

Fundamentals of Human-Computer Interaction 2



Photos/collage by Jack L. Moffet in Dan R. Olsen, « Interacting in Chaos », Interactions, sept-oct 1999.

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Outline

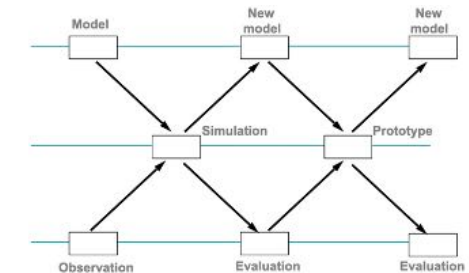
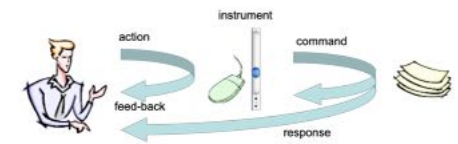
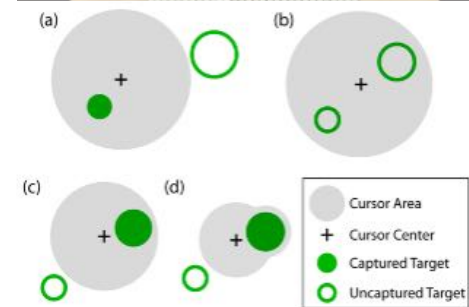
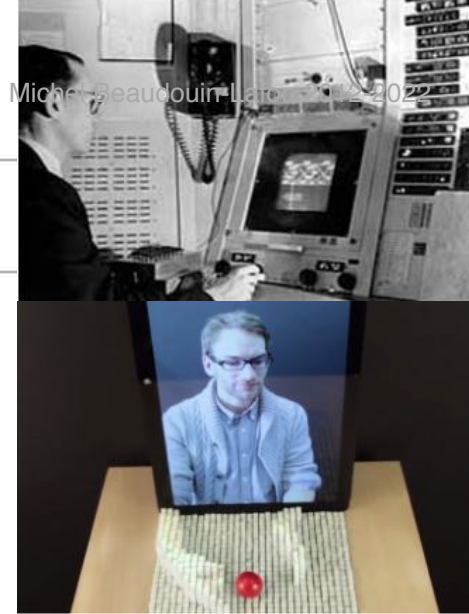
History

Advanced interaction styles

Pointing and navigation

Instrumental interaction

Theories and models for HCI



A short history of Human-Computer Interaction

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See Michel Beaudouin-Lafon, *50 ans d'Interaction Homme-Machine :
retours vers le futur*, 2016, Interstices

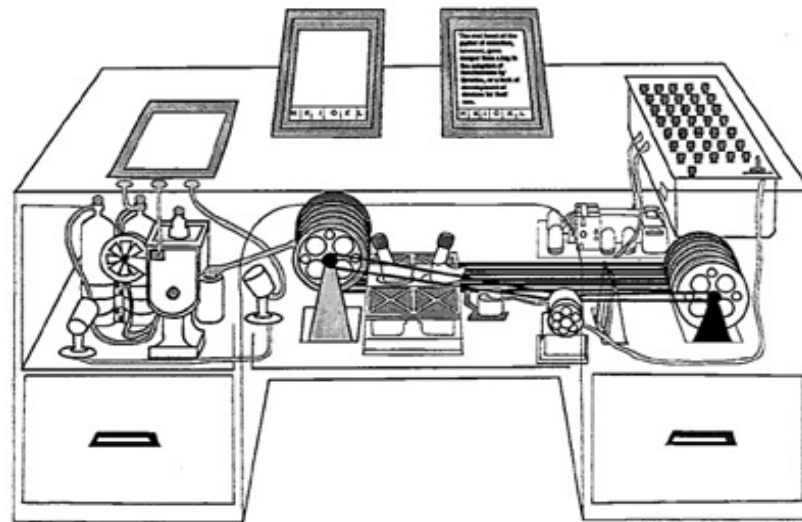
<https://interstices.info/50-ans-dinteraction-homme-machine-retours-vers-le-futur/>

