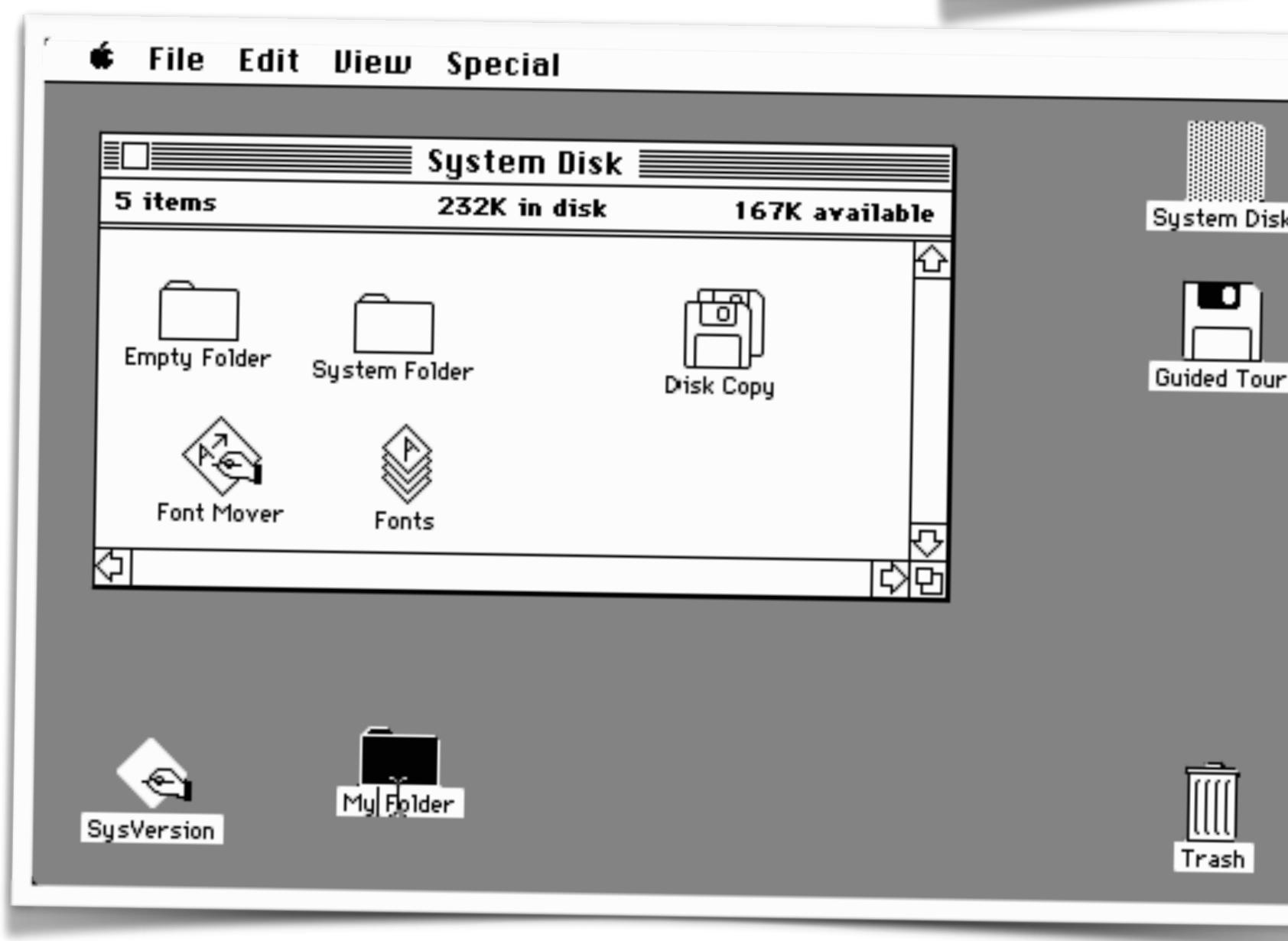
SELECT COMMANDS OPTION AS FOLLOWS:
OPTION #1 : GRAPHIC COMMANDS BUT NO
'LET' OR 'REM' COMMANDS
OPTION #2 : 'LET' & 'REM' COMMANDS BUT
NO GRAPHICS
WHICH OPTION # DO YOU WANT ?
COPYRIGHT 1977 BY APPLE COMPUTER INC.
MEMORY SIZE? 25693
J 14940 BYTES FREE

1980s: Graphical User Interface (GUI)

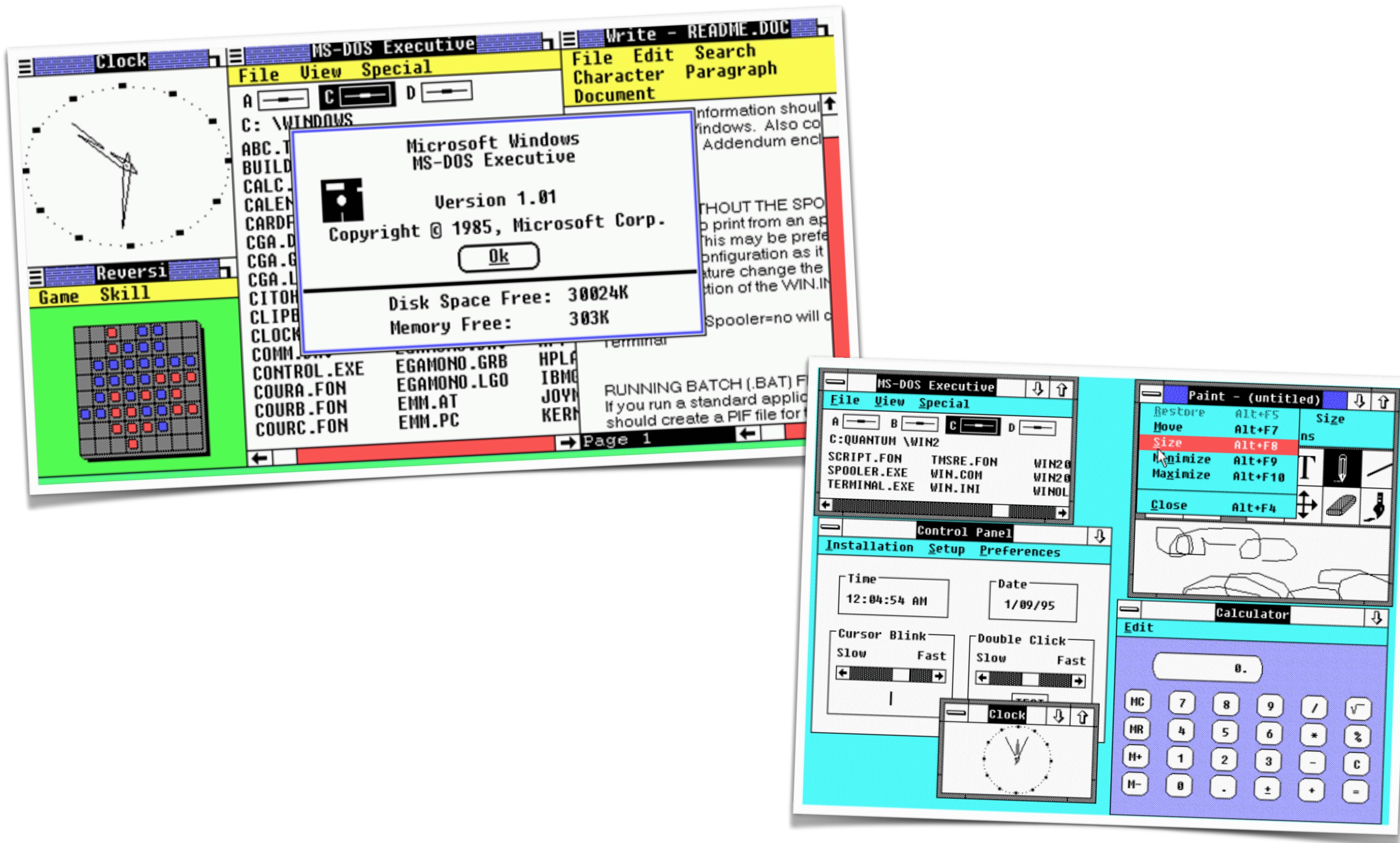


Xerox Star. The first commercial attempt at a mouse based GUI.

1984: Macintosh & GUI



1987: Window 1.0 & 2.0



In the 1990/2000s

- Computing resources are cheap
- Computers are operated by non-computer experts



Present-future : Ubiquitous / Pervasive Computing

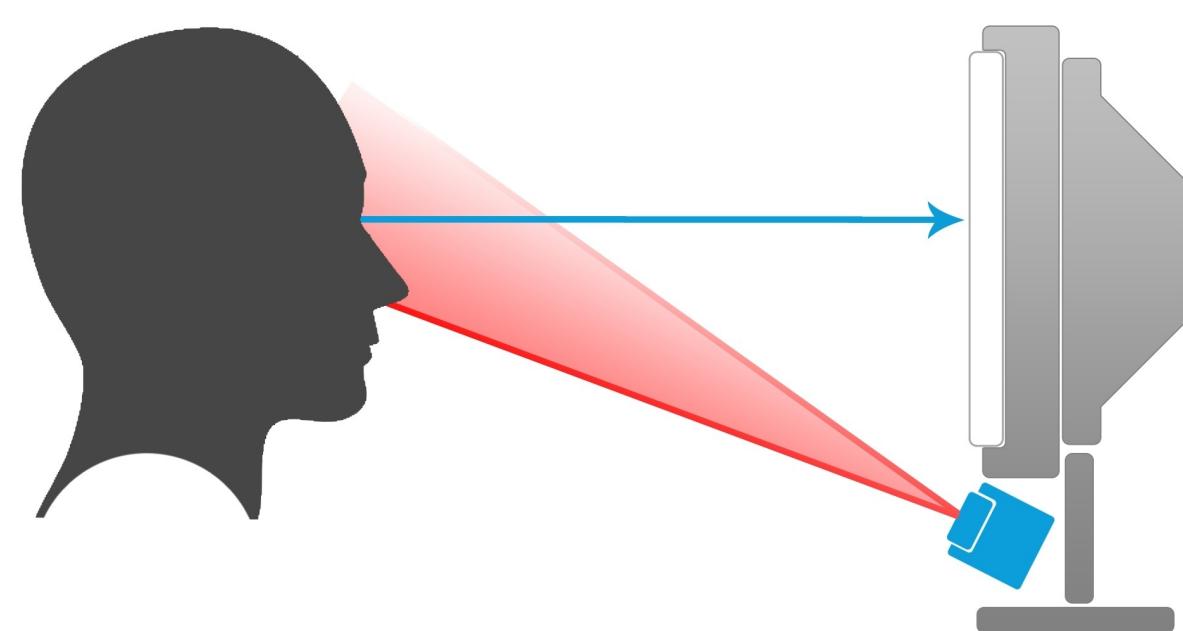


User Interface (UI)

