Design Thinking and Advanced Prototyping

ELEC-C9821 – UX and Visual Design

Aalto University
School of Electrical
Engineering

Salu Ylirisku

15.3.2023

Today’s agenda

09:15 - 10 Lecture

1. What is UX

10:15 - 12 Workshop

3. Prototype V2 goals and reqs
4. Discussion

What is User eXperience (UX)

Tools for the mind

Robin Willians (a graphic designer) got a book to identify trees for Christmas. Decided to go out to identify a few.

Name: *Joshua tree*

“Oh, we don’t have that kind of tree in Northern California. That is a weird-looking tree. I would know if I saw that tree, and I’ve never seen one before.”

I took a walk around the block, and there must have been a sale at the nursery when everyone was landscaping their new homes—at least 80 percent of the homes had Joshua trees in the front yards. *And I had never seen one before!*

Joshua tree

The Non-Designer’s Design Book, Third Edition
Williams, Robin (2008) Safari, an O’Reilly Media Company.

Words as tools for the mind

- Words enable us to notice things
- Words enable to do this together
- Words enable us to plan according to what we notice
- Words enable us to act towards what we notice
- Words enable us to reflect on our experiences about what they enable us to notice

Why did this term UX emerge?

- What work does this term do for us?
- What does it enable us to talk about?
- What does it enable us to plan, act, and reflect?
- When did it appear?
- Why then and not earlier?

Good design as an aim

Remember the varieties of goodness?

Words about the ‘aims’ of design

1.	**Make it possible**	**Utilitarian goodness**
2.	**Make it superior**	**Technical goodness**
3.	**Make it safe**	**Medical goodness**
4.	**Make it usable**	**Instrumental goodness**
5.	**Make it pleasurable**	**Hedonic goodness**
6.	**Make it sustainable**	**The good of human**

Possible
Superior
Safe
Usable
Pleasurable
Sustainable

Designing smart machinery for humans

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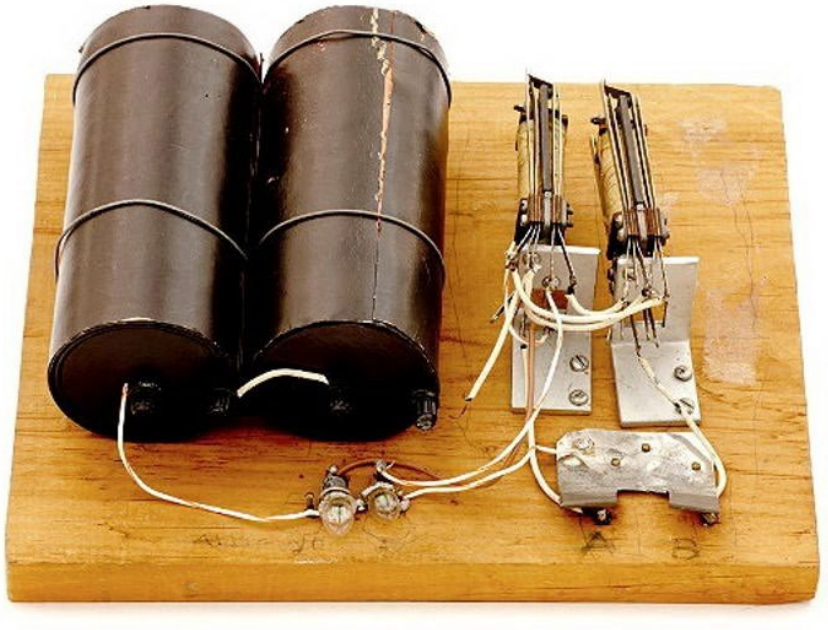
1930s