Memex - Vannevar Bush (1945)

Vision for a desktop information management system

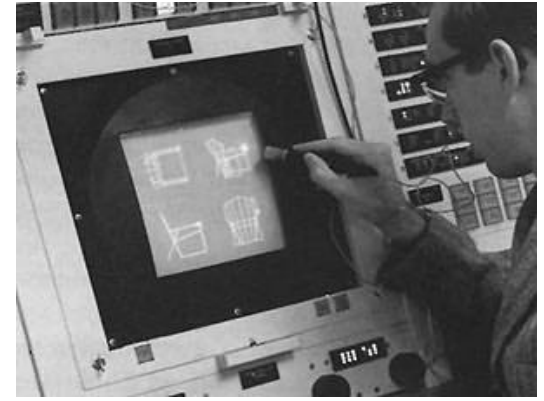
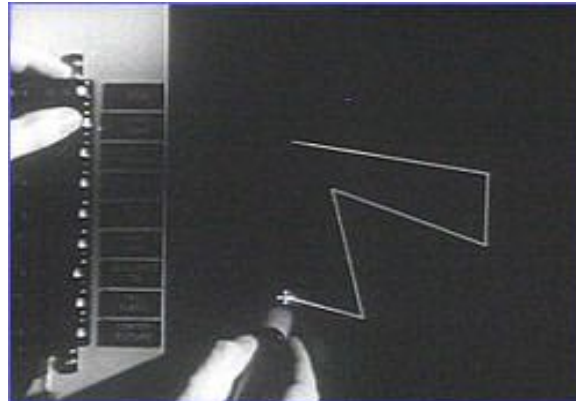
Electromechanical system