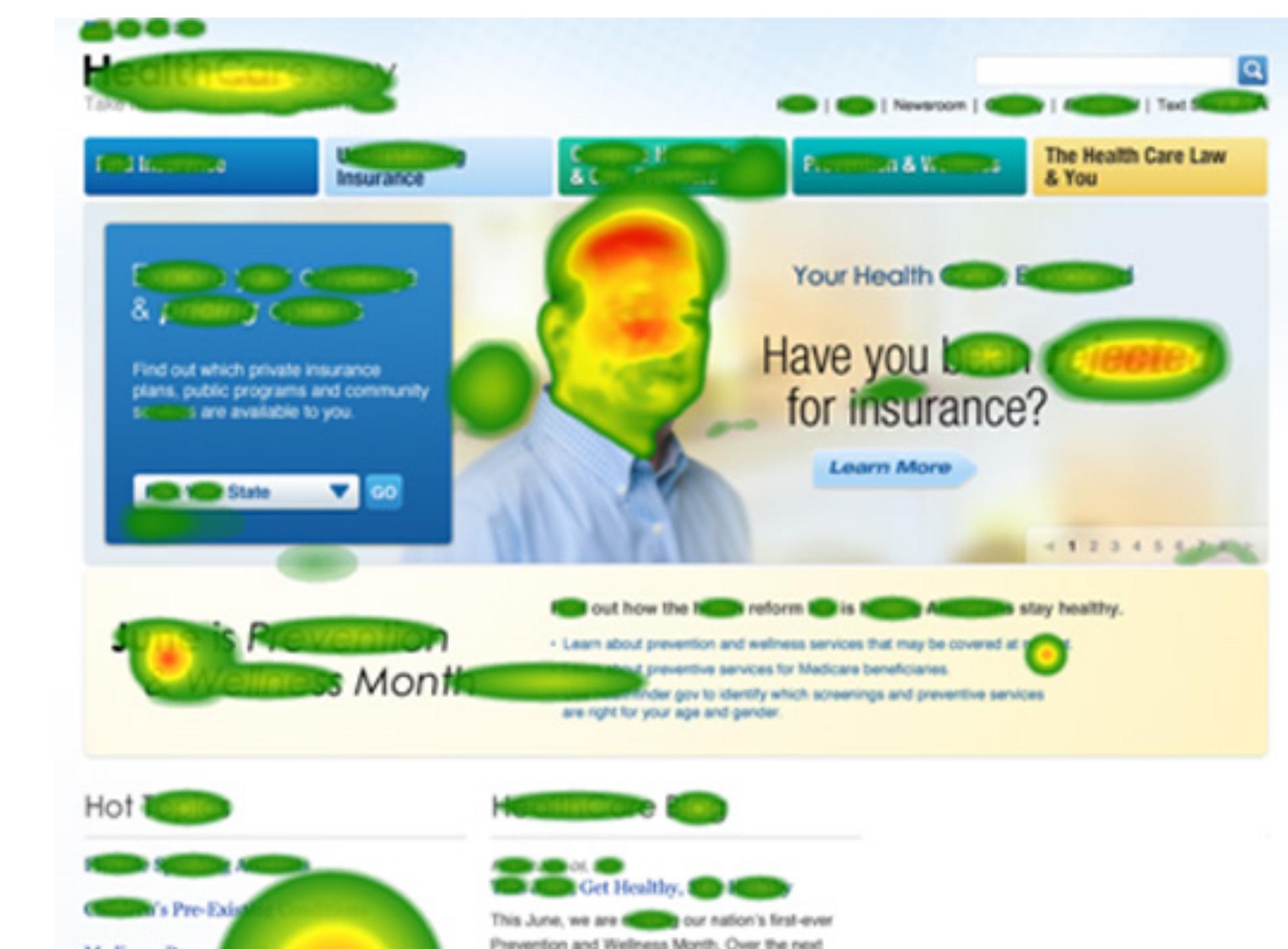
- It is the part of the product/system/software that user SEE, HEAR & TOUCH
- Eg. in a STANDARD PC, the UI may consists of the following:
 - SCREEN, KEYBOARD, MOUSE, SPEAKERS
- In other systems, the UI may consists of:
 - MICROPHONE (voice input)
 - BUTTONS (eg. ON/OFF and CANCEL on printers, remote controller, etc)
 - LIGHTS (modem, ATM, air-conditioner, etc)
 - HAND-TRACKING GLOVE which detects user fingers' movements
 - EYE TRACKER that can trace where the user eyes are looking at



HAND-TRACKING GLOVE

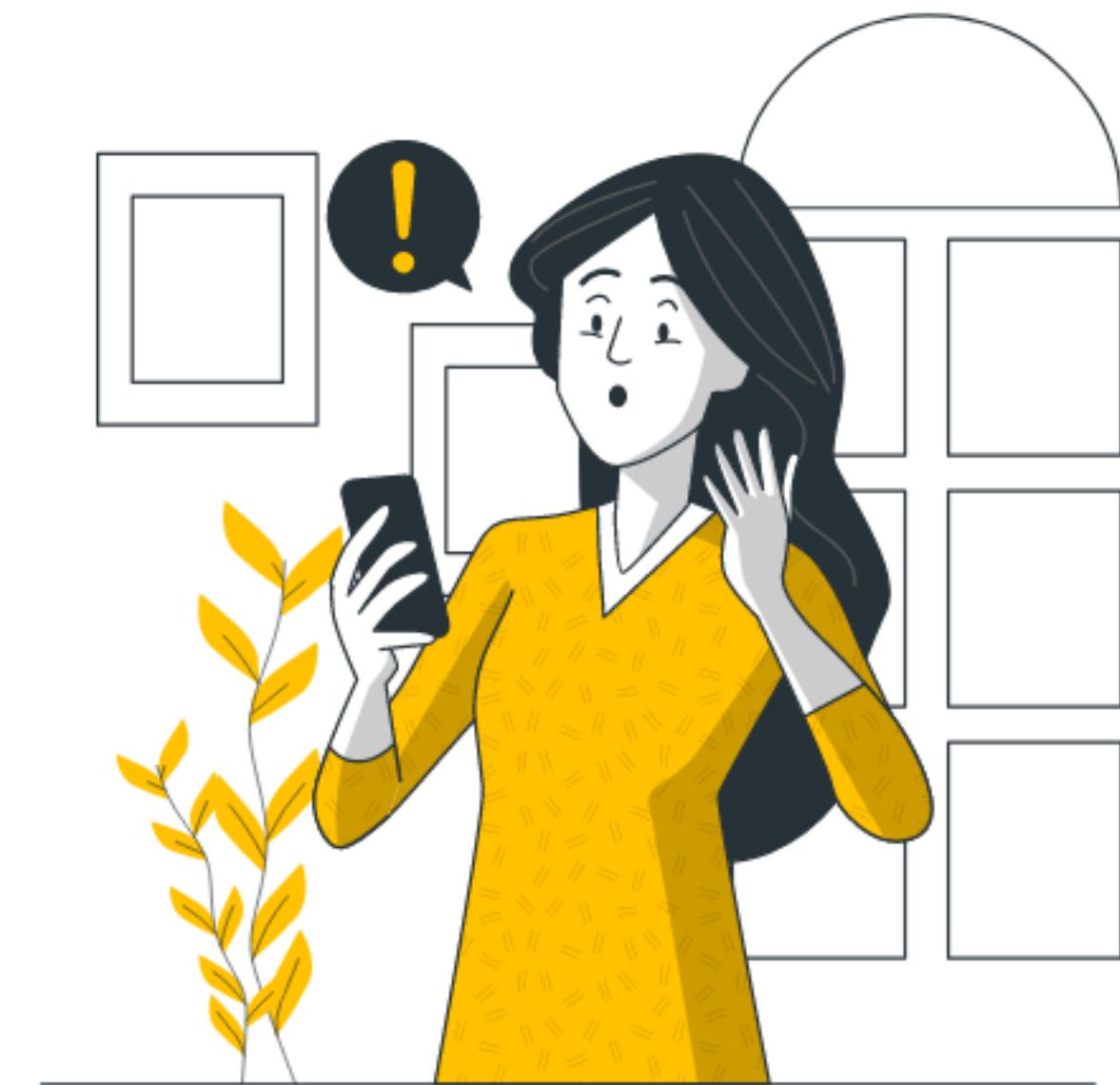


EYE TRACKER

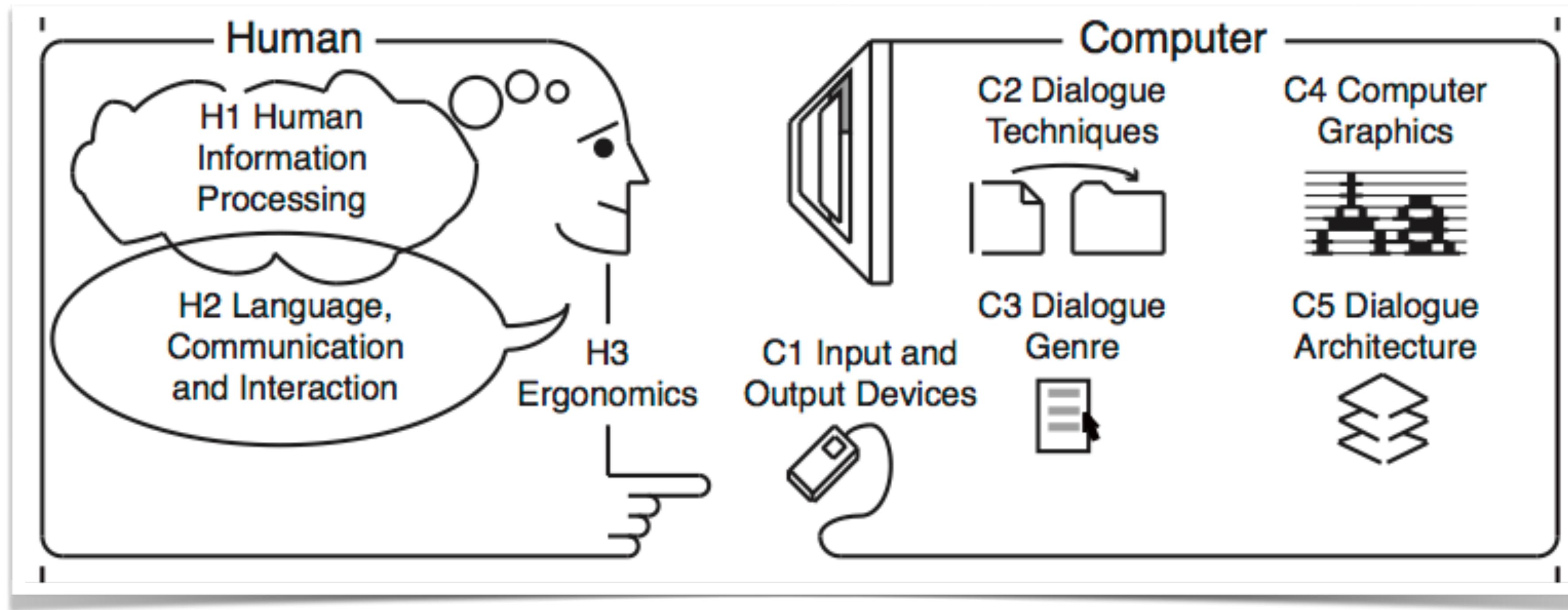


Human

- The user (human) is the one whom computer systems are designed to assist. So , we need to know user (human) capabilities and limitations.
- Humans are limited in their capacity to process information. This has important implications for design.
- More details on coming chapter.



