CSE440: Introduction to HCI

Methods for Design, Prototyping and Evaluating User Interaction

Lecture 02:
History & State of the Art in HCI

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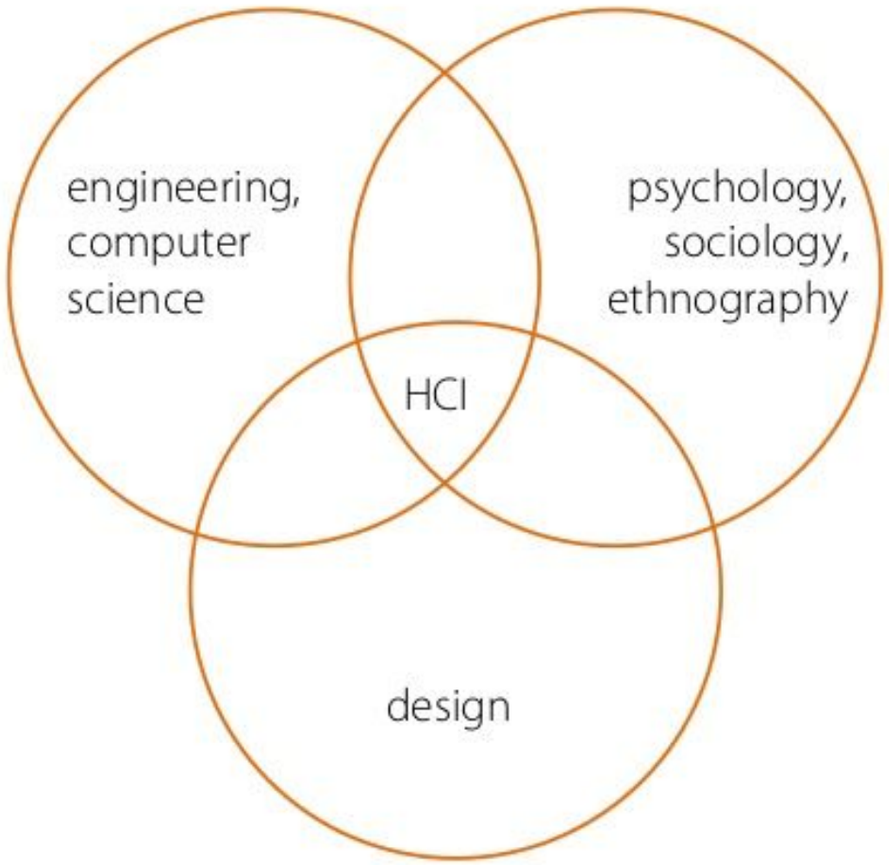
DESIGN
USE
BUILD

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

What is HCI?

HCI (human-computer interaction) is the study of how people interact with computers and to what extent technology is or is not developed for successful interaction with human beings.



https://www.cs.bham.ac.uk/~rxb/Teaching/HCI%20II/intro.html

https://www.slideshare.net/agaszostek/history-and-future-of-human-computer-interaction-hci-and-interaction-design

HCI != Usability

A usable system is easy to learn, easy to remember how to use, effective, efficient, safe, and enjoyable to use.

Usability is only one part of HCI, but has been one of the main goals. HCI has also:

- developed **guidelines and standards** that support designers
- developed **methods** to evaluate the user experience of a given product/system
- used **mathematical models** to predict users' performance with a system (e.g., Fitt's law for mouse movement time, and models that predict search time or mental effort)
- investigated new **interaction paradigms** or new ways of integrating technology in our lives (think smart clothes, touch displays, VR/AR, voice-based interfaces …)

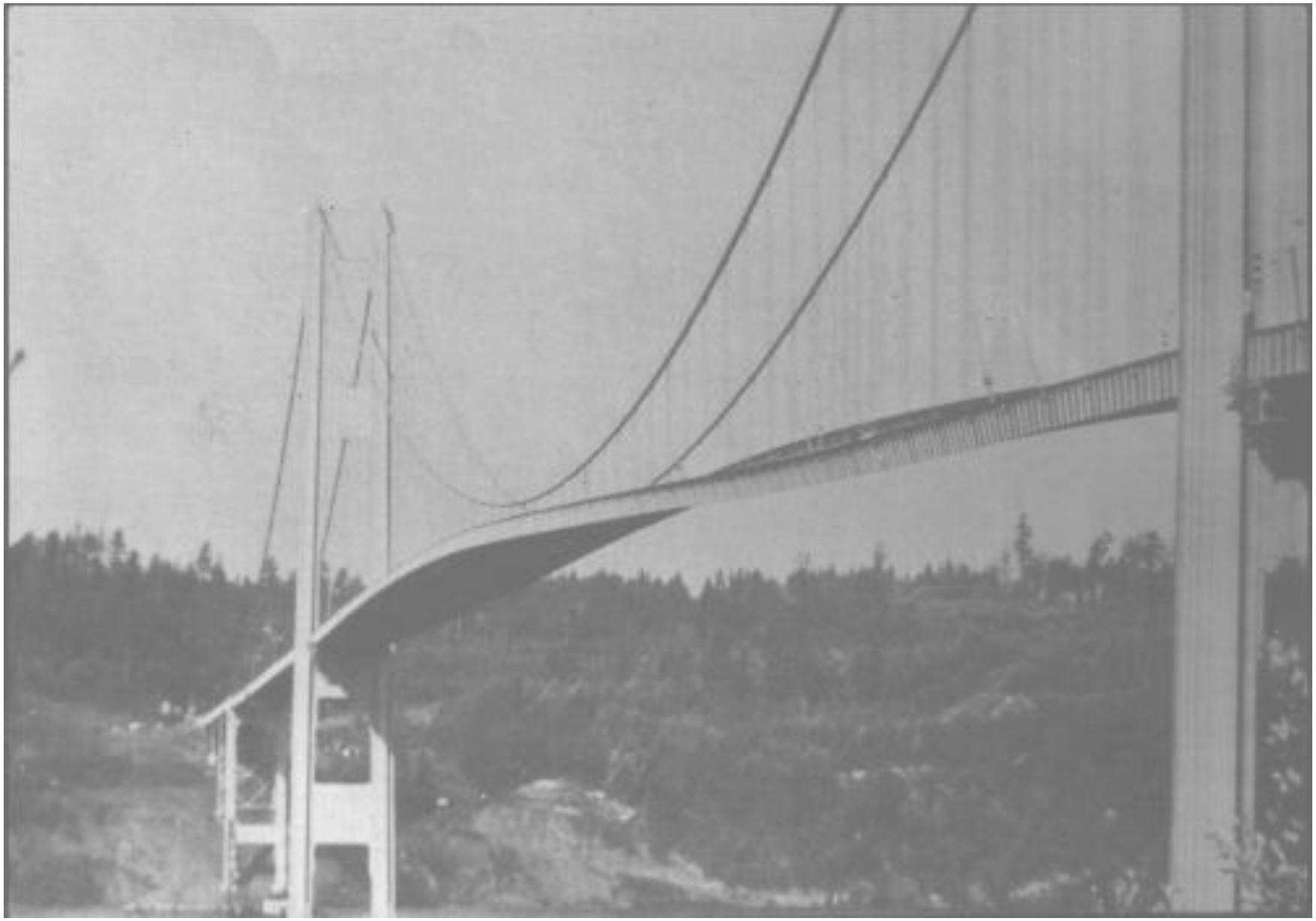
Boehm-Davis, Deborah A. "Discoveries and developments in human-computer interaction." *Human factors* 50.3 (2008): 560-564.

Why do we do HCI in CSE?

Every engineering discipline includes the study of **breakdowns** and the design of improved / or new **solutions** that address those breakdowns

Why do we do HCI in CSE?

Tacoma Narrows (nicknamed “Galloping Gertie”)



Why do we do HCI in CSE?

Tacoma Narrows (nicknamed “Galloping Gertie”)

2-minute activity

Can you find a technology analogue to the collapse of the Tacoma bridge?

Inside Facebook's Myanmar operation
Hatebook
A REUTERS SPECIAL REPORT

Why do we do HCI in CSE?

Understanding how and why **human interaction breaks down** is fundamental to designing better technology

This study must include computer scientists, as we are the ones creating/building the technology

HCI is an extension of traditional CS disciplines

We **design, implement, and evaluate** computing systems for particular tasks (e.g., parallel programming, network routing)

HCI **incorporates humans** into the computing system

- Humans as an additional constraint

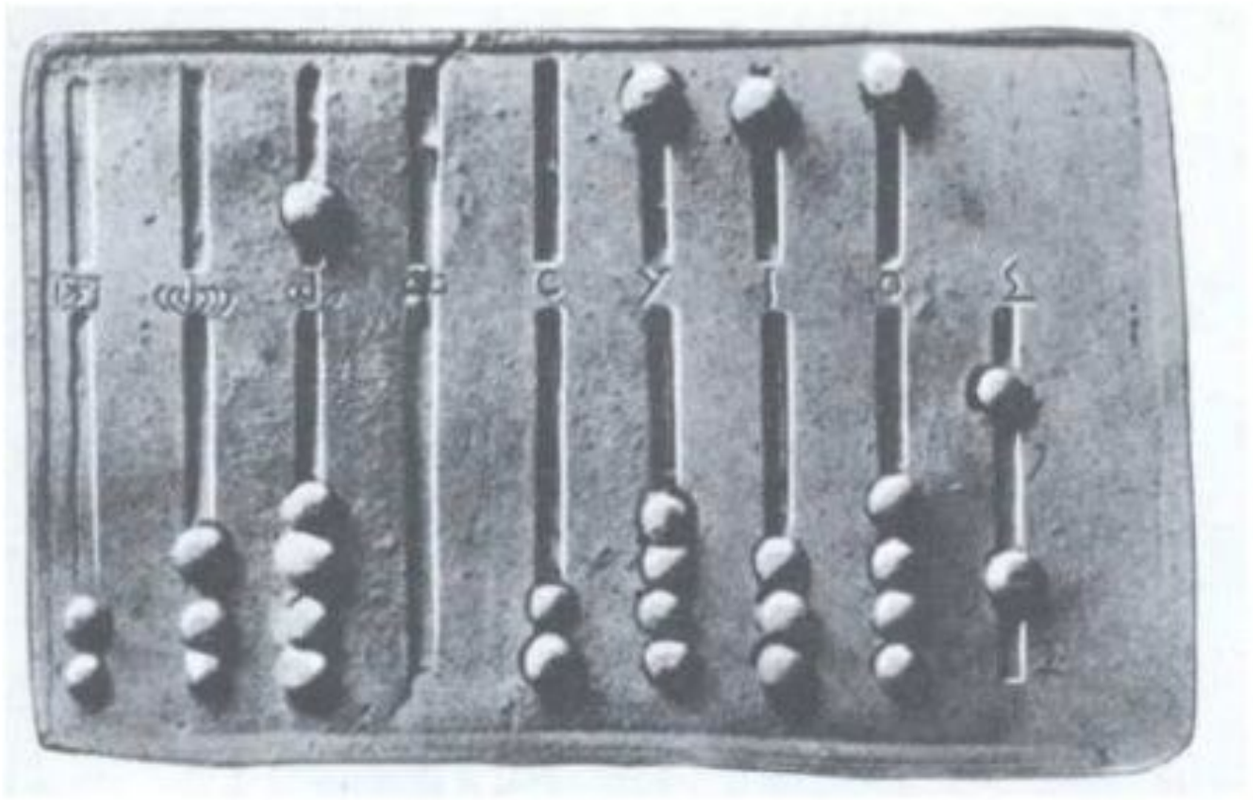
Any computer system must be designed taking into account

- the **physical** constraints of the machine (e.g., processor speed, networking capabilities)
- the **human** physical and mental constraints (e.g., attention, memory)
- (should we add, **social** level constraints?)

http://www.pgbovine.net/what-is-hci-research.htm

A history of HCI

Calculating devices in antiquity



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Konrad Zuse (1910-1995)

Invented the world’s first programmable computer (in 1941)

