



storage & search

up in the clouds

History of Information

April 10, 2012





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SPECIAL SERIES

Starting Up: Silicon Valley's Origins



View caption

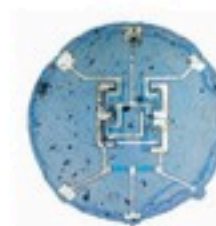
Courtesy of Intel

Intel Legends Moore And Grove: Making It Last

(13) (20)

In Silicon Valley, the spotlight is often on young entrepreneurs with fresh ideas that will change the world. But for decades, two titans of the tech world thrived in the fast-paced industry: legendary Intel executives Gordon Moore and Andy Grove.

On Morning Edition Playlist



Timeline: The Birth Of Silicon Valley

(6) (24)



America's Magnet For Innovation, And Investments

(13) (15)

On Morning Edition Playlist



A Rare Mix Created Silicon Valley's Startup Culture

(35) (50)

On Morning Edition Playlist

http://www.npr.org/series/149920095/starting-up-silicon-valleys-origins
24-Hof12_Storage&Search-PD 3

overview

assignments

liberating information

'open' vs 'closed'

internet as library

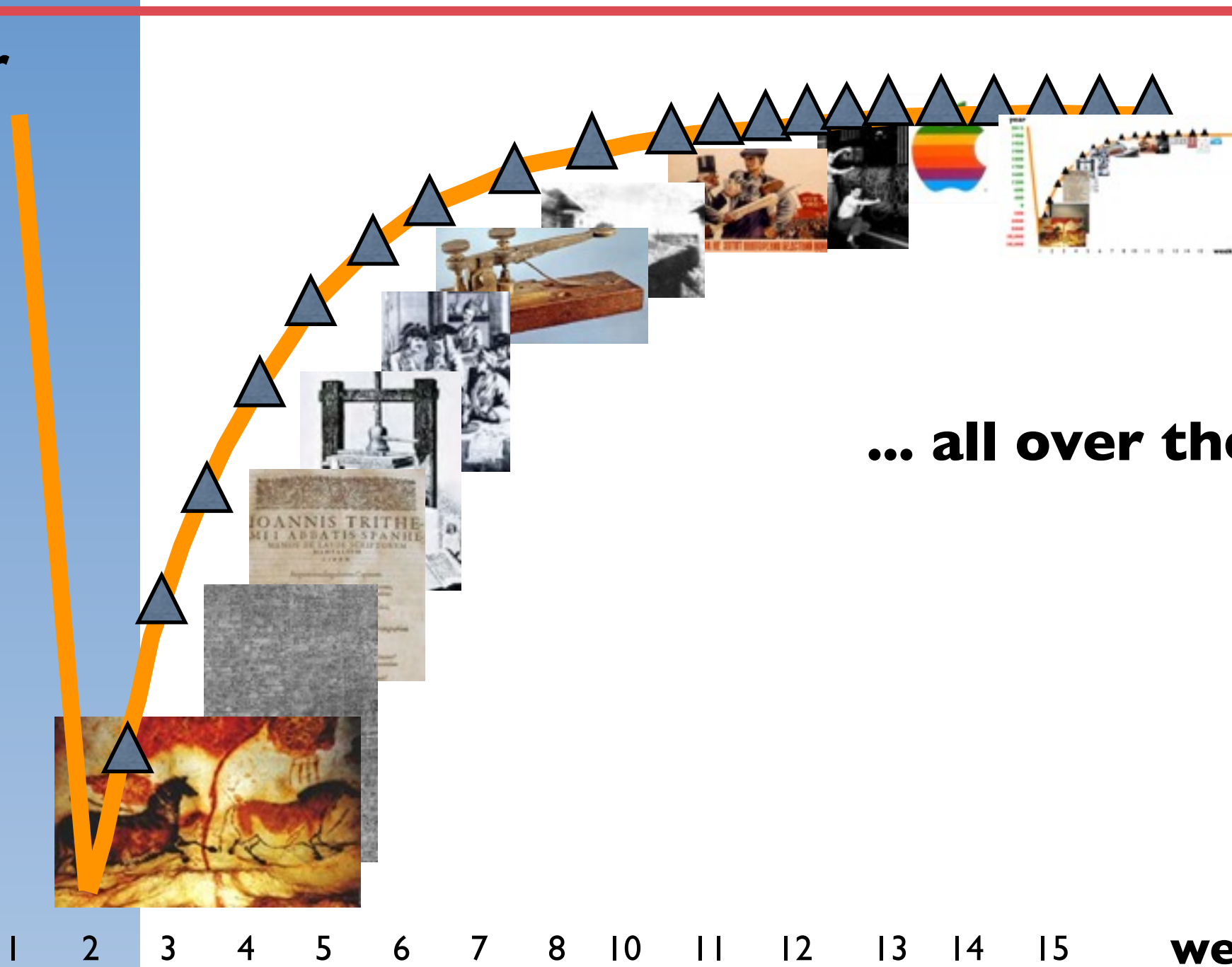
beyond Babbage

where are
we?

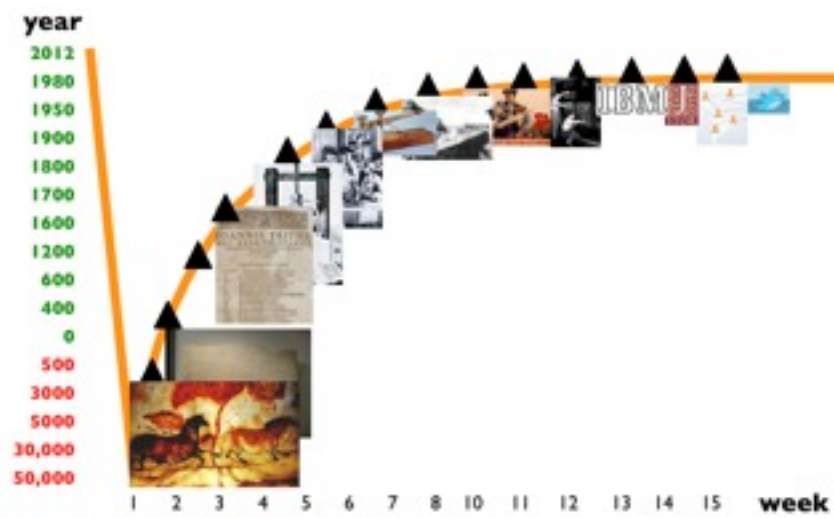
where are we?

year

2010
1980
1950
1900
1800
1700
1600
1200
600
400
0
500
3000
5000
30,000
50,000



... all over the place



looking back

when was the age of information?

revolutions

print

science

'unnoticed'

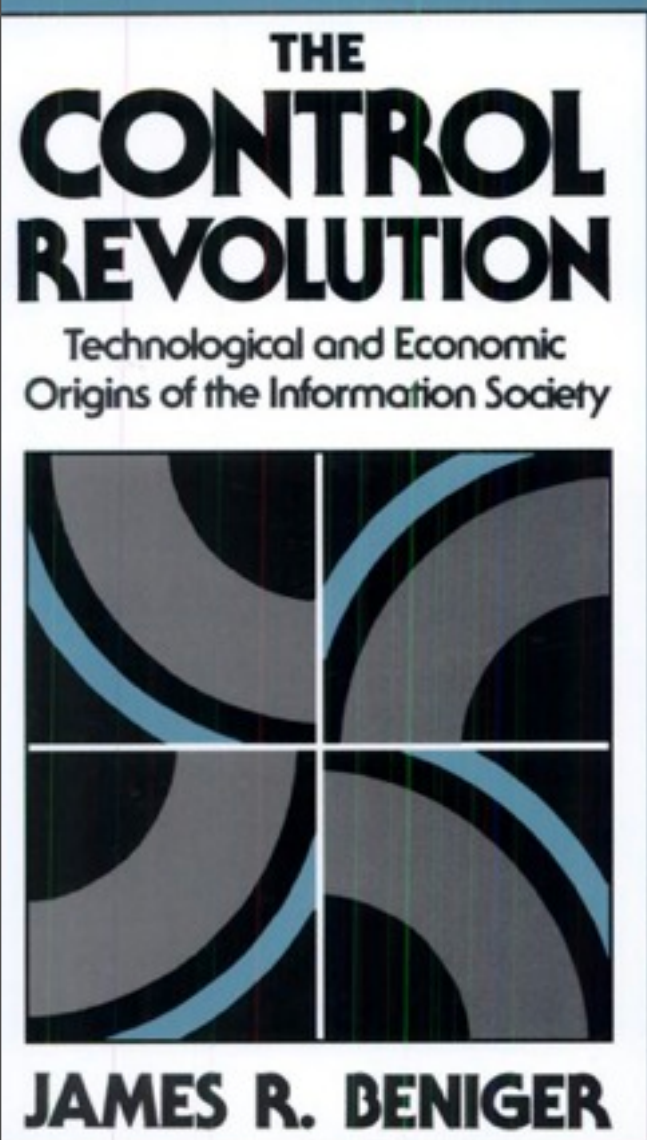
communications

computer

control revolution?