Interaction



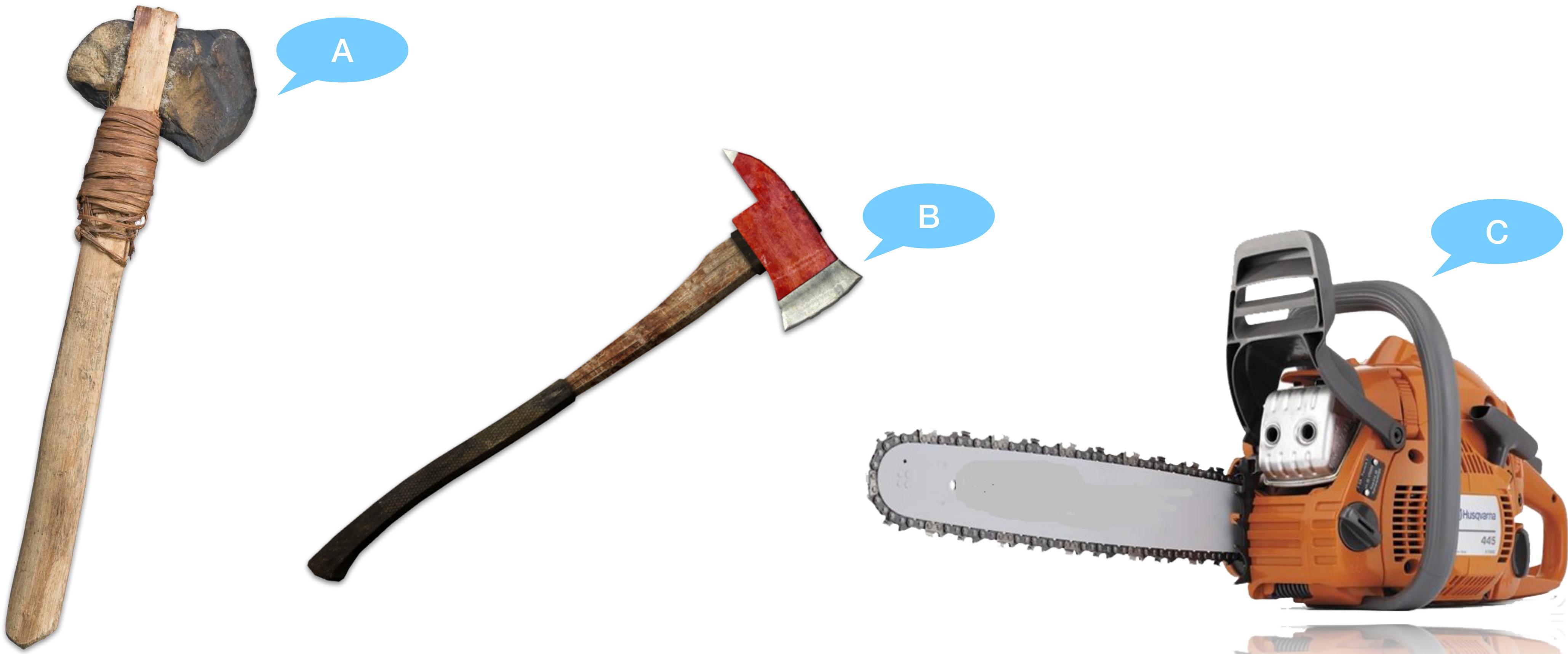
- Some keywords:
 - User Interface (UI)
 - Usability
 - User experience (UX)

Usability

- Definition: The **effectiveness**, **efficiency** and **satisfaction** with which specified users achieve specified *goals* in *particular environments* (ISO 9241-11:2018)
- Usability is a quality attribute that assesses how easy user interfaces are to use.
- International Standard Organisation (ISO 9241-11:2018)
 - Effectiveness
 - Efficiency
 - Satisfaction

Goal: Chopping down a tree

Tools:



- Benefits of systems/software/products with GOOD USABILITY

Benefits to the USERS

- Increased productivity
- Reduce learning time
- Reduced errors
- Reduced stress

Benefits to the DEVELOPERS

- Minimize the cost of customer support
- Reduce the time needed for training
- Good reputation

Effectiveness

Effectiveness is the completeness and accuracy with which users achieve specified goals.

- It is determined by looking at whether the user's goals were met successfully and whether all works are correct.
- Measurement of how well the system performs (desired output = actual output).
- “Can users use the system to do the work they need to do?”

Efficiency

Efficiency is the resources used in relation to the results achieved. (Typical resources include time, human effort, costs and materials.)

- Efficiency concerned primarily with how quickly a task can be completed, while effectiveness considers how well the work is done.
- “Can experienced users be productive using the system?”
- “Once users have learned the design, how quickly can they perform tasks?”

Satisfaction

Satisfaction is the user's physical, cognitive and emotional responses that result from the use of a system, product or service meet the user's needs and expectations

- The comfort and acceptability of the work system to its users and other people affected by its use.
- How pleasant is it to use the design?

User Experience (UX)

Person's perceptions and responses resulting from the use and/or anticipated use of a product, system or service. (ISO 9241-210:2010)

Enjoyable

Fun

Entertaining

Helpful

Motivating

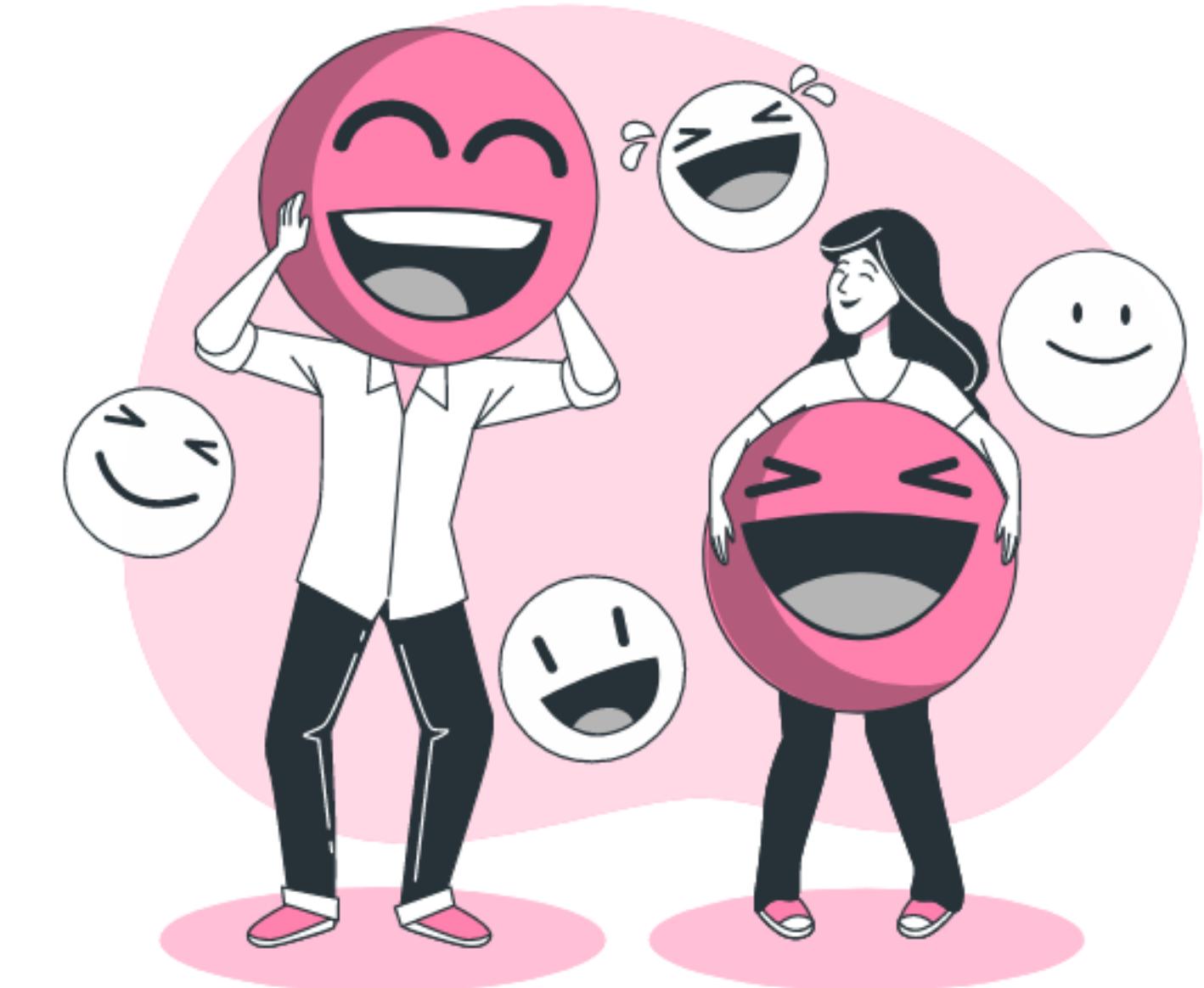
Aesthetic

Rewarding

Emotionally fulfilling

Informative

.....etc...