Possible

Bell Labs /

George Stibitz

- Proof of concept
- “Model K” adder made with relays
- K is for Kitchen table



https://www.computerhistory.org/timeline/1937/

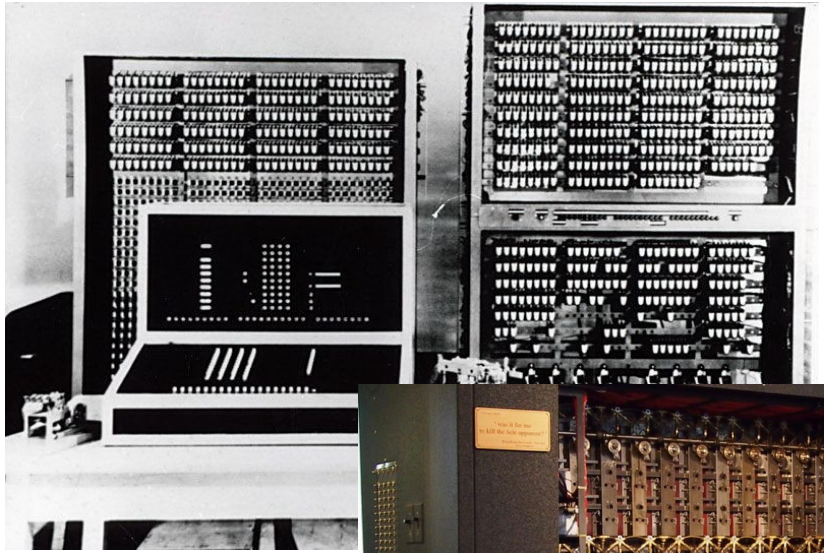
More on adder in electronics:
https://en.wikipedia.org/wiki/Adder_(electronics)

1940s

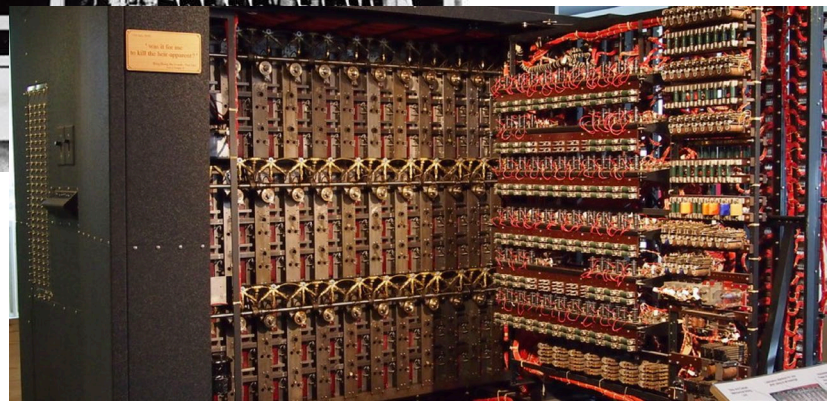
Superior

Konrad Zuse

- Z3 computer
- The first programmable computer
- 2300 relays
- 5-10 Hz



1941



Alan Turing’s Bombe 1941
(based on Marian Rejewski's 1938 "Bomba.”)

1943 first electronic computer ENIAC built

1948 random access memory RAM invented

1940sSide note… The B-17 design failure

Crash landings

“..in 22 months, there had been at least 400 crashes...”

Blaming the pilots at first, but..

..it was a design failure!

Instead of landing gears, the pilots triggered the flaps.

https://medium.com/swlh/the-flying-fortress-fatal-flaw-694523359eb

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New words invented for designers

Aviation Psychologist Alfonse Chapanis who studied the B-17 case:

- **“Designer Error”**
- **“Shape Coding”**

Chapanis, A. (1953). Psychology and the Instrument Panel. *Scientific American, 188*(4), 74–82. doi:10.1038/scientificamerican0453–74

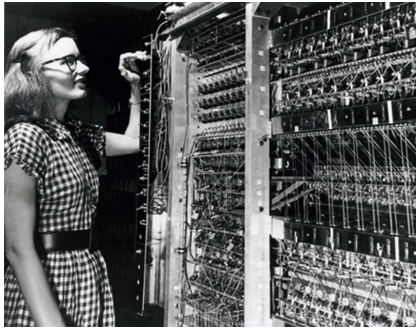
https://medium.com/swlh/the-flying-fortress-fatal-flaw-694523359eb

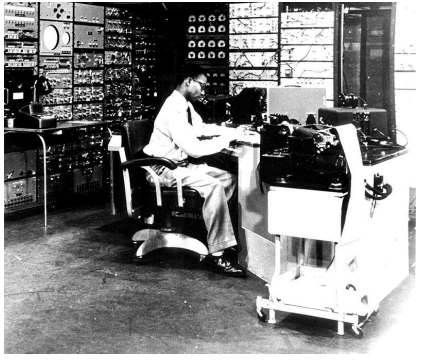
1950s

Possible
Superior

1952 Data and instructions stored in memory (not looking very user friendly)

1956 Direct keyboard input





1952
Institute of Advanced Study (IAS) computer

1956
Flexowriter / MIT

Usable

Psychologist John E. Karlin / Bell Labs
First keypad to phones, 1959

1958

Possible
Superior
Usable

First computer pointer device

“Operators directed actions by touching a light gun to the SAGE airspace display.”