James R. Beniger, *The Control Revolution: Technological and Economic Origins of the Information Society*, 1986

24-Hof112_Storage&Search-PD 8



"People just
produce whatever
they want;
the good stuff
spreads, and
the bad gets
ignored"

--Paul Graham, 2005

whose in control?

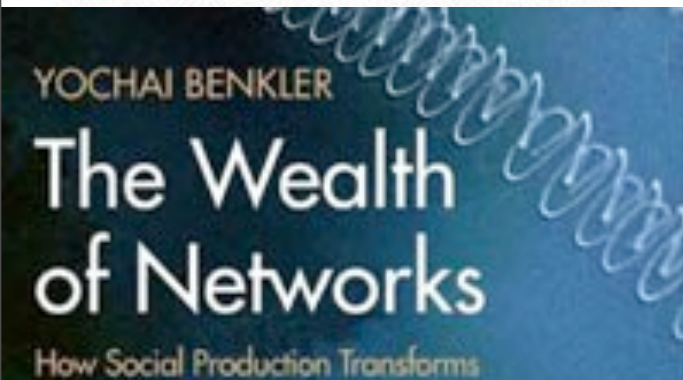
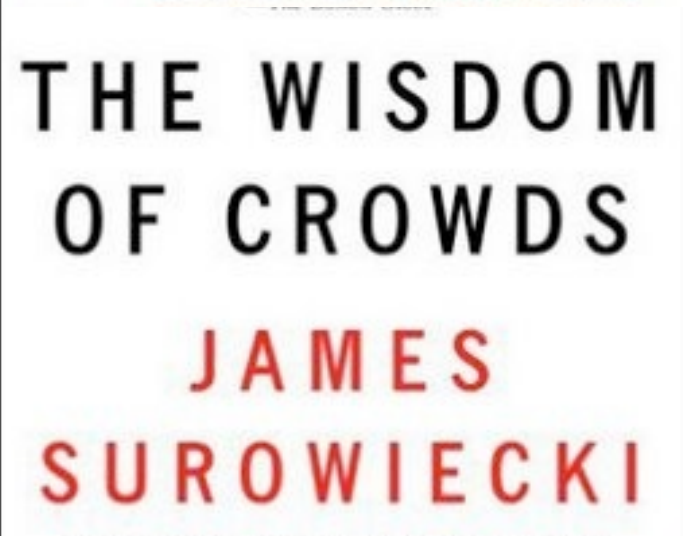
"Information wants to be free" --Stewart Brand

"filisofar vuol esser libero"

Galileo ...

"libertas philosophandi"

Alcinous, Kepler,
Descartes, Spinoza



social liberation

(FL)OSS, crowdsourcing, web 2.0 ...

Raymond - *Cathedral and the Bazaar*, 1997

Surowiecki - *The Wisdom of Crowds*, 2004

Benkler - *The Wealth of Networks*, 2006

Shirky - *Here Comes Everybody*, 2008



French *contrôle*,
earlier *contrerolle*
'the copie of a roll
(of account, etc.), a
paralell of the same
qualitie and content
with th' originall;
also, a controlling
or ouerseeing'

whose in control?

"Information needs to be controlled."

"Information leads to control."



tradeoffs

Morse paradox?

"The record of intelligence is made in a permanent manner

...

Communications are secret to all but the persons for whom they are intended."

--Morse

control or freedom?

"A record if it is to be useful to science must be continuously extended, .. stored .. consulted ... The camera hound ... wears on his forehead a lump little larger than a walnut ... every time [the scientist] looks at something worthy of the record, he trips the shutter

Vannevar Bush, "As We May Think," 1945

control or freedom?

"For almost all of human history, most of what humans experienced was quickly forgotten. Today, however, retention of digital data is (relatively) easy and cheap. As a consequence, and absent other considerations, we keep rather than delete it. ... I propose that we shift the default when storing personal information back to where it has been for millennia, from remembering forever to forgetting over time."