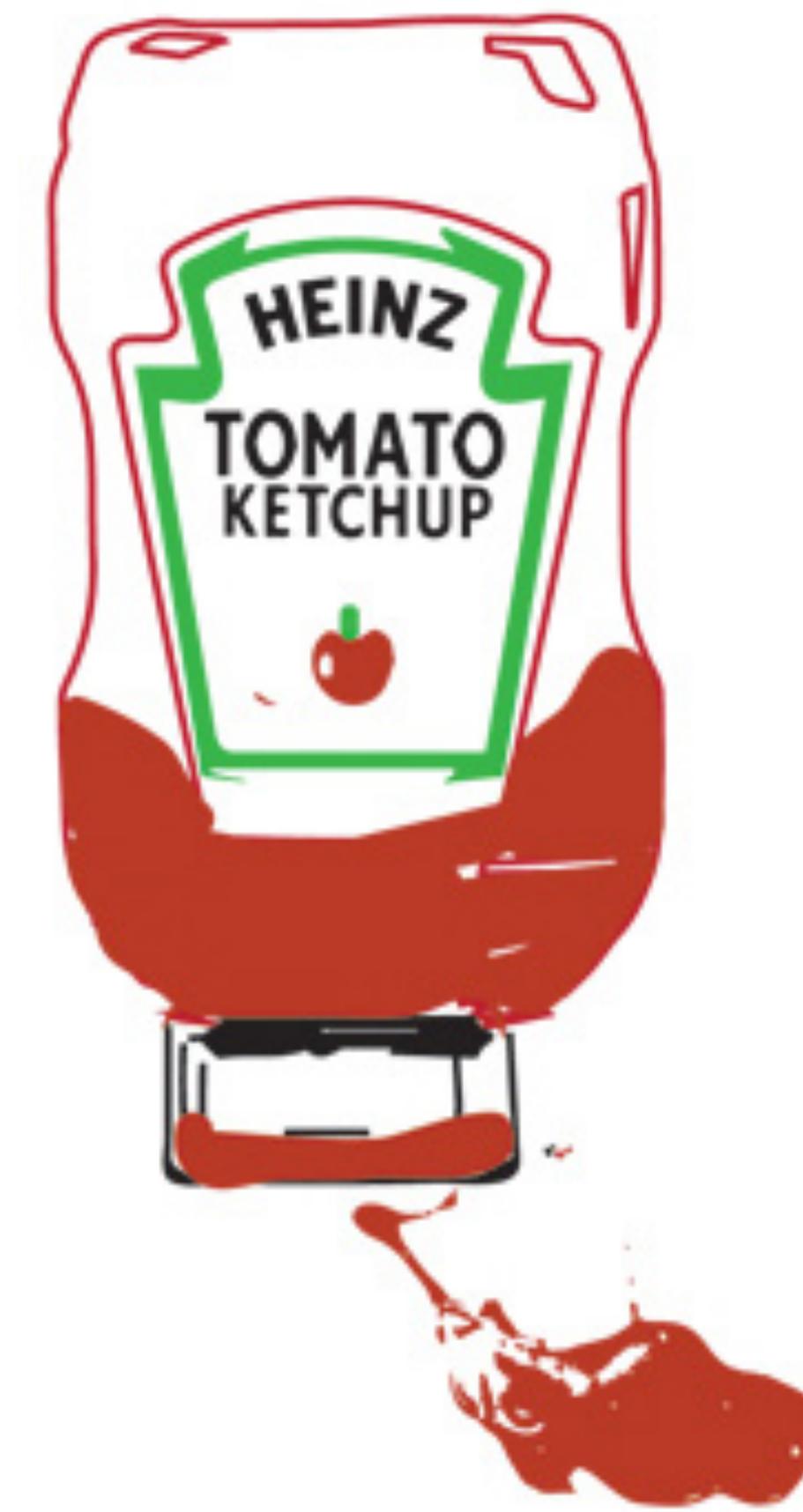
UI



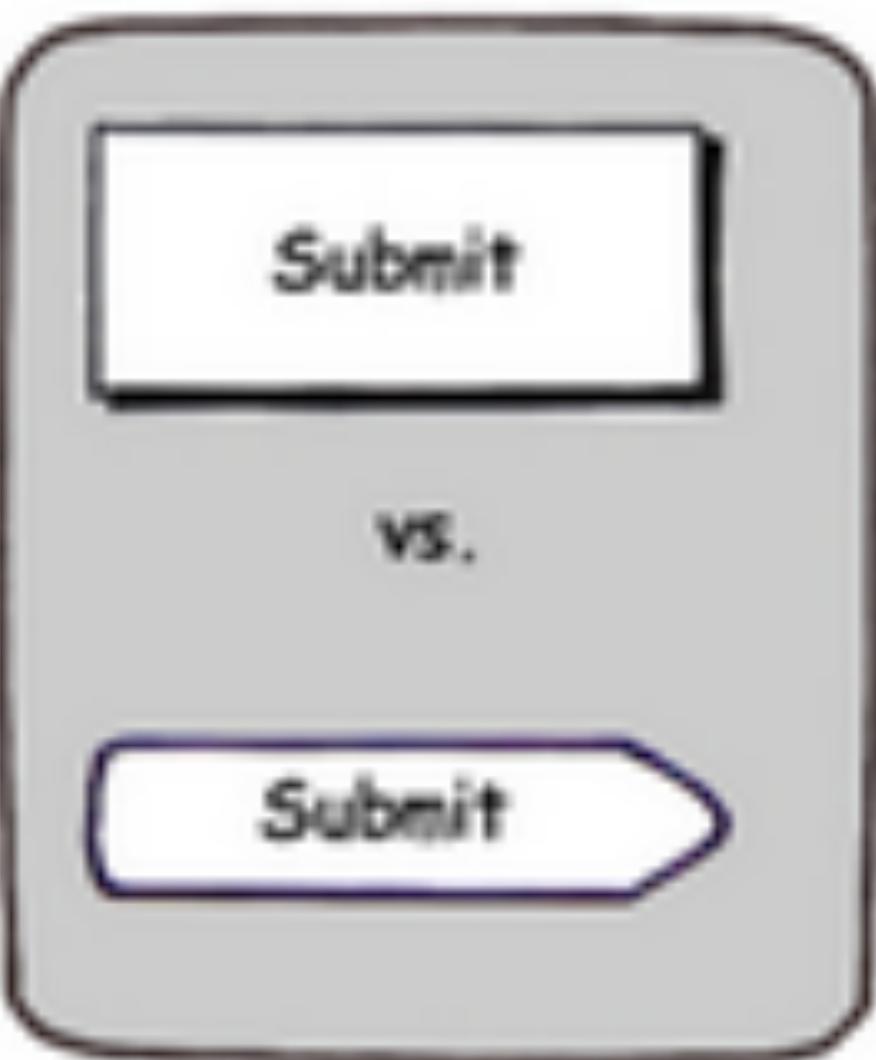
UX



Usability

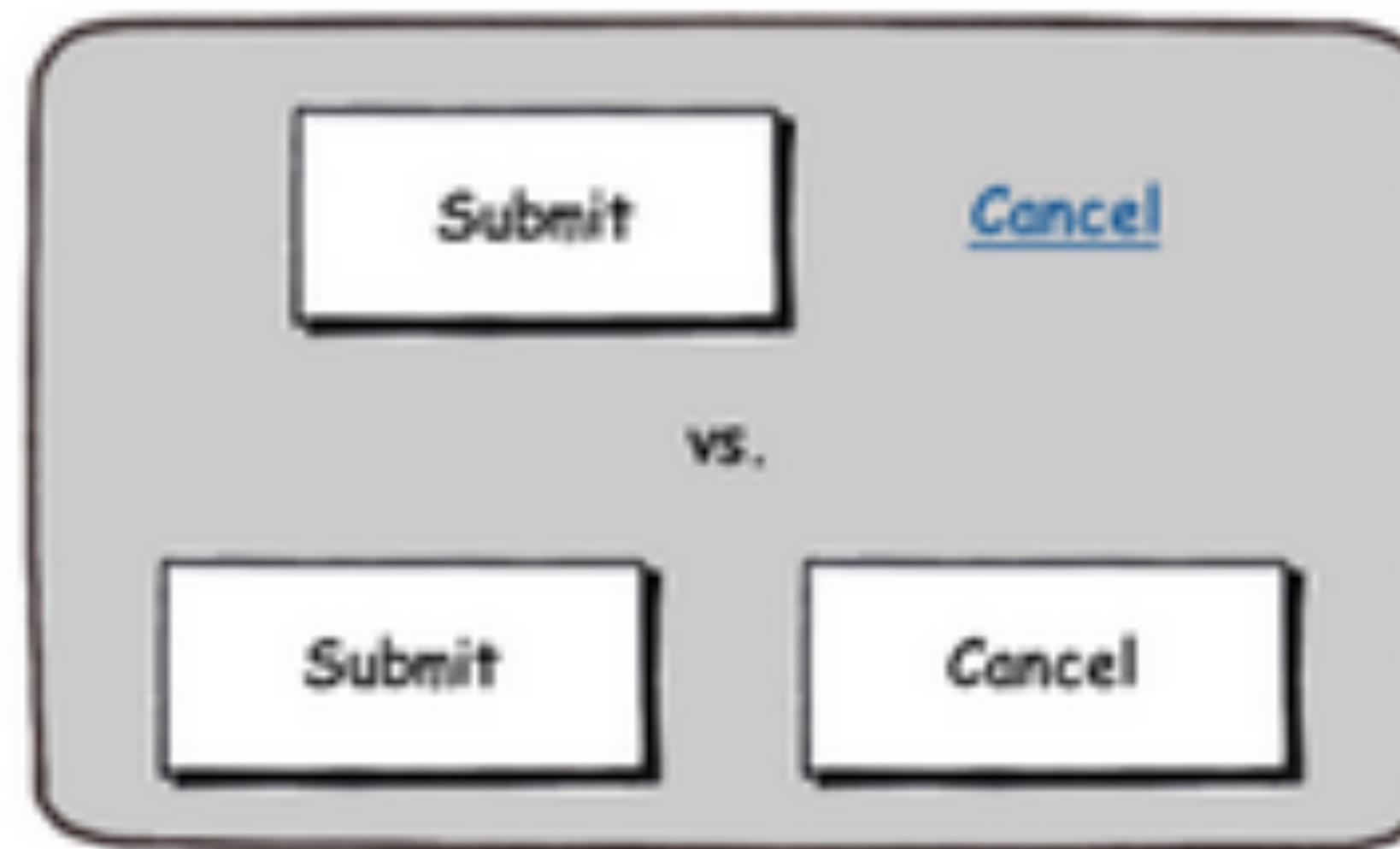


UI Design



Function: It works.

