

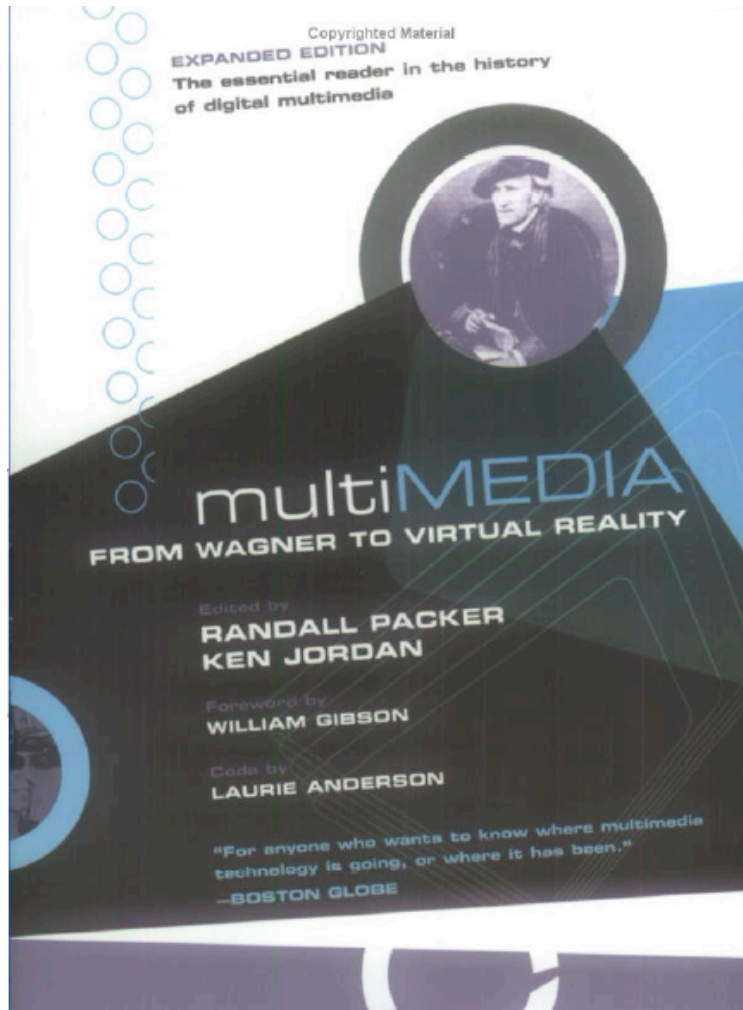
Département Informatique, CNAM

Multimédia & interaction humain-machine
2008-2009

Généralités introductives

P. Cubaud

1. Convergence des medias
2. Interactivité
3. Hypermedia
4. Immersion / simulation



<http://www.artmuseum.net/w2vr/>

1. Convergence des médias

le dessin

l'écrit

les machines à enregistrer

- le livre imprimé, la bibliothèque**
- le son, le disque**
- la photographie**
- le cinéma**

les télécommunications

- télégraphe**
- téléphone**
- FAX**

la radiodiffusion

la télévision

⇒le numérique

- telos**
- stenos**
- cryptos**

Le dessin

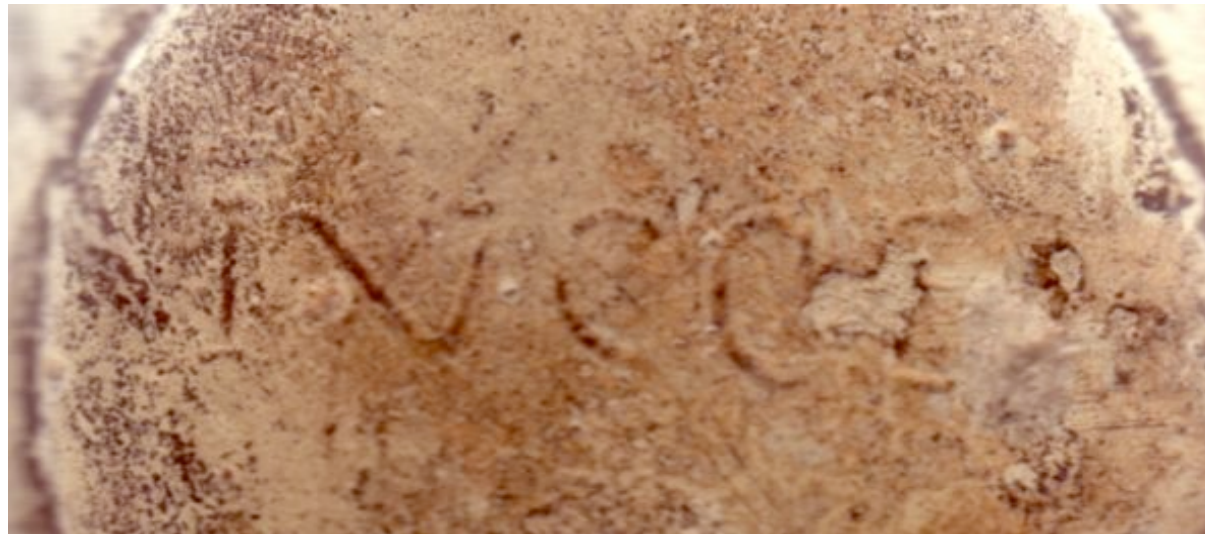


Lascaux -15000

L'alphabet (Byblos, -1500)



Ch. HIGOUNET. L'écriture. Que-sais-je n°653, 10ème ed., 1997. (p. 71)



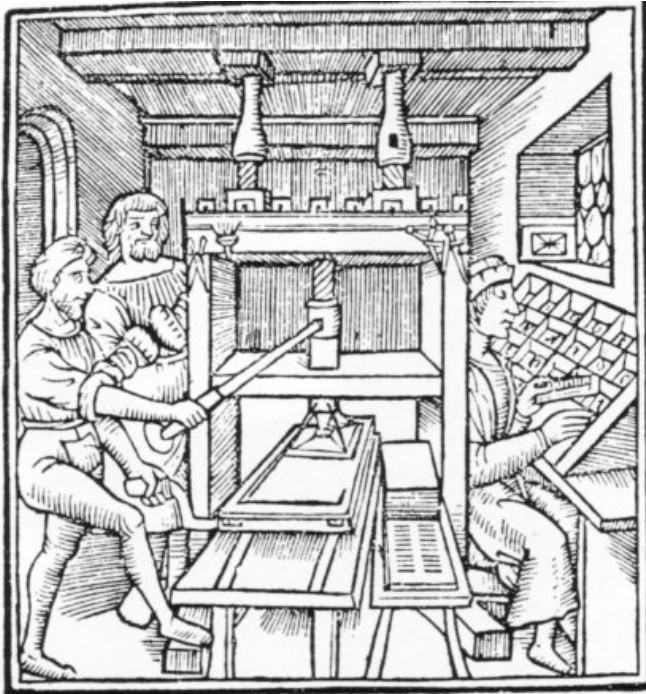
Les support flexibles



Exposition "Les 3 révolutions du livre" Musée des Arts & Métiers, Nov. 2002
<http://livre.museum.cnam.fr>

L'imprimerie (ca, 1450)

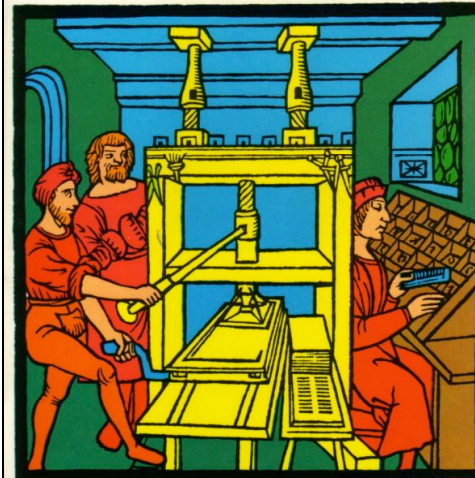
Presse typographique à deux coups, 1529



M. AUDIN. Histoire de l'imprimerie - Radioscopie d'une ère : de Gutenberg à l'informatique. Picard, 1970 (p. 100)

L'apparition du livre

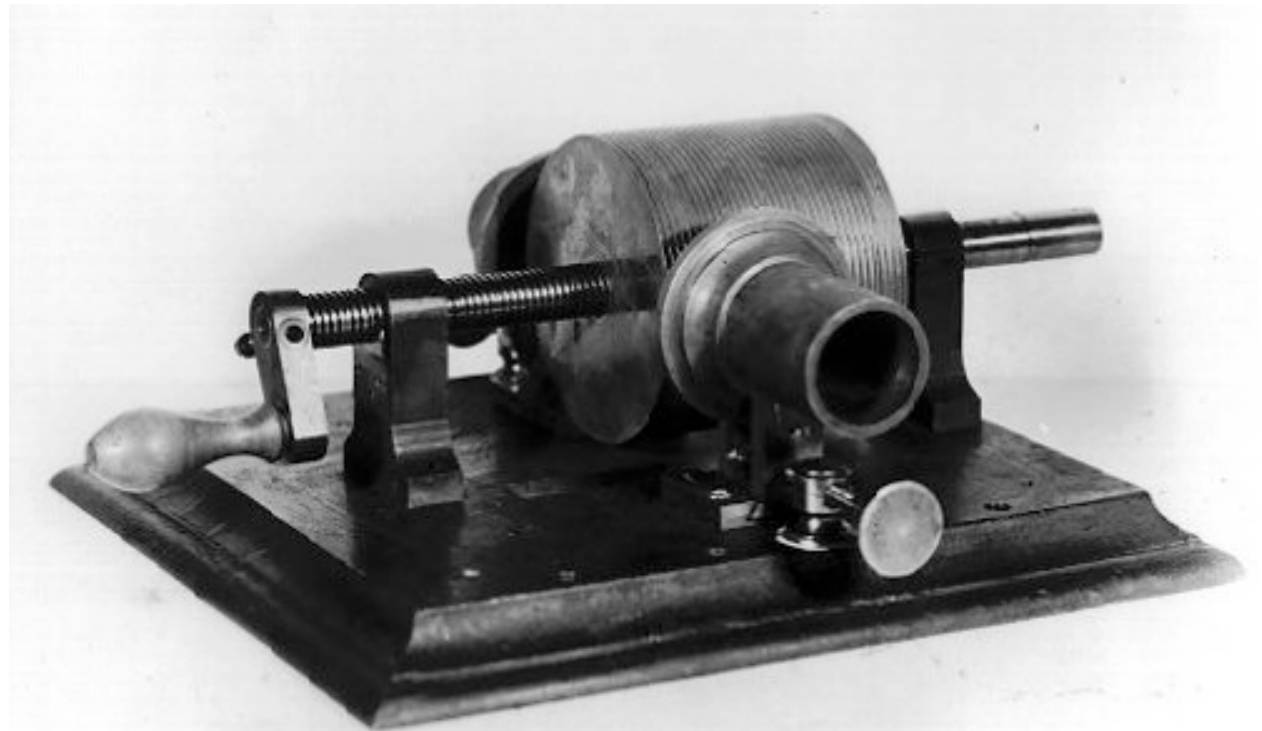
Lucien Febvre et Henri-Jean Martin



L' évolution de l'humanité

Albin Michel

1877 : Ch. Cros et Th. Edison le disque



U.S. DEPARTMENT OF THE INTERIOR, NATIONAL PARK SERVICE, EDISON NATIONAL HISTORIC SITE

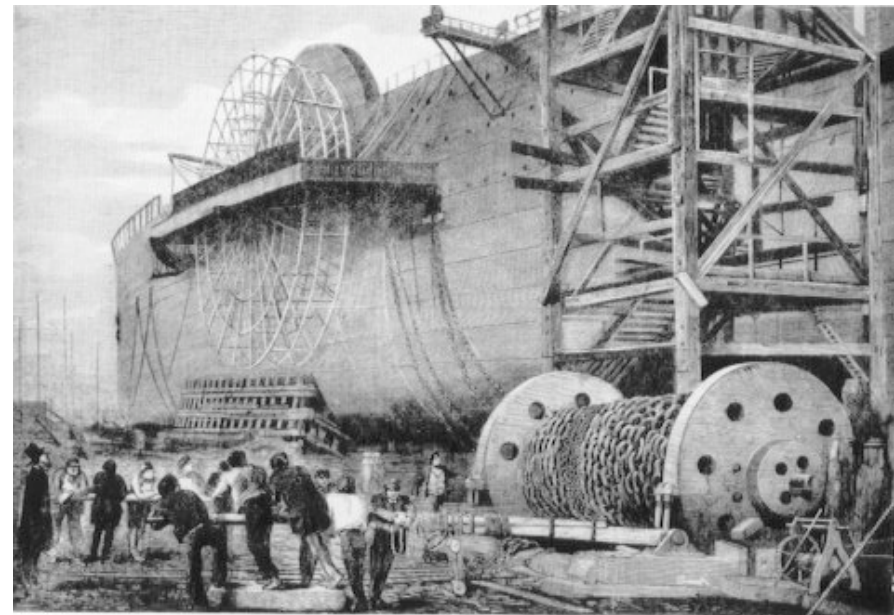
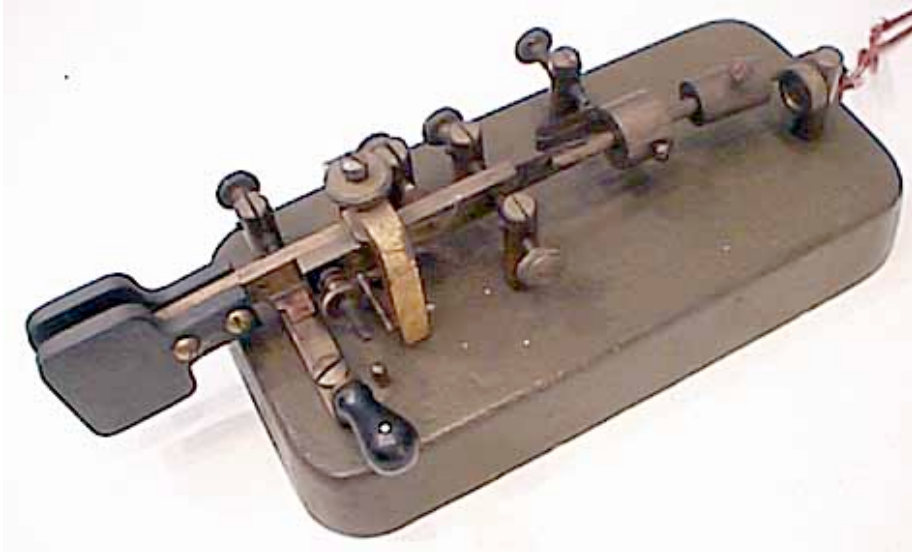


1839 - DAGUERRE - Le Daguerreotype



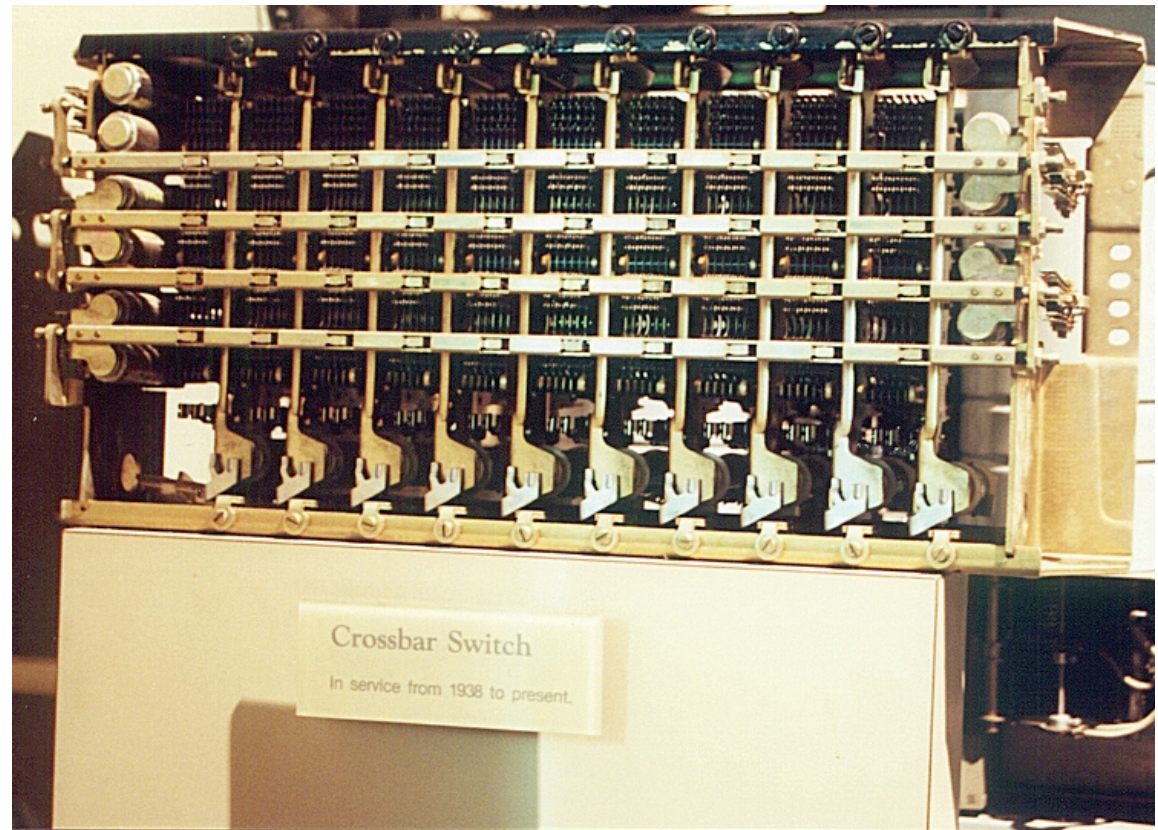
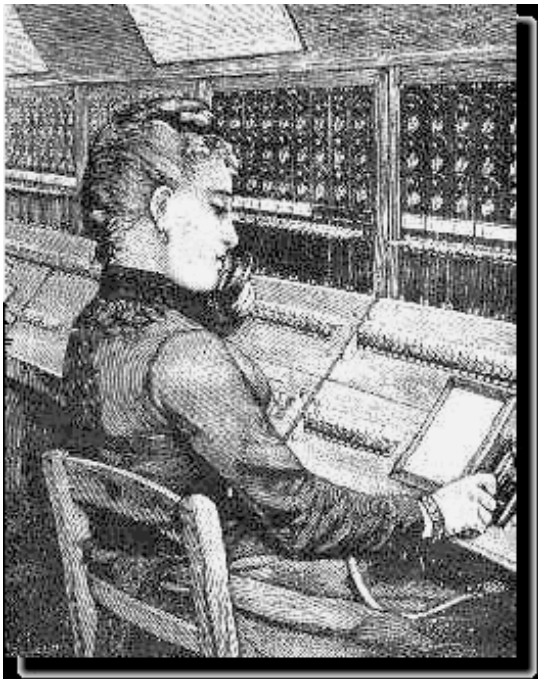
1895 - Auguste et Louis LUMIERE (Lyon)- Le cinématographe