This remained the only working computer in Europe up to 1951

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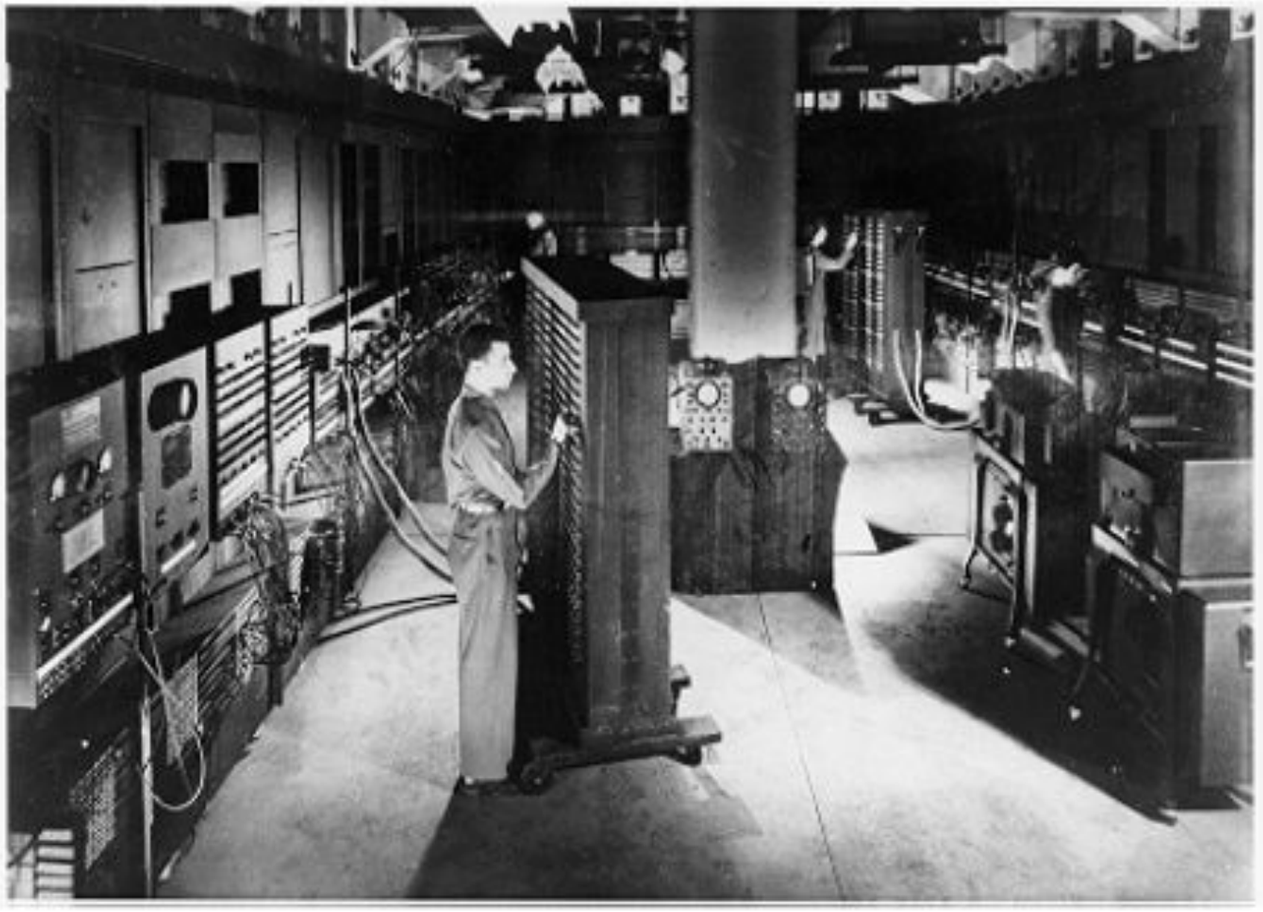
ENIAC (~1946)

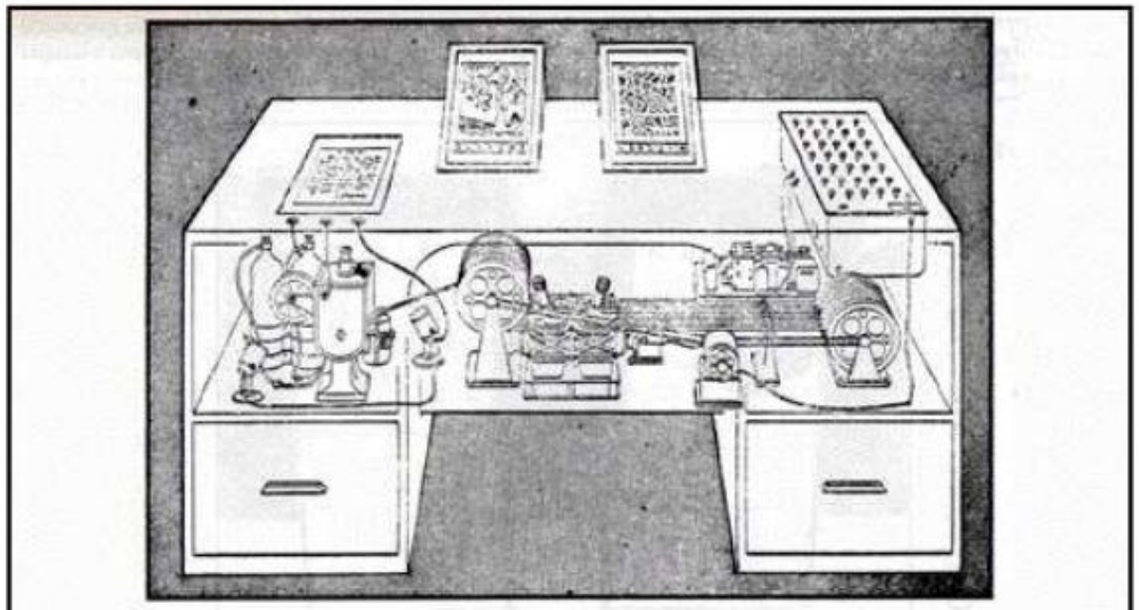
First electronic numerical integrator and computer in the US

Construction contract was signed in 1943

The first programmers of the ENIAC were six women (“Refrigerator Ladies”)



Memex (1945)



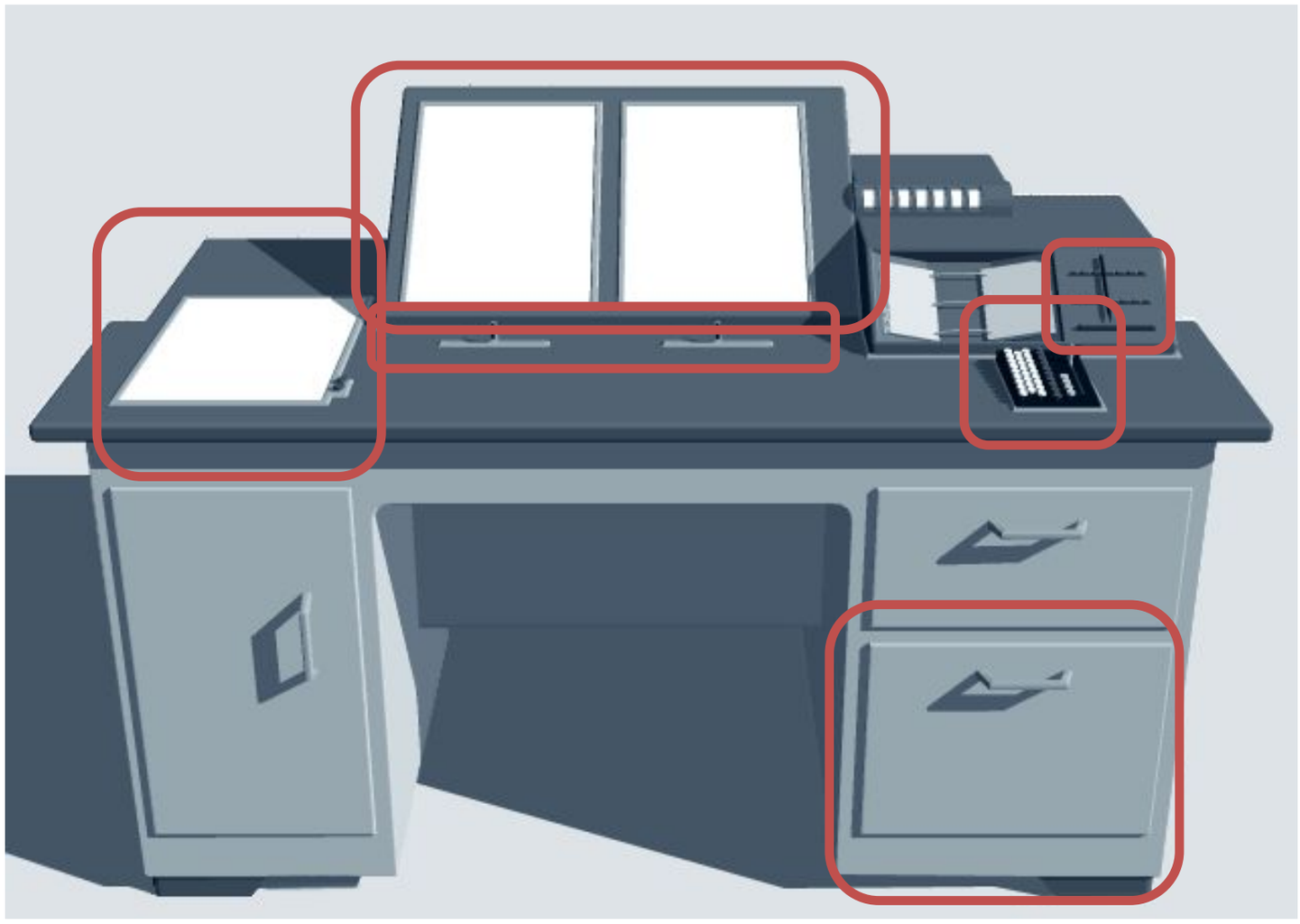
Memex in the form of a desk would instantly bring files and material on any subject to the operator's fingertips. Slanting translucent viewing screens magnify supermicrofilm filed by code numbers. At left is a mechanism which automatically photographs longhand notes, pictures and letters, then files them in the desk for future reference (*LIFE* 19(11), p. 123).

https://www.theatlantic.com/magazine/archive/1945/07/as-we-may-think/303881/

Memex (1945)

"wholly new forms of encyclopedias will appear, ready made with a mesh of **associative trails** running through them…"

Memex (1945)



Memex (1945)

“If the user wishes to **consult** a certain book, he taps its **code** on the keyboard…”

“Frequently-used codes are **mnemonic**, so that he seldom consults his code book;”

“He can add marginal **notes and comments** … even … by a stylus scheme”

SketchPad by Ivan Sutherland at MIT (1963)