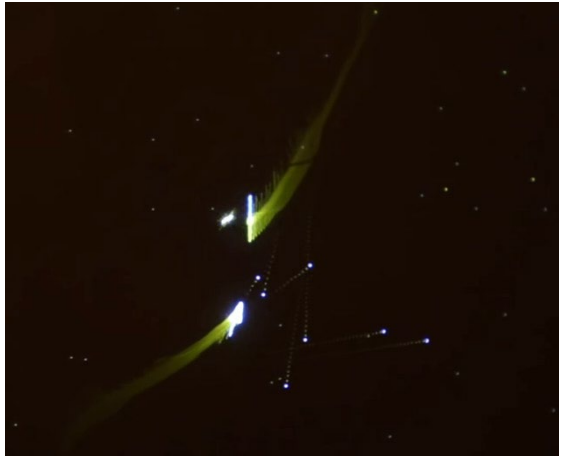
Used a full megawatt of power to drive its 55,000 vacuum tubes, 175,000 diodes and 13,000 transistors

https://www.computerhistory.org/timeline/1958/

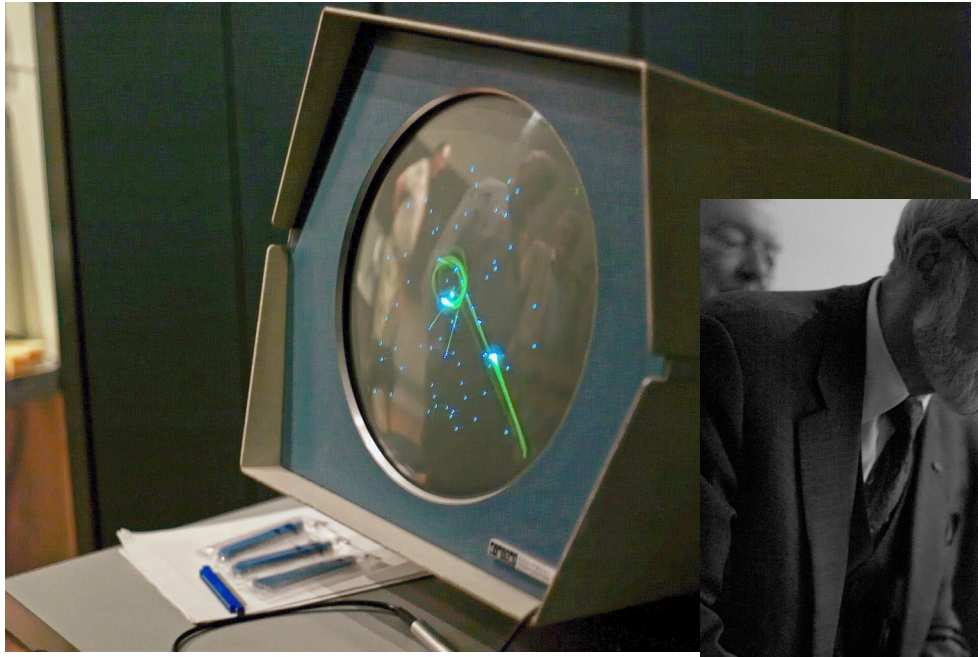
1960s

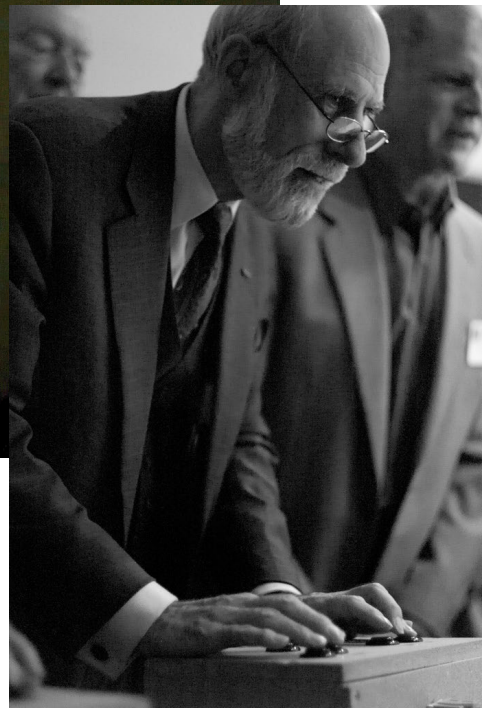
Possible
Superior
Pleasurable

1962 The first visual computer game Space War!



https://en.wikipedia.org/wiki/Spacewar!