Télégraphe



Contemporary newspaper picture of the Great Eastern under construction

Téléphone

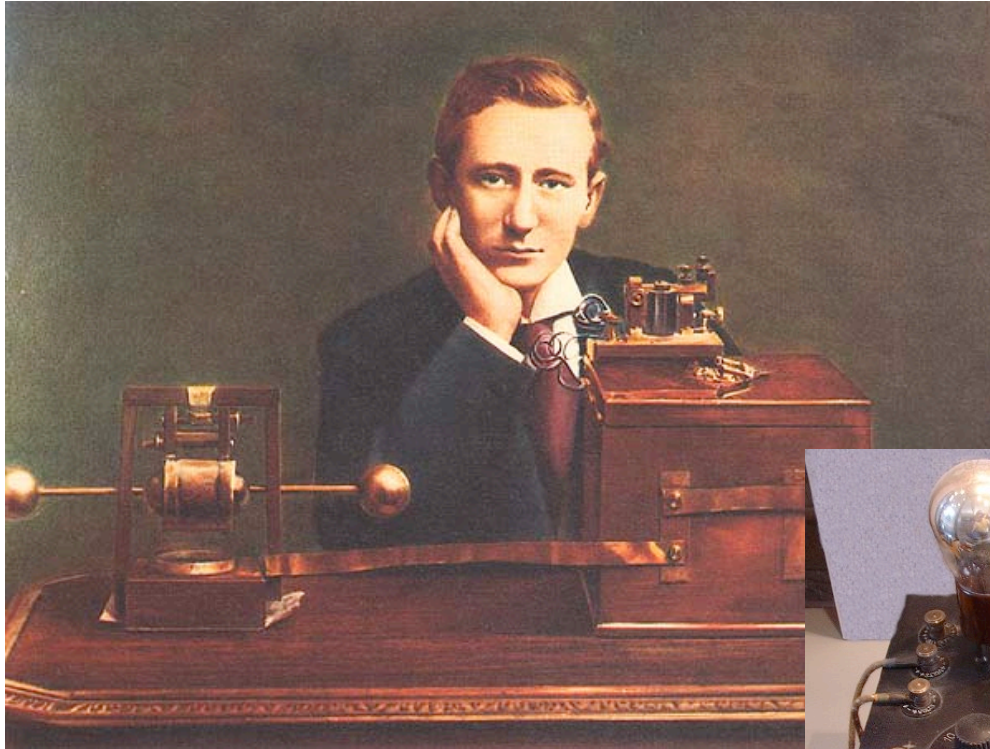


1904 - La télécopie



12 minutes, 13x24 cm, 2 lignes/mm

la radio



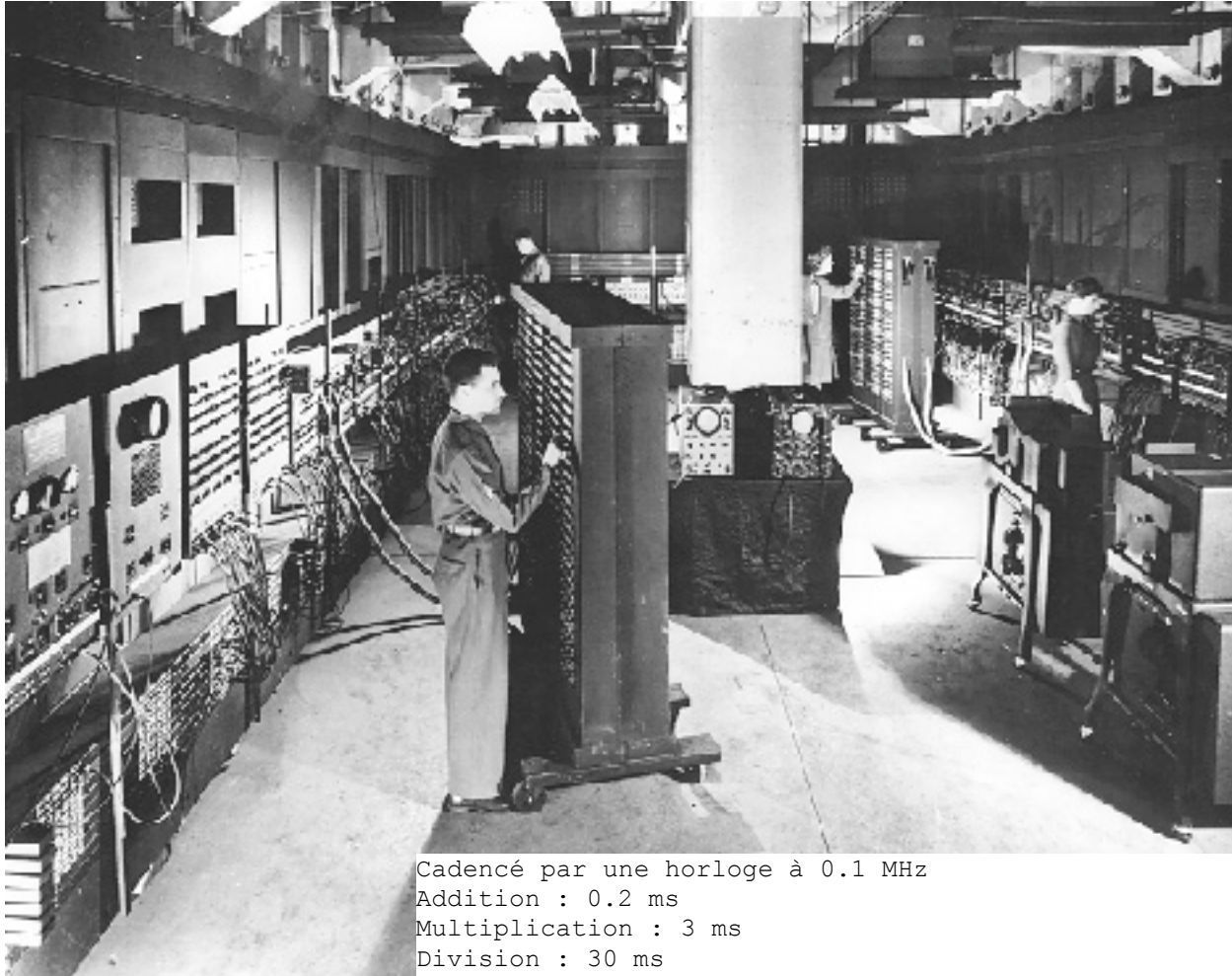
La télévision



1946 - RCA - Modèle 630TS (écran de 10 pouces)

l'informatique

Electronic Numerical Integrator And Computer



Cadencé par une horloge à 0.1 MHz

Addition : 0.2 ms

Multiplication : 3 ms

Division : 30 ms

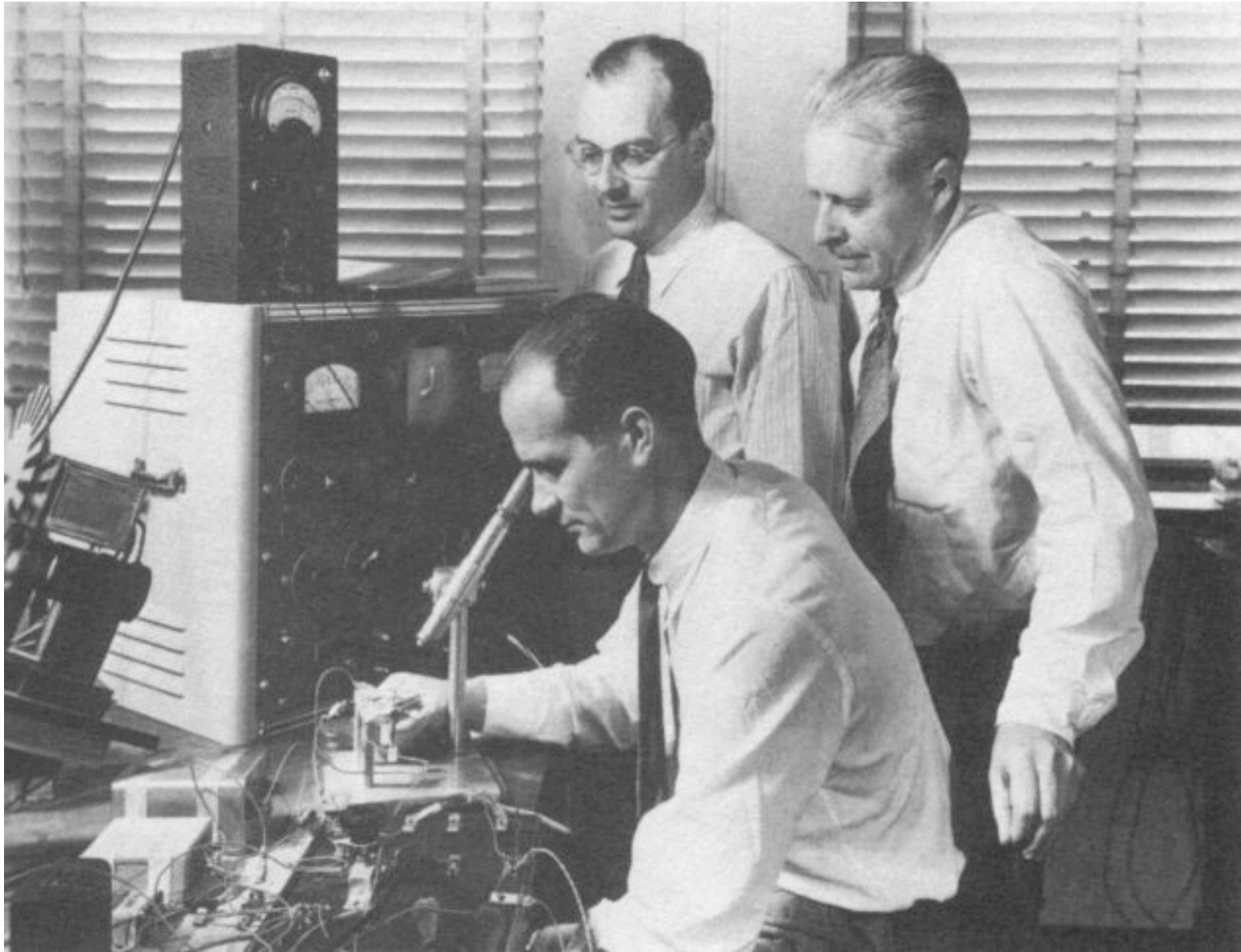
20 cases mémoires de 10 chiffres

18000 tubes

70000 résistances, 10000 condensateurs, 6000 interrupteurs

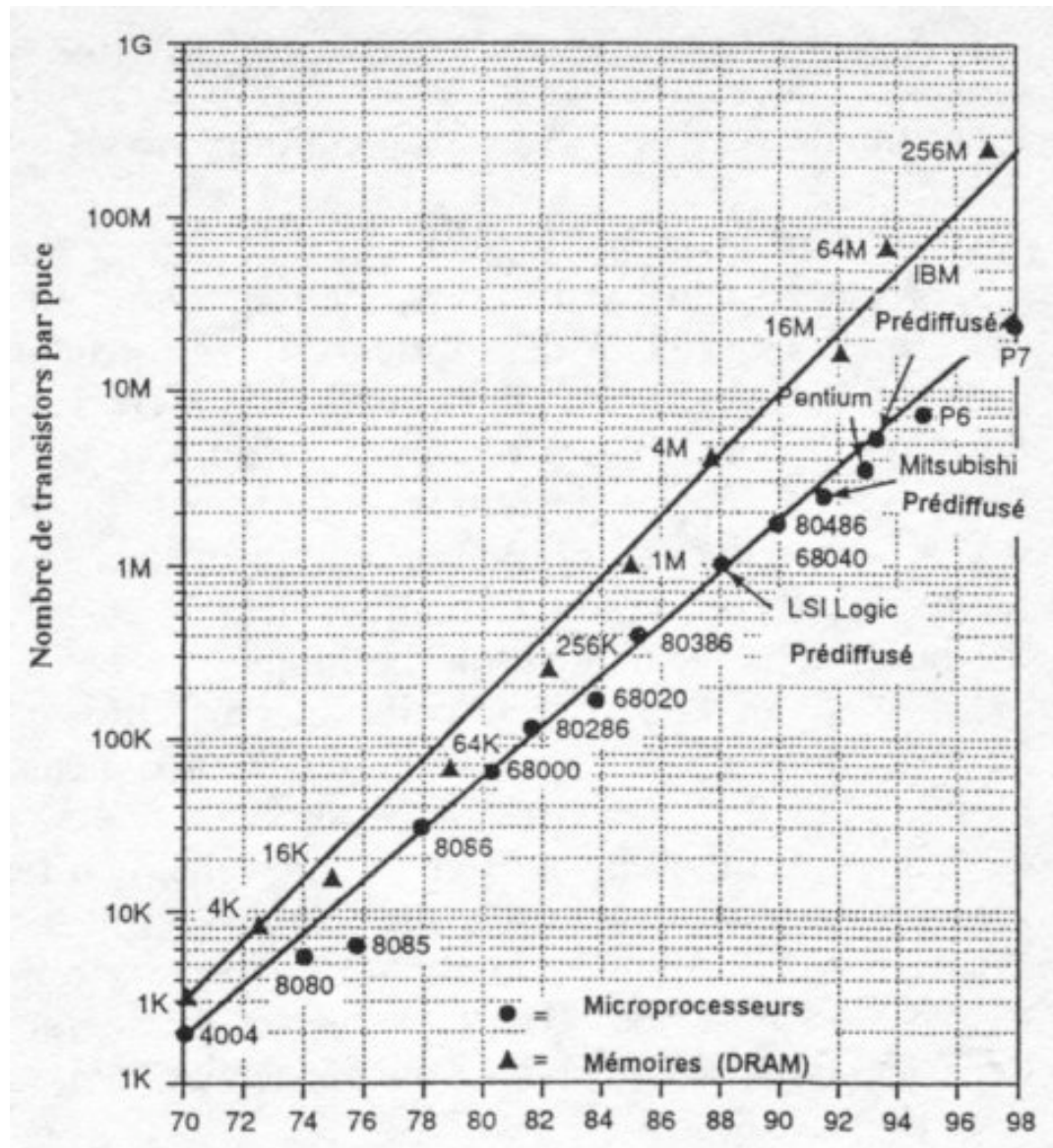
Consommation de 140 KW

35 m de long, 3 m de haut, 12 cm de profondeur, 30 tonnes



Shockley (assis), Bardeen (gauche) et Brattain (droite) - Bell Labs, Murray Hill, , New Jersey (1947)

La « loi » de Gordon Moore



Densité mémoire : x 1.5 / an

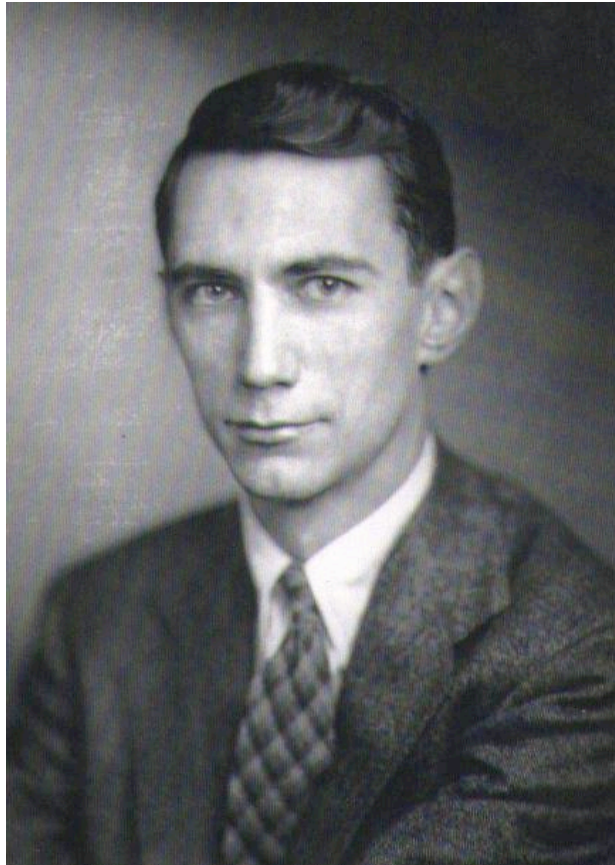
Densité microprocesseur : x 1.35 / an

Date	Finesse gravure	Nbre transistors	Surface puce	Nbre E/S
1998	0.25 μm	256 M	320 mm ²	1500
2001	0.18	1 G	500	2000
2004	0.12	4 G	1000	3500

J-P. DAUVIN et al.