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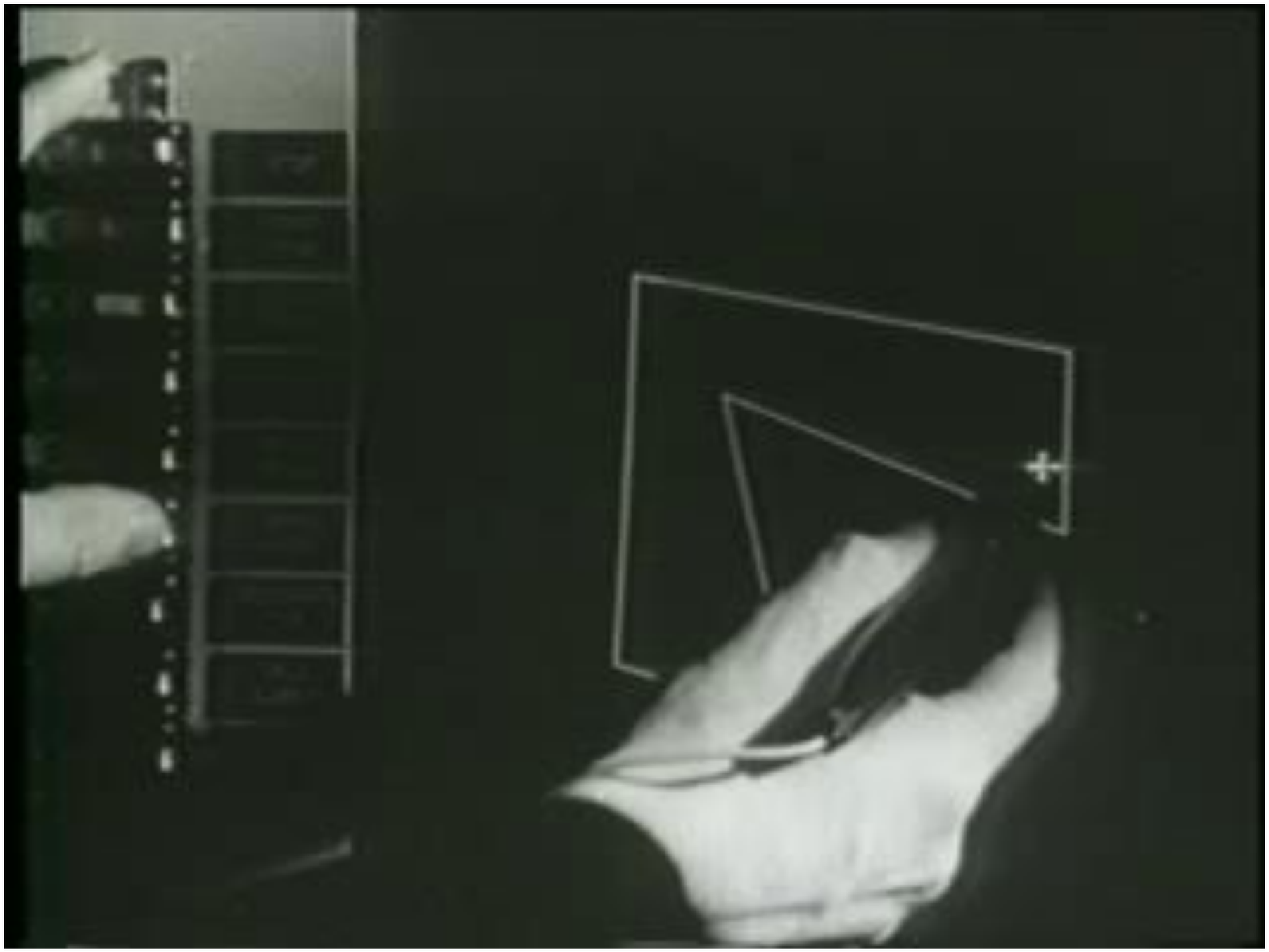
SketchPad by Ivan Sutherland



https://courses.cs.washington.edu/courses/cse440/videos/history/AlanKay1987-Sketchpad.m4v

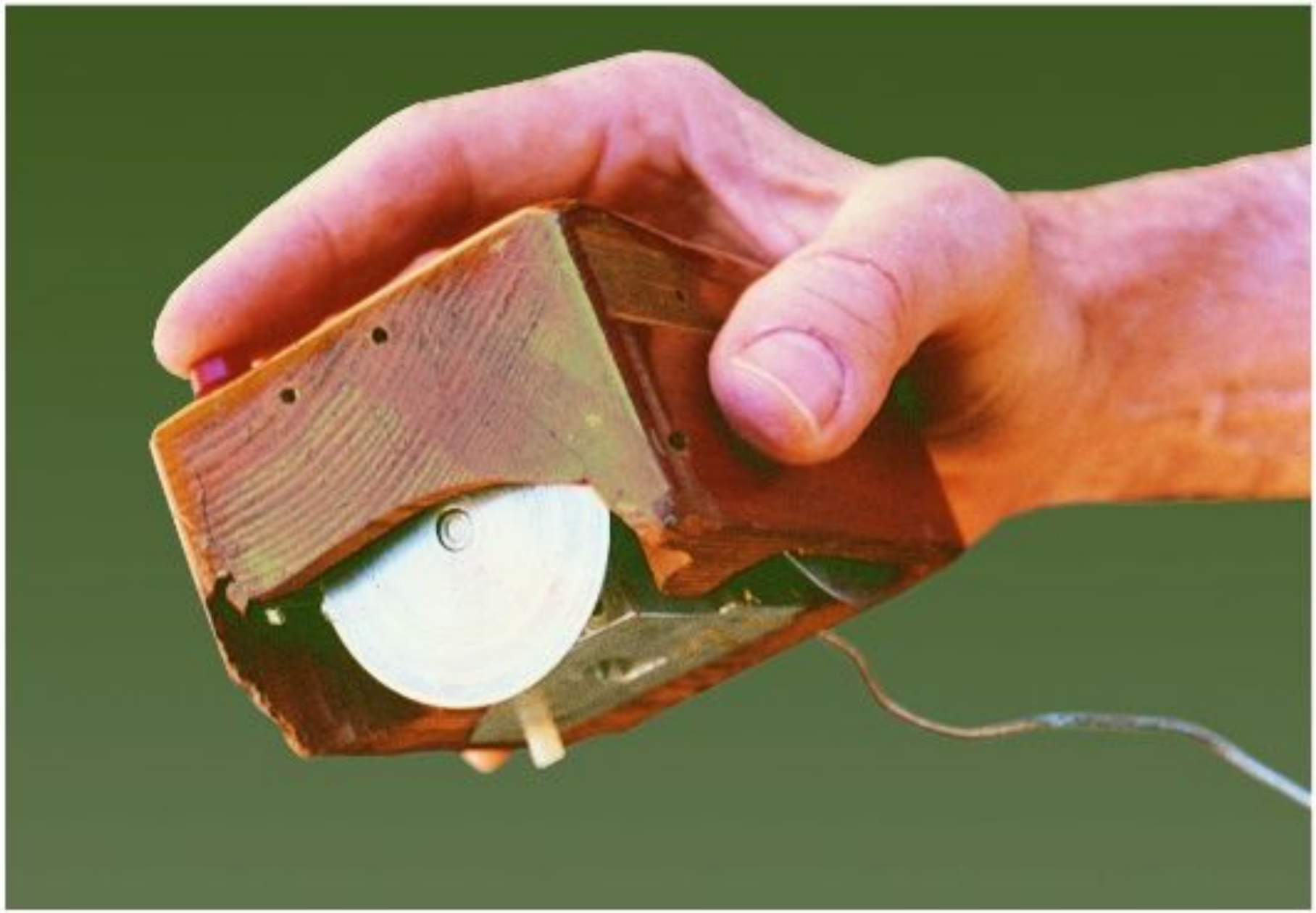
SketchPad by Ivan Sutherland at MIT (1963)

Direct manipulation of objects

SketchPad paved the way for the **Graphical** User Interface

Sutherland's PhD thesis also defined the terms "objects" and "instance"

SketchPad is the first **object-oriented** programming system



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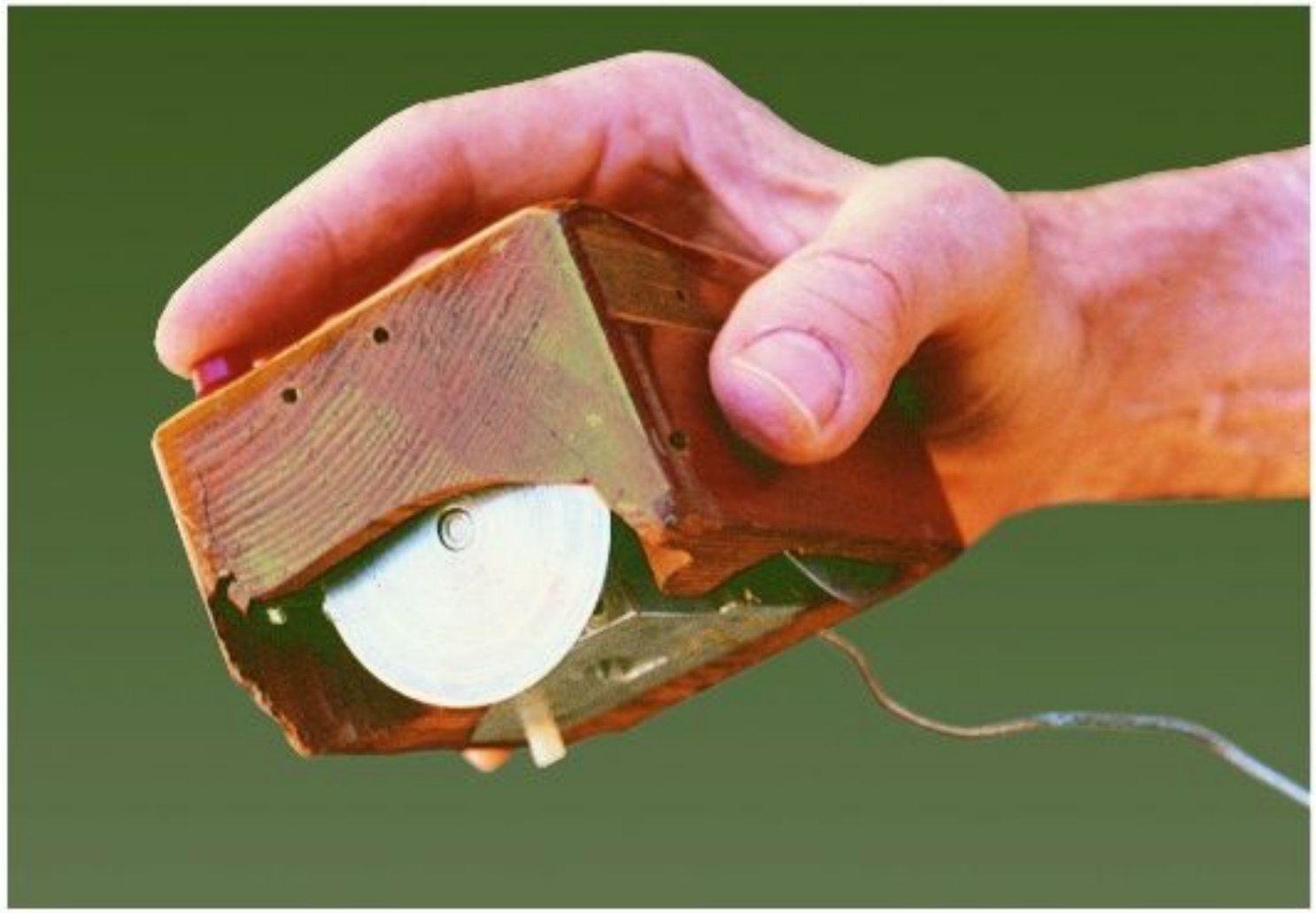
First mouse by Engelbard at Stanford (1963)



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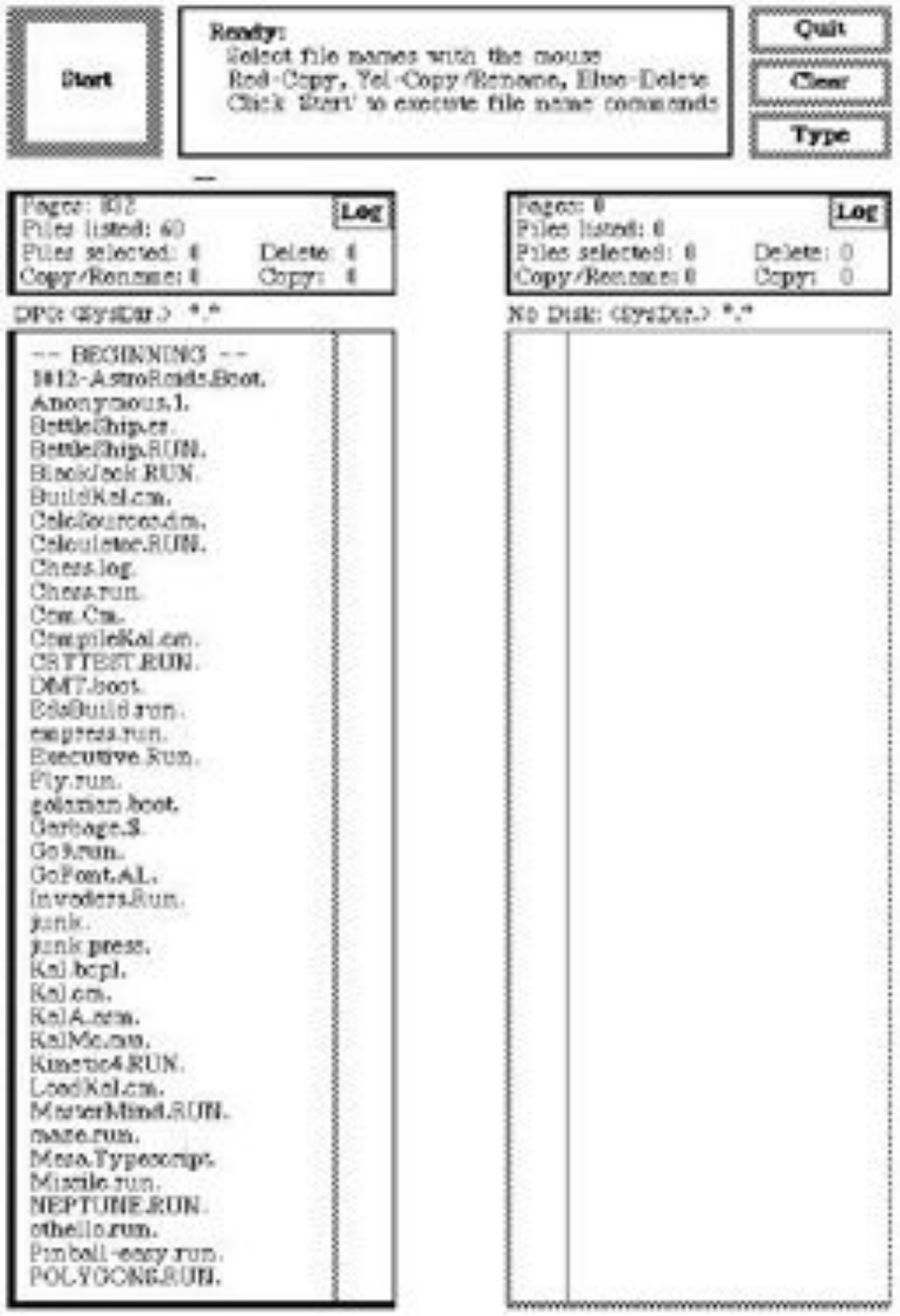
Nothing eventful happened in the next 10 years…