Someone might call this **UX** today!

1964 – computers getting easier to duplicate and transport

Superior

“A small, general purpose computer”

PDP-8 by DEC

1968 – Computers get mobile

Apollo Guidance Computer (AGC)

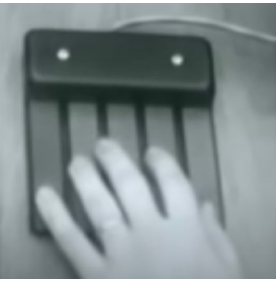
“Astronauts communicated with the computer by punching two-digit codes into the display and keyboard unit (DSKY).”

https://www.computerhistory.org/timeline/1968/

1968 – The mother of all demos

Possible
Superior
Usable
Pleasurable

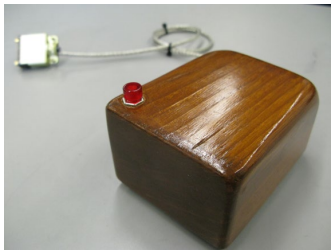
Standford Research Institute (SRI) /
Doug Engelbart & Team

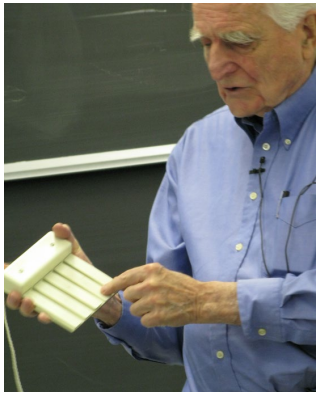


- The computer mouse
- 2-dimensional display editing
- In-file object addressing, linking
- Hypermedia
- Outline processing
- Flexible view control
- Multiple windows
- Cross-file editing
- Integrated hypermedia email
- Hypermedia publishing
- Document version control
- Shared-screen teleconferencing

- Computer-aided meetings
- Formatting directives
- Context-sensitive help
- Distributed client-server architecture
- Uniform command syntax
- Universal "user interface" front-end module
- Multi-tool integration
- Grammar-driven command language interpreter
- Protocols for virtual terminals
- Remote procedure call protocols
- Compilable "Command Meta Language"

https://www.youtube.com/watch?v=B6rKUf9DWRI





“Show, rather than tell”