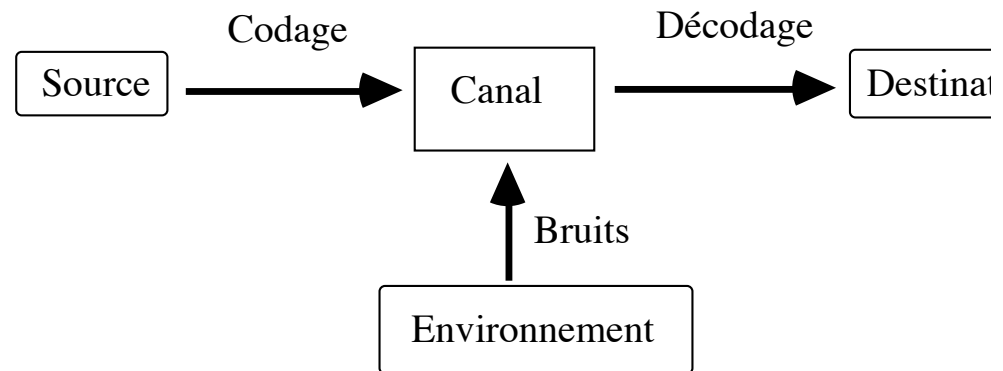
Les composants électroniques et leur industrie. Que-sais-je n°1080, 1995.

telos : la transmission (sans perte)



<http://www.research.att.com/~njas/doc/shannon.html>

Modèle de Shannon pour la communication :

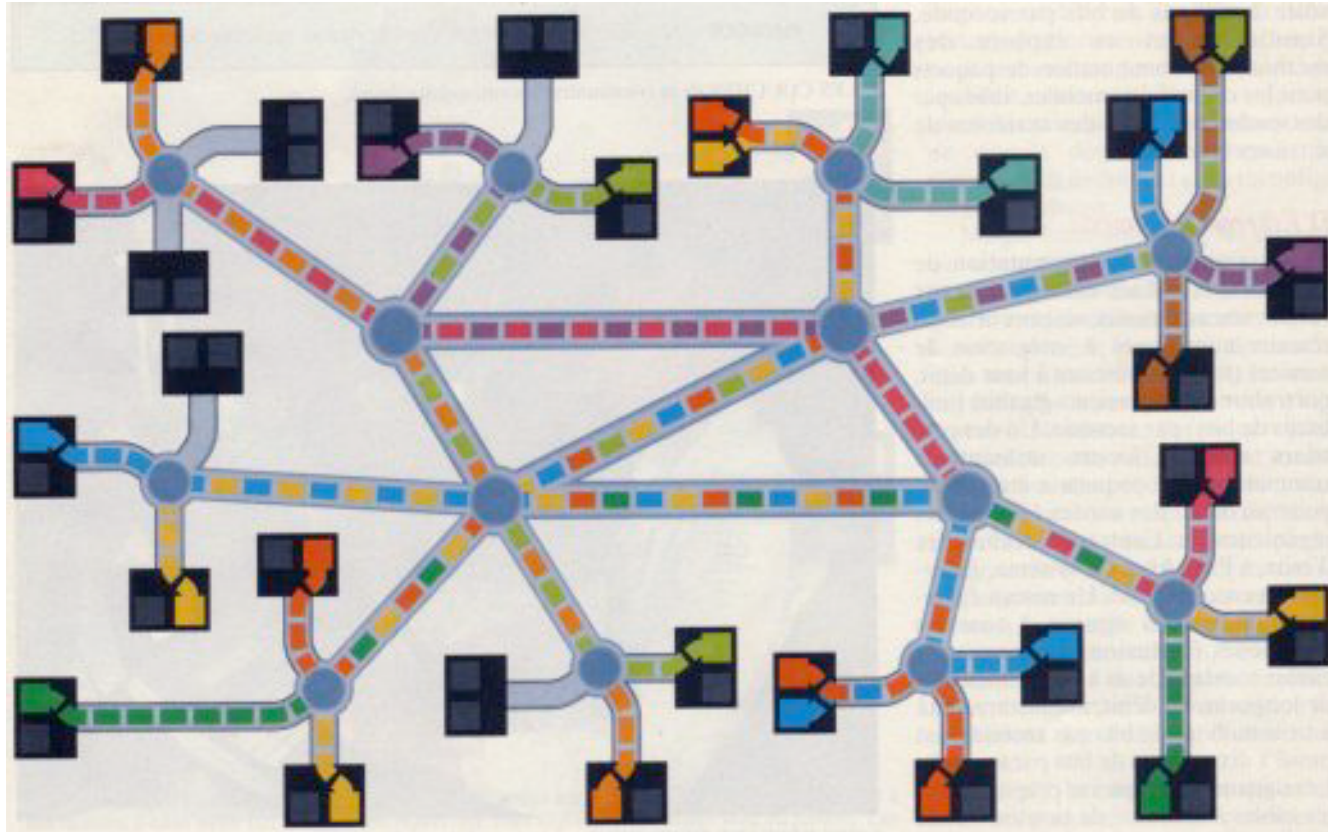


=> théorème de Shannon

$$C = B \cdot \log(1 + S/N)$$

P. Baran. Commutation par paquets (1965)

l'information de routage est contenu dans les paquets et ne provient pas de circuits extérieurs



stenos : la compression



JPG?

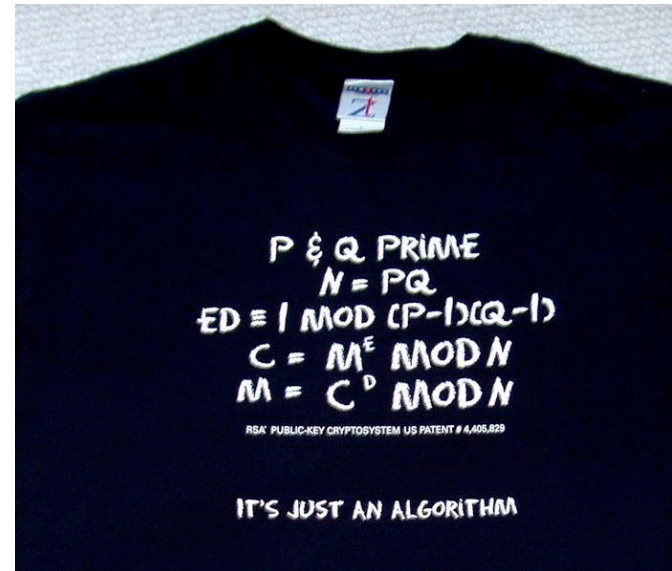
cryptos

1976 : Diffie & Hellman

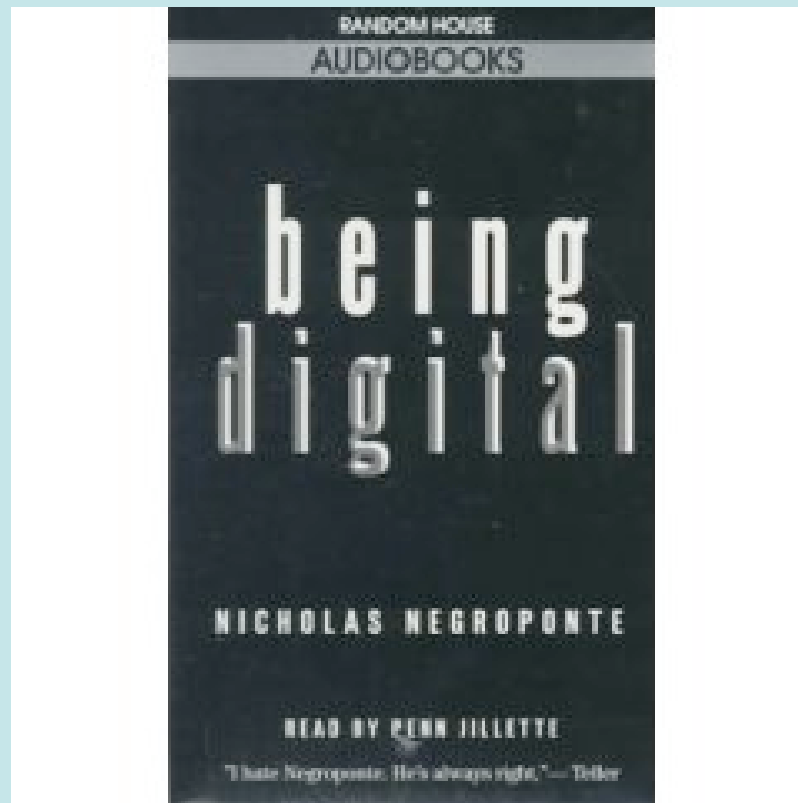
1978 : R.S.A.



<http://w1tp.com/enigma/>



<http://theory.lcs.mit.edu/~rivest/>



Nicholas Negroponte L'homme numérique

0123456789:;<=>...
 ./0123456789:;<=>?\$ABCL
 -./0123456789:;<=>?\$ABCDE.
 .-/0123456789:;<=>?\$ABCDEF6.
 '0123456789:;<=>?\$ABCDEFGH1
 0123456789:;<=>?\$ABCDEFGH1J1
 1123456789:;<=>?\$ABCDEFGH1JK1
 23456789:;<=>?\$ABCDEFGH1JKL1
 23456789:;<=>?\$ABCDEFGH1JKL1
 23456789:;<=>?\$ABCDEFGH1JKL1
 3456789:;<=>?\$ABCDEFGH1JKL1
 6789:;<=>?\$ABCDEFGH1JKL1
 789:;<=>?\$ABCDEFGH1JKL1
 19:;<=>?\$ABCDEFGH1JKL1
 7:;<=>?\$ABCDEFGH1JKL1
 '—\?\$ABCDEFGH1JKL1
 1BCDEFGH1JKL1NO1
 CDEFGH1JKL1NOPG

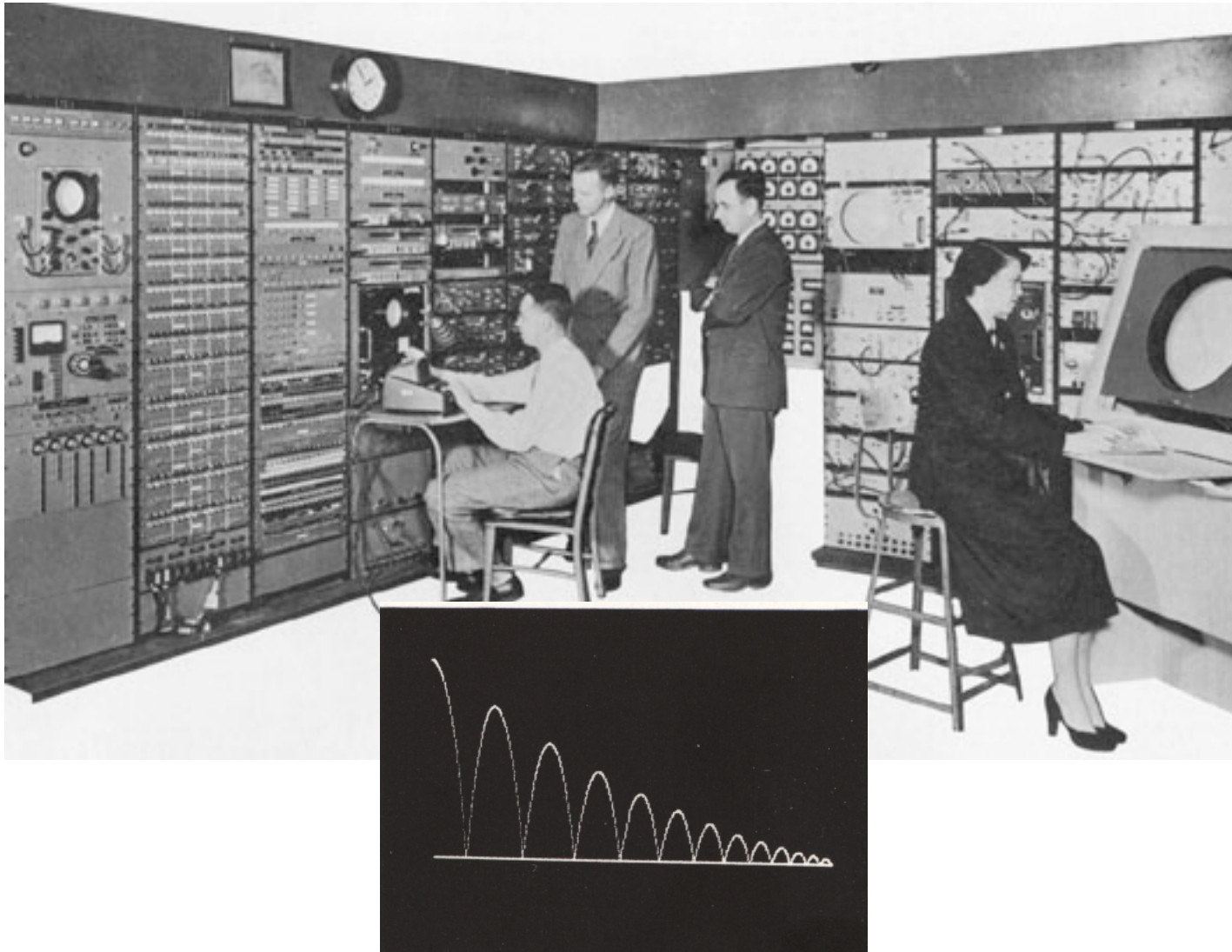
POCKET

Comment le multimédia
et les autoroutes de l'information
vont changer votre vie

2. Interactivité

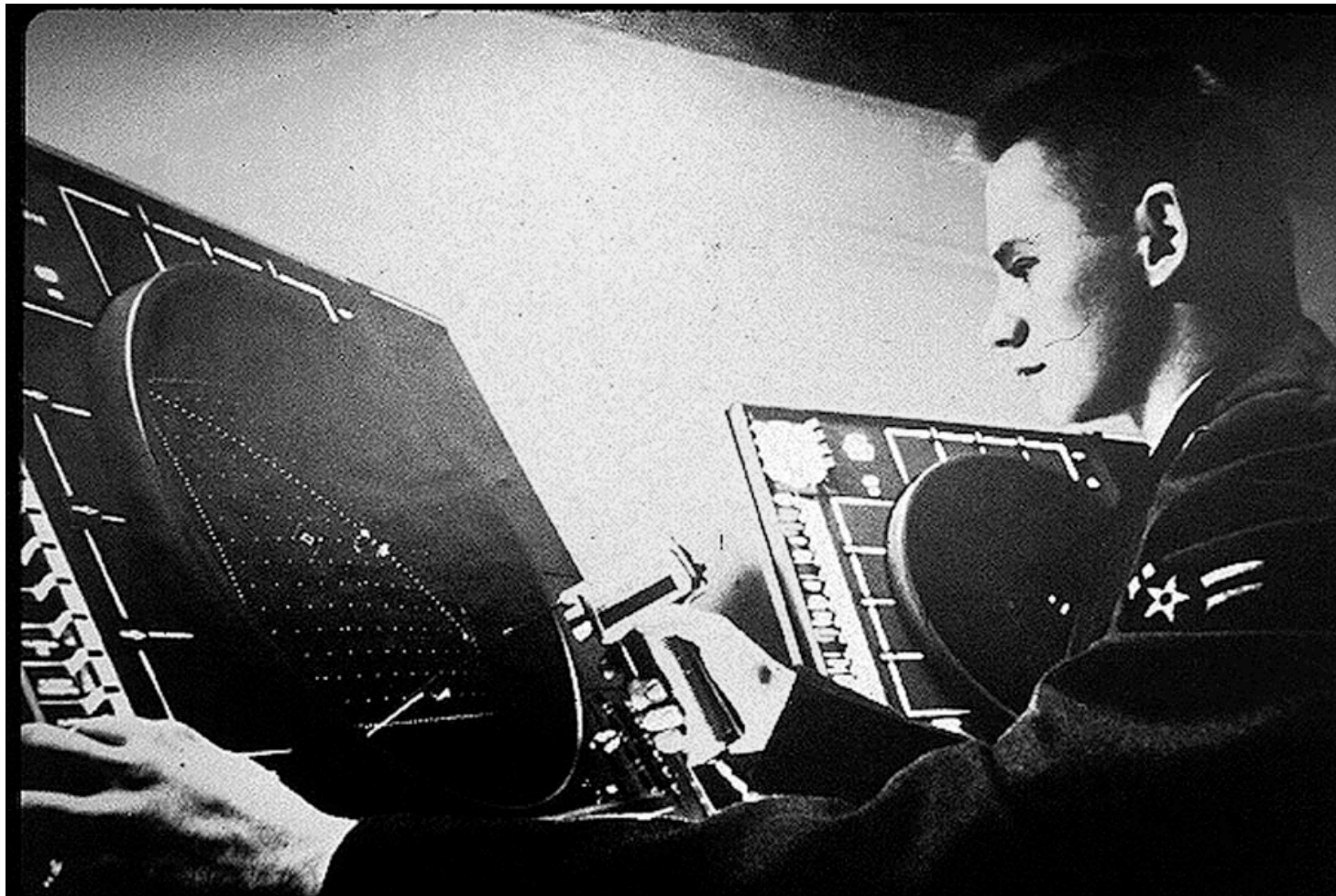
en MM le contenu dépend du lecteur

- **(le livre à système)**
- **(1000 milliards de poèmes)**
- **le time sharing**
- **la station individuelle : Licklider**
- **l'augmentation : Engelbardt**
- **Alto**
- **les GUIs WIMP**
- **le collaboratif : ex xerox**
- **le tel. portable**
- **rea. augmentée ?**
- **le post WIMP ?**



1949-51 - Project WHIRLWIND

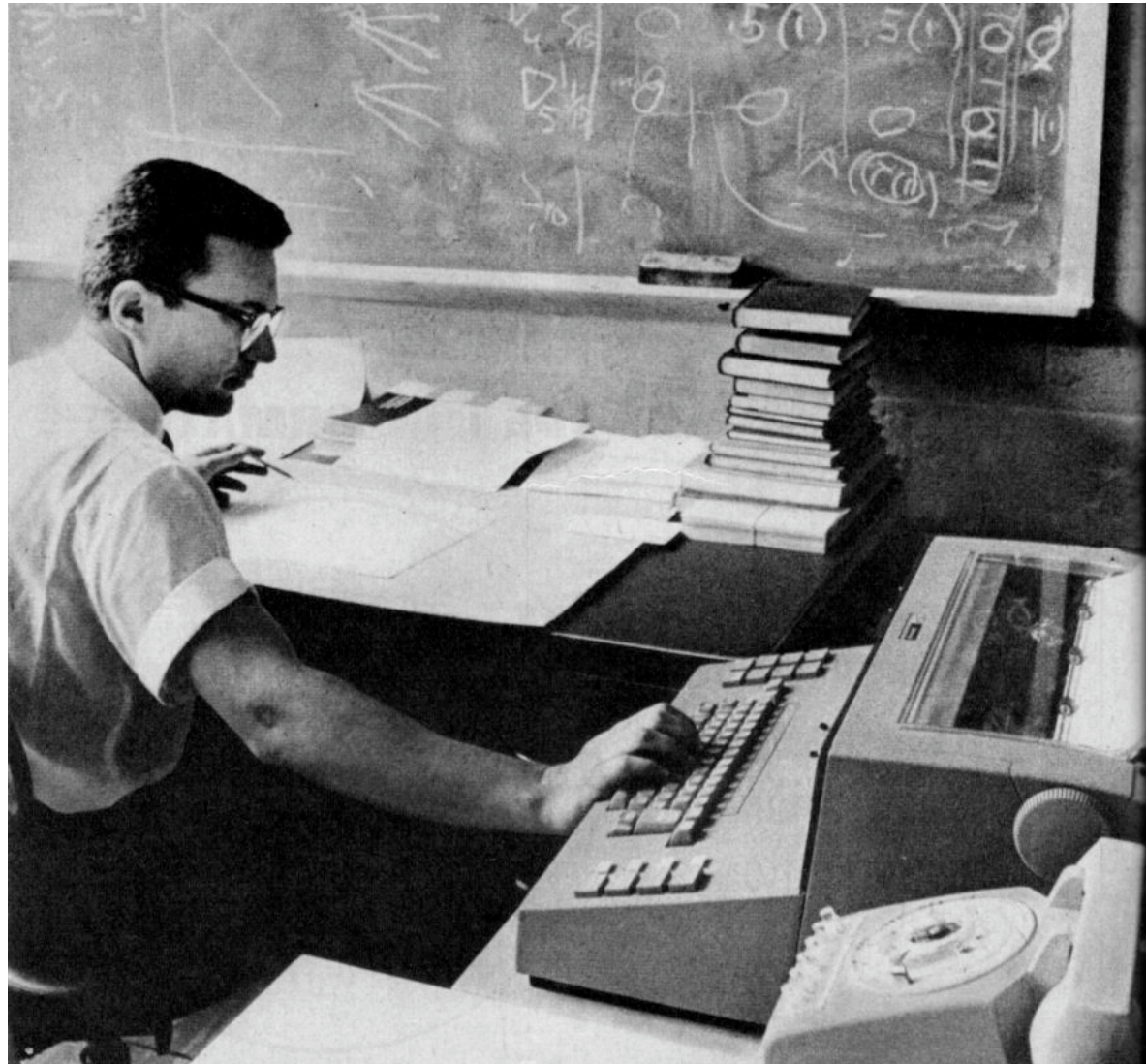
Le système SAGE et le temps réel (1950)





1961 - Yvan SUTHERLAND (MIT) - Sketchpad sur TX2
en 1h, un pavage de 900 hexagones = 2j dessin prof.