Xerox Alto (1973)

Xerox Alto


Start
Ready:
Select file names with the mouse
Red-Copy, Yel-Copy/Rename, Blue-Delete
Click 'Start' to execute file name commands
Quit
Clear
Type
Log
Log
-- BEGINNING --
1812-AstroRoids.Boot.
Anonymous.1.
BattleShip.cr.
BattleShip.RUN.
BlackJack.RUN.
BuildKal.cm.
CalcSources.dm.
Calculator.RUN.
Chess.log.
Chess.run.
Cow.Cm.
CompileKal.cm.
CRTTEST.RUN.
DMT.boot.
EdsBuild.run.
empress.run.
Executive.Run.
Fly.run.
goldman.boot.
Garbage.3.
Go.run.
GoFont.AL.
Invaders.Run.
junk.
junk press.
Kal.bcpl.
Kal.cm.
KalA.asm.
KalMc.mu.
Kinetic4.RUN.
LoadKal.cm.
MasterMind.RUN.
maze.run.
Mesa.Typescript.
Missile.run.
NEPTUNE.RUN.
othello.run.
Pinball-easy.run.
POLYGONS.RUN.

VisiCalc (1979)

VisiCalc was the **Killer App** for Personal Computers

Turned the microcomputer from a hobby for nerds into a serious thing

Because of it, IBM introduced the IBM PC 2 years later

Suddenly, small and large business bought computers

With the emergence of personal computing in the late 1970s, everyone became a potential computer user…

With the emergence of personal computing in the late 1970s, everyone became a potential computer user…

… but computer users still had to deal with arcane commands and system dialogs

Xerox Star (1981)

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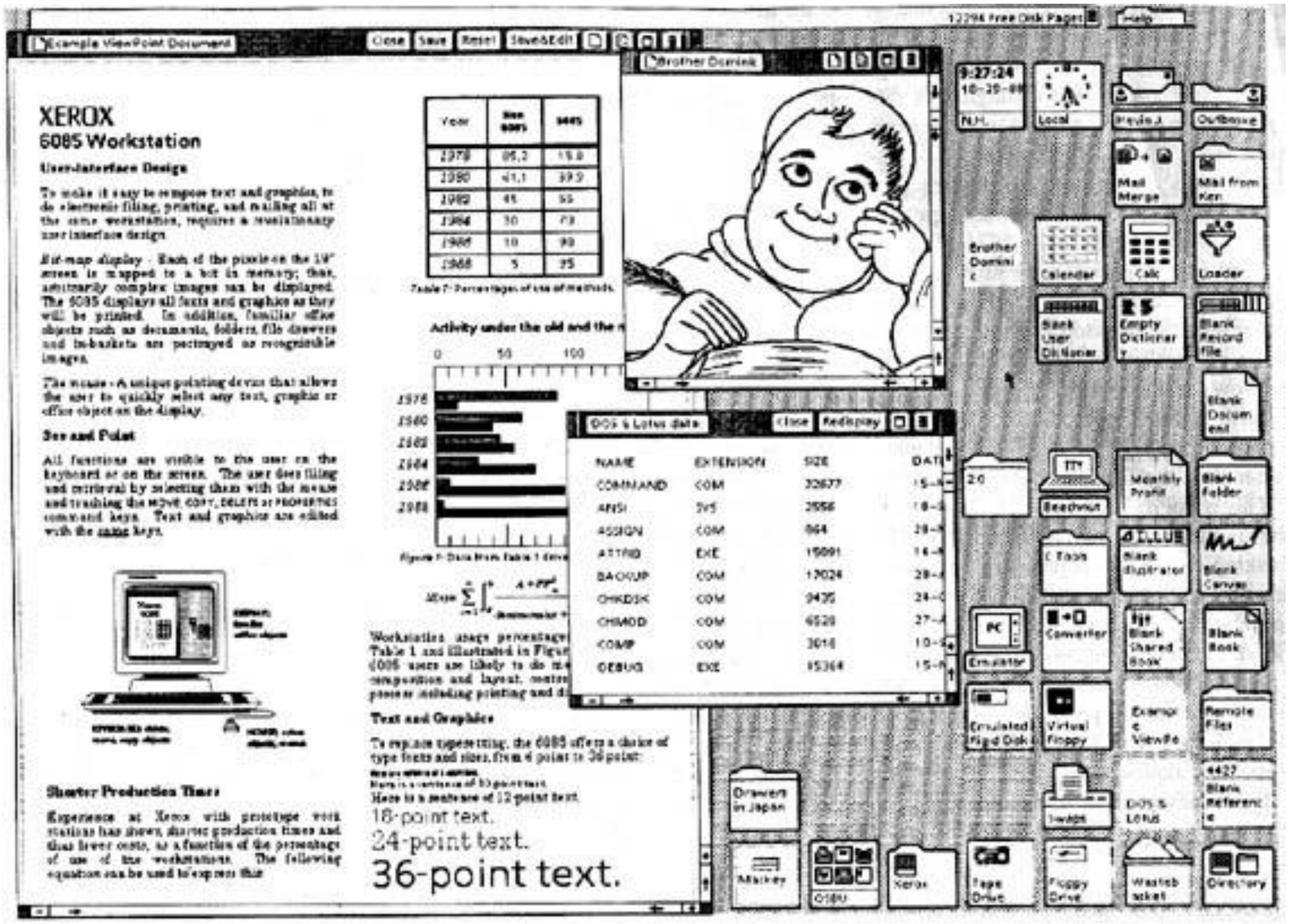

Apple Lisa (1981)