--Victor Mayer-Schönberger, "Useful Void," 2007

24-Hof112_Storage&Search-PD 14

THE
MASTER
SWITCH
THE RISE AND FALL OF INFORMATION EMPIRES
TIM WU



old revolution?

"The oscillation of information industries
between open and closed"

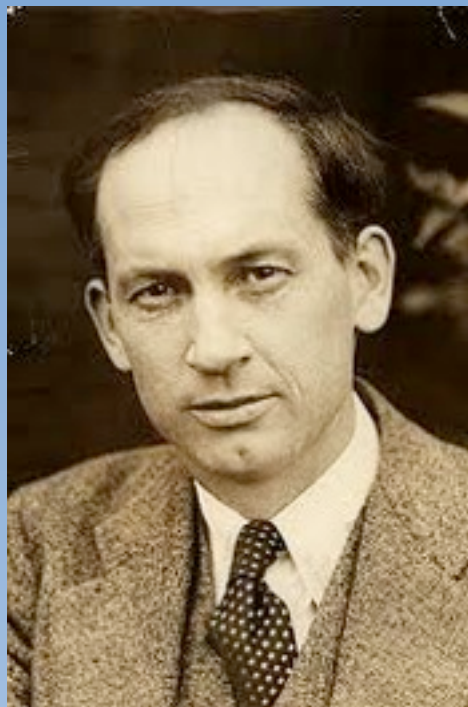
--Tim Wu, *The Master Switch:
The Rise and Fall of Information Empires*, 2010

"Institutions develop social impulses ...
the drive to innovate and the
opposite drive to resist innovation"

--Peter Burke, *A Social History
of Knowledge*, 2000

"time binding" and "space binding"

--Harold Innis, *Empire and Communications*, 1950



Harold Innis
1894-1952

overview

assignments

liberating information

'open' vs 'closed'

internet as library

beyond Babbage?

or still 'registering'?

where are
we?



Vannevar Bush
NSF

beyond Babbage's dreams

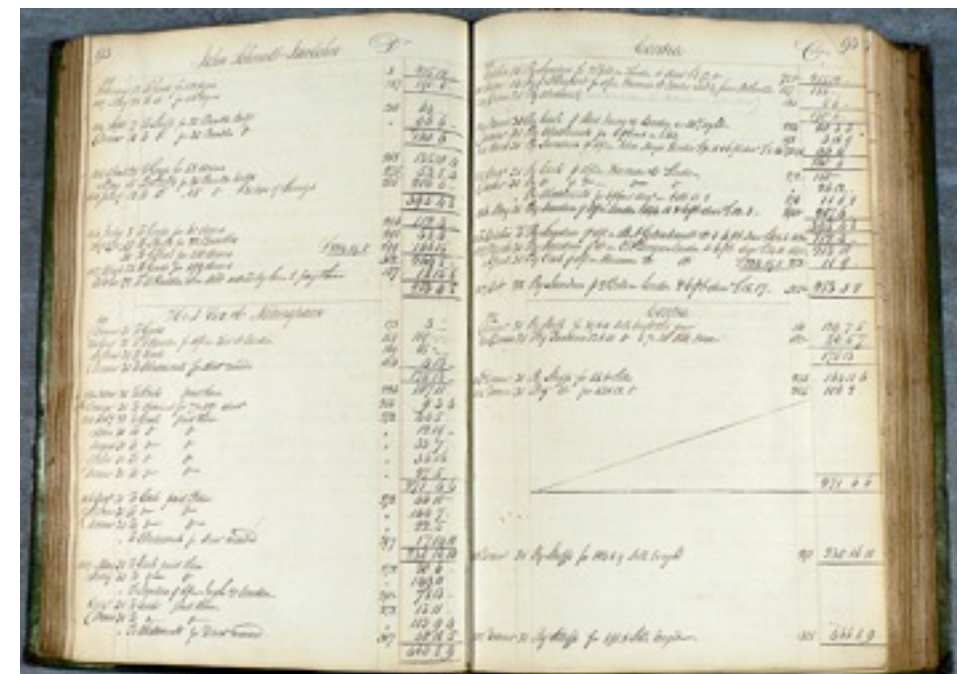
towards the web

Vannevar Bush: "memex"



Ted Nelson

Ted Nelson: "Hypertext"