1970s

Superior
Usable

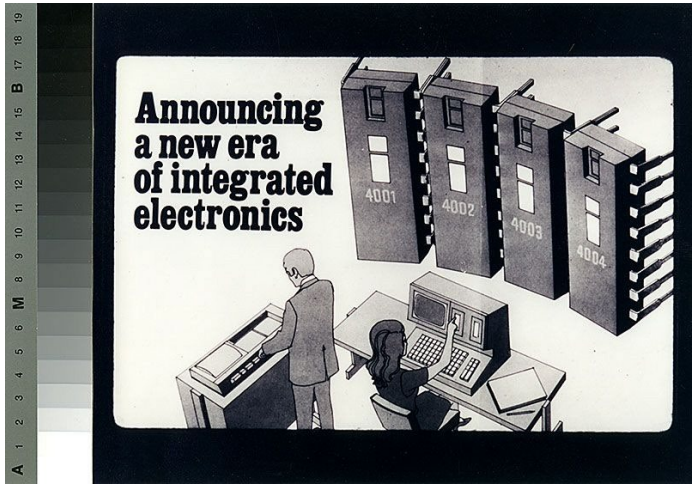
HP-35 Scientific calculator

- Pocketable
- Solid state memory

The first microprosessor

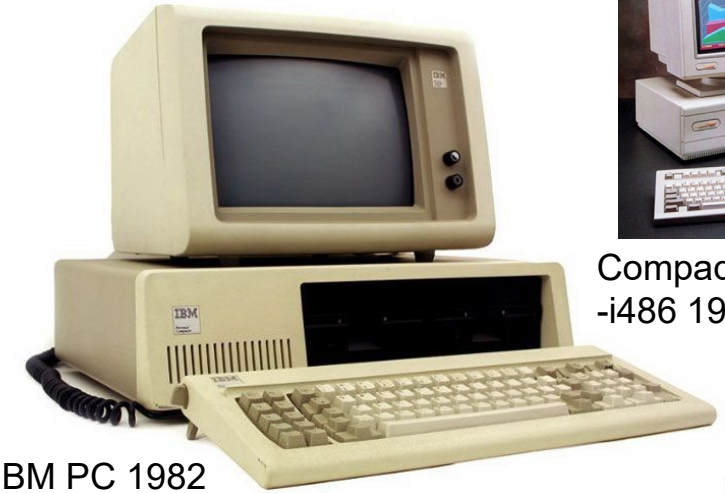
IBM 4004

- 2250 transistors, 90 Kops

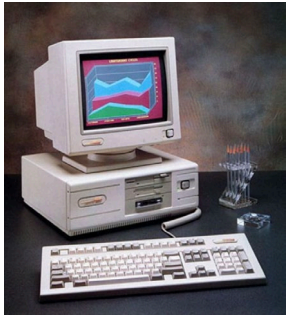


1980s

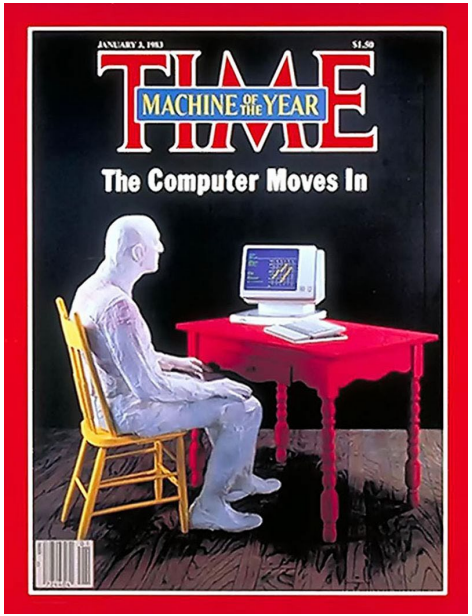
1980 VIC-20



IBM PC 1982

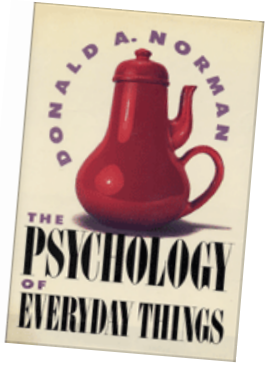


Compaq 386 1986
-i486 1989



Macintosh 1984

Nokia-Mobira
Cityman 1987



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User Experience mentioned! ->>
1988 by Donald A. Norman

1990s

Don Norman actively talks about UX inside Apple…

Apple PowerBook 1991

Apple Newton 1993

Sony Vaio 1996

Apple iMac 1998

Superior
Usable
Pleasurable

Nokia 101, 1992

Nokia 2110, 1995

Nokia 9110
communicator, 1996

Nokia 6110, 1998

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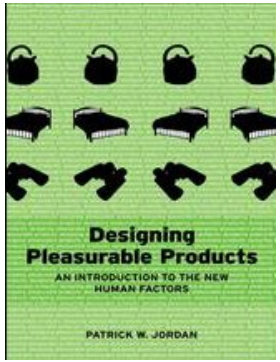
2000s

UX becomes a major topic in HCI research



Jordan P., 2000

First camera phones
(Sony J-Phone), 2000

Amazon Kindle 2007

Arduino 2005

Apple iPhone 2007

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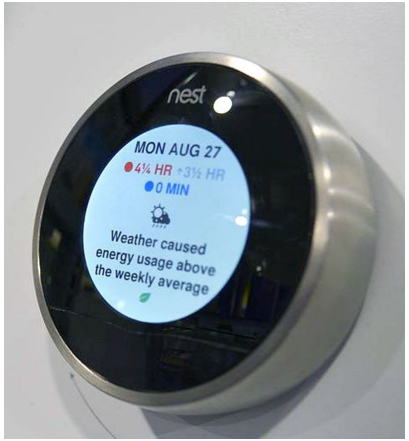
2010s