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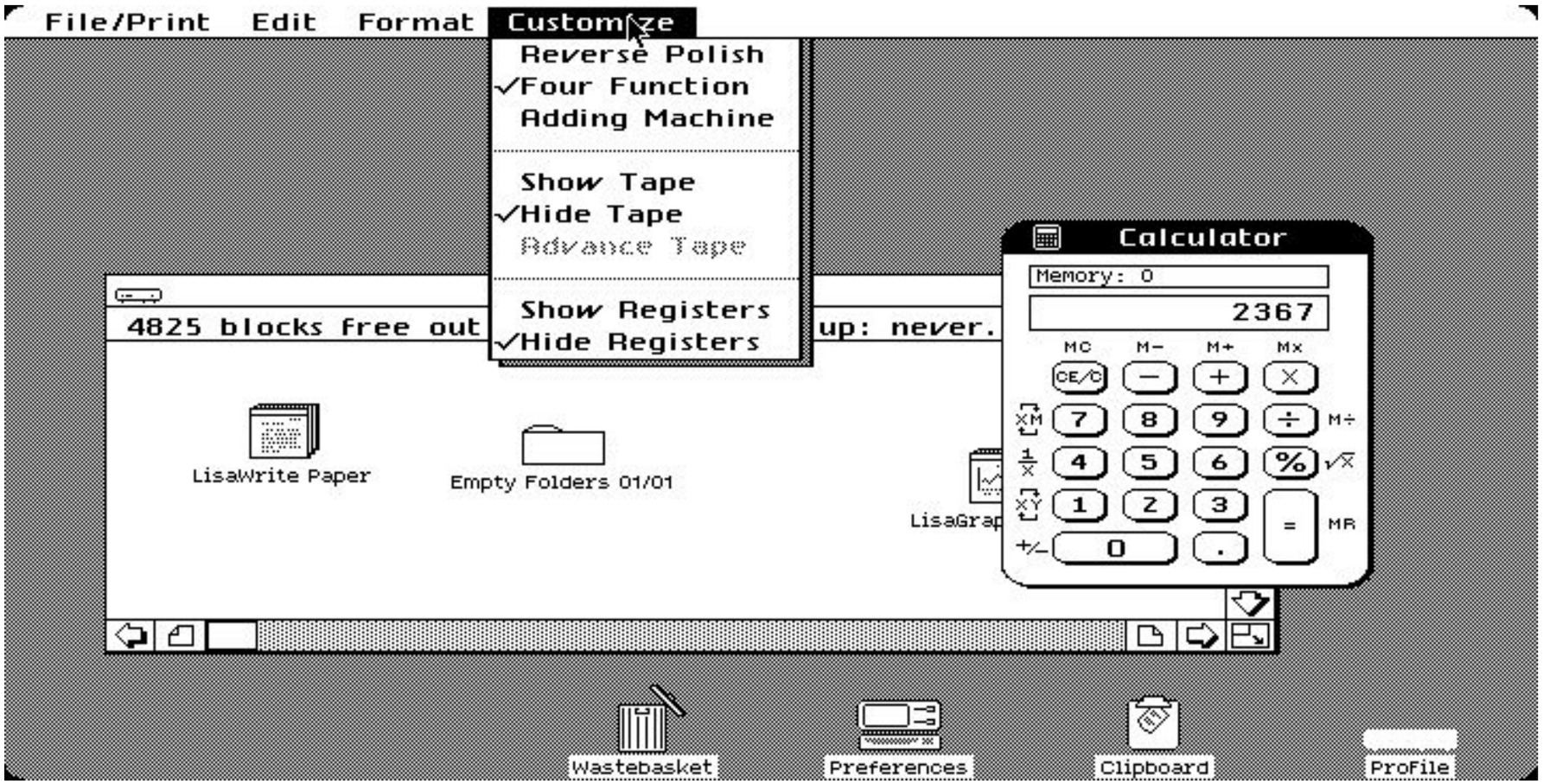
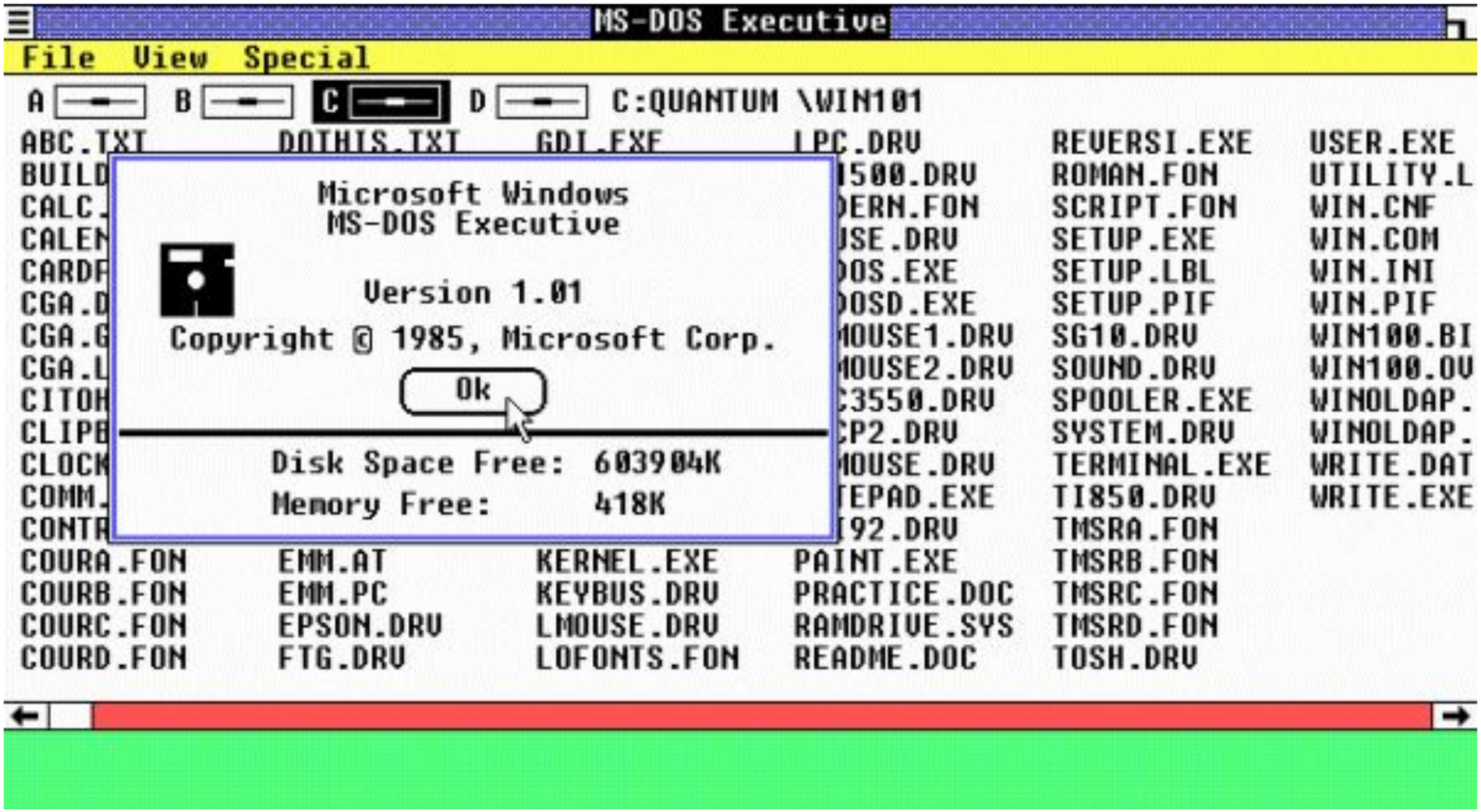
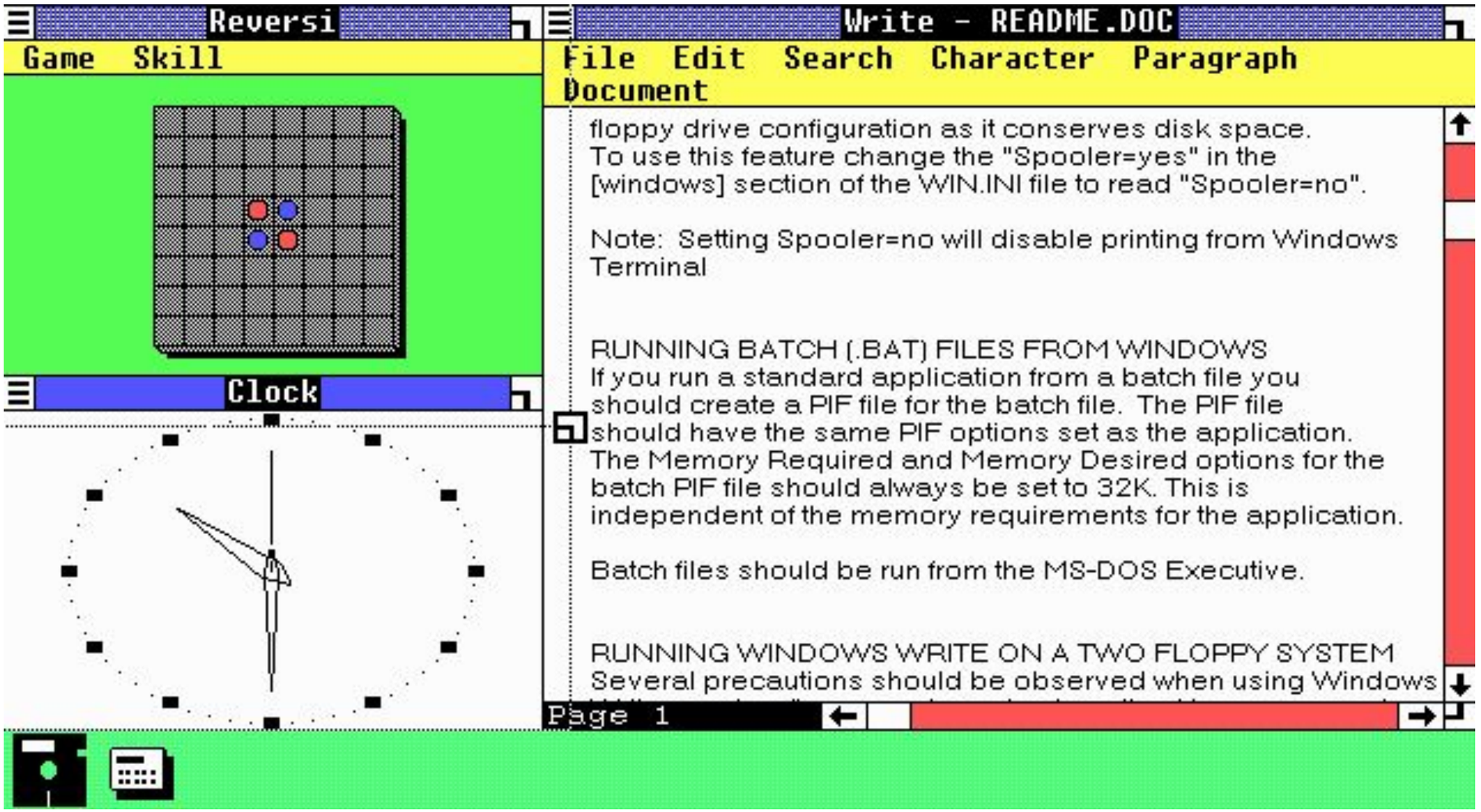


Apple Mac (1984)

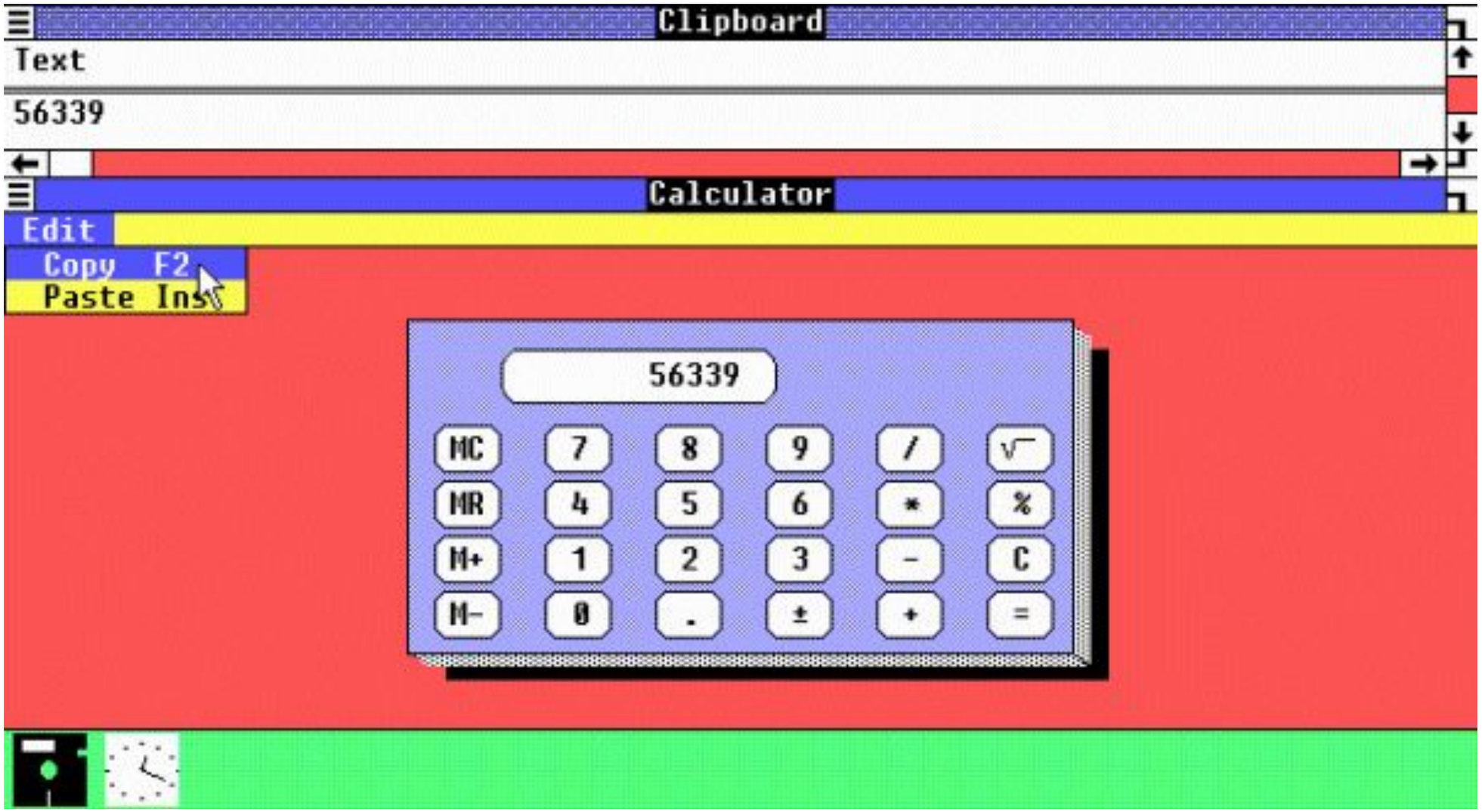
Windows 1.0 (1985)



Windows 1.0 (1985)



Windows 1.0 (1985)



Windows 2.0 (1987)