Le temps partagé (time sharing) : MIT, 1959-1964



J.C.R. Licklider (1960)
“man-computer symbiosis”

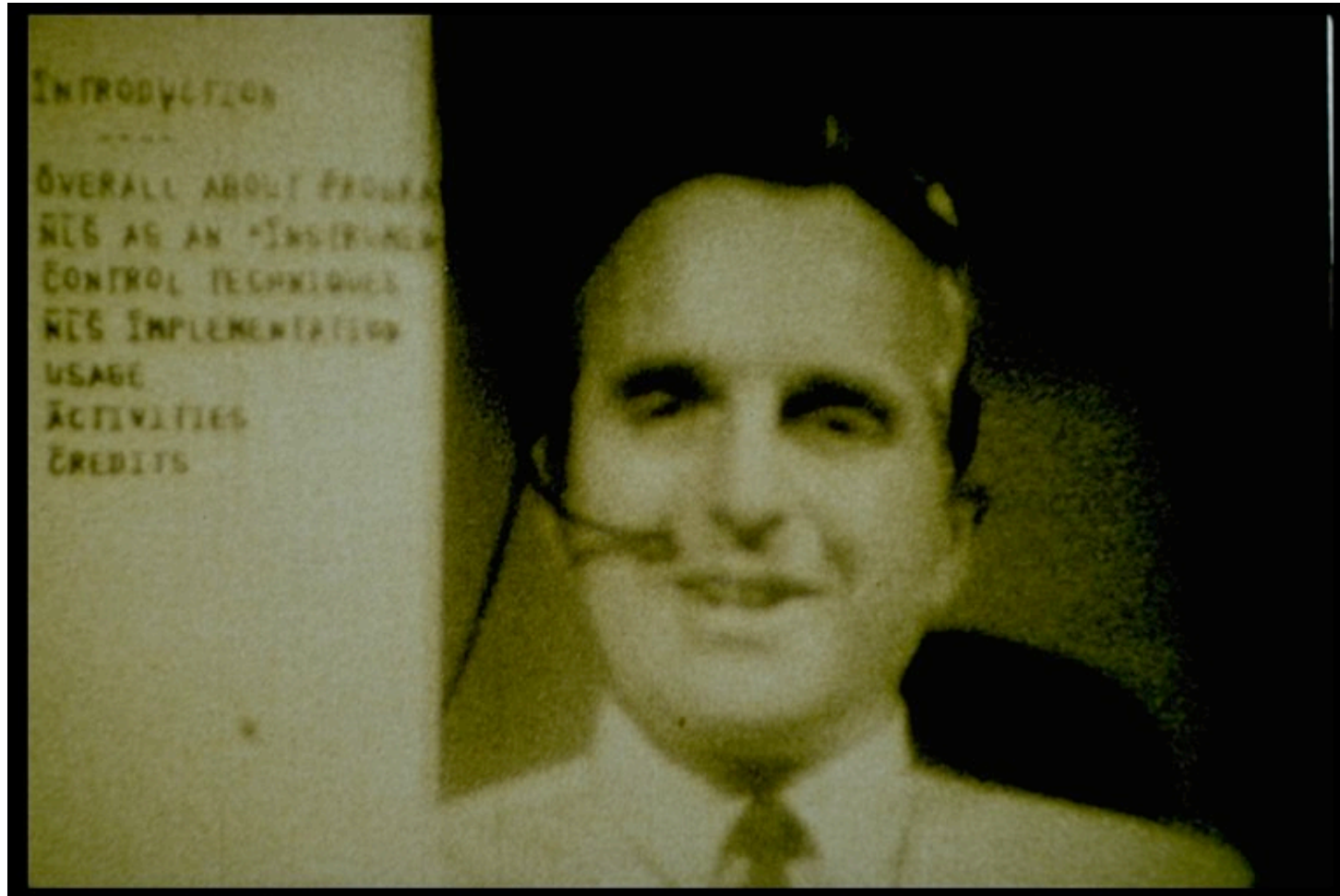


“The hope is that, in not too many years, human brains and computing machines will be coupled together very tightly and that the resulting partnership will think as no human brain has ever thought and process data in a way not approached by the information-handling machines we know today.”

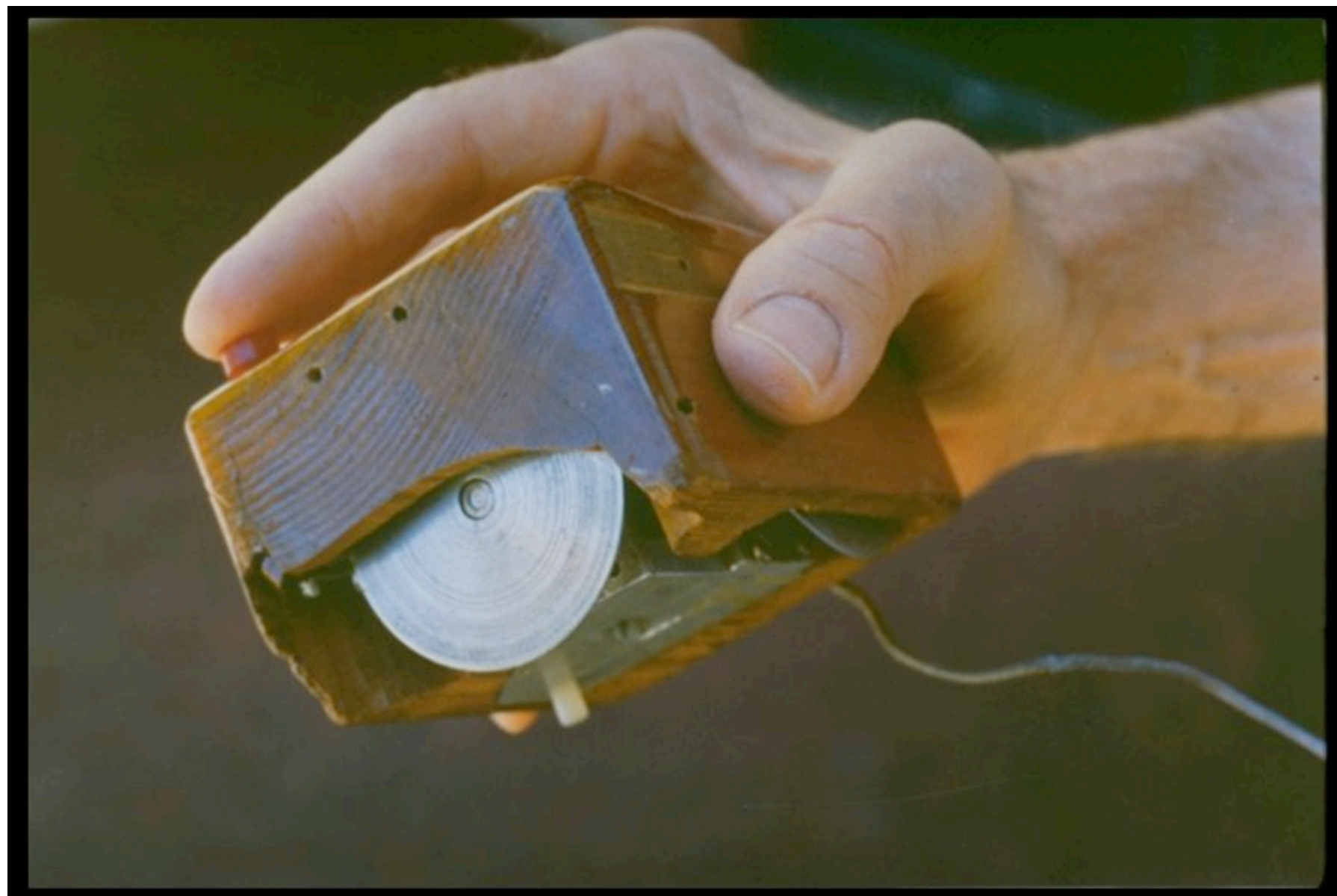
Douglas Engelbart : "augmenting human intellect"(1963)



The mother of all demos



"A Research Center for Augmenting Human Intellect," Douglas C. Engelbart, and William K. English, AFIPS Conference Proceedings of the 1968 Fall Joint Computer Conference, San Francisco, CA, December 1968, Vol. 33, pp. 395-410



1973

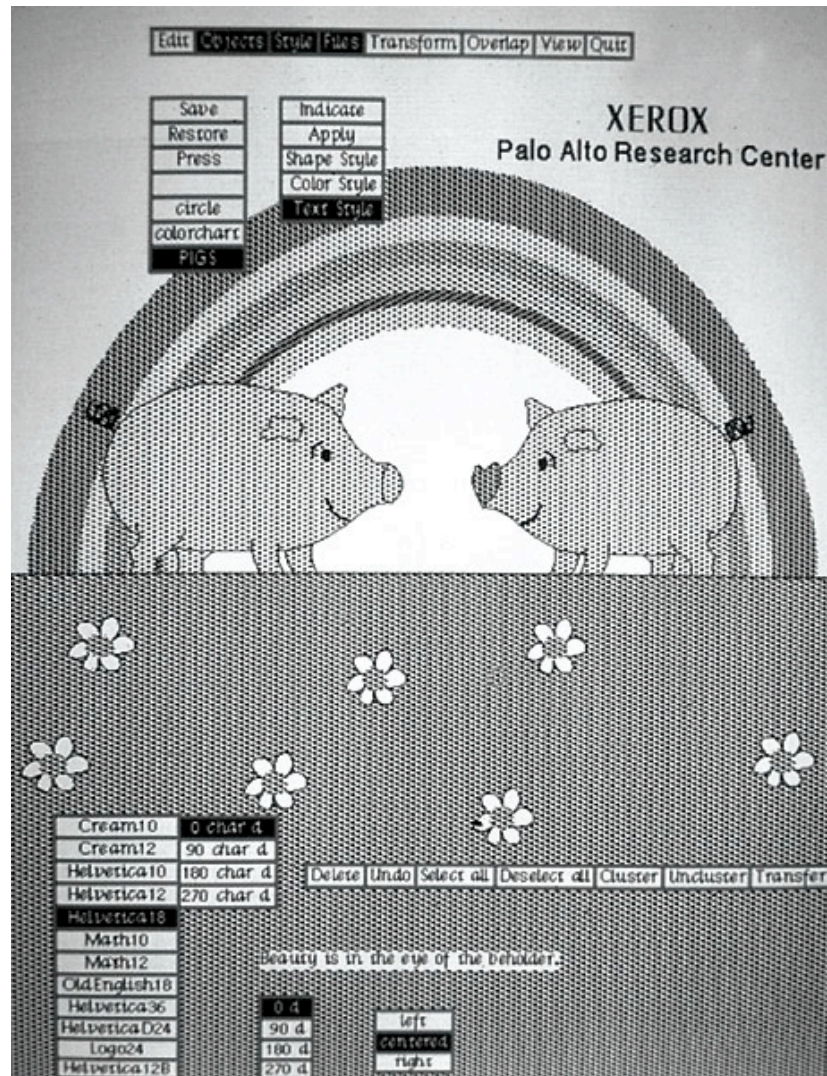
L'ordinateur de bureau Alto

Laboratoire d'informatique du XEROX PARC
B. LAMPSON, Ch. THACKER, R. TAYLOR

- OS temps partagé + interface graphique multi-fenêtres
- Ecran N&B 606 x 808 pixels (80 ppi)
- Clavier séparé, reconfigurable, mesure de force et durée
- Souris 3 boutons
- 2 disques durs de 3 Mo pour le stockage local
- Ethernet
- Imprimante laser