Usability Design



Action: It works well.

User Experience Design

Yes, Complete My Order

No thanks

Bonus: Order arrives earlier than promised

Emotion: It works well and makes me say Wow!



Order canceled!

Sorry, your order has been canceled by
the driver.

OK

x

Driver has canceled your order

Let's move on and find another one, shall we?

RETRY ORDER

x

Yah, belum jodoh... Driver batal ngambil order

Tenang, masih ada driver lain yang siap nganterin!

CARI DRIVER LAGI



Driver has canceled your order

Let's move on and find you another one. Shall we?

[RETRY ORDER](#)



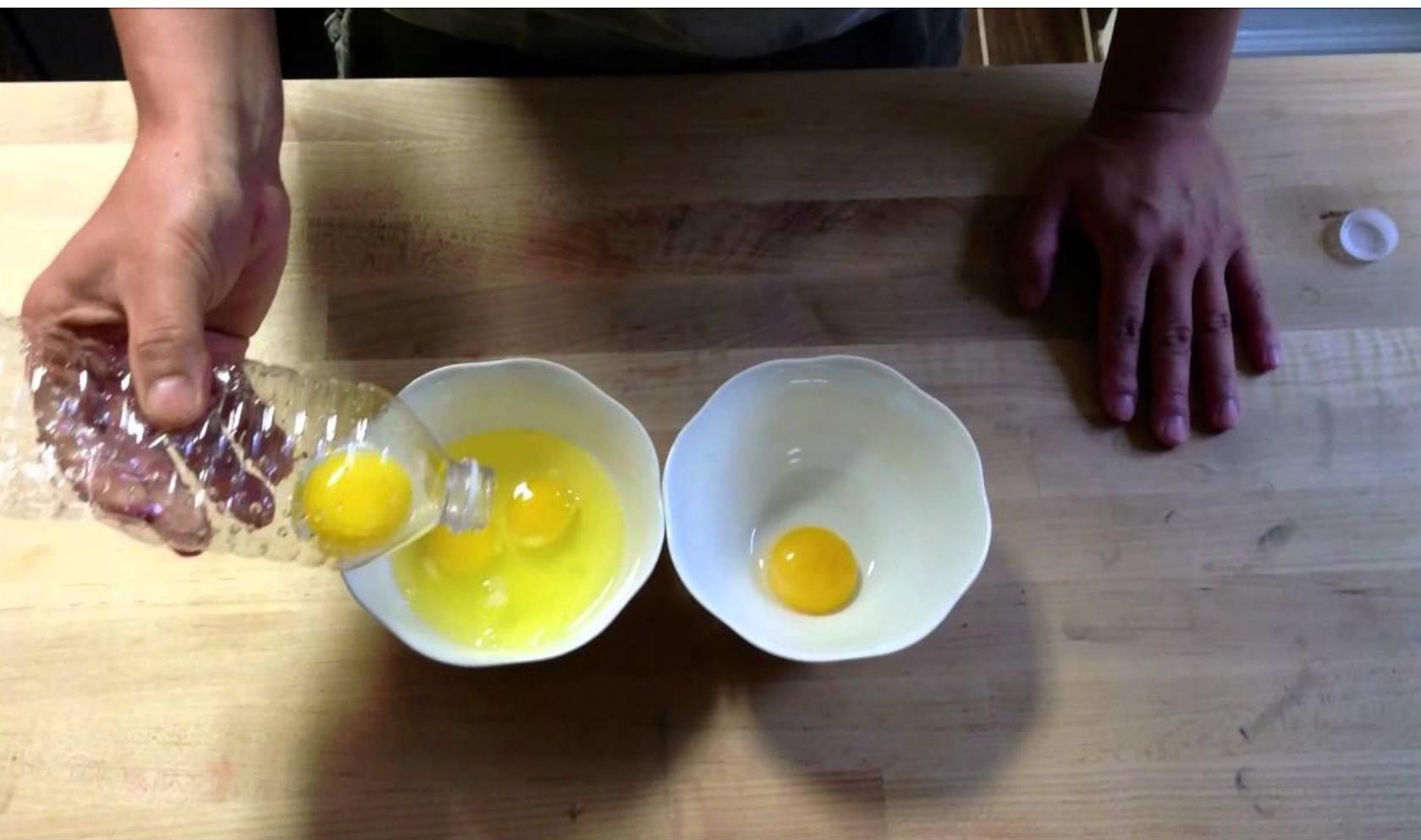
**Yah, belum jodoh...
Driver gak jadi ngambil order.**

Tenang, masih ada driver lain yang siap nganterin!

[CARI DRIVER LAGI](#)

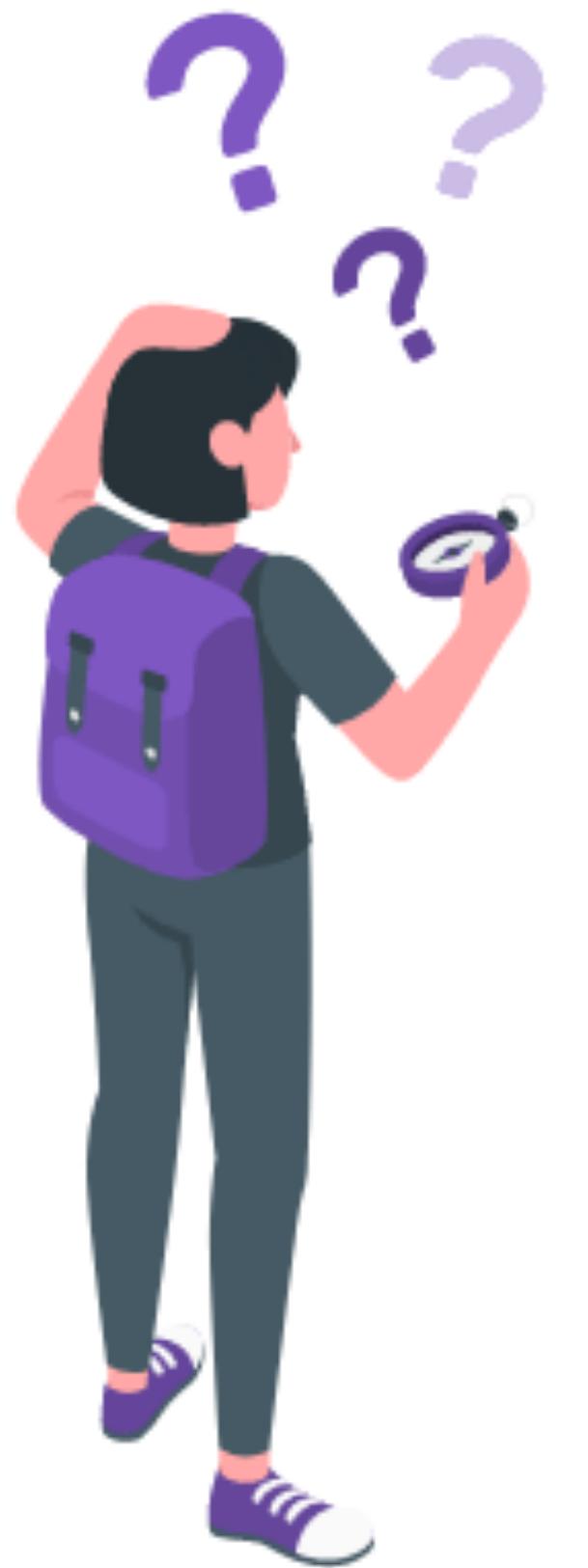
Usability + UX





Effect of poor UI design/ Usability Problem

- It is sometimes difficult to see/notice the effects of good design, but there are many examples of the EFFECTS OF POOR UI DESIGN
- THE EFFECTS can...
 - cause user to makes more errors
 - cause unnecessary anxiety and inconvenience to the user
 - Decrease user productivity
 - makes the product difficult to use and learn
 - Cause the product to be perceived to have low quality and value



How to design a good UI with good usability?

- This course will teach you how to **DESIGN, CONSTRUCT & TEST** user interfaces (UI)
- The goal is to provide you with the needed knowledge to design a good UI for a product/system/software
- Generally, people like systems/applications that are easy to use
- A system/software/product that is easy to use, have **HIGH** level of **USABILITY**
- Others which gives user a nightmare, have **LOW** level of **USABILITY**

Disciplines Contributing to HCI

Computer Science

- the study of construction of hardware and software.
- Provide knowledge about the capabilities and limitations of the technology.

Cognitive Psychology

- the study of how info is processed and represented in the mind.
- Provide knowledge about the capabilities and limitations of the users.