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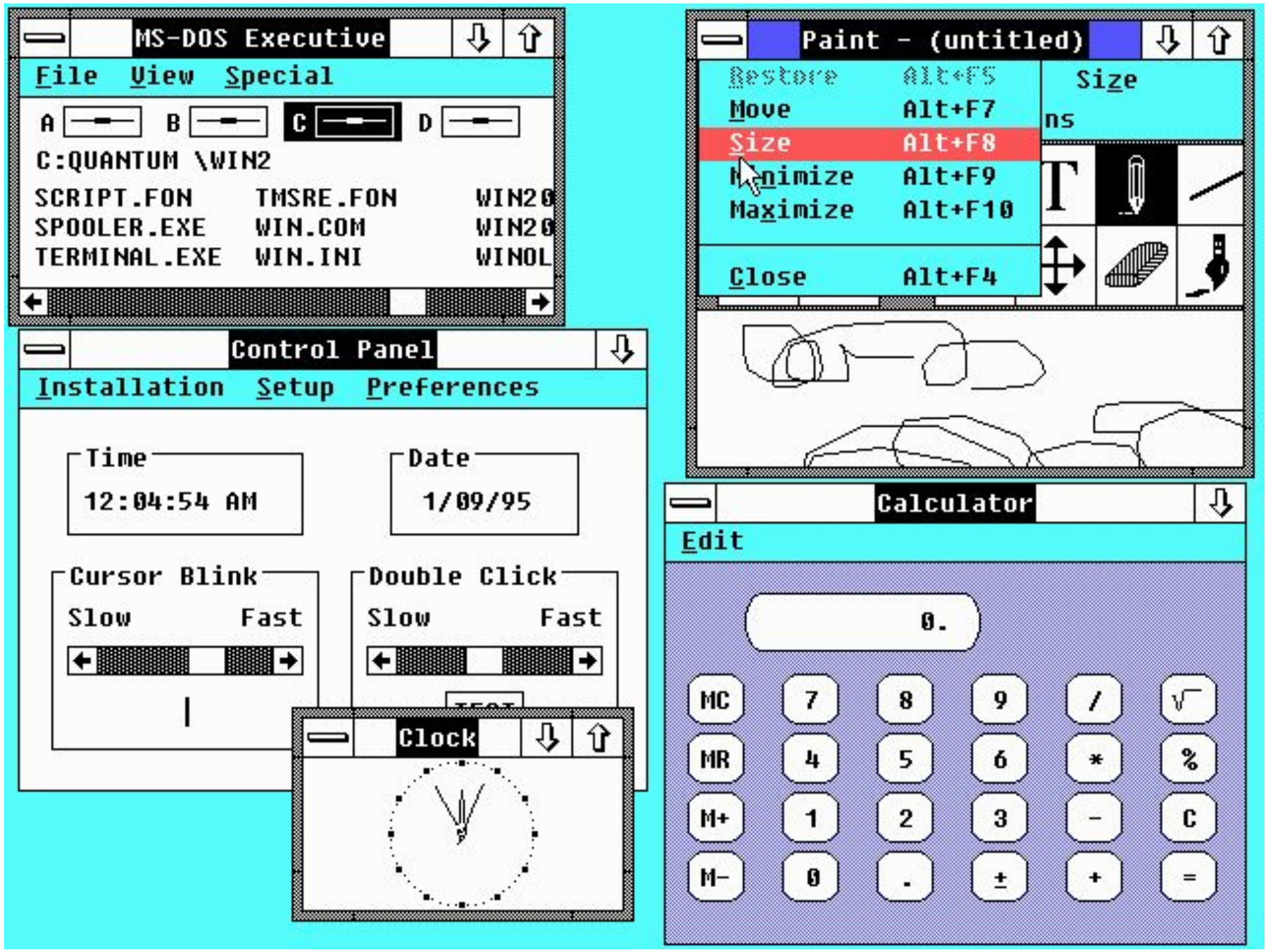
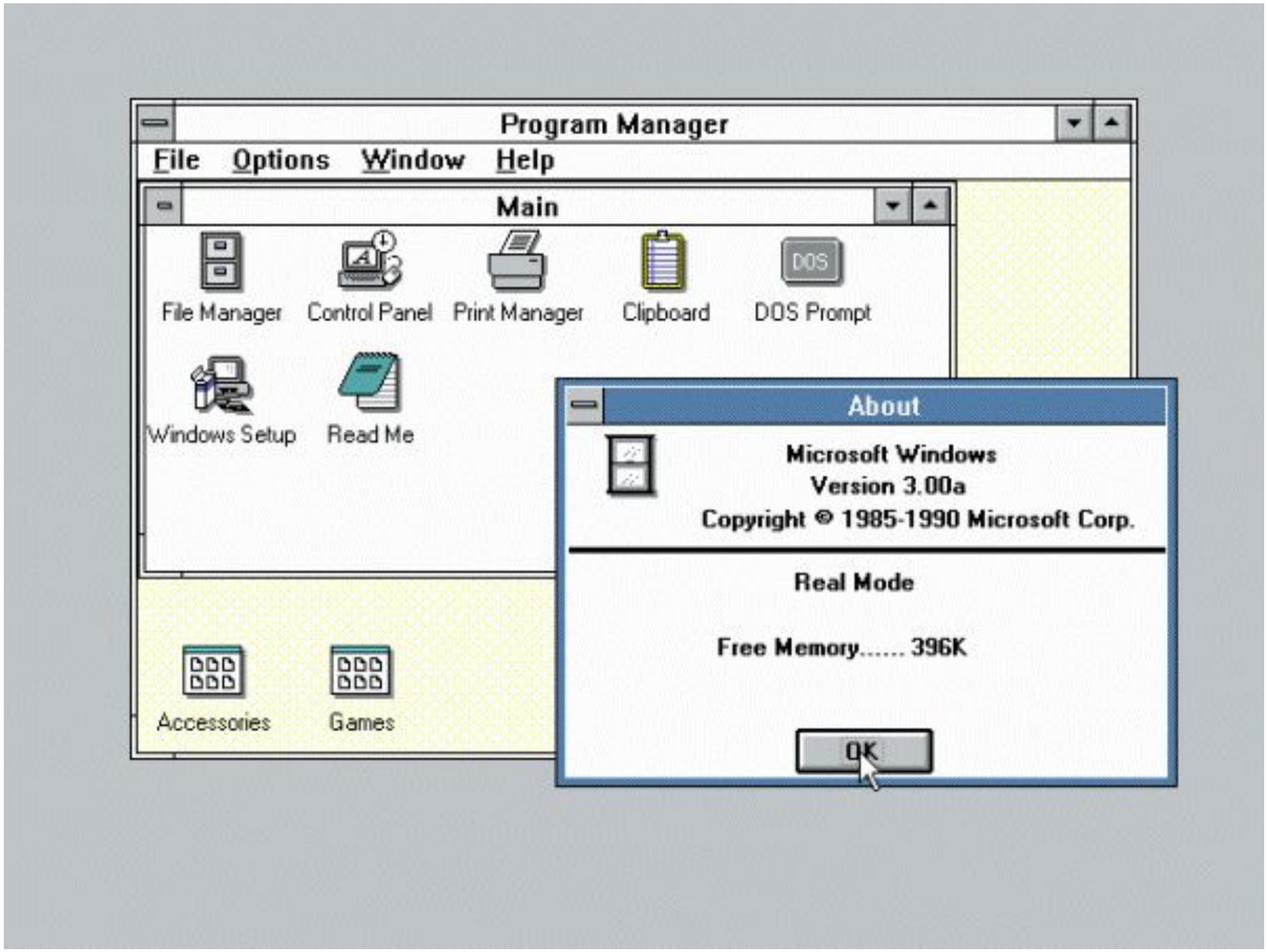
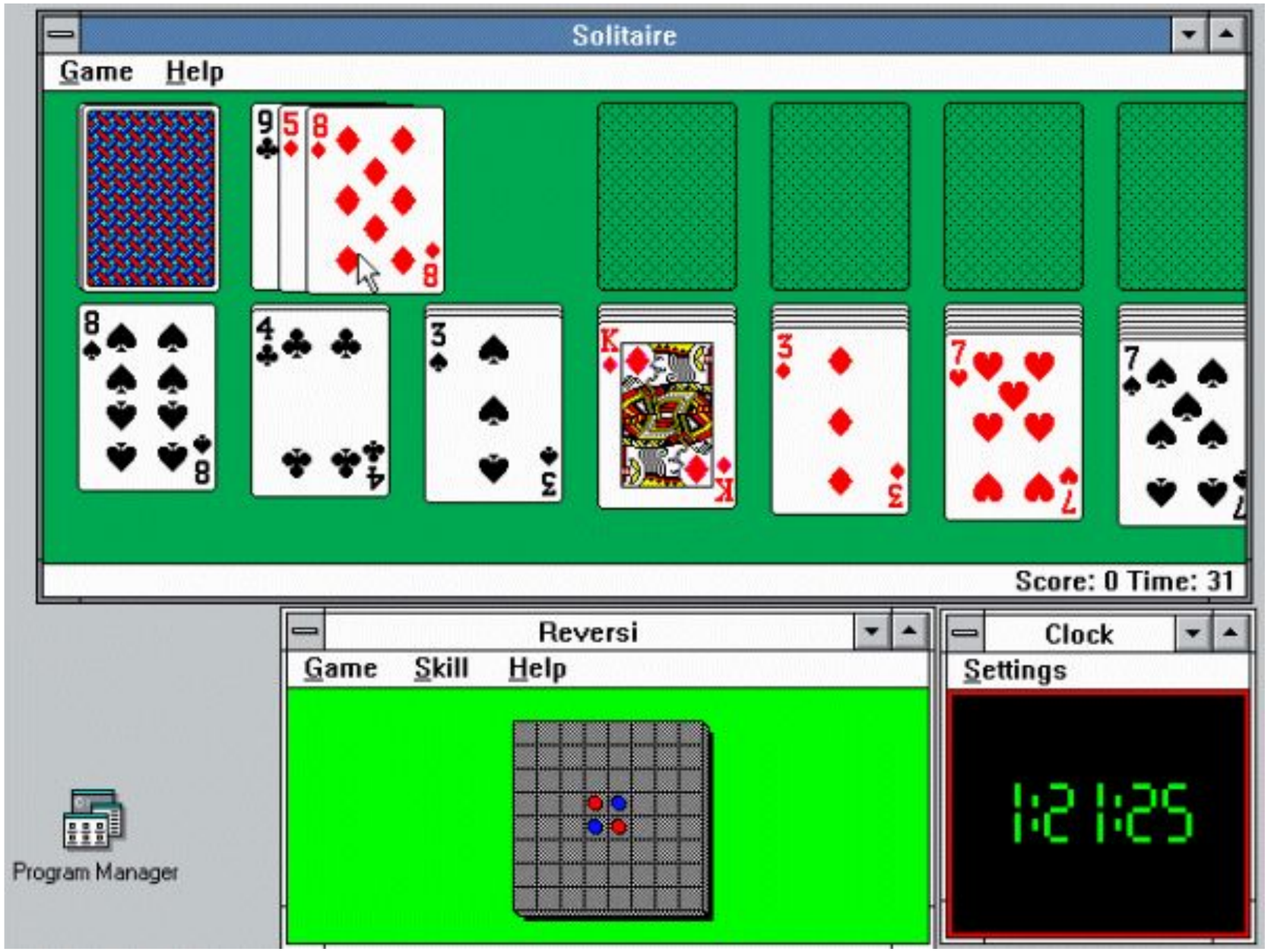


Windows 3.0 (1990)



Windows 3.0 (1990)



World Wide Web (1990)