Seen as the ancestor of the notion of hypertext

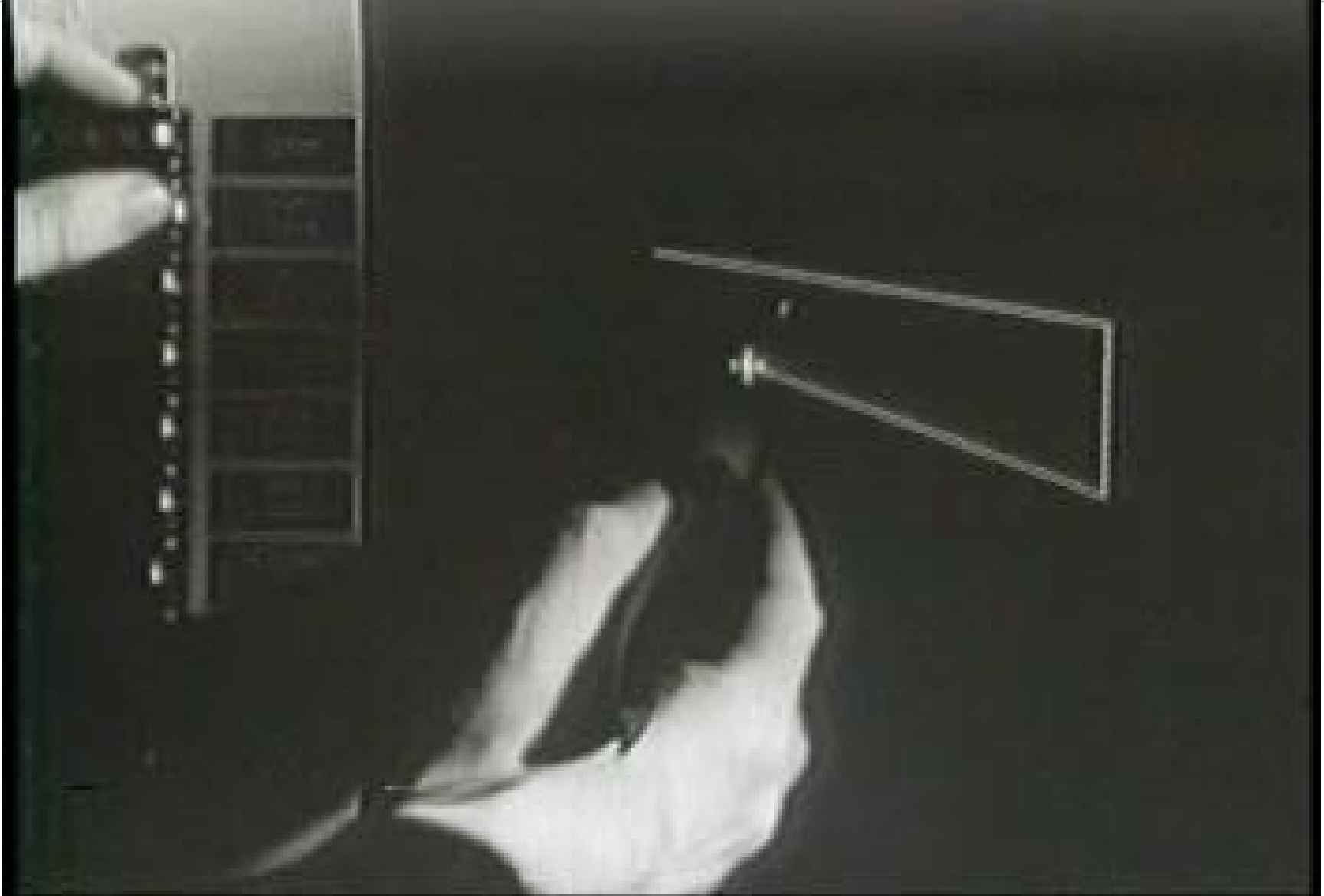


Sketchpad - Ivan Sutherland (1963)

Direct manipulation geometric shapes
Geometric constraints, zoom, click-drag



Sketchpad - Ivan Sutherland (1963)





NLS / Augment - Douglas Engelbart (1968)

Inventor of the mouse (1963)



Bimanual interaction



Hypertext, cooperative work,
document sharing, video-conferencing





NLS / Augment - Douglas Engelbart (1968)



Visicalc - Dan Bricklin (1979)

First spreadsheet (Apple II)

120 (U) +H20+12 19

HOME BUDGET, 1979			
MONTH	NOV	DEC	TOTAL
SALARY	2500.00	2500.00	30000.00
OTHER			
INCOME	2500.00	2500.00	30000.00
FOOD	400.00	400.00	4800.00
RENT	350.00	350.00	4200.00
HEAT	110.00	120.00	575.00
IREC.	100.00	100.00	1200.00
TAXES	1000.00	1000.00	12000.00
ENTERTAIN	100.00	100.00	1200.00
MISC	100.00	100.00	1200.00
CAR	300.00	300.00	3600.00
EXPENSES	2460.00	2470.00	28775.00
REMAINDER	40.00	30.00	1225.00
SAVINGS	30.00	30.00	330.00

Xerox Star - Xerox PARC (1981)

First commercial graphical workstation
Document-centric approach



XEROX 6085 Workstation

User-Interface Design

To make it easy to compose text and graphics, to do electronic filing, printing, and making all at the same workstation, requires a revolutionary user interface design.

Bit-map display - Each of the pixels on the 19" screen is mapped to a bit in memory; thus, arbitrarily complex images can be displayed. The 6085 displays all fonts and graphics as they will be printed. In addition, familiar office objects such as documents, folders, file drawers and in-baskets are portrayed as recognizable images.

The mouse - A unique pointing device that allows the user to quickly select any text, graphic or office object on the display.