Ergonomics/human factors

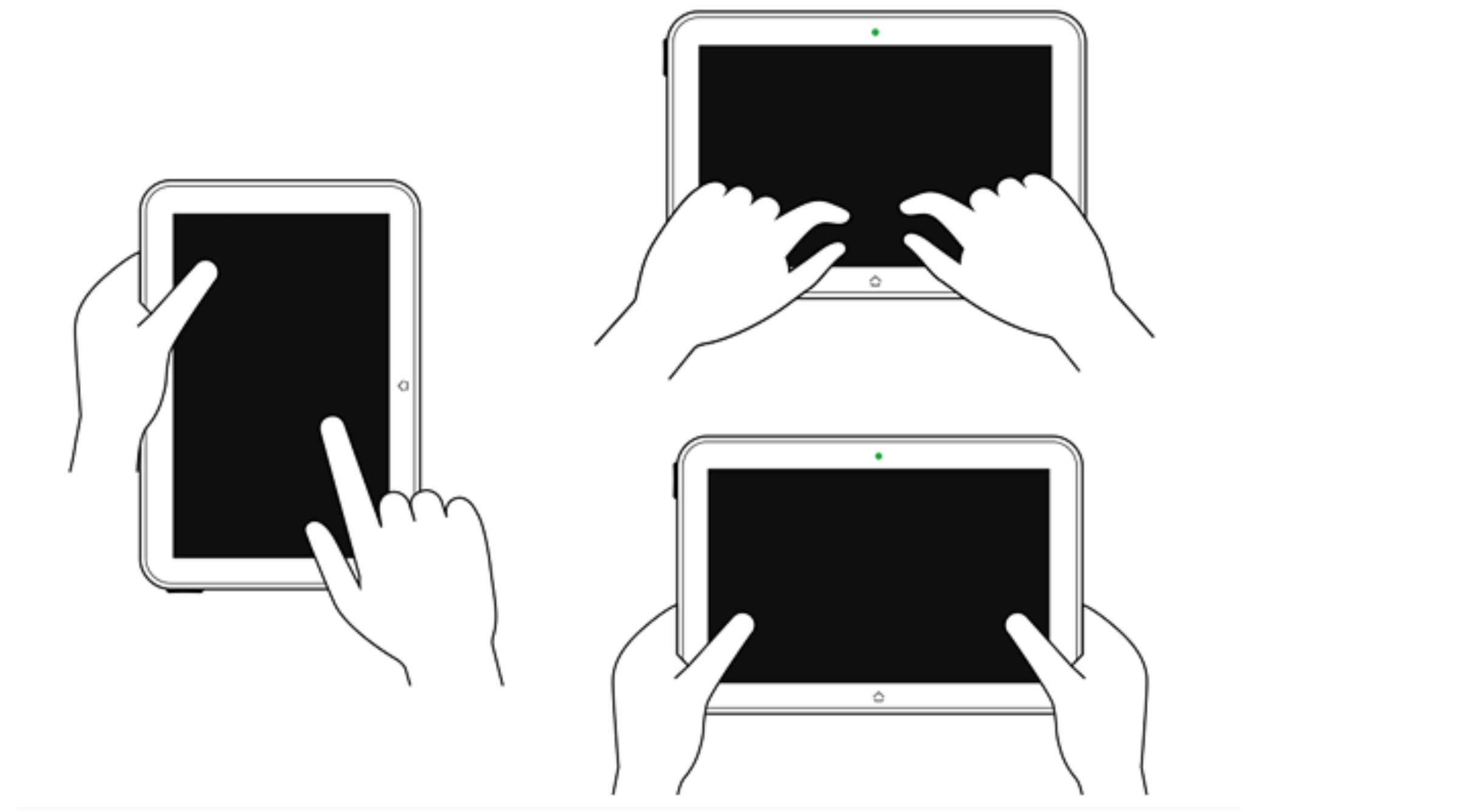
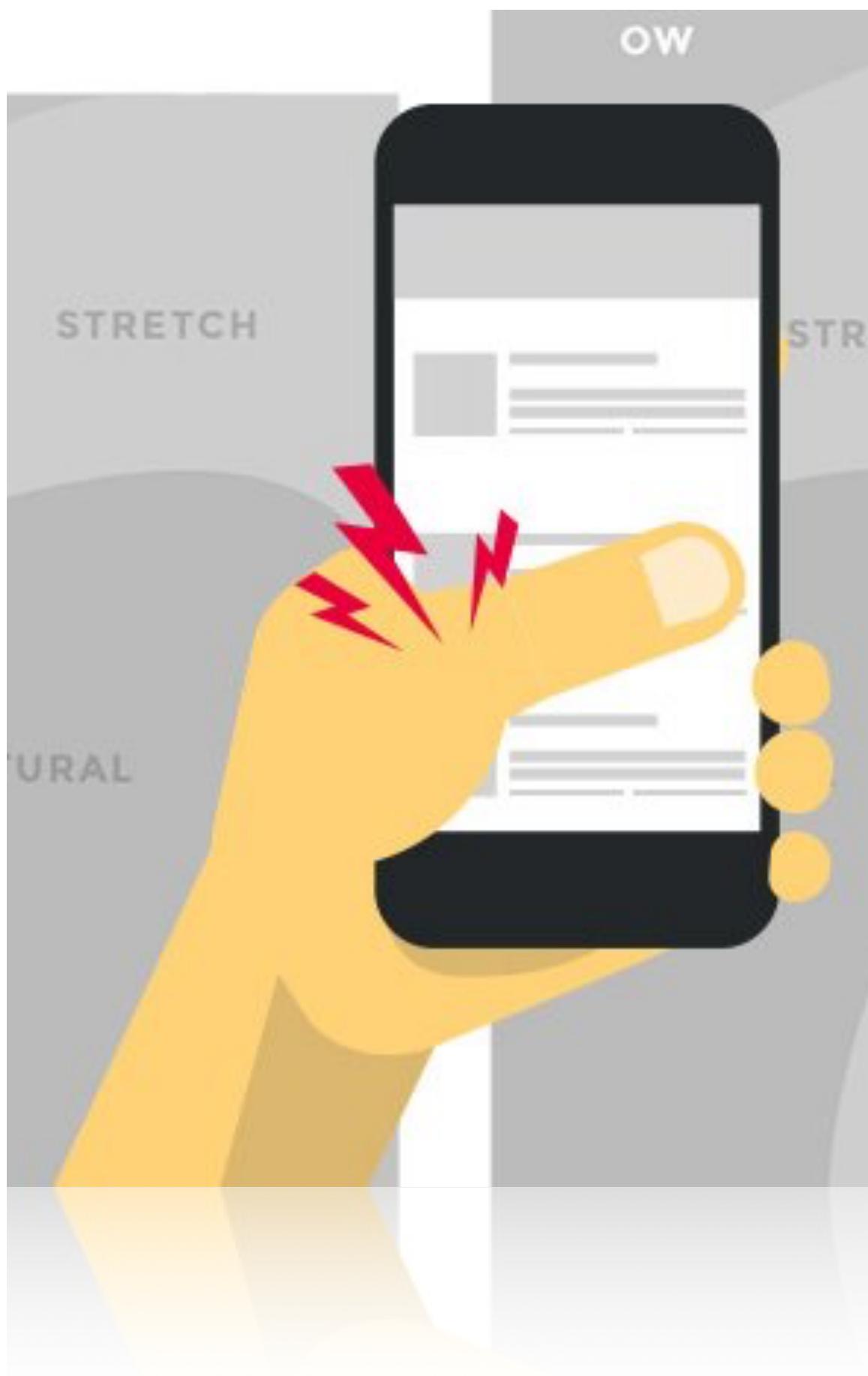
- the study of human beings in relationship to their working environment
- Provide knowledge about how to design tools to suit the capacities and capabilities of the users
- Also provide knowledge about how to design the working environment to suit the users rather than the other way round.

Social and Organizational Psychology & Others.....

The ideal designer of interactive systems should have expertise in a variety of disciplines

(in other words an interactive system designer should have a wide variety of knowledge)

- Ergonomics/human factors



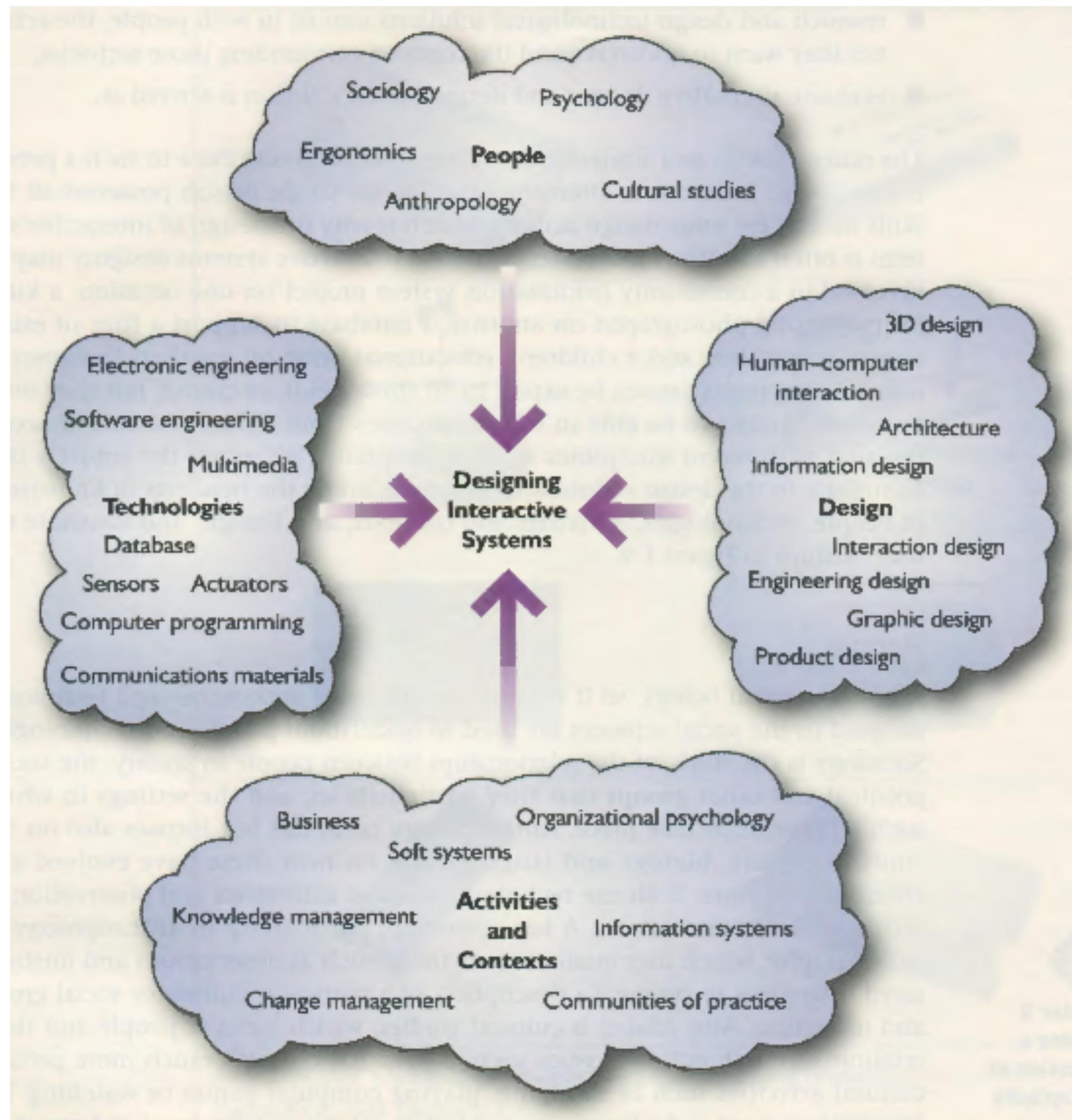


Computer Science

Cognitive Psychology

Ergonomics/human factors

Social and Organizational Psychology



Disciplines contributing to interactive system design

Source: Benyon (2005), pp 22.