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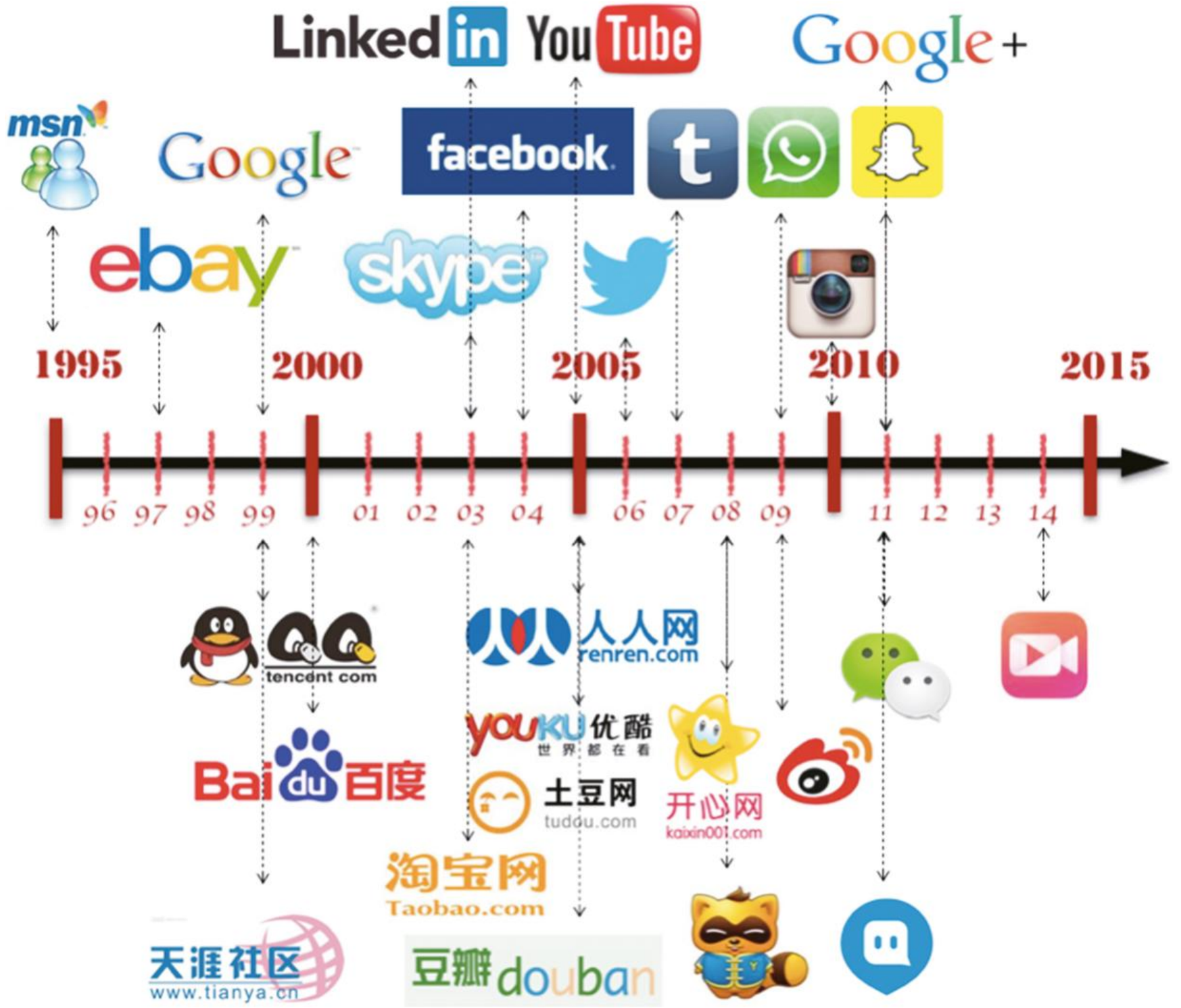
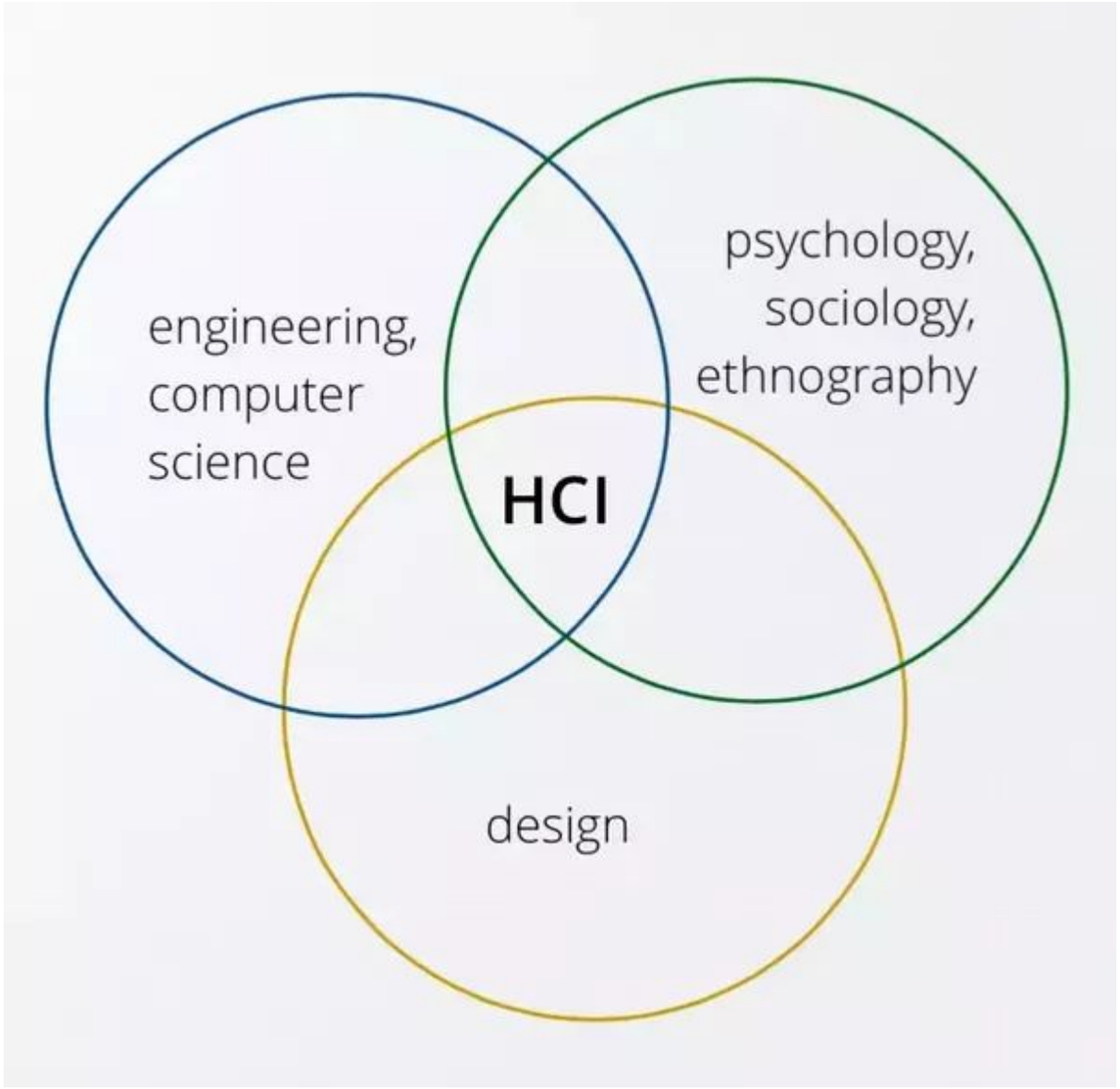


https://ucldigitalpress.co.uk/Book/Article/17/42/1216/



"HCI is concerned with understanding the influence technology has on how people think, value, feel, and relate and using this understanding to inform technology design." Wright & McCarthy (2008)

HCI’s impact on society

We can now use computers as an every-moment-partner

Less and less training is required for most application and devices

Some examples

- Touch screen: direct interaction with objects
- Voice control: for some people the only way to interact with computers

HCI’s impact on culture

Smartphones have changed how we spend our "empty times": should we read the news? answer emails? chat with friends? play "2 Dots"? should we just be bored?

Social Media have influenced how we stay in touch with each other and how find new friends and lovers.

Games, more than entertainment, can be used as social and even productive tools.

HCI’s impact on economy

Massive increase in productivity

HCI found how to speed up input and reduce its complexity

People can perform tasks faster than they used to

Reduced need for training

More people can use technology than ever before

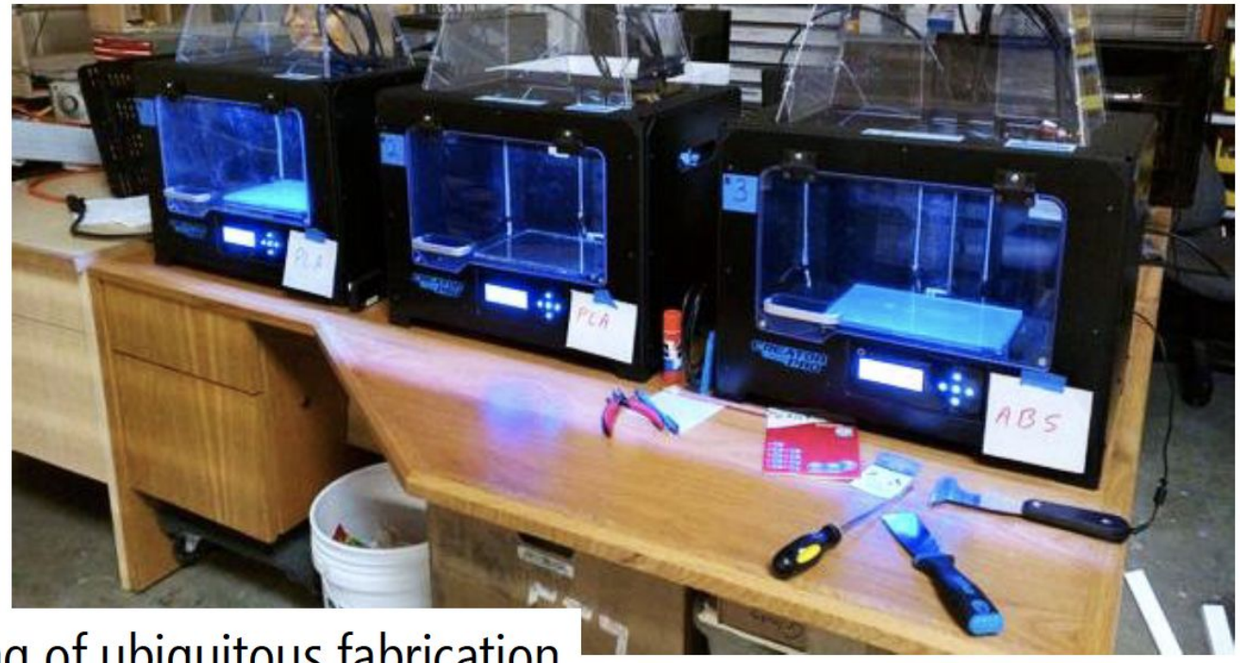
What now???

Fabrication (3D Printing) in HCI

1987
The first commercial 3D printer
SLA-1 printer by 3D Systems Inc.
Invented by Charles Hull

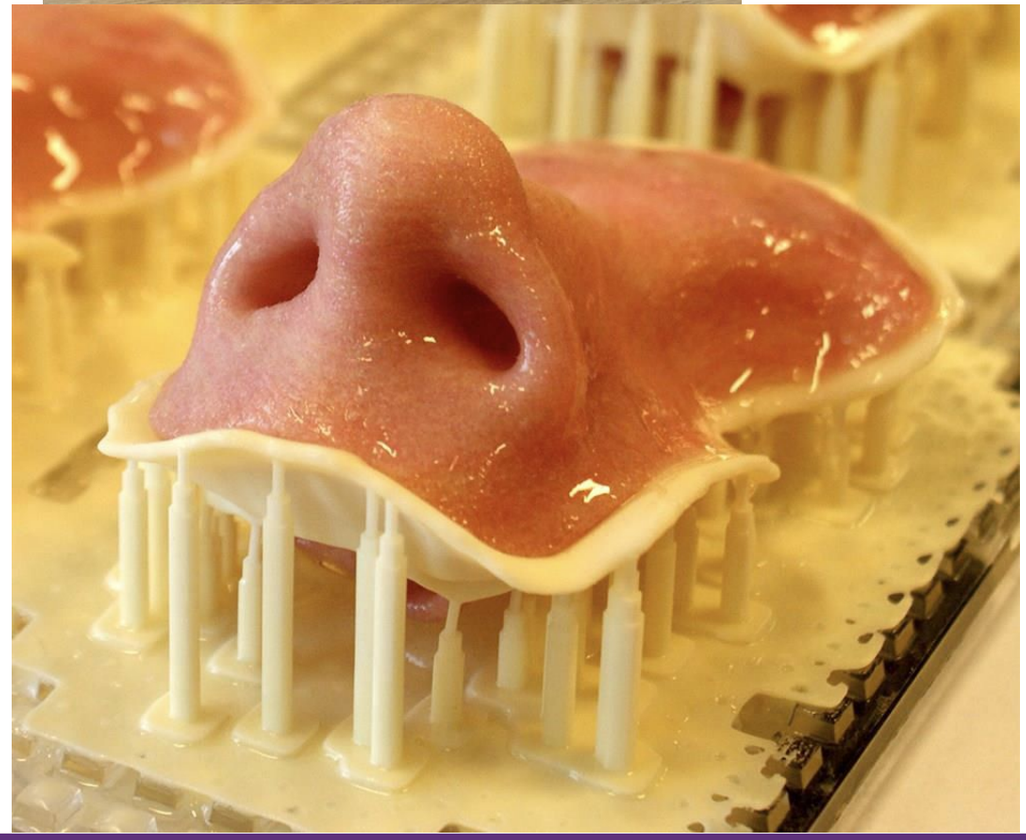
1992
The first commercial FDM printer
3D Modeler by Stratasys, Inc.
Invented by Scott & Lisa Crump

“The idea for the technology came to Crump in 1988 when he decided to make a **toy frog for his young daughter using a glue gun loaded with a mixture of polyethylene and candle wax**. He thought of creating the shape layer by layer and of a way to automate the process. In April 1992, Stratasys sold its first product, the 3D Modeler.”