See and Point

All functions are visible to the user on the keyboard or on the screen. The user does filing and retrieval by selecting them with the mouse and touching the MOVE, COPY, DELETE or PROPERTIES command keys. Text and graphics are edited with the same keys.



Shorter Production Times

Experience at Xerox with prototype workstations has shown shorter production times and thus lower costs, as a function of the percentage of use of the workstations. The following equation can be used to express this:

Year	Men 6085	6085
1978	95.2	15.8
1980	61.1	39.9
1982	45	55
1984	30	70
1986	10	90
1988	5	95

Table 1: Percentages of use of methods.

Activity under the old and the new



Figure 1: Data from Table 1 drive

$$X(t) = \sum_{n=1}^{\infty} \int_0^t A + P^n dt$$

Johannes W. W.

Workstation usage percentages: Table 1 and illustrated in Figure 1. 6085 users are likely to do the composition and layout, control process including printing and distribution.

Text and Graphics

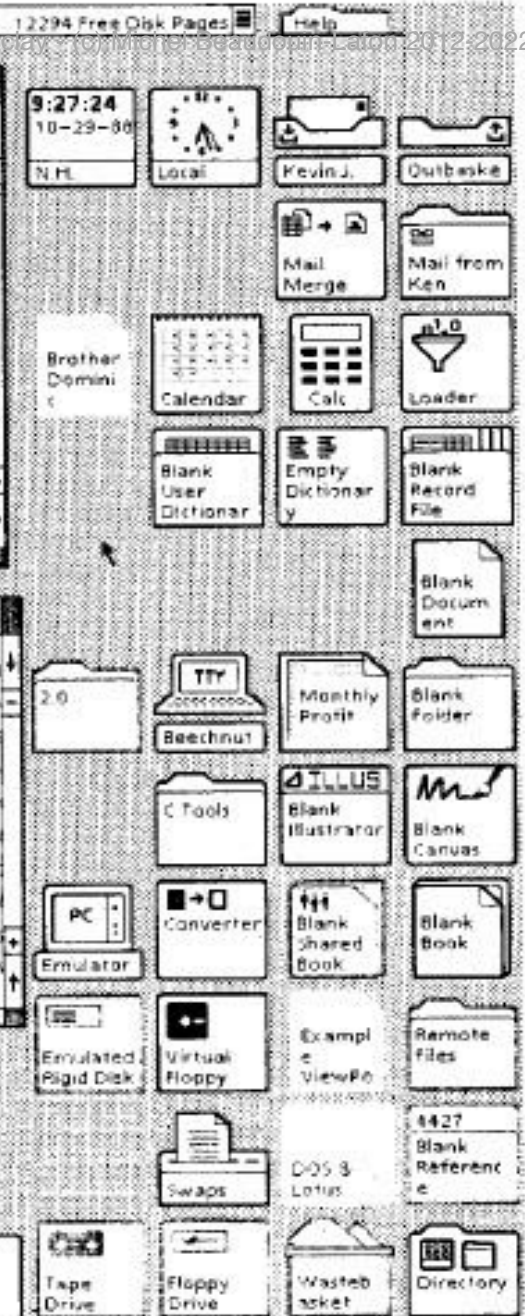
To replace typesetting, the 6085 offers a choice of type fonts and sizes, from 6 point to 36 point:

Here is a sentence of 6-point text.
Here is a sentence of 12-point text.