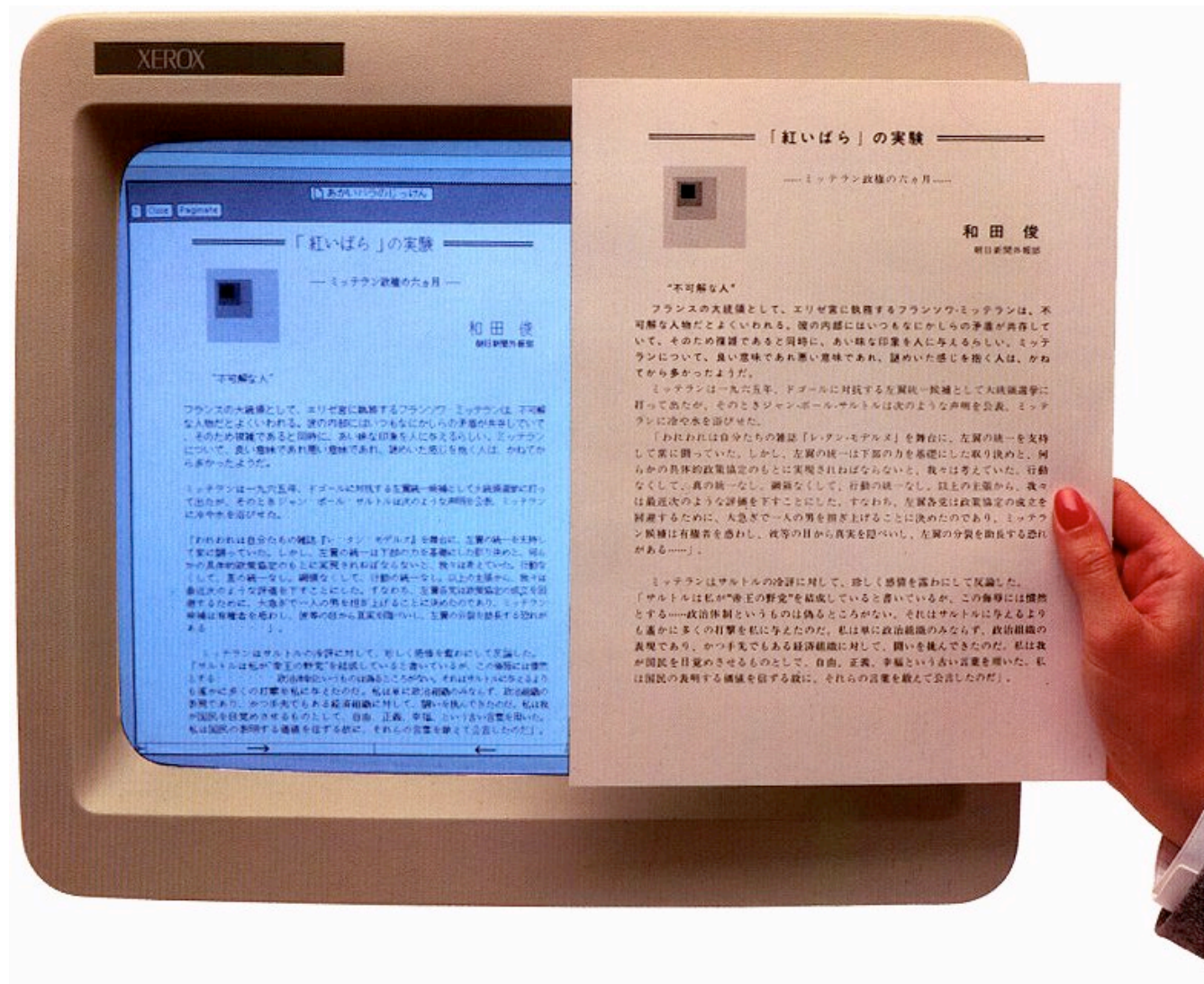


Interface WIMP



<http://toastytech.com/guis/>

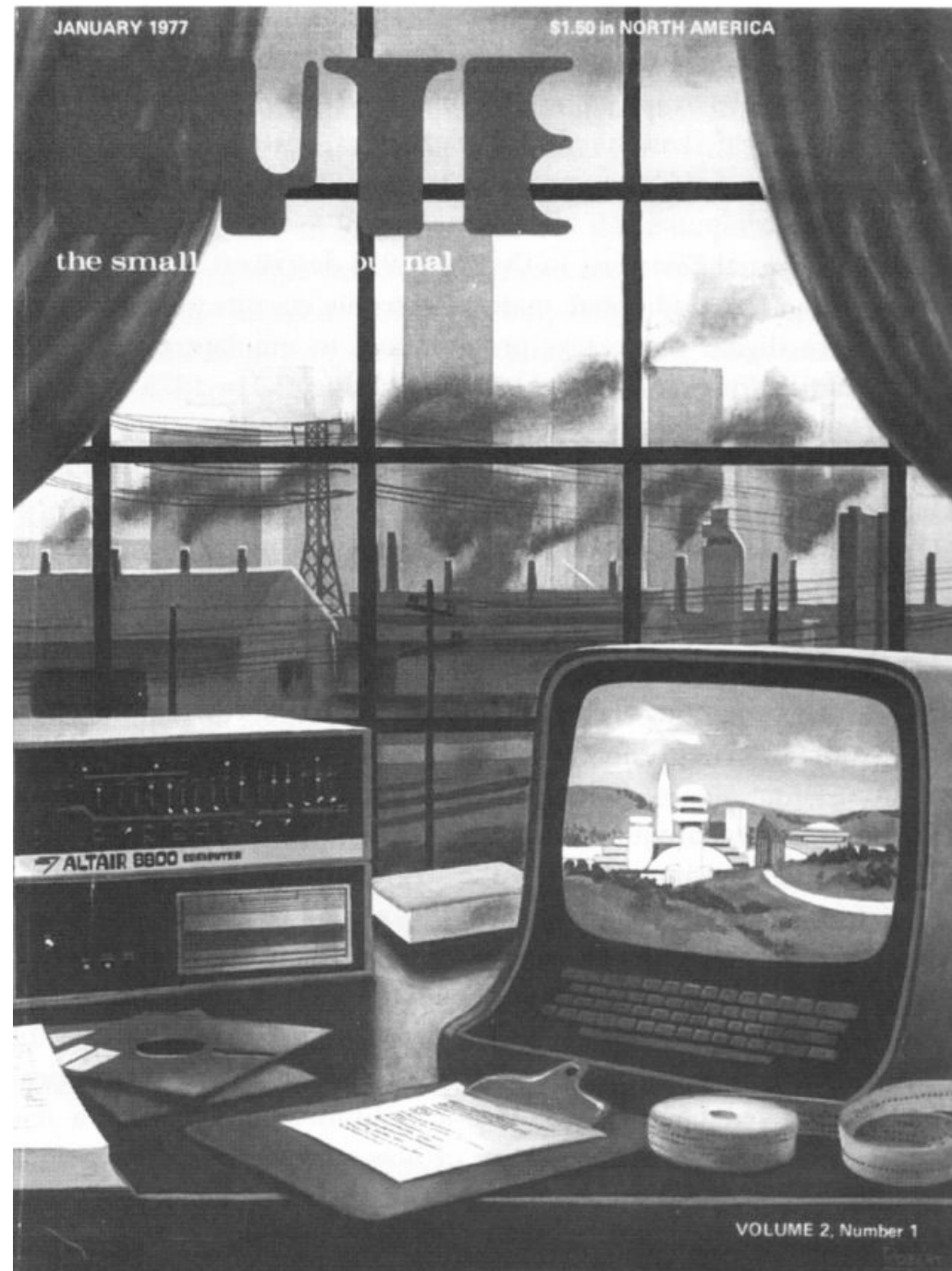
Xerox Star et le WYSIWYG (1977)



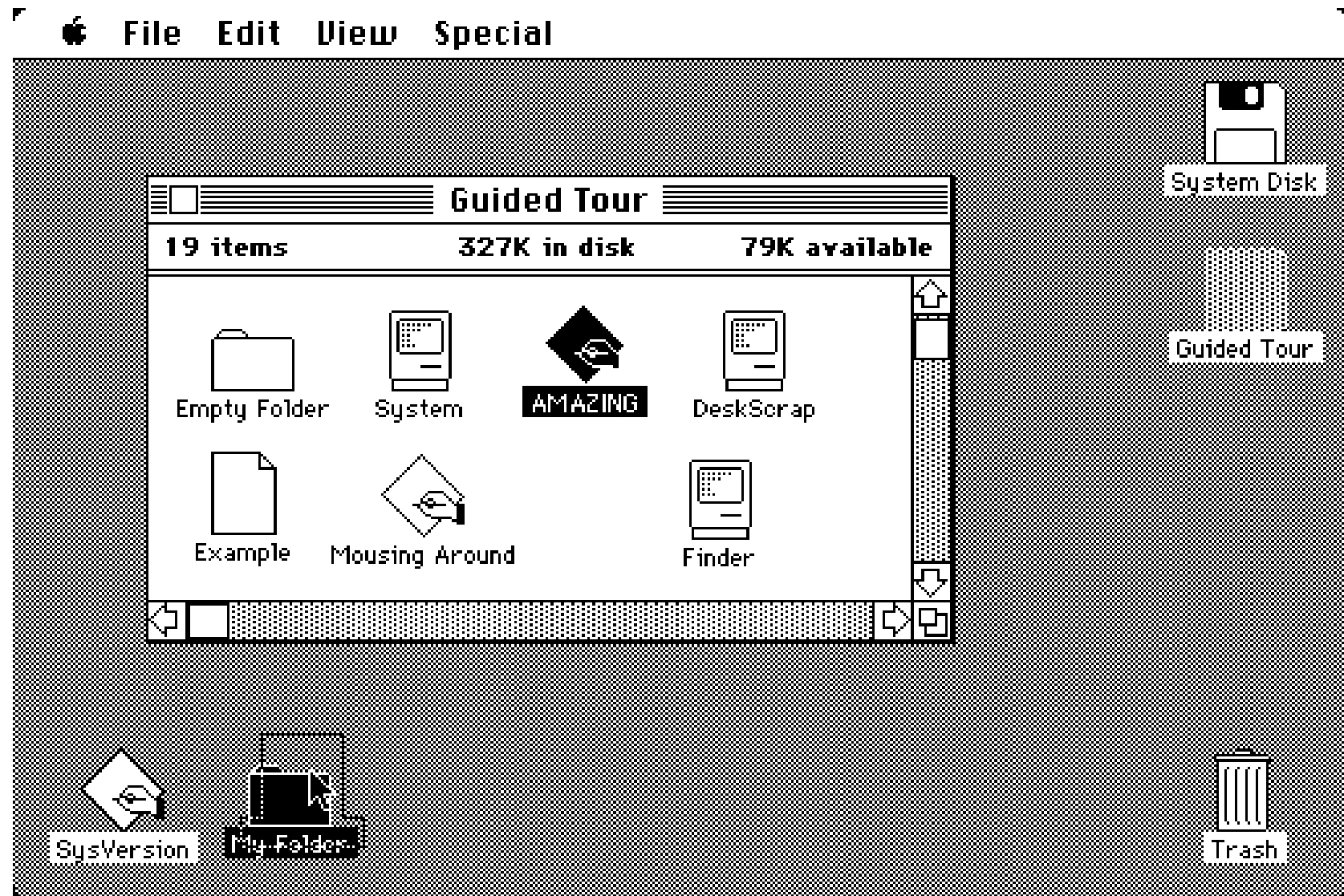
<http://toastytech.com/guis/>

Les micro-ordinateurs

1977



Apple : MacIntosh (1/1984)

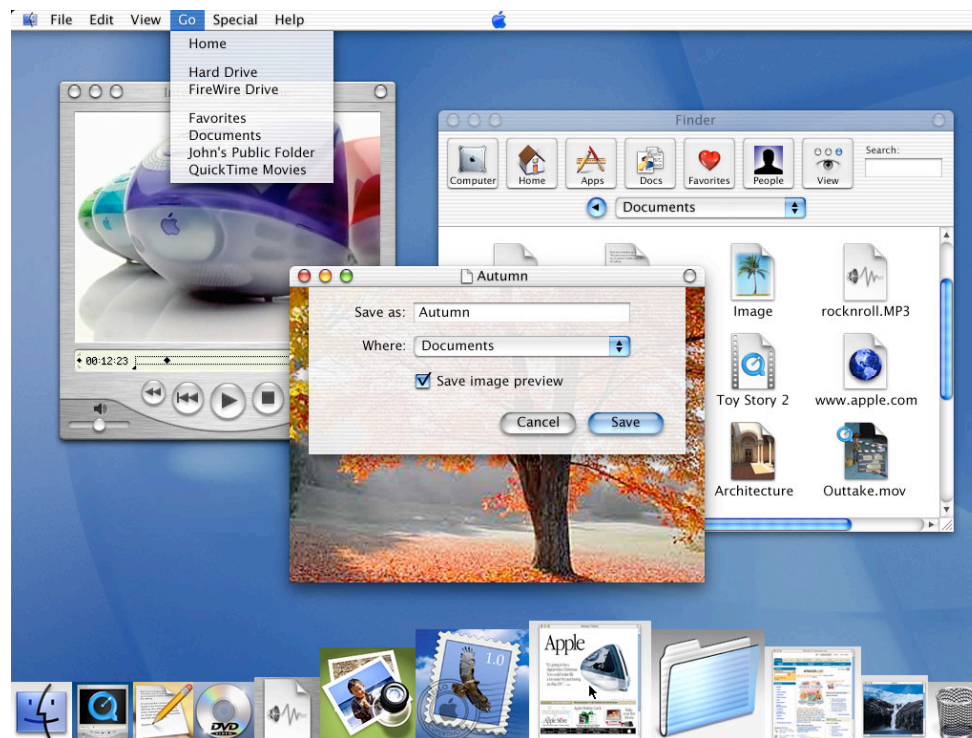
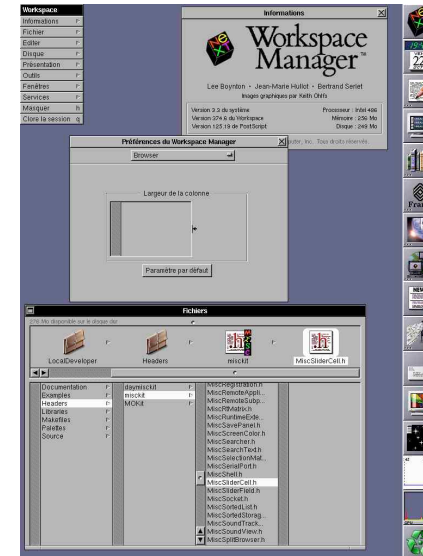


<http://toastytech.com/guis/>

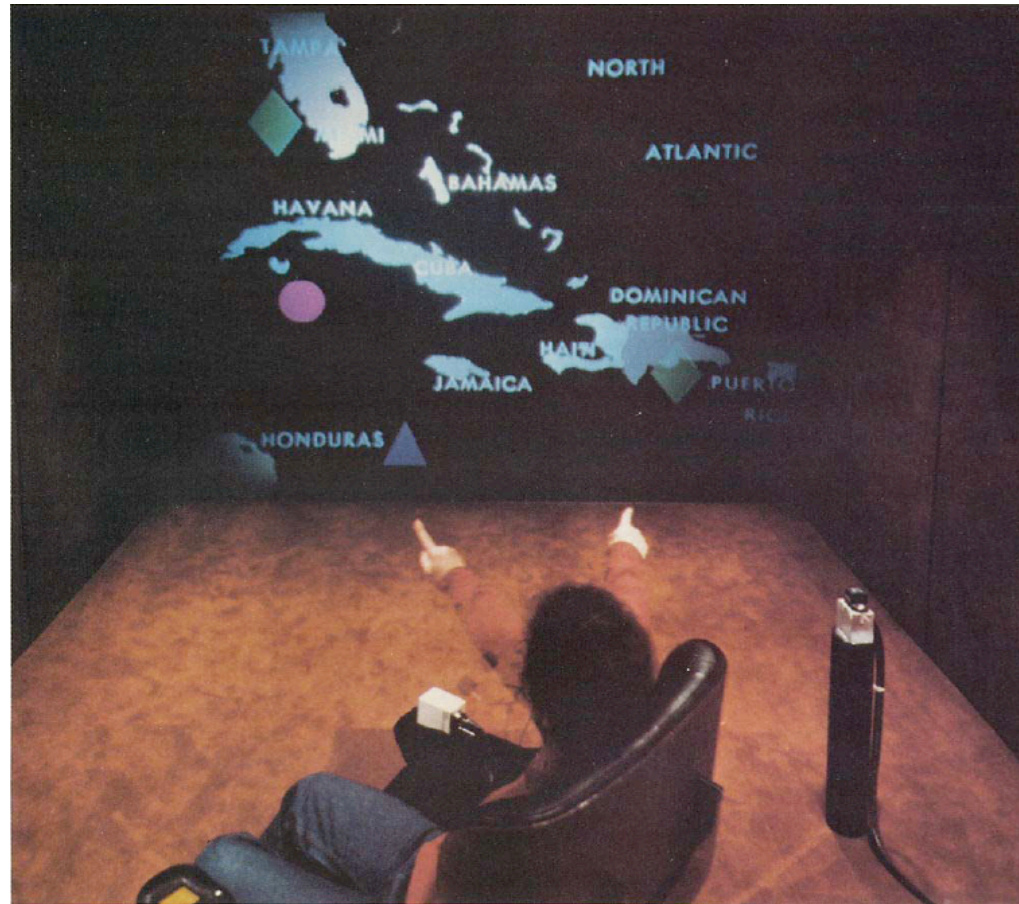
X Window (X11.1 : 9/1987)



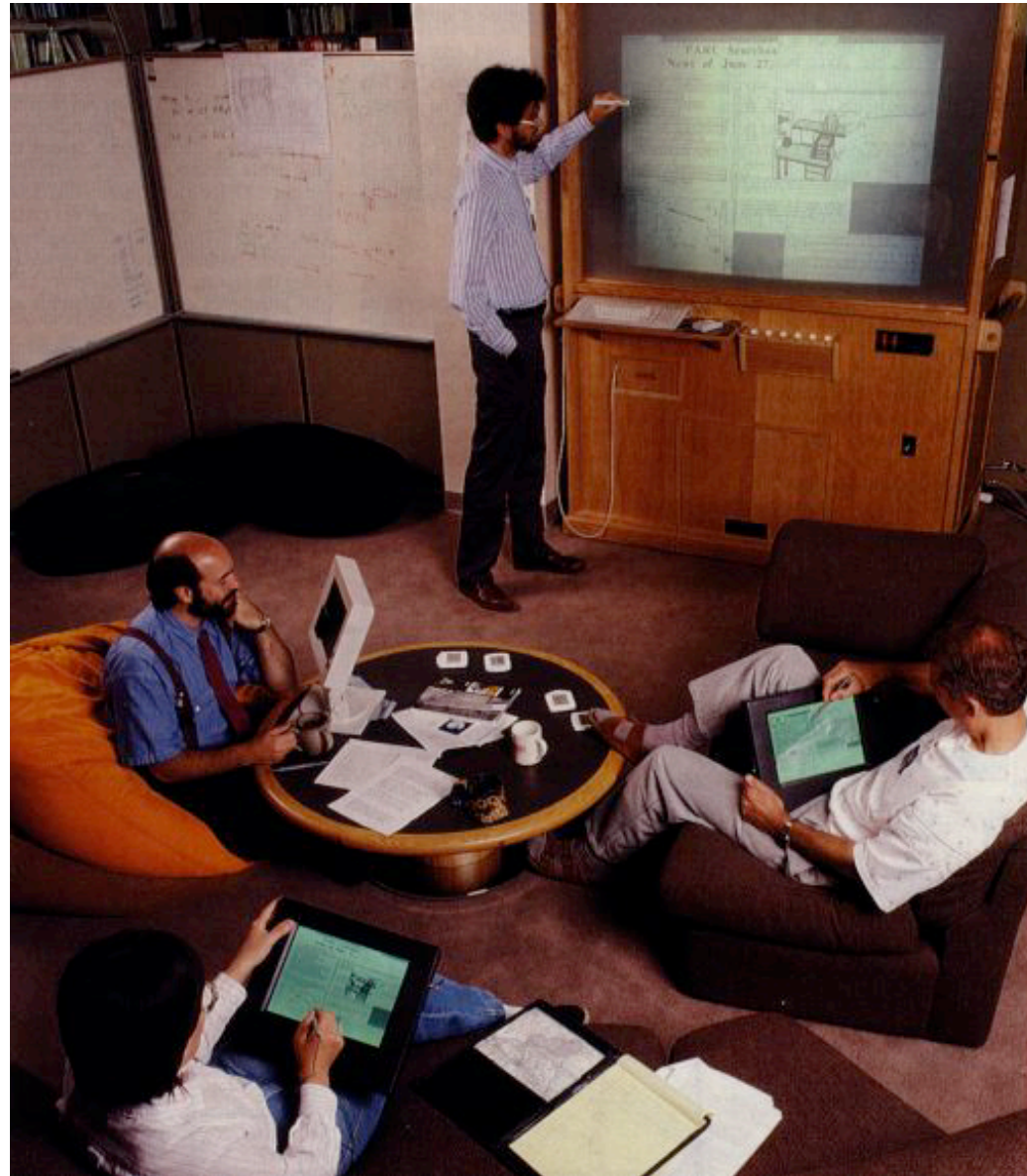
NeXTSTEP (0.8 : 10/1988)



Apple Aqua (1/2000)

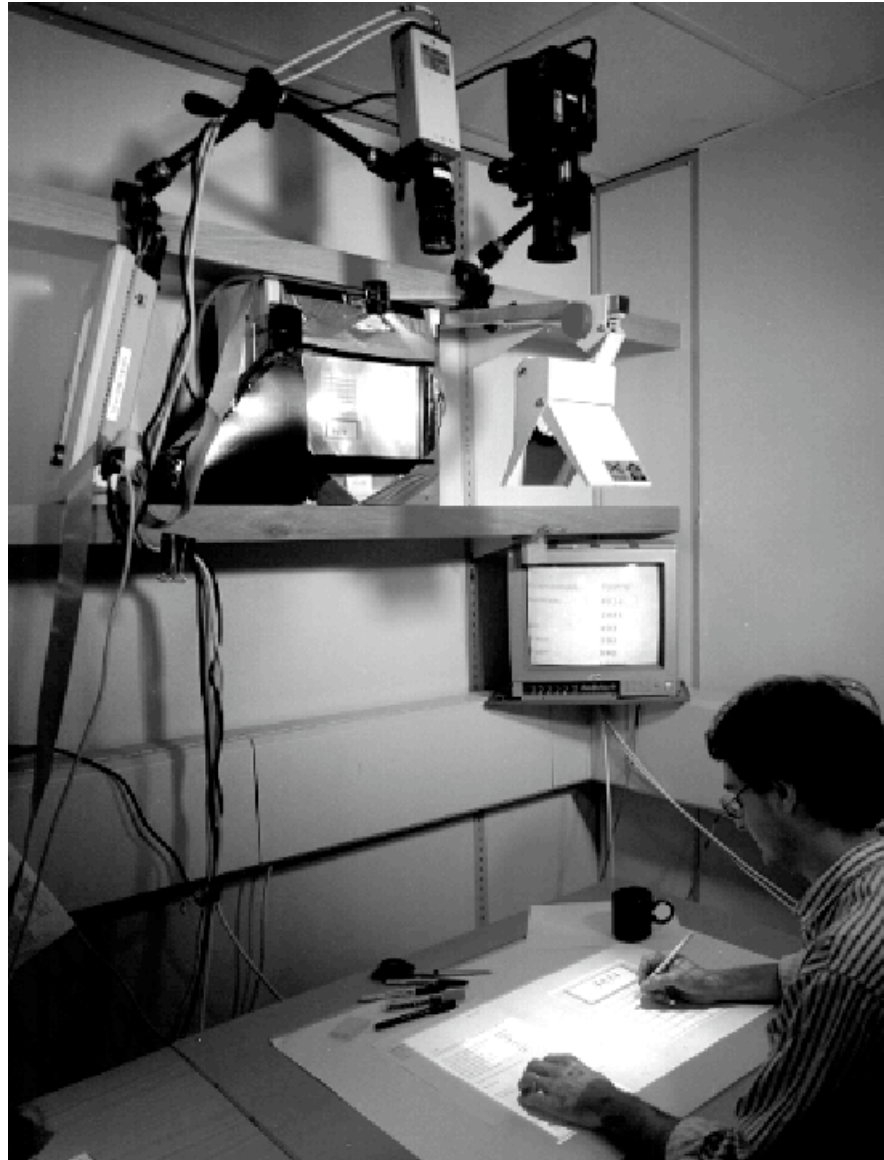


"put that there" - R.A. Bolt - MIT, 1978



M. Weiser, PARC Xerox, ca. 1990

La réalité augmentée



Pierre Wellner. *Interacting with paper on the DigitalDesk*.
Comm. ACM, july 1993.