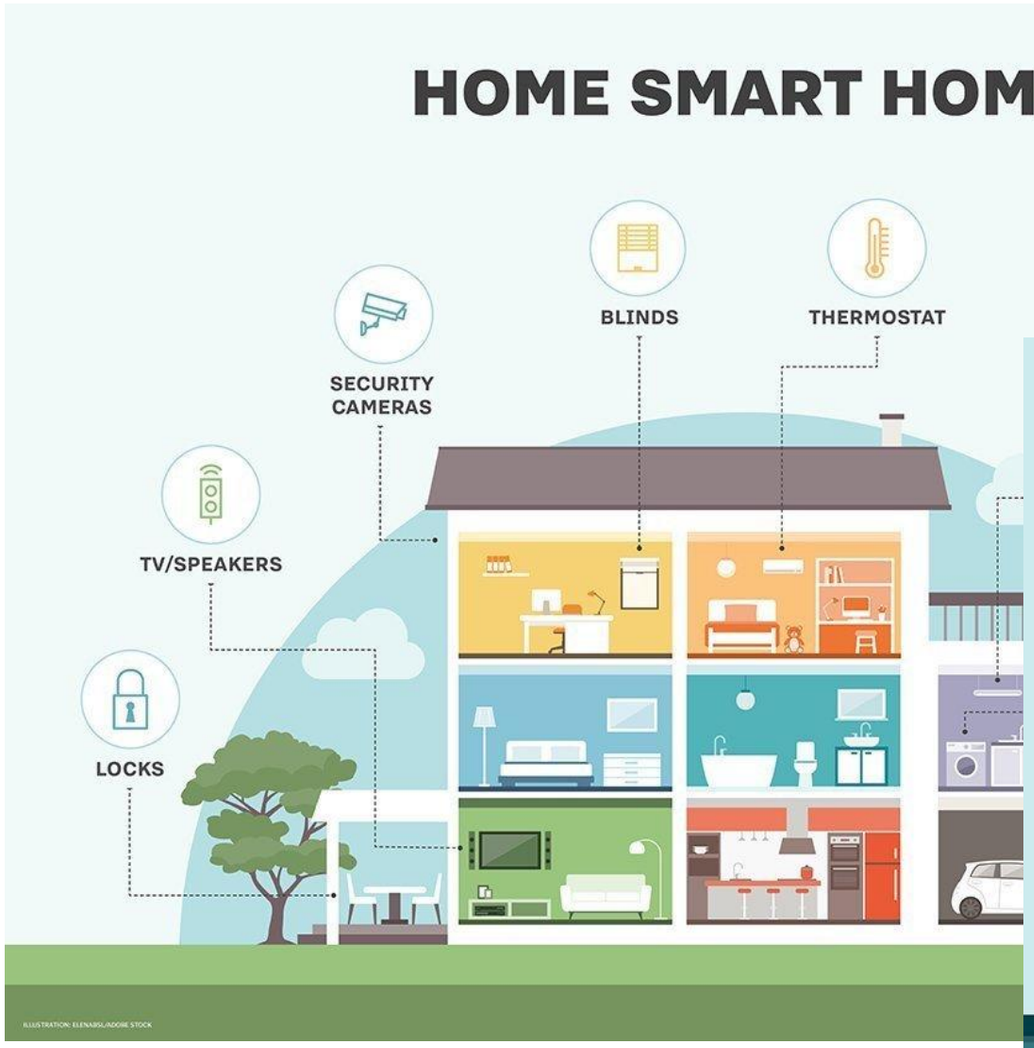
2009 marked the beginning of ubiquitous fabrication

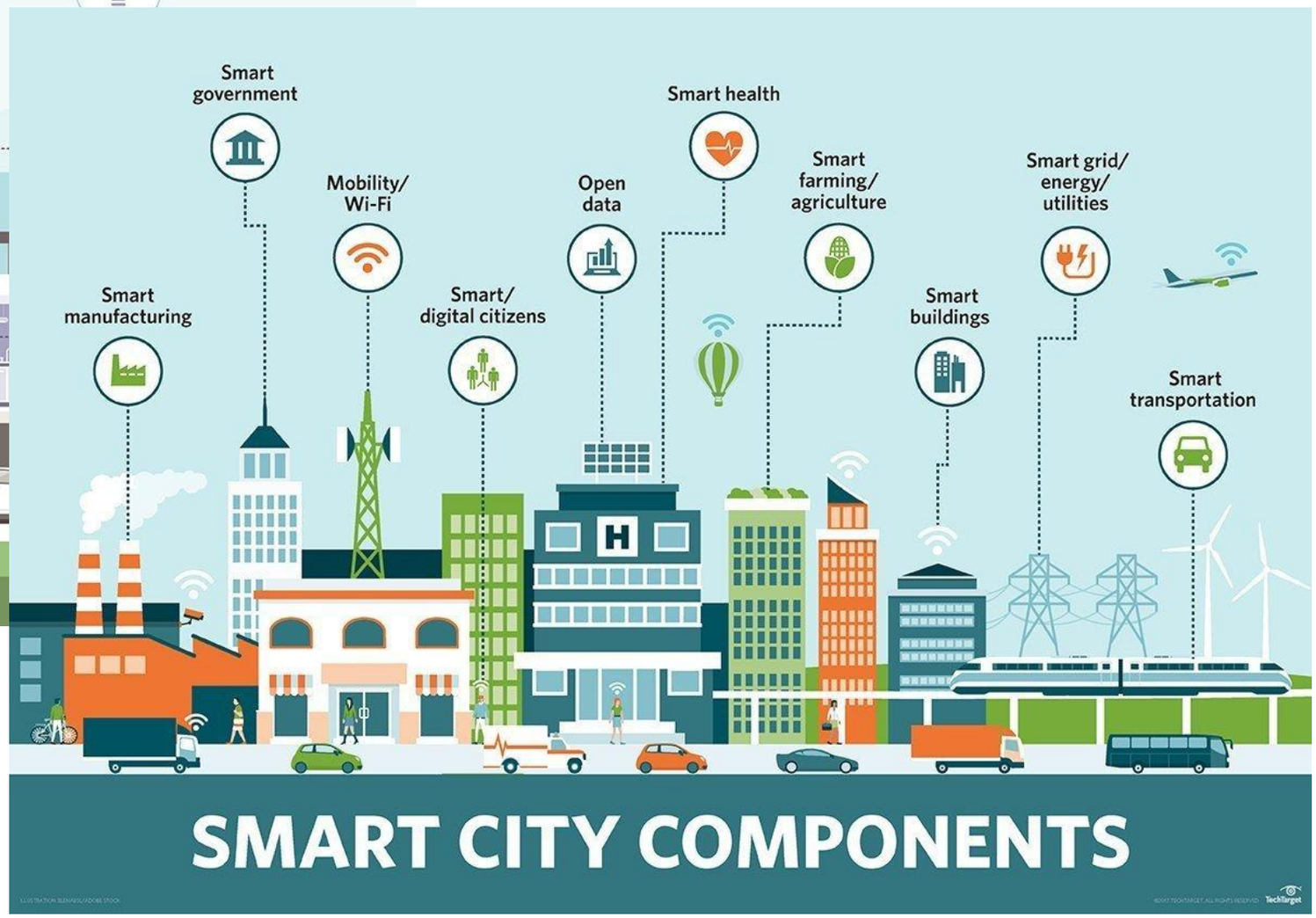
54
LGND



3D Printing pancakes using FDM

Society as the next platform





https://internetofthingsagenda.techtarget.com

And beyond (VR/AR)

And beyond (VR/AR)

https://vimeo.com/325863364#t=895s

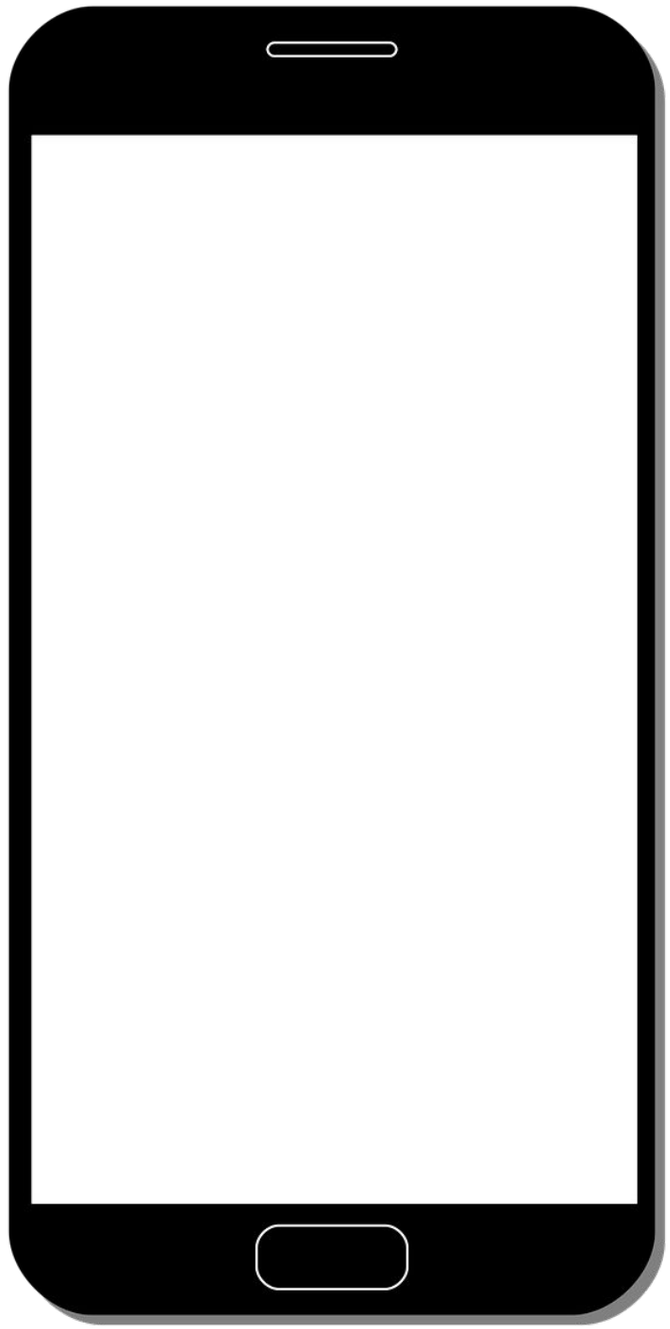
Activity

Activity (10 minutes)

In light of the next steps of socio-technology:

How would you reimagine this thing?

TASK: In pairs, create an innovative concept that will push our pocket devices into the future of interactive technology!

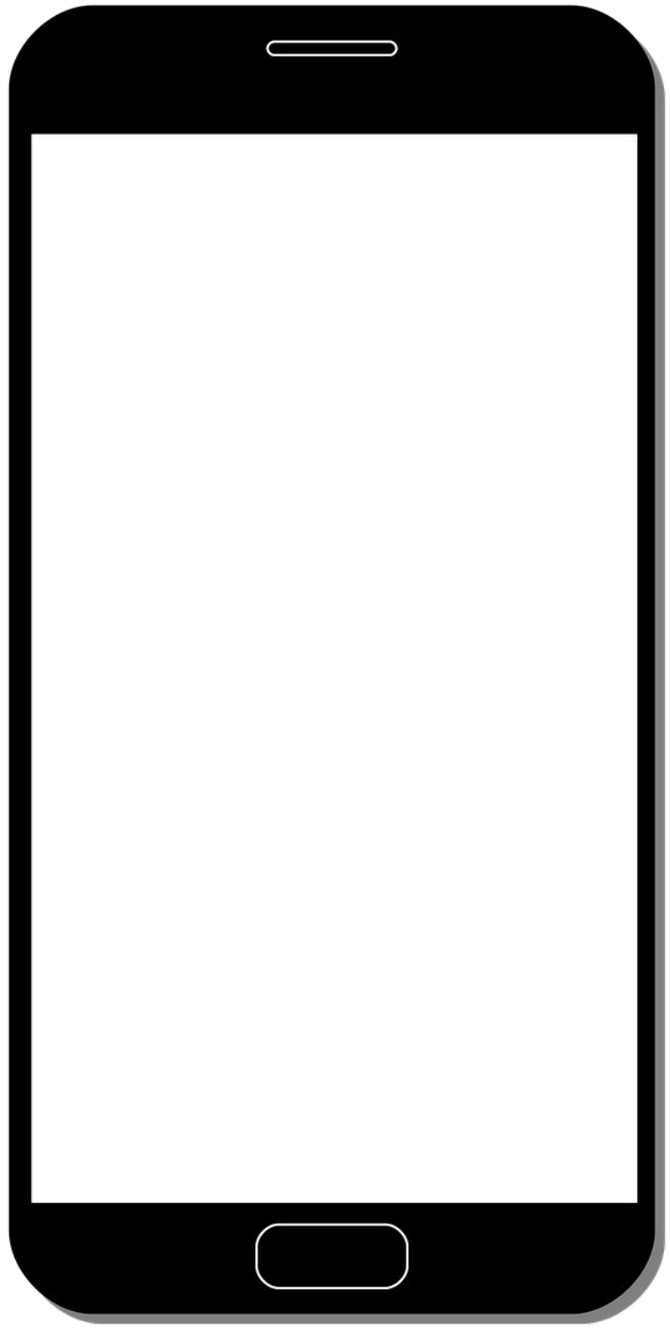


Reflection

What did you come up with?

What were the challenges?

How did your process differ from what you did on Tuesday?



Ask me something!