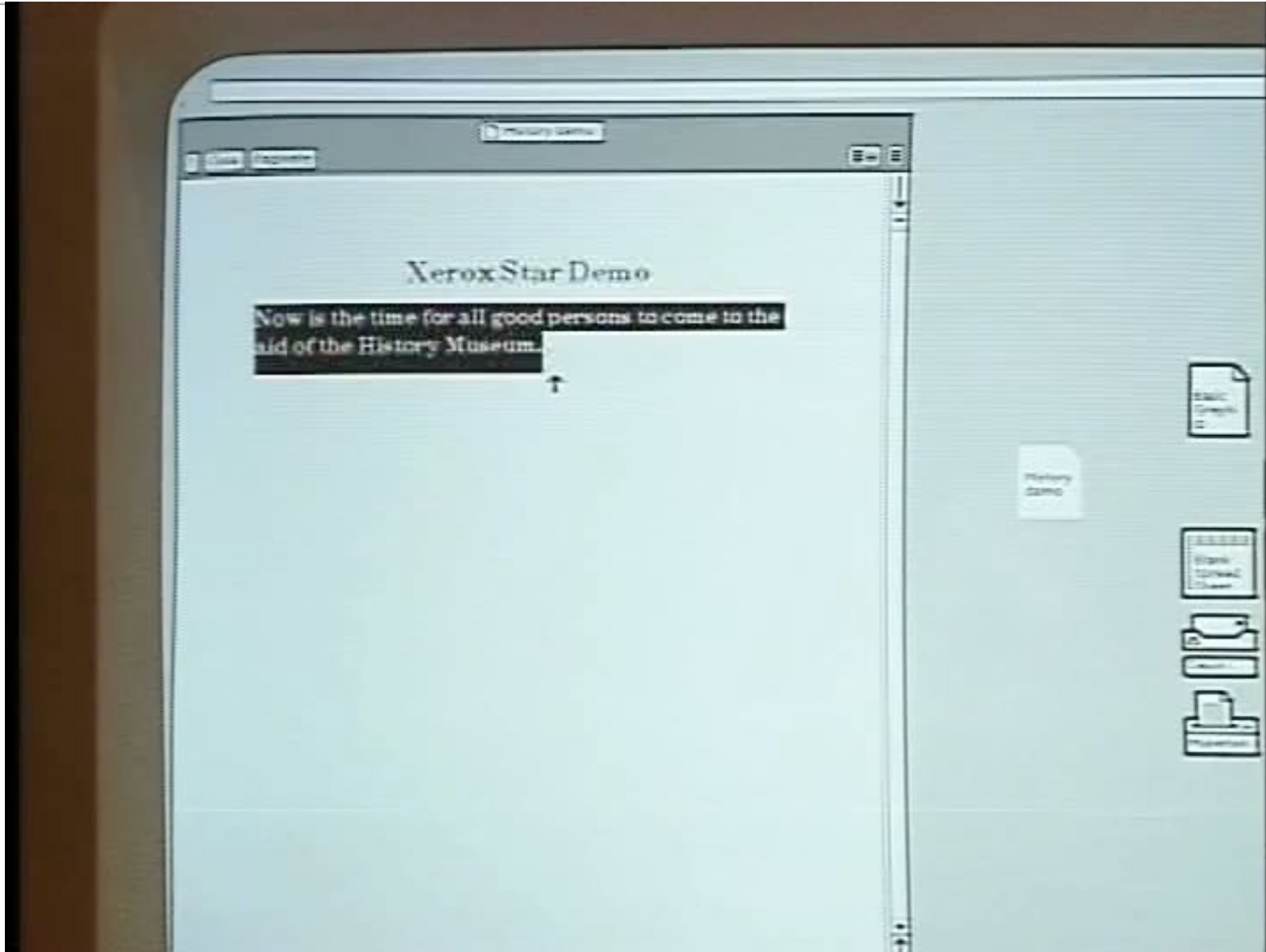
18-point text.
24-point text.
36-point text.