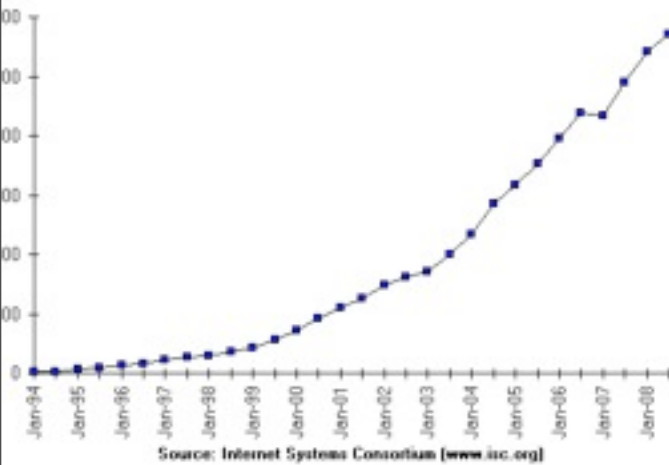
TBL: HTTP & the CERN address book



Tim Berners-Lee
CERN

browsing

Internet Domain Survey Host Count



1993, NCSA Mosaic
Mark Andressen

CERN releases W3 technology

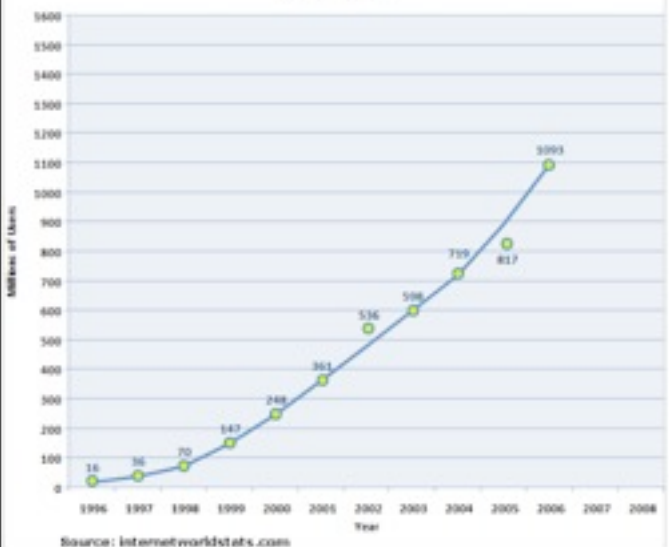
1994, 200+ HTTP servers; traffic up x 1,000

1994, Netscape

1995, Internet Explorer

2009, Google Chrome

Internet Usage Growth
1995 - 2006



"This makes me think of a sort of gated community Google users have that creates a public and private in the Internet Interesting topic..."

--Clarissa Jackson

closed-open-closed?

closed networks

Mead Data Central/Lexis, 1967/1973

CompuServe, 1969/1977

Prodigy, 1984

AOL, 1983

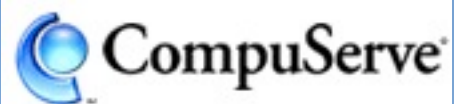
going open

Net goes public 1990-95

HTML, 1990 - going open

going closed again?

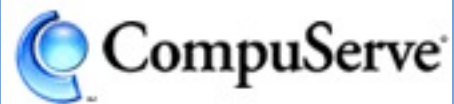
facemash 2003



Aol.

"This makes me think of a sort of gated community Google users have that creates a public and private in the Internet Interesting topic..."
--Clarissa Jackson

closed-open-closed?



Aol.

April 9, 2012, 3:52 PM ET

AOL Patent Sale Heavy With Tax Benefits

Article

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Maxwell Murphy
Senior Editor

AOL finally found a use for Netscape. The now defunct Internet browser AOL bought in 1999 for \$4.2 billion in stock has become the vehicle that allows it to sell and license its patent trove in an essentially tax-free transaction.

overview

assignments

liberating information

'open' vs 'closed'

internet as library

beyond Babbage

where are
we?

a new library?

"the Internet ... is a library"

--Frances Cairncross,
The Death of Distance, 1997

"the web is a global library
produced by millions of people"

--Yochai Benkler,
The Wealth of Networks, 2006



changing ideas of library?



"The Internet is
a library with
all the books on
the floor."

*Librarian's Guide
to Cyber Space*



old problem, new tools?