TOM CRUISE

A JONAS MELORE FILM
**MINORITY
REPORT**

*"Two Thumbs Way Up!
A Masterpiece."*

— Ebert & Roeper

3. Hypermédia

coexistence de plusieurs média

- **le livre à planches**
- **l'index, l'encyclopédie**
- **Otlet**
- **MEMEX**
- **Ted Nelson**
- **hypercard**
- **le web**
- **le DVD / MPEG4**
- **smil et al.**

parsemées en dessous de glandes jaunes à forte; calice très velu N;

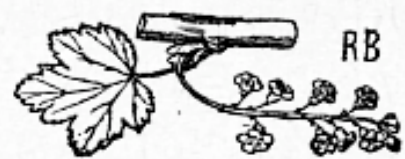


feuilles à pétiole allongé; fleurs noirâtres en dehors; fruits noirs. [Bois, champs; fl. rougeâtres;

non
tes;
sans
R, P;
ouges.

= Fleurs verdâtres.

: Grappes de fleurs et de fruits *pendantes* RB;



fleurs ayant été [Bois, haies; noirâtres; 3-10

: Grappes de fleurs et de fruits *dressées* A; fruits sans goût acide;



= Fleurs *rougeâtres* ou d'un *rouge brun*, dressées avant la formation des fruits, à étamines presque aussi longues que les pétales P;



rameau de la grappe à sépales dressés. noirâtres; 2-12 d.; av

SAXIFRAGÉES

calice à 5 divisions; 10 étamines; fruit divisé en 2 loges.....

jaunâtre, à 4 divisions CH, rarement 5; **SAXIFRAGÉ.** —



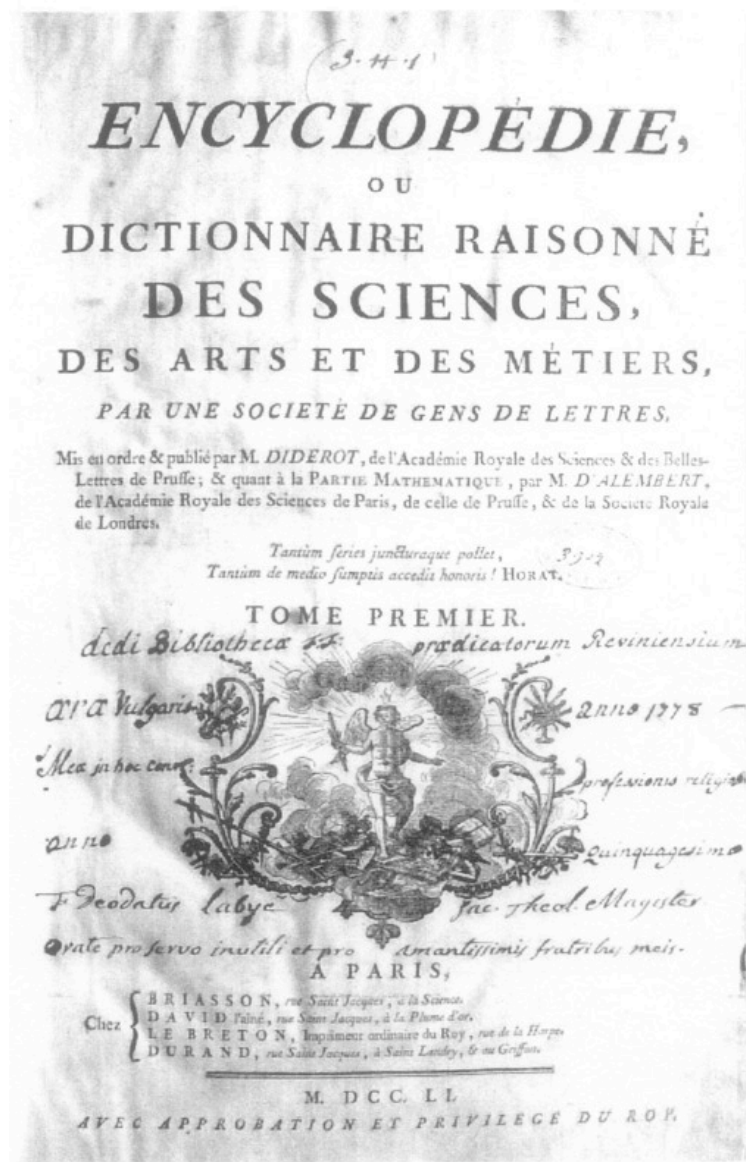
ordinairement 8 étamines; fruit noir

urs roses ou violettes, rarement blanches.....

et un bord cartilagineux, en même temps émarginées; pas le dixième de la longueur de la feuille.

⊙ Pétales roses, plus courts que le calice qui est d'un noir rougeâtre.
⊙ Pas à la fois ces caractères.

: Feuilles, en général, de plus de 4 mm. de largeur et ordinairement de plus de 10 centimètres.....
: Feuilles, en général, de moins de 4 mm. de largeur et ordinairement de moins de 10 centimètres.....



Paul OTLET : « un internet de papier »



www.mondaneum.be

4. Organisation rationnelle des livres et des documents. Biblio-technie, Biblio-Economie

41. Principes généraux

413. Moyens matériels : matrices et outillages, installations

413.13. Inventions à faire

8 - Télélecture - comme application particulière de la télévision.

1° Donner des textes en lecture à distance.

2° Permettre à chacun par un dispositif approprié de prendre connaissance à distance de textes publiquement exposés à cet effet.

3° Permettre la vision à distance des textes de livres disposés sur les rayons d'une bibliothèque ou des feuilles réunies en dossier dans les classeurs.

9 - Téléscription - (...) d'ajouter à distance des inscriptions à des textes existants

P. OTLET Traité de documentation. le livre sur le livre, théorie et pratique.
Bruxelle, van Keenberghen, 1934. réimpr. Liège, C.L.P.C.F., 1989 (p. 289 et suiv)

Vannevar BUSH : MEMEX

The Atlantic | July 1945 | As We May Think | ...

Précédente Suivante Arrêter Actualiser Démarrage Remplissage automatique Imprimer Courrier

Adresse : <http://www.theatlantic.com/unbound/flashbks/computer/bushf.htm>

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More on technology from *The Atlantic Monthly*.

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The Atlantic Monthly | July 1945

AS WE MAY THINK

BY VANNEVAR BUSH

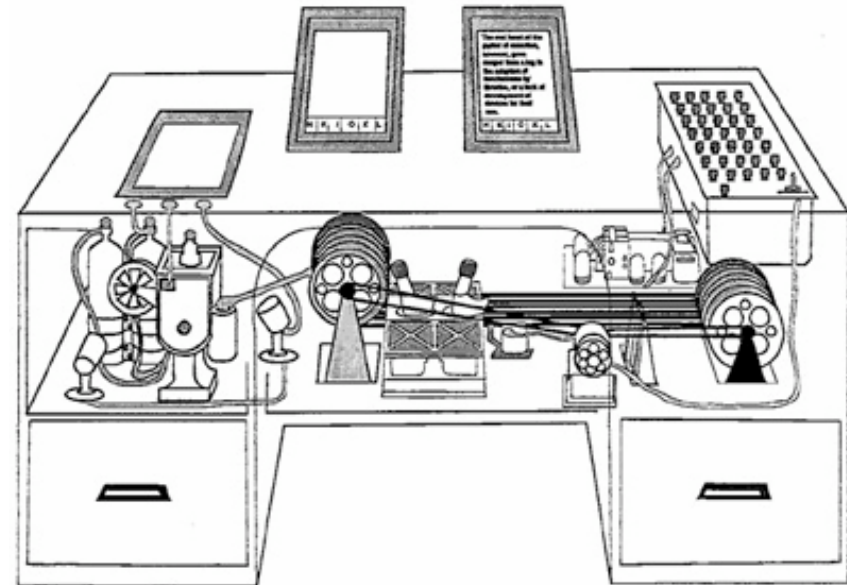
.....

As Director of the Office of Scientific Research and Development, Dr. Vannevar Bush has coordinated the activities of some six thousand leading American scientists in the application of science to warfare. In this significant article he holds up an incentive for scientists when the fighting has ceased. He urges that men of science should then turn to the massive task of making more accessible our bewildering store of knowledge. For years inventions have extended man's physical powers rather than the powers of his mind. Trip hammers that multiply the fists, microscopes that sharpen the eye, and engines of destruction and detection are new results, but not the end results, of modern science. Now, says Dr. Bush, instruments are at hand which, if properly developed, will give man access to and command over the inherited knowledge of the ages. The perfection of these pacific instruments should be the first objective of our scientists as they emerge from their war work. Like Emerson's famous address of 1837 on "The American Scholar," this paper by Dr. Bush calls for a new relationship between thinking man and the sum of our knowledge. —THE EDITOR

This has not been a scientist's war; it has been a war in which all have had a part. The scientists, burying their old professional competition in the demand of a common cause, have shared greatly and learned much. It has been exhilarating to work in effective partnership. Now, for many, this appears to be approaching an end. What are the scientists to do next?

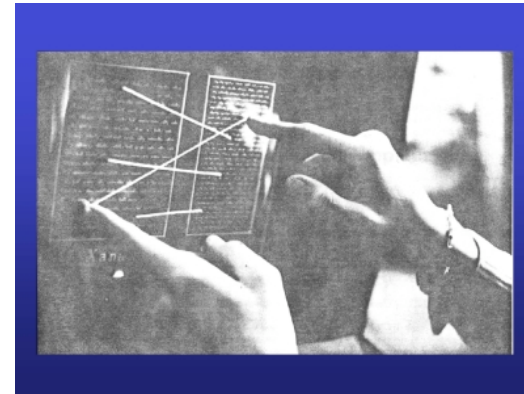
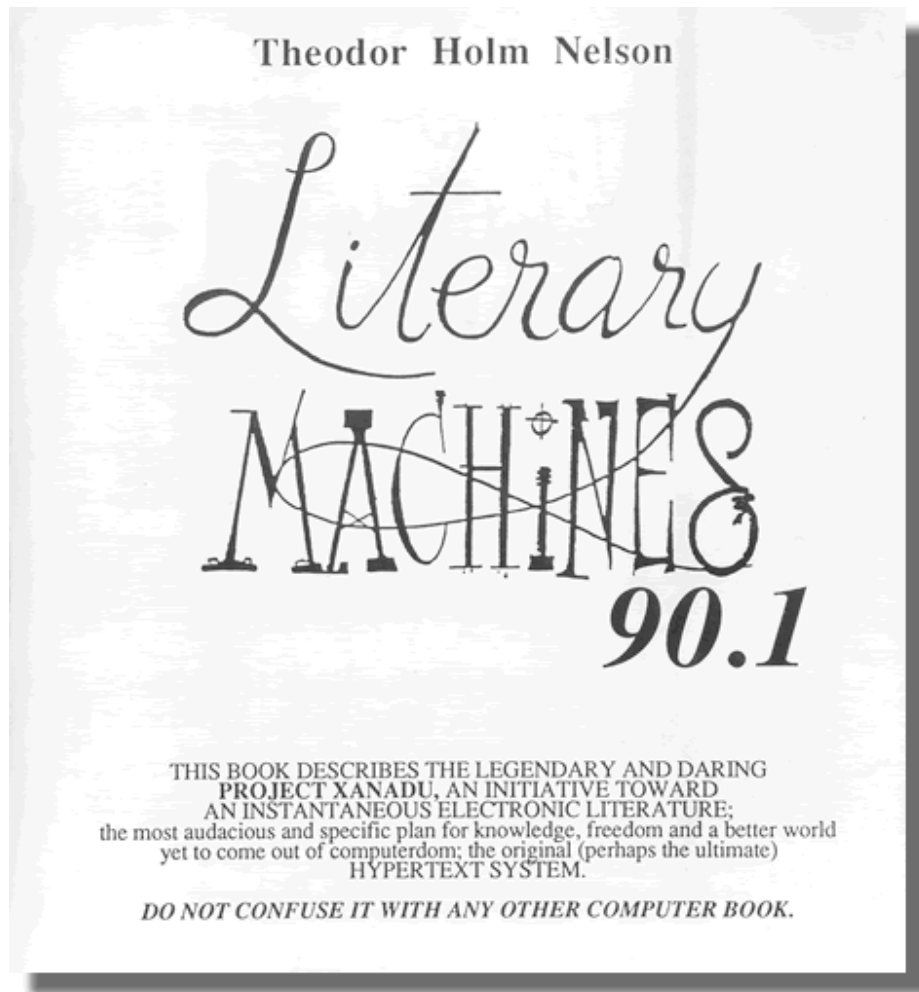
For the biologists, and particularly for the medical scientists, there can be little indecision, for their war has hardly required them to leave the old paths. Many indeed have been able to carry on their war research in their familiar peacetime laboratories. Their objectives remain much the same.

It is the physicists who have been thrown most violently off stride, who have left academic pursuits for the making of strange destructive gadgets, who have had to devise new methods for their unanticipated assignments. They have done their part on the devices that made it possible to turn back the enemy, have worked in combined effort with the physicists of our allies. They have felt within themselves the stir of achievement. They



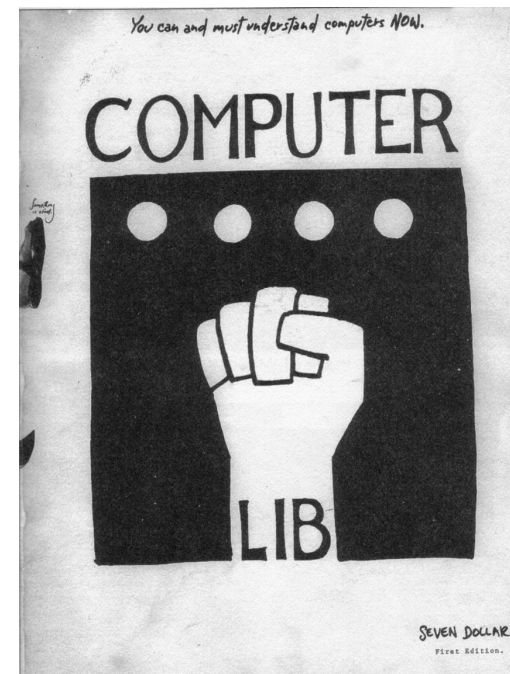
<http://www.theatlantic.com/unbound/flashbks/computer/bushf.htm>

Ted Nelson (Xanadu et l'hypertexte)

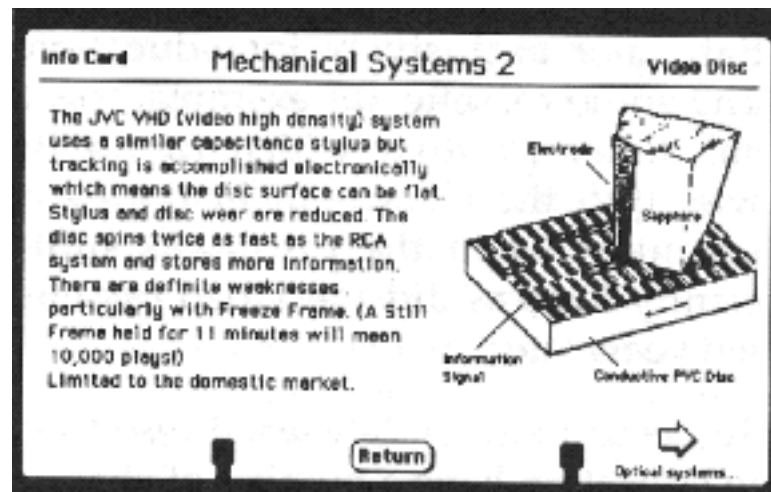
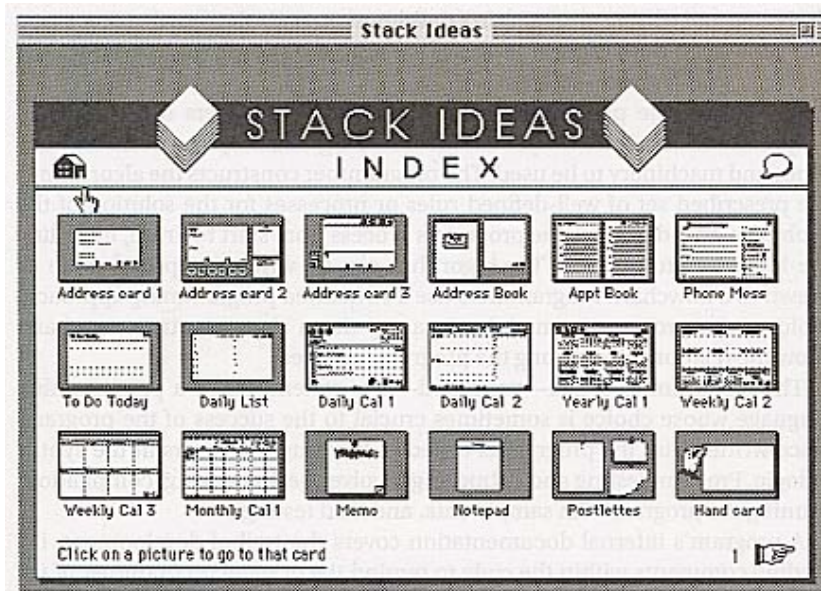


http://www.bootstrap.org/colloquium/session_09/session_09_nelson.html

...by 'hypertext' I mean nonsequential writing - text that branches and allows choice to the reader, best read at an interactive screen. (20th ACM Conf. 1965)