NAME	EXTENSION	SIZE	DATE
COMMAND	COM	22677	15-11
ANSI	SYS	2556	18-11
ASSIGN	COM	864	28-11
ATTRIB	EXE	15091	14-11
BACKUP	COM	17024	28-11
CHKDSK	COM	9435	14-11
CHMOD	COM	6528	27-11
COMP	COM	3018	10-11
DEBUG	EXE	15364	15-11



Xerox Star - Xerox PARC (1981)



Macintosh - Apple (1984)

Graphical personal computer

Finder

MacPaint

MacWrite

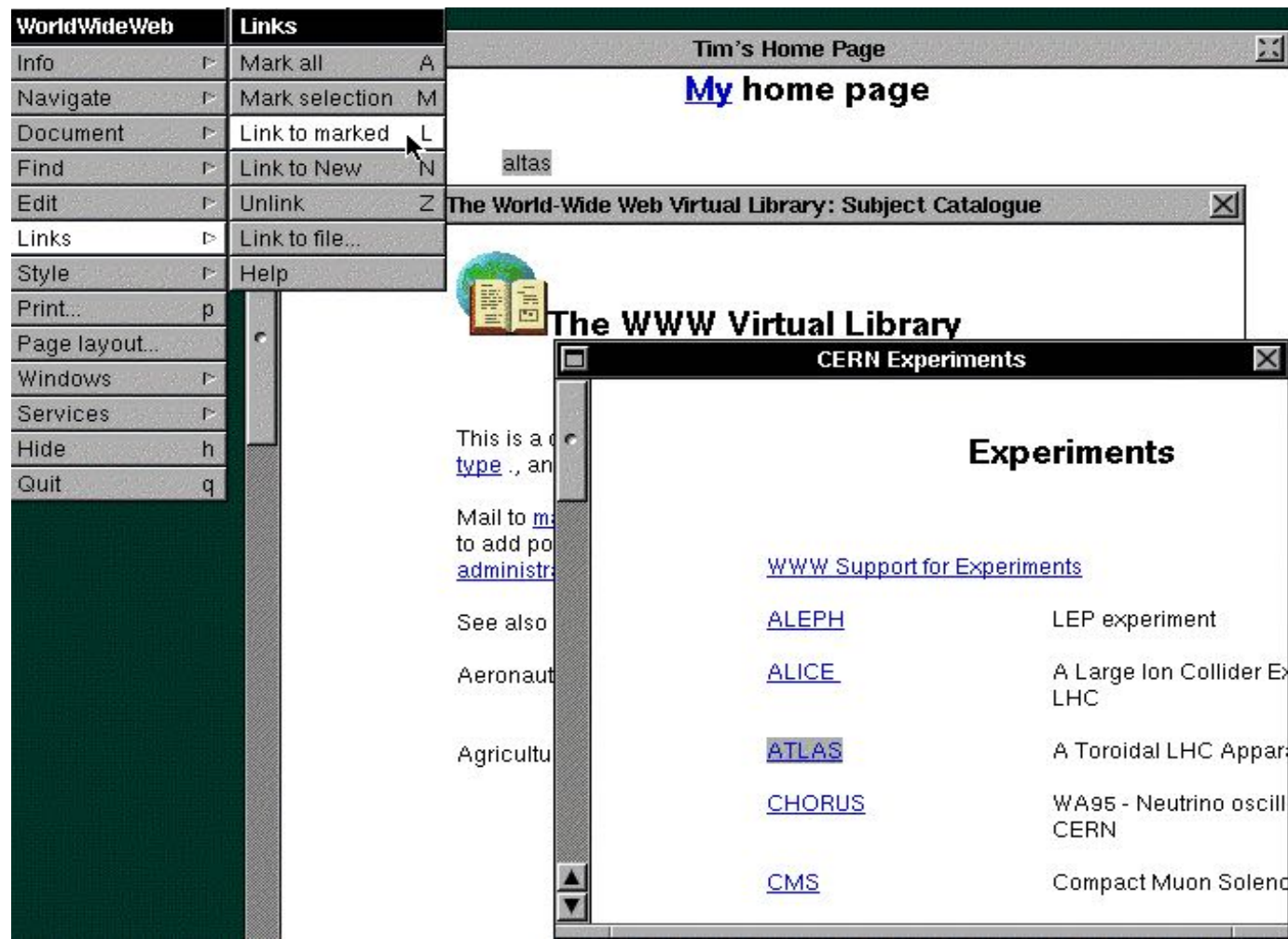
Hardware + software design



World-Wide Web - Tim Berners-Lee (1990)

Networked hypertext

Integrated browser + editor



Are the visions getting more and more limited?