1988, WAIS



1990, Archie



1992, Veronica (Gopher)



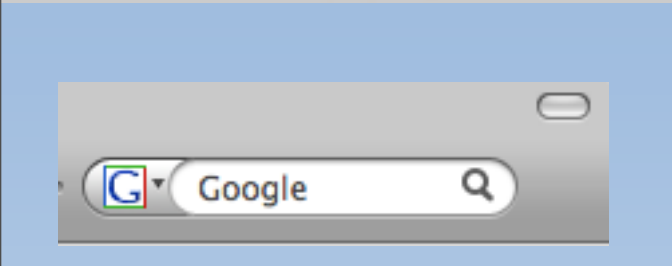
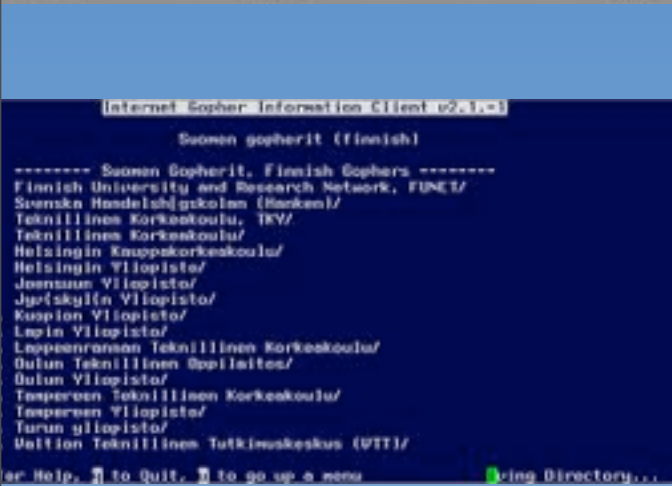
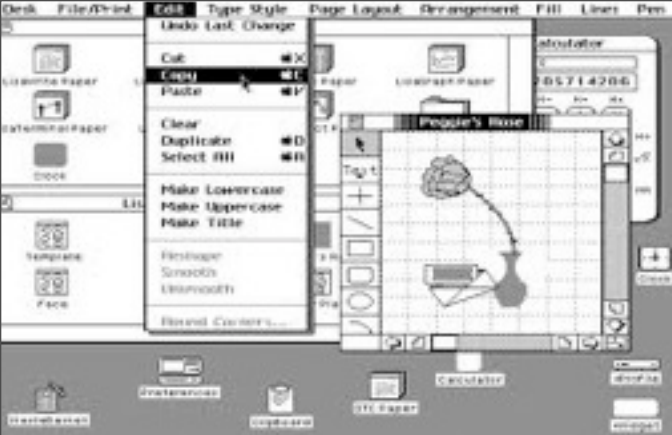
1994, Lycos

1995, Alta Vista, Yahoo

1996, Inktomi

1997, Ask Jeeves





real change?

YAHOO!

yet another hierarchical officious oracle

Google™

to organize the world's information

overview

assignments

liberating information

'open' vs 'closed'

internet as library

what do we know
of libraries?

beyond Babbage

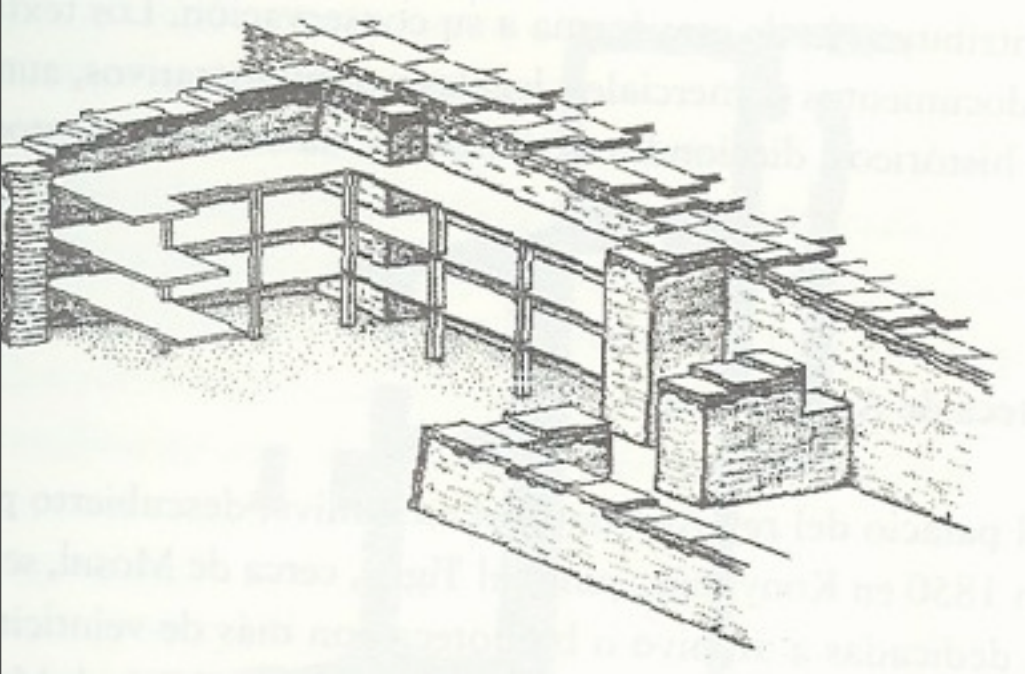
where are
we?