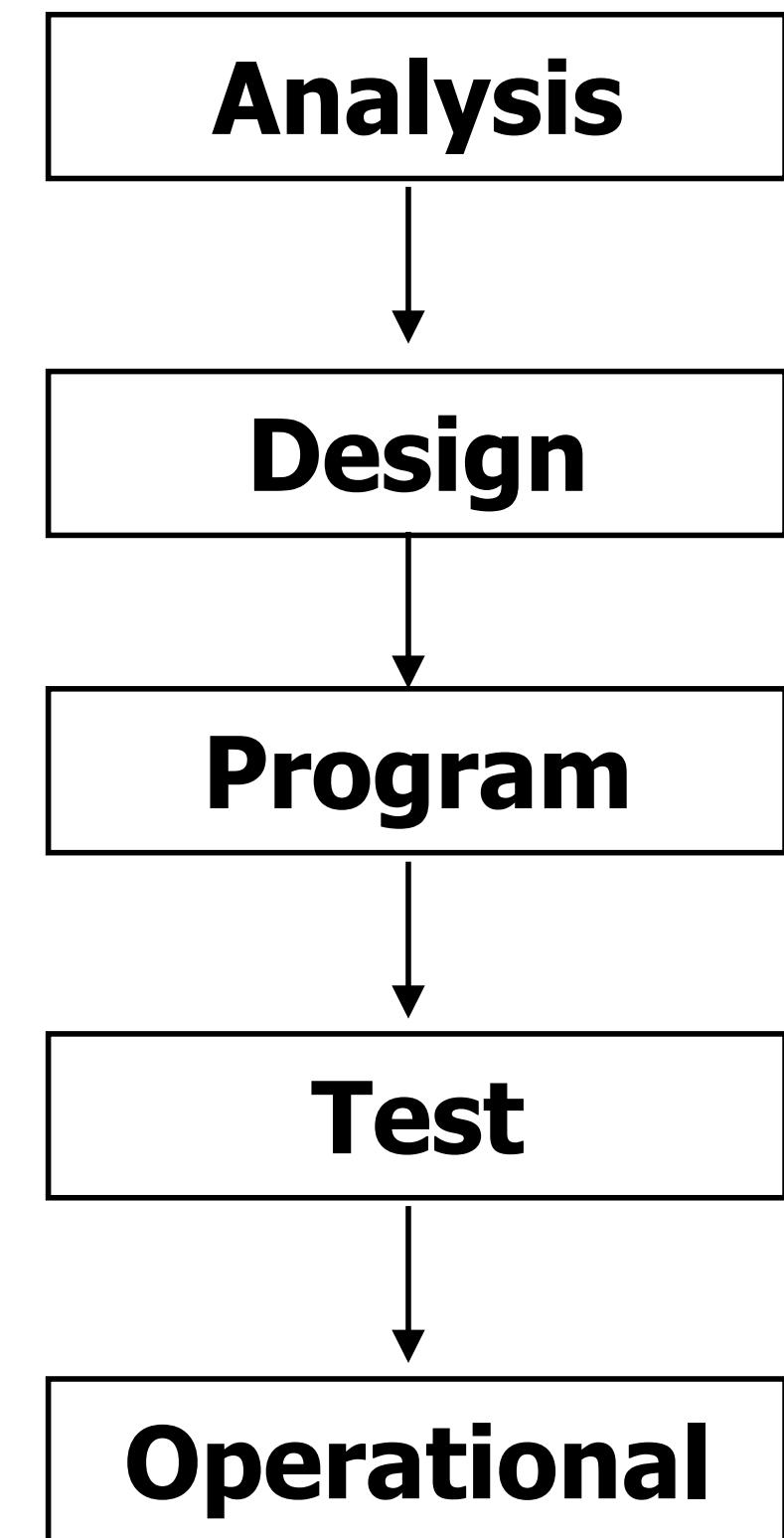
“It is not possible to design effective interactive systems from one discipline in isolation” — Alan Dix

Input is needed from **other disciplines** because we need to understand:

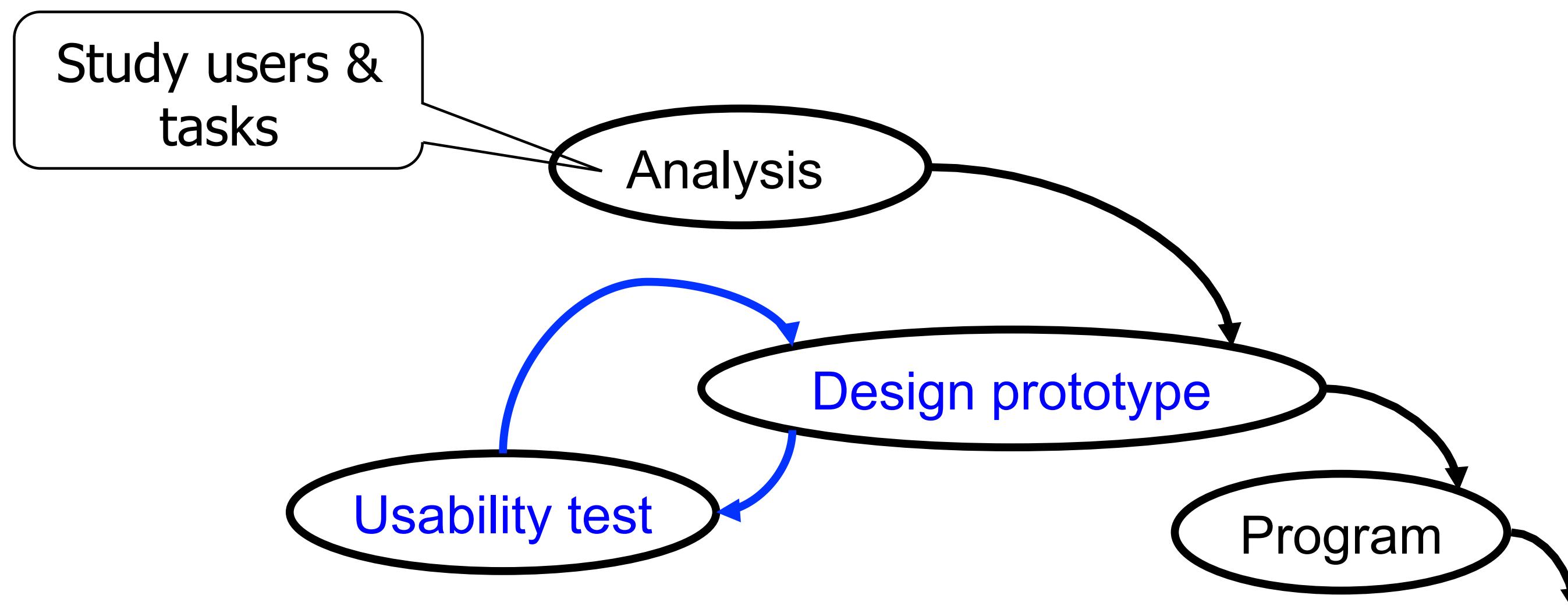
- the COMPUTER SYSTEM
- the USER and the TASKS the user is performing
- the ENVIRONMENT in which the task is being perform

HCI and Software Development

- The Development process (Traditional way)
- Follows numbers of stages in sequence
- At the beginning, the requirements for the system are analyzed and then this information is processed and converted into a design, which is then coded and tested and the product is completed and becomes operational.
- This approach to software development is called the “**WATERFALL**” lifecycle model of software development