NLS/Augment



Xerox Star



Macintosh



World-Wide Web

« Augmenting human intellect »

Cooperative work

Personal use, network transparency

Document-centric

Personal use, explicit network access

Application-centric

Networked, but poor user interaction

Browsing but not editing

Distinction between invention and innovation

HCI does not follow Moore's law



Original Macintosh



iMac 27"

January 1984 - \$2500

x0.7

September 2012 - \$1700

CPU 68000 - 0.7 MIPS

x214 000

CPU core i7 - 150 000 MIPS

RAM 128 kB

x31 250

RAM 4 GB

Floppy 400 kB

x2 500 000

Hard drive 1 TB

9" b&w, 512x342

x3 / x21

27" colors, 2560x1440

Keyboard, mouse

same

Keyboard, mouse

WIMP desktop

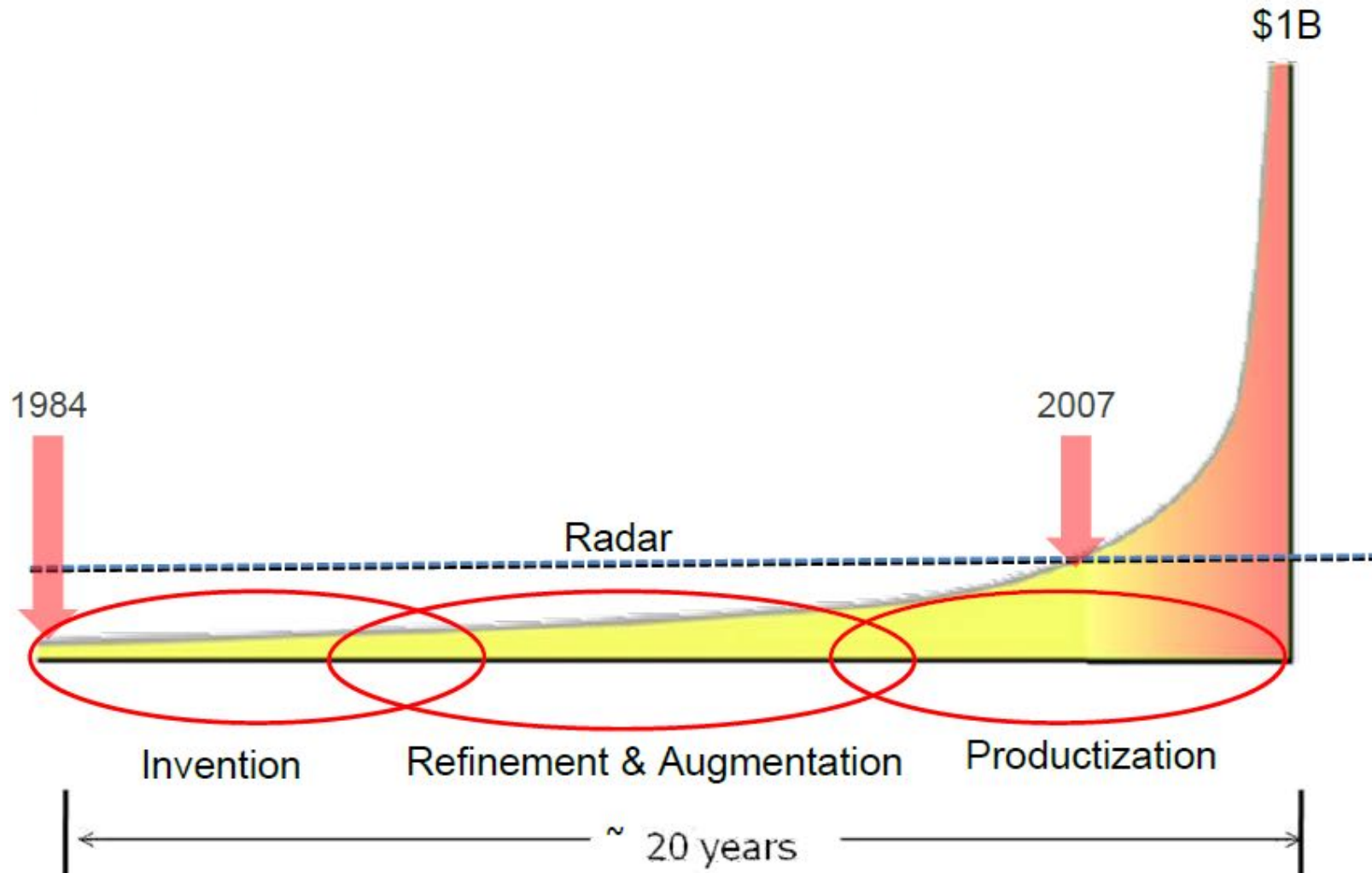
same

WIMP desktop



Bill Buxton

The long nose of innovation



Visions are important

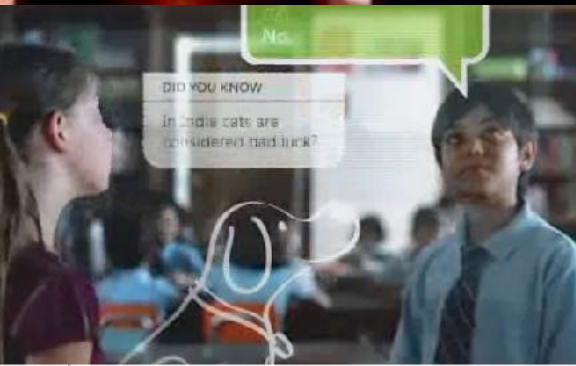
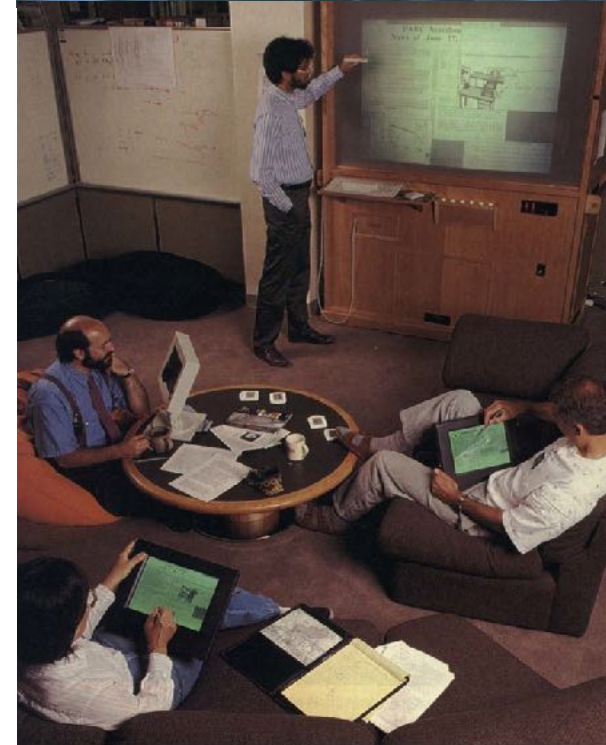
Augmenting Human Intellect – Doug Engelbart

Ubiquitous Computing – Mark Weiser

BUT a vision is more
than just a video

Knowledge Navigator – Apple

Future Vision – Microsoft



Knowledge Navigator (Apple, 1987)