iPhone with retina display 2010



Nest learning thermostat, 2011

Apple watch, 2015

iPad 2010

Raspberry Pi, 2012

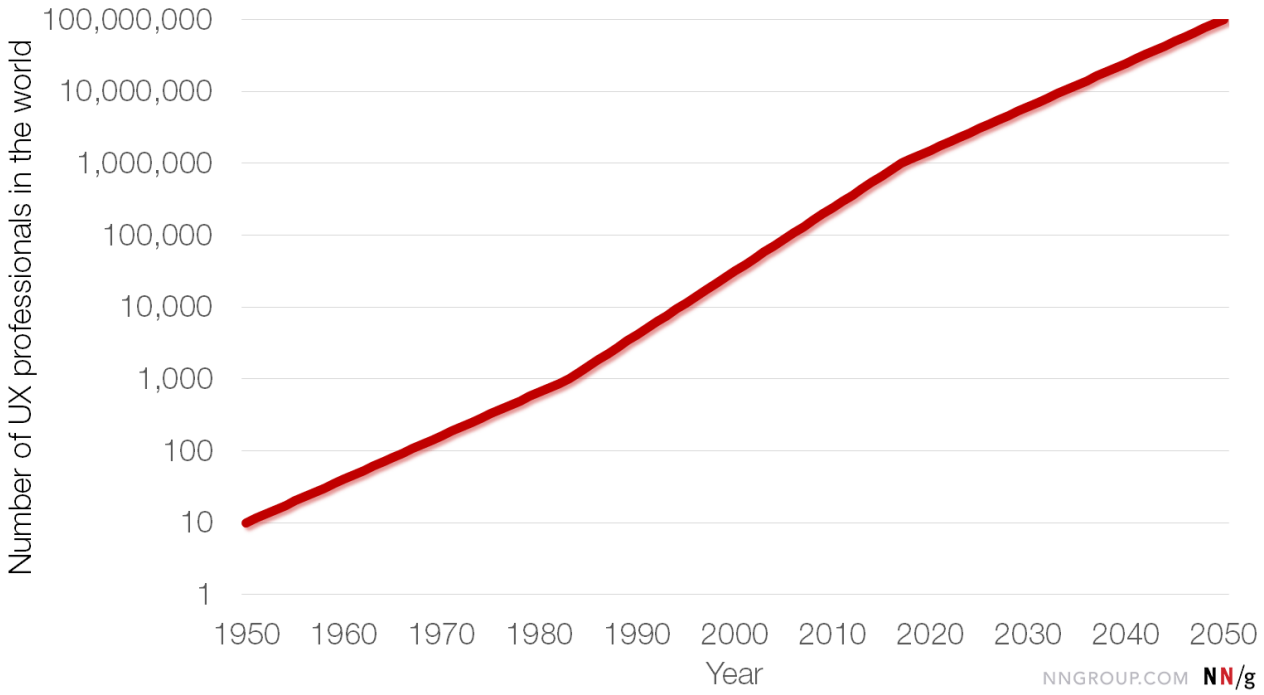
IoT…

2020s

ACM digital library
637,087 *Results for:* ***user experience***

The first one:
R. D. Huntoon. 1951. Factors influencing the effective use of computers. In Proceedings of the February 4-6, 1953, western computer conference (AIEE-IRE '53 (Western)). Association for Computing Machinery, New York, NY, USA, 5. https://doi.org/10.1145/1434821.1434823

https://www.nngroup.com/articles/100-years-ux/



Jacob Nielsen’s analysis

Why did UX emerge as a ‘hot new topic’ in the 2000s?

3 reasons:

- **The PC revolution of the 1980s**
- **The web revolution of the 1990s and 2000s**
- **The great press coverage of usability in 1990s and 2000s**

Why did this term UX emerge?

- What work does this term do for us?
- What does it enable us to talk about?
- What does it enable us to plan, act, and reflect?
- When did it appear?
- Why then and not earlier?

So what does the term UX do?

- **What does the term enable us to notice, make plans for, and to reflect on?**
- **What was the ‘blind spot’ that it highlighted in the history of designing machinery for humans?**

-- Presence Check --

Workshop: Prototype V2

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Prototype V2
Learning Goals and Requirements

Due this Friday!

Circuit Shop Schedule

We have a scheduler on MyCourses to help you to distribute across the week so that the small space does not get too full.

Circuit Shop (piiripaja) is located in front of the Electronics Workshop (Sähköpaja).

Available times are during the regular exercise times (may be adjusted if needed)

This week

- **Project: Return V2 goals & reqs. in MyCourses**
- **Write your weekly diary and submit it**
- **Exercises (mini project) (Fri 14-16, Mon 14-16, Tue 10-12)**
  - VOLUNTARY!