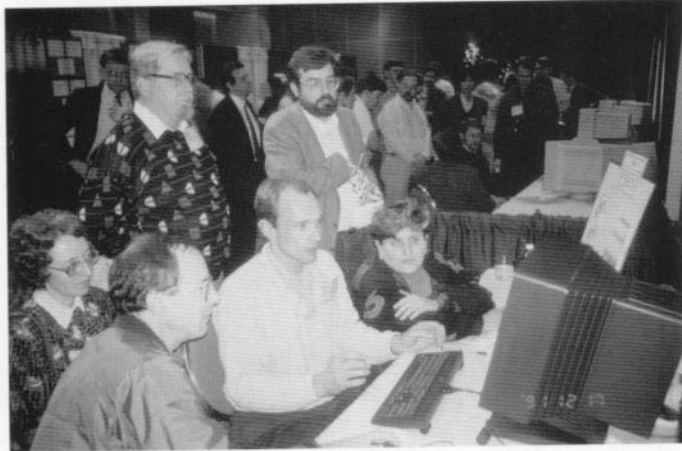


Apple hypercard - 1987 Bill Atkinson



<http://www.folklore.org/index.py>

Le World-Wide-Web



PL.10 After having his paper rejected, Tim Berners-Lee demonstrates the World Wide Web to delegates at the Hypertext '91 conference in San Antonio, Texas.

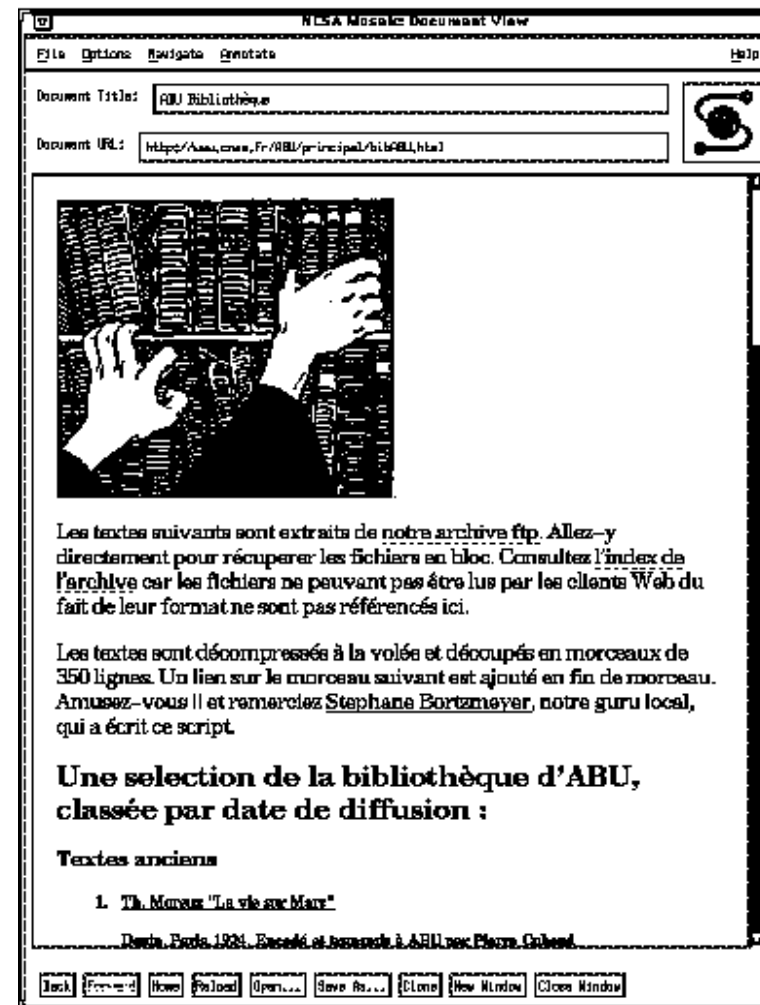
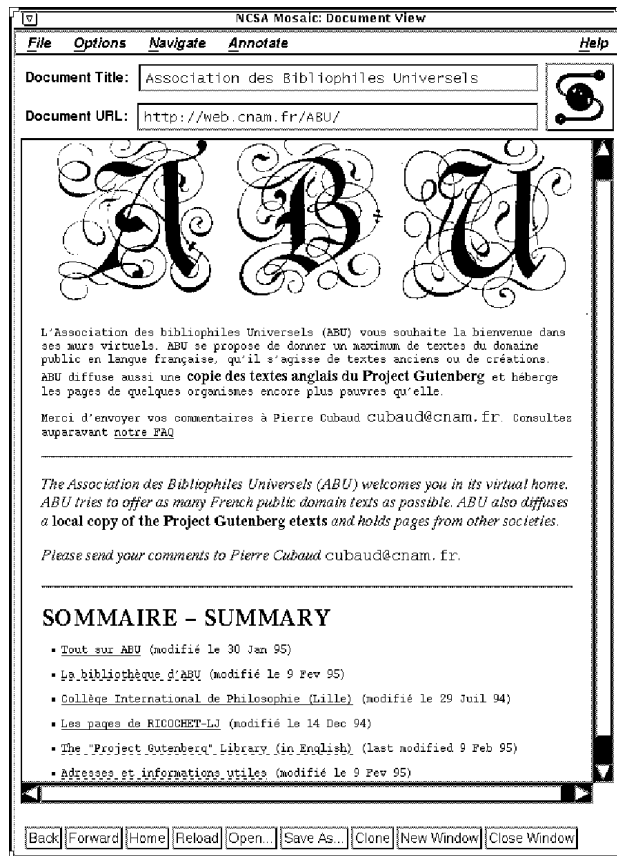
J. GILLIES, R. CAILLIAU. *How the web was born*. Oxford U. Press, 2000.

Date: Fri, 19 Feb 1993 09:16:11 +0100
 From: Stephane Bortzmeyer <bortz@cnam.cnam.fr>
 Subject: comp.infosystems.wais #758 - New X-based
 information systems browser available.
 Je viens de le rapatrier dans ~ftp/incoming/xmosaic-
 0.8.tar.Z. Mais je n'ai pas le temps de l'installer
 dans l'immediat. Si quelqu'un l'a...

Packet Count by Service

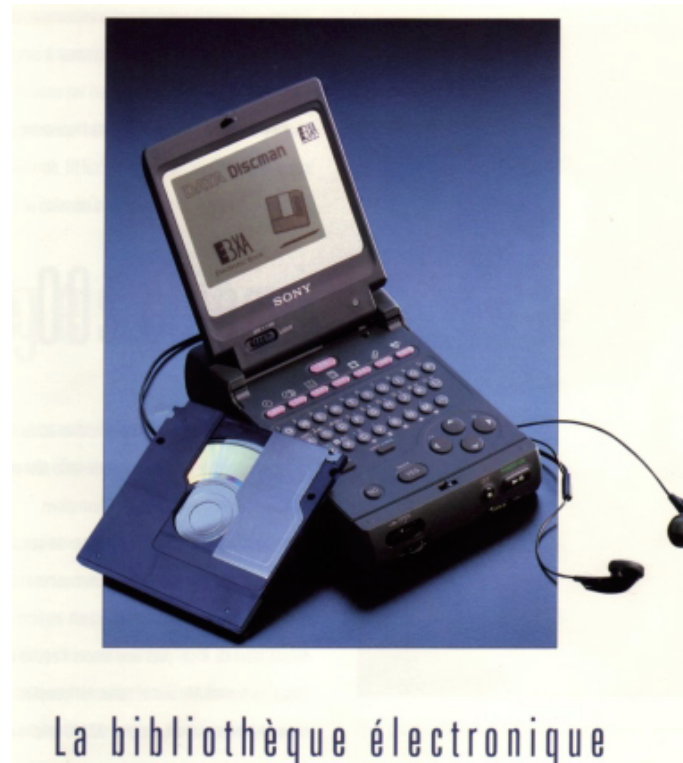
Date	ftp	gopher	www	z.39.50
Dec 1992	6,581,977,950	146,666,950	323,850	10,447,750
Jan 1993	7,350,390,050	187,225,100	511,450	12,502,550
Feb 1993	7,724,768,500	256,061,750	1,969,900	16,575,600
Mar 1993	9,009,608,450	327,717,650	11,294,550	19,506,350
Apr 1993	8,964,047,250	362,609,650	23,988,250	27,044,700
May 1993	8,770,114,800	427,431,800	49,340,000	19,374,200
Jun 1993	8,887,261,050	452,723,300	100,493,200	22,054,300
Jul 1993	9,417,707,000	541,610,600	138,925,550	21,687,700
Aug 1993	10,084,911,100	589,286,650	145,908,300	22,188,150
Sep 1993	10,425,439,550	762,736,250	214,267,950	29,200,000
Oct 1993	11,654,250,600	962,541,300	354,115,000	35,074,250
Nov 1993	12,631,179,400	1,121,316,450	512,805,100	31,658,600
Dec 1993	12,713,435,800	1,148,324,150	685,153,950	29,648,100
Jan 1994	12,932,460,700	1,383,479,450	822,317,950	37,510,800
Feb 1994	13,574,303,450	1,472,386,850	1,105,399,700	32,606,000
Mar 1994	15,692,853,250	1,757,346,750	1,597,847,800	31,654,400
Apr 1994	15,615,201,500	1,872,741,250	2,035,281,650	31,726,150
May 1994	17,116,010,000	1,990,558,500	2,589,730,950	31,146,150
Jun 1994	16,310,408,300	2,012,045,400	3,060,869,850	36,281,300
Jul 1994	16,146,166,250	1,979,391,550	3,355,432,550	37,126,100
Aug 1994	18,160,551,300	2,355,422,400	4,187,132,200	50,777,950
Sep 1994	20,119,437,650	2,695,472,350	5,082,138,200	53,662,850

Statistics provided by Merit NIC Services machine
 Graph by: James E. Pitkow, pitkow@cc.gatech.edu



Le site ABU en 1995 (client XMosaic sur station Sun)

le livre électronique ?

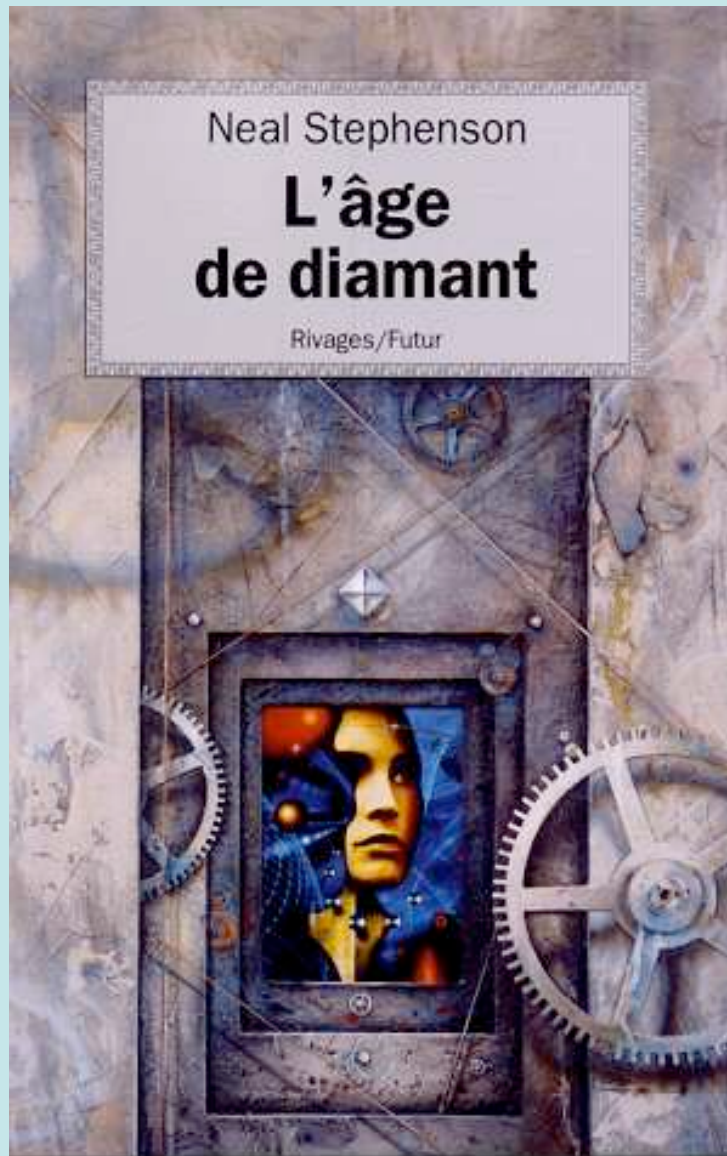


SONY data discman (ca 1992)

Neal Stephenson

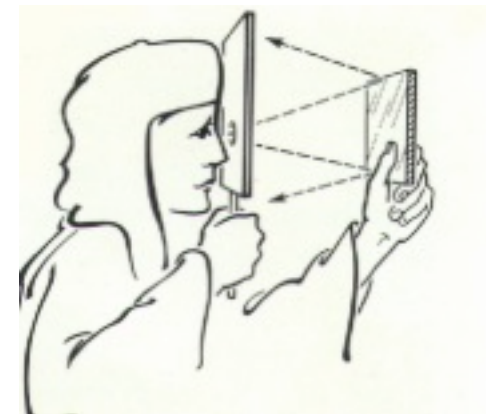
L'âge de diamant

Rivages/Futur



4. Immersion par la simulation

- la perspective**
- les panoramas**
- l'opéra**
- le panneau de contrôle synoptique**
- le simulateur de vol**
- le jeu video**
- la vision en relief**
- le son multipiste**
- l'image de synthèse**
- la réalité « virtuelle »**
- la visualisation d'info**



<http://www.kap.pdx.edu/trow/winter01/perspective/>

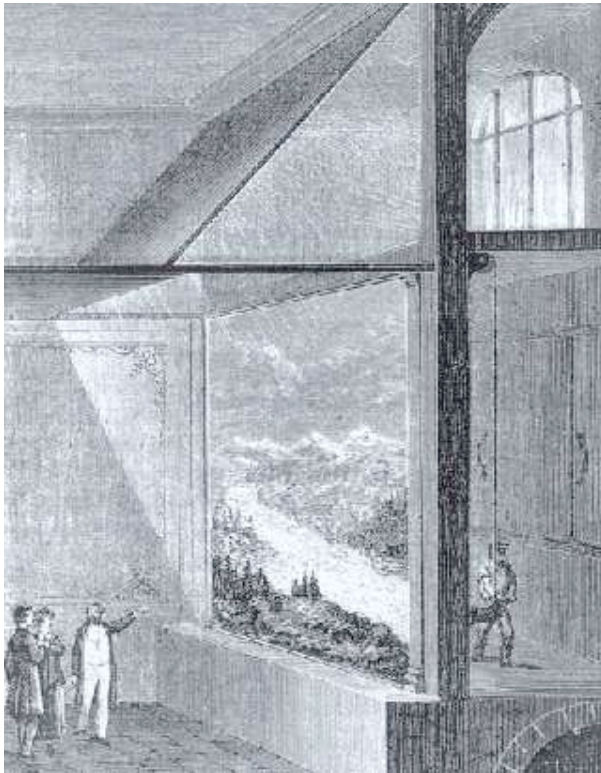
ca 1415 - Filippo BRUNELLESCHI - L'image calculée



German opera composer Richard Wagner believed that the future of music, music theater, and all the arts, lay in an embrace of Gesamtkunstwerk or total artwork, a fusion of the arts that had not been attempted on this scale since the classic Greeks. In 1849, Wagner wrote the essay, *The Art-work of the Future*, defining the synthesis of the arts in which opera served as a vehicle for the unification of all the arts into a single medium of artistic expression.

The Festspielhaus (Festival House) Theater opened in 1876 in Bayreuth, Germany, where Wagner applied his theatrical innovations including: darkening the house, surround-sound reverberance, and the revitalization of the Greek amphitheatrical seating to focus audience attention on stage. This approach to opera foreshadowed the experience of virtual reality, immersing the audience in the imaginary world of the stage.