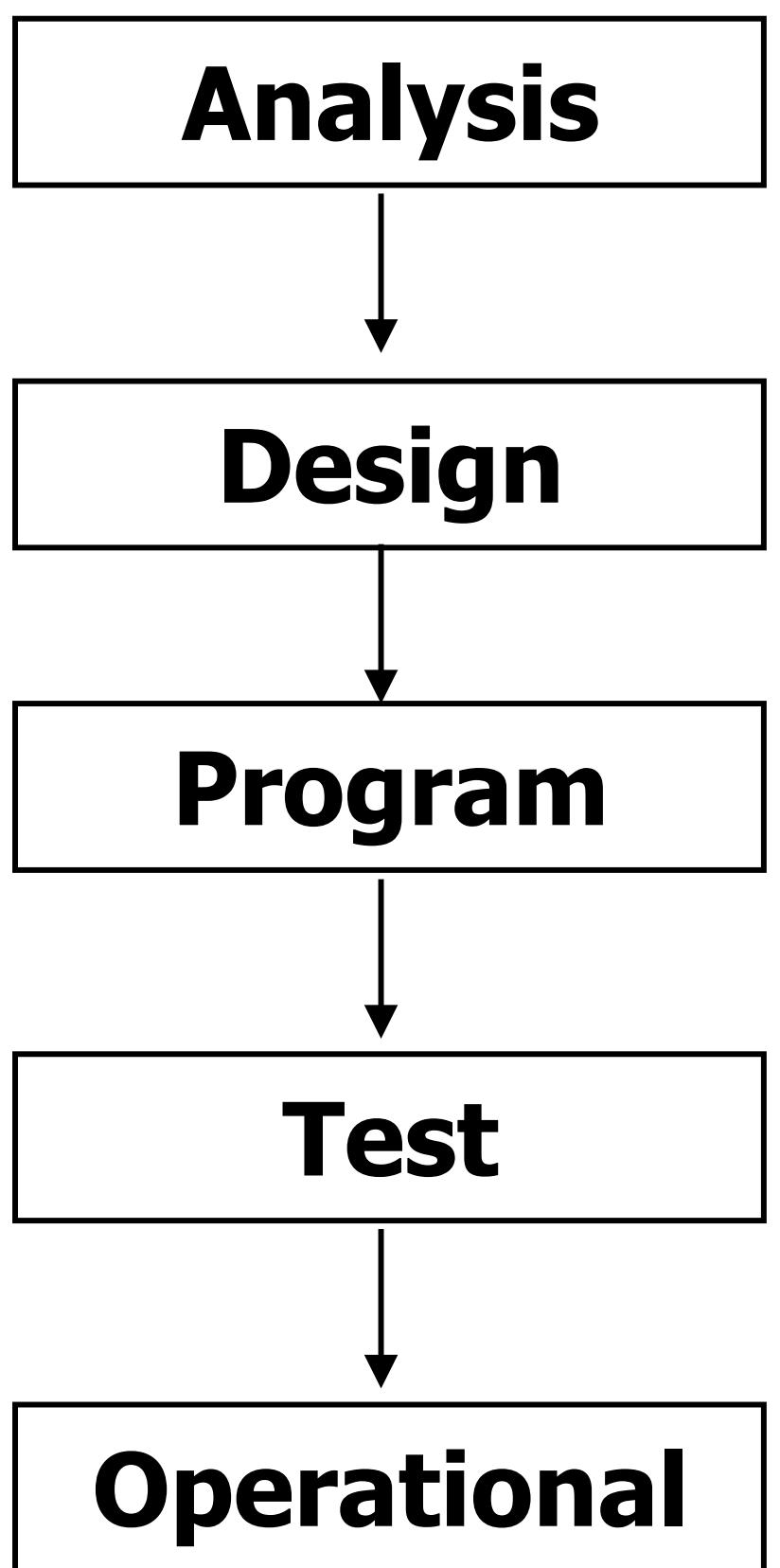


- The development process _HCI framework

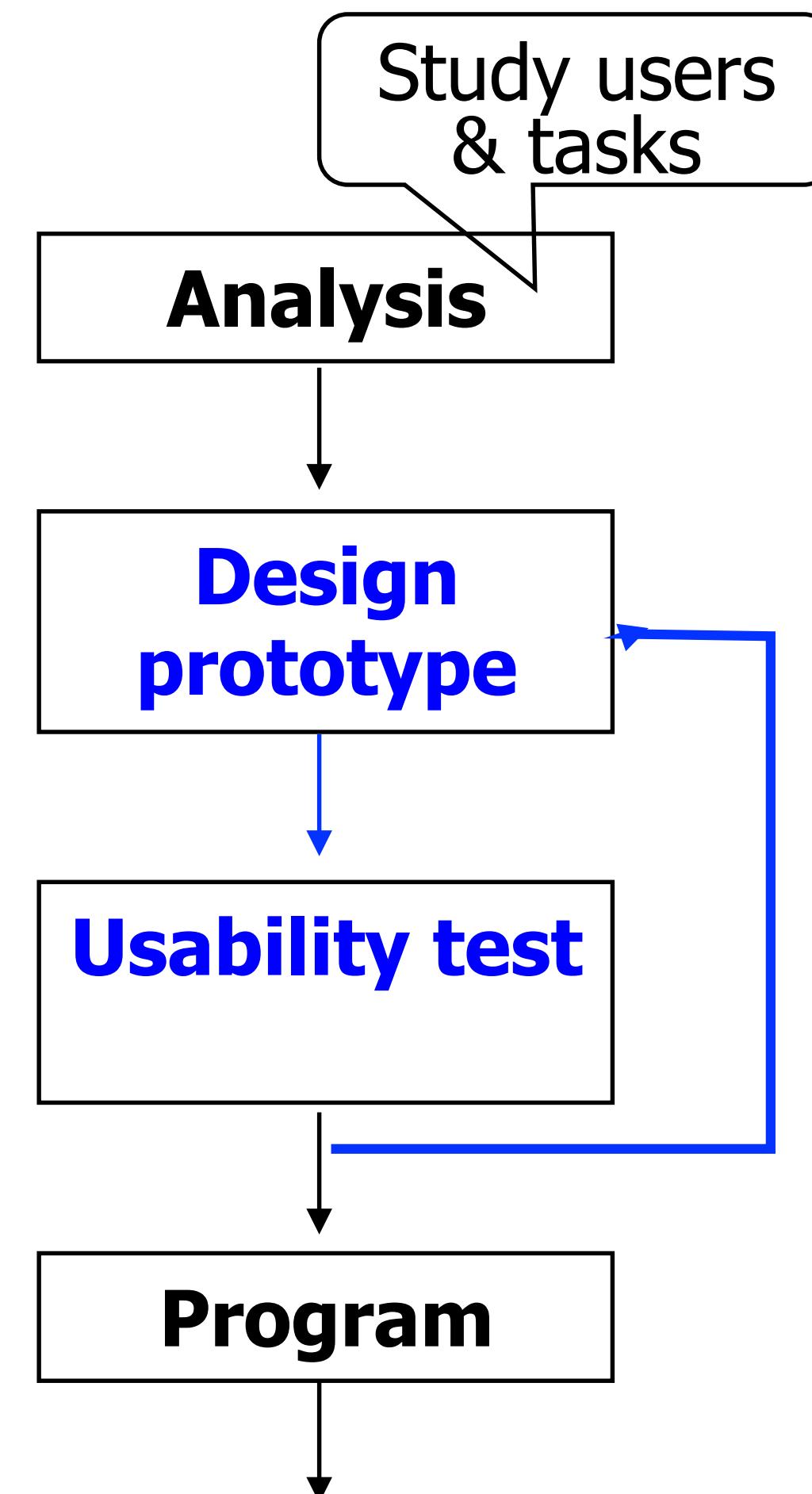


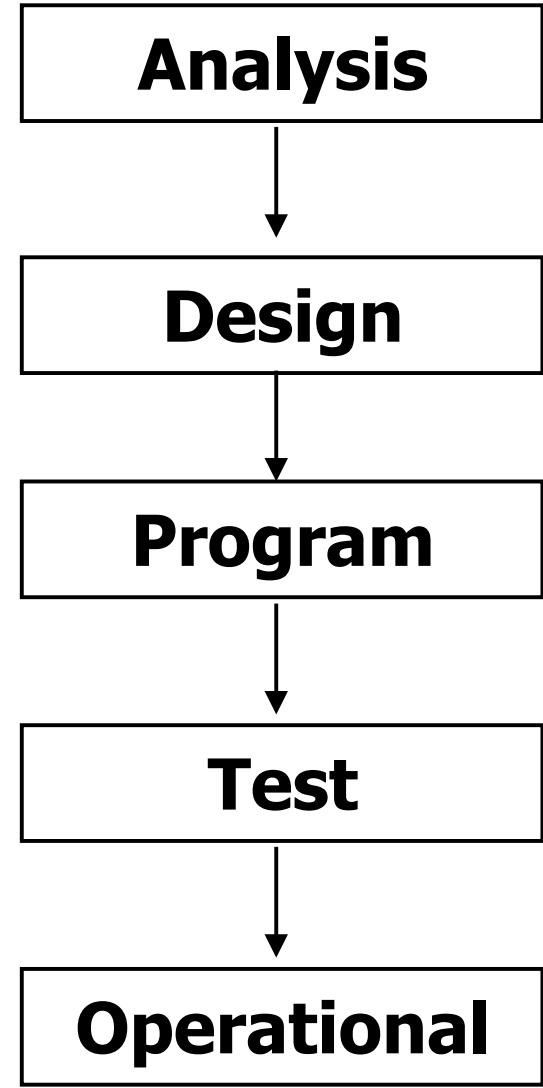
So, to make a good UI:

- focus on users and their tasks (be user centered)
- build a little(prototype), test a little (usability test)
- iterate until a good design is achieved



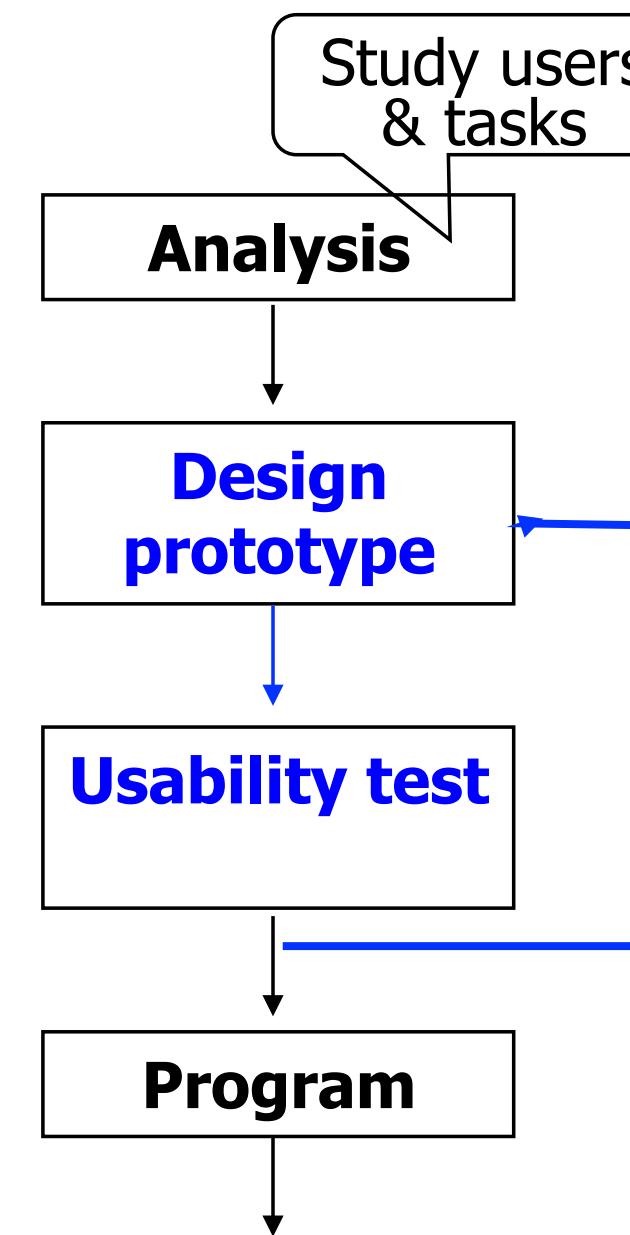
The essential difference between the waterfall approach and the HCI Framework : Iteration





Waterfall Approach

- Development process often driven by functional processing requirements
- deliver what the designer think what the users want



HCI Framework

- Focus on user's need
- Analyse user's tasks so can provide functionality to support those tasks
- Build prototype
- Carry out early testing & evaluation with users
- Iterate until a good design is achieved

People, Activities, Contexts, Technologies (PACT) Analysis

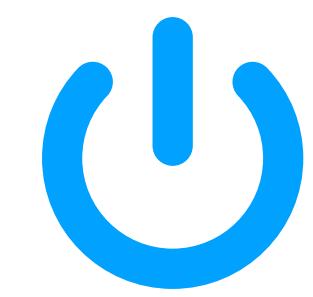
Before we even begin an UI design, we must first identify and understand current situation, and assess if any possible improvements can be made.

PACT analysis looks at:

- People: Sociology, culture, biology, language, psychology, etc...
- Activity & Context: Interaction that take place in the context of some ‘community of practice’. Eg. Business community and its organisation of information.
- Technologies: Selecting appropriate software and hardware.

Designing a train ticket machine.

- People: physical (age, height, weight), psychology (memory, mental models), usage (expert, novices)
- Activities: time (when, frequency), complexity, safety critical, content (information/media dealing with)
- Context: physical environment, social context (culture/language).
- Technology: input (touch screen, mouse) , output (monitor, speaker)

 **Thank you**