Oracle Bones
Anyang, c1100 bce

"as early as the second millennium BCE the Chinese had ... means of organizing and storing their written records."
Helliwell, 1998

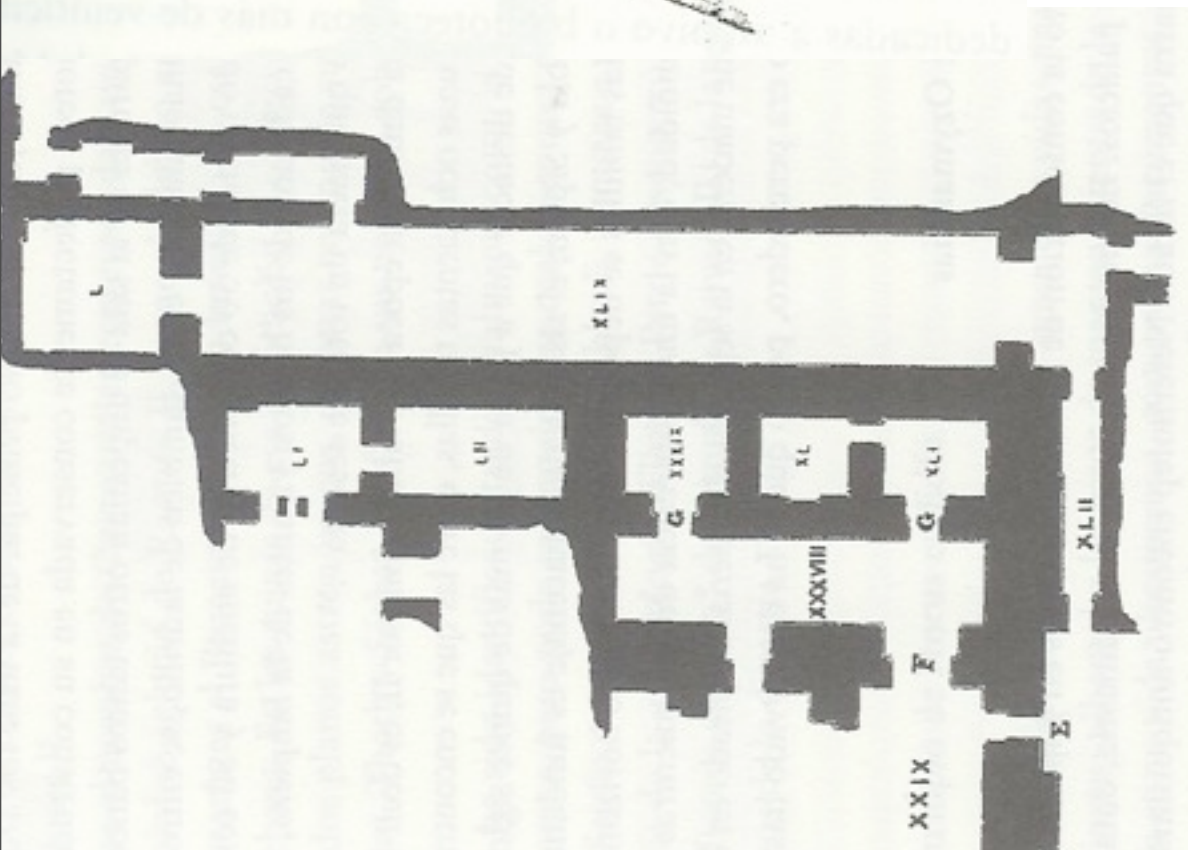
stored writings



Ebla (Syria) c 2250 bce

Babylon (Iraq) 15,000 tablets

Nineveh (Iraq) c. 650 bce



what was stored?