Les panoramas (dioramas)



<http://www.digischool.nl/ckv2/romantiek/romantiek/panorama/>



Rue Léon Jouhaux (Xème)

vision en relief

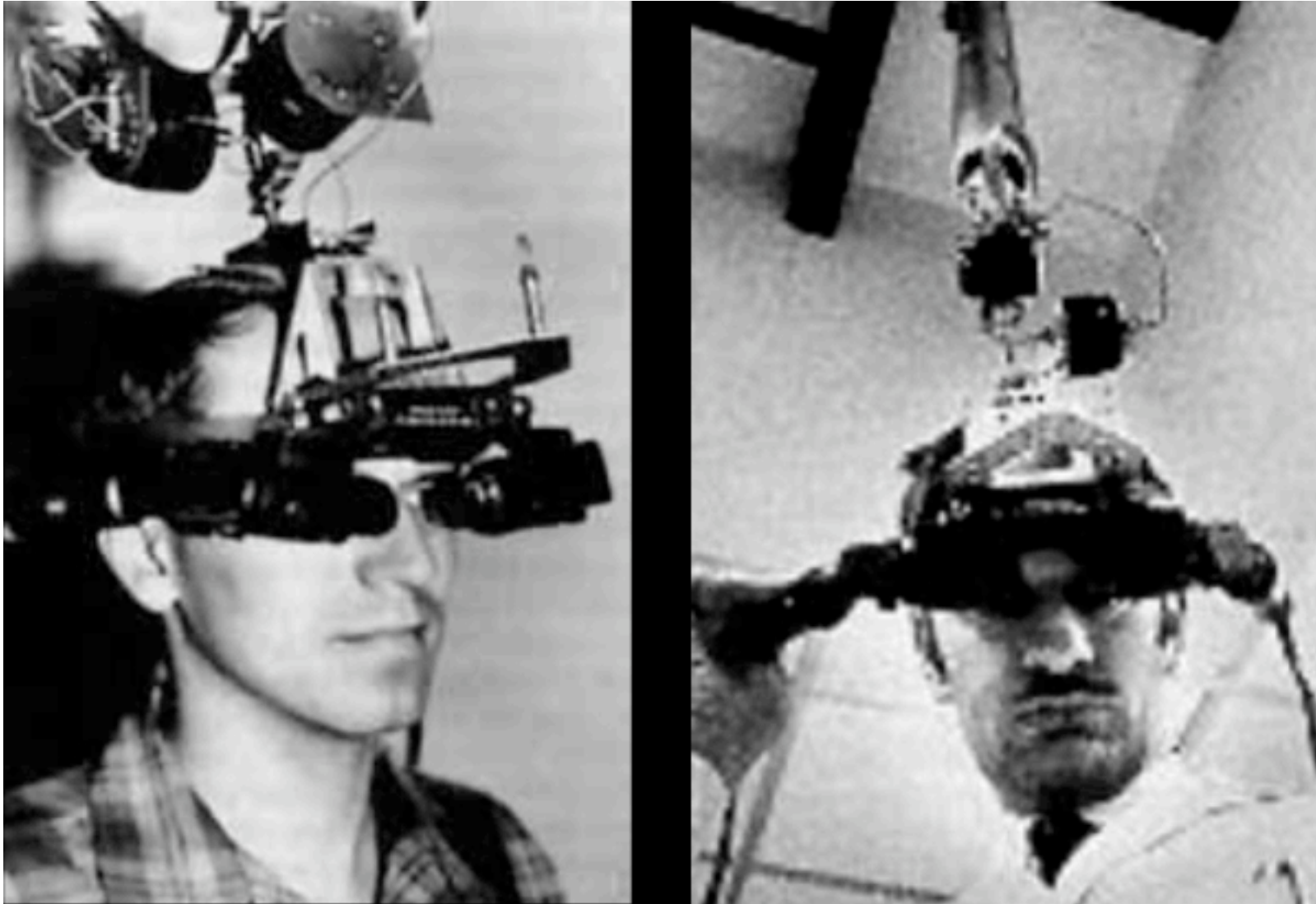


<http://www.berezin.com/3d/holmes.htm> (en kit 45€)

son stéréo



Ivan Sutherland, “The Ultimate Display” (1965)



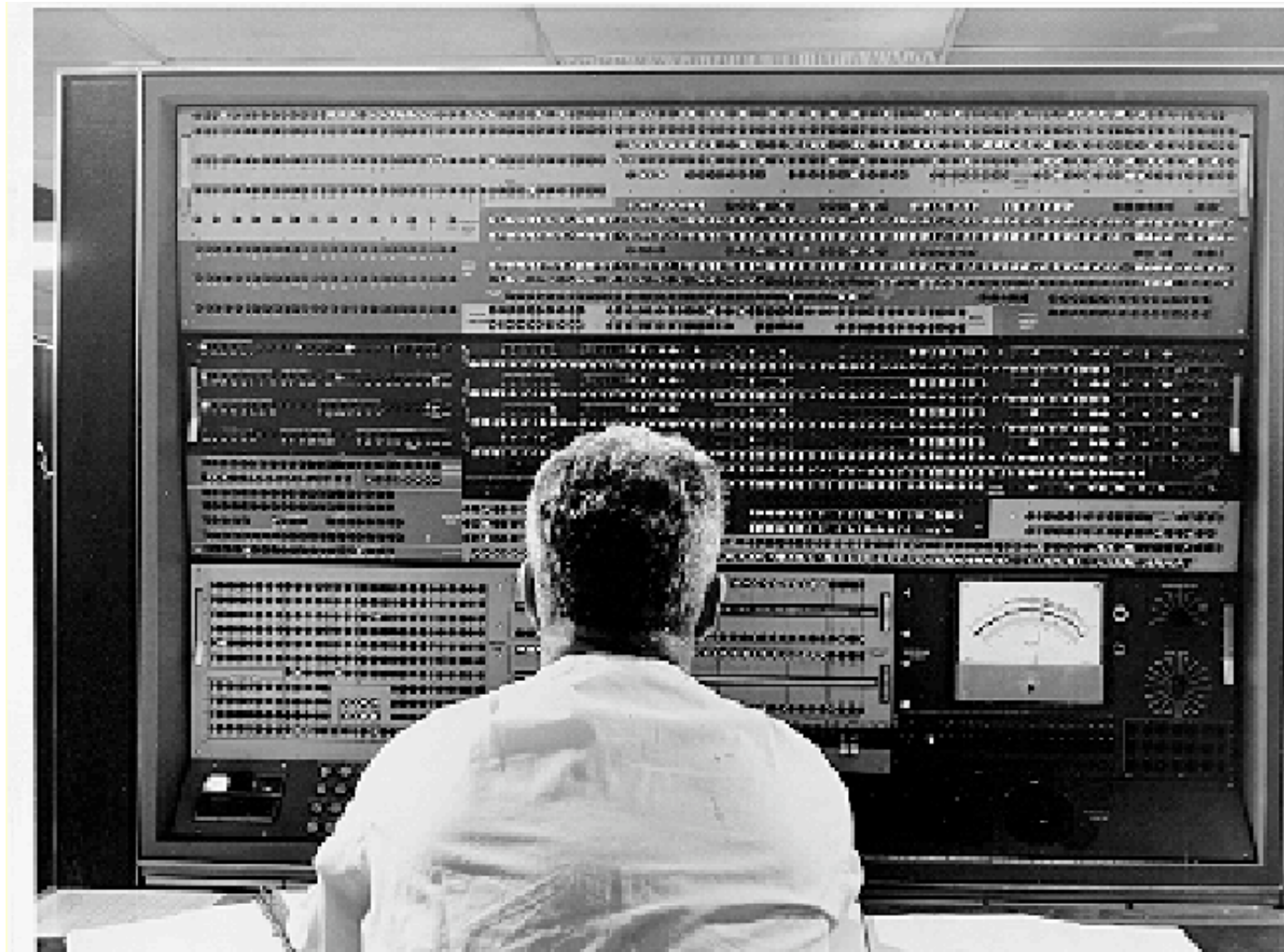


<http://www.5dt.com/products/phmd.html>

**poignée retour d'effort
(Richard feldmann, 197?)**



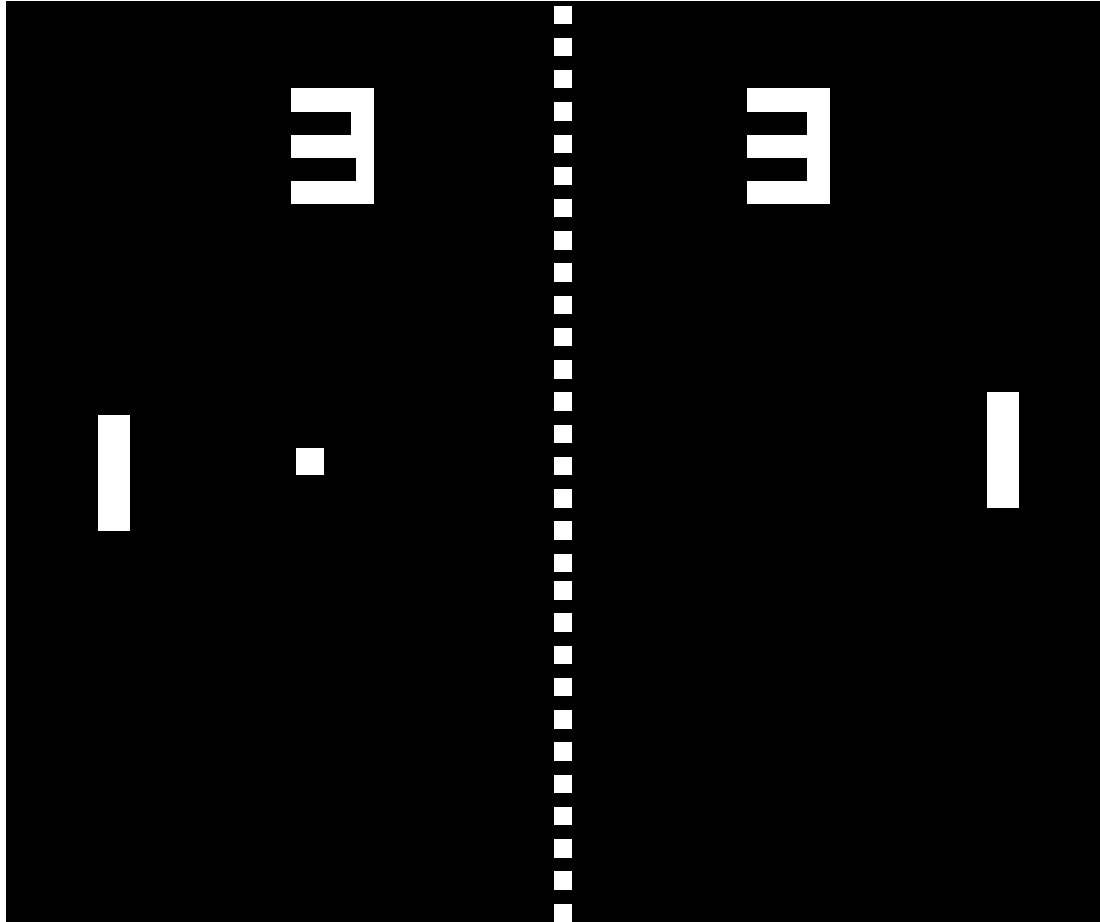
Panneau de contrôle (synoptique)



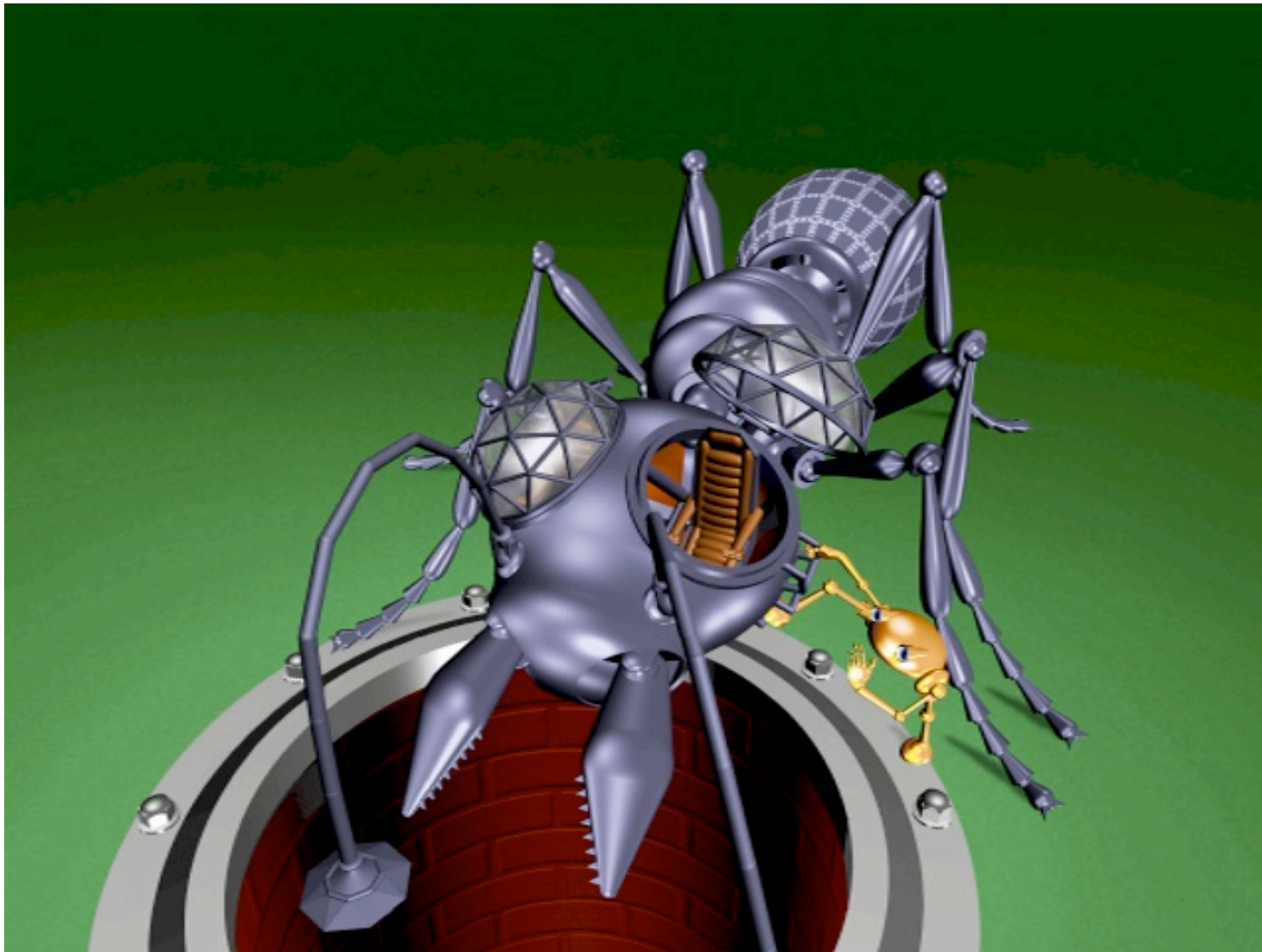
simulateur



jeu vidéo



Pong (1972)



1980 - NYIT - The works

La "réalité virtuelle"

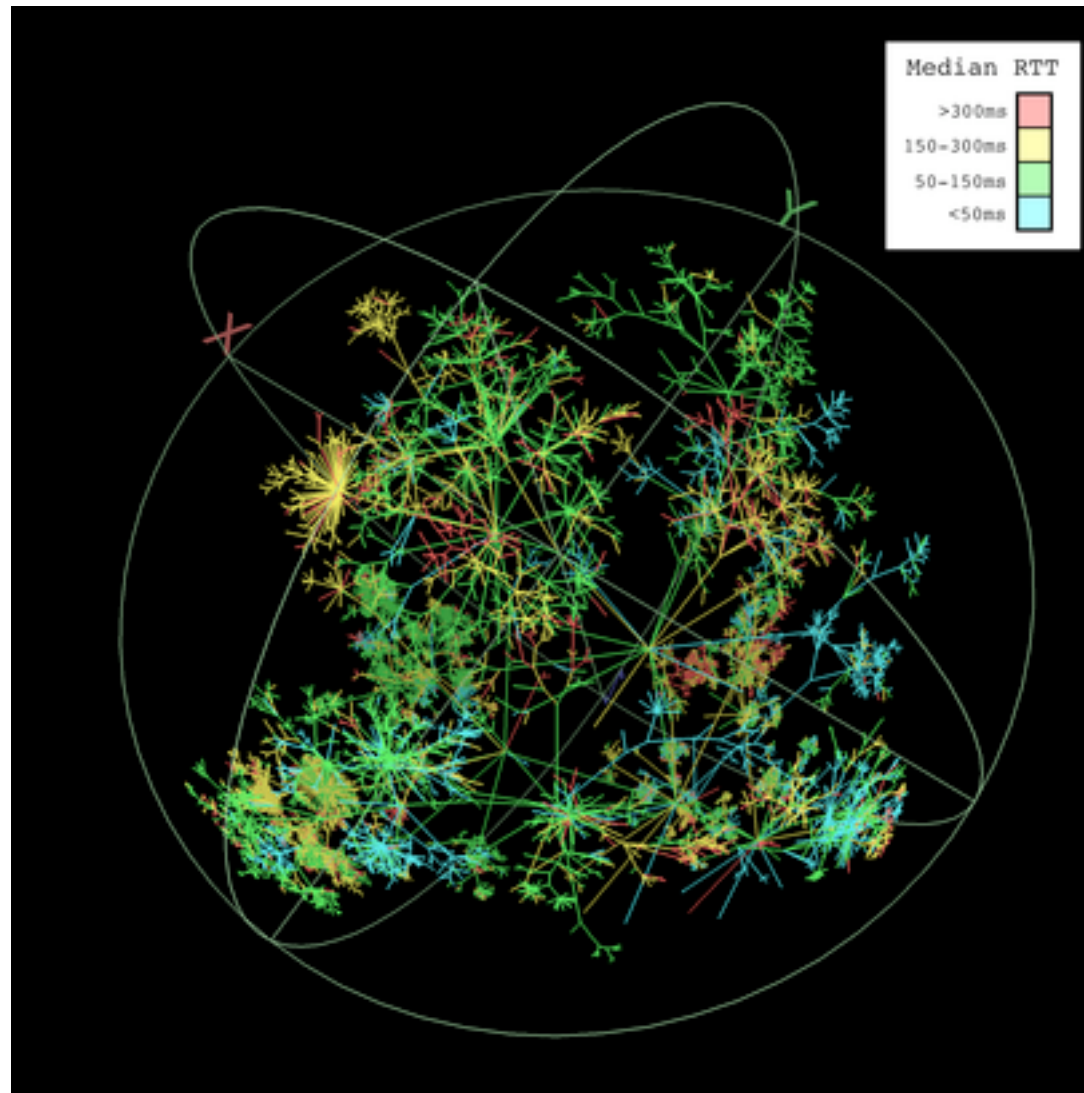


K. Borner et al.
SLIS Univ. Indiana



P. Cubaud, A. Topol

"information visualization"



CAIDA

Processing



<http://processing.org>