Ebla: accounts, lists, etc.

Nineveh: *Gilgamesh*

pressed in clay?

time- to space-binding?

He came a far road, was weary, found peace,
and set all his labours on tablets of stone

...

See the tablet box of cedar,

Release its clasp of bronze

Lift the lid of its secret

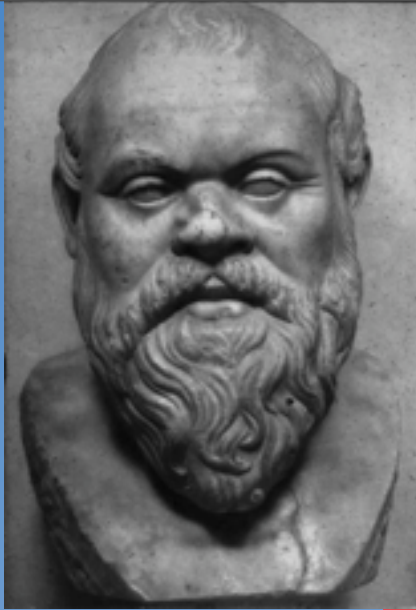
Pick up the tablet of lapis lazuli and read out

the travails of Gilgamesh, all that he went through

--*Gilgamesh*, 3000 bce

[trans Andrew George

24-Hof112_Storage&Search-PD 27



new technologies

Lyceum [Greece]

(Aristotle)

Pergamum [Turkey]

(c 197 bce)
200,000 scrolls

Alexandria

430,000 volumes



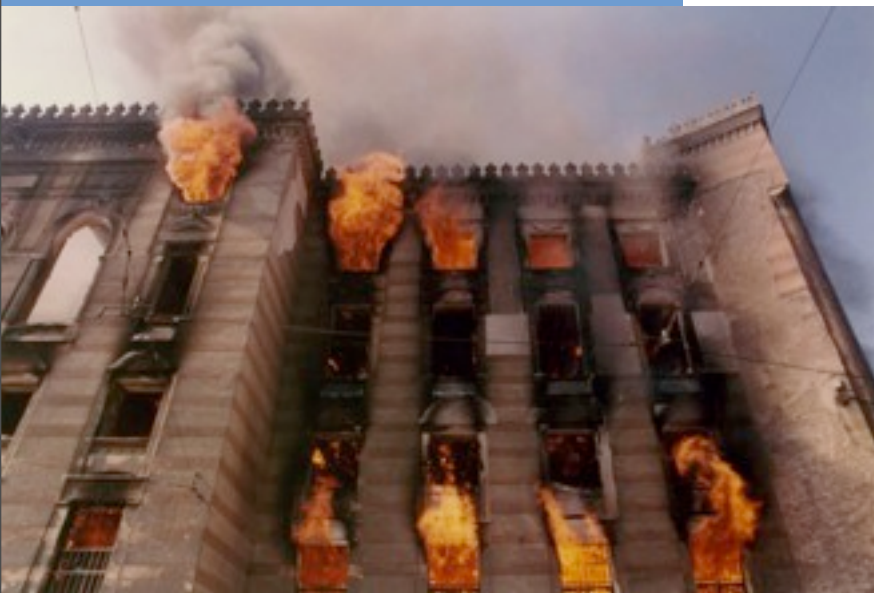
abundance & order

Zenodotus c248 bce
alphabetical ordering

Callimachus c240 bce
subject categories

Aristophanes c195 bce
& Aristarchus c153 bce
scholarly versions
editorial commentary

fired clay to fired papyrus



symbolic storage

Alexandria

who burned?



Tripoli

"At Tripoli ... three million books ... put to the flames by the Crusaders."

--Duncan Haldane, *Islamic Bookbindings*, 1983

another revolution

questions of durability

1145, Roger of Sicily ordered all charters on paper to be copied to parchment then destroyed

1248, paper accepted by the notaries of Languedoc

enduring suspicion

"The written word on parchment will last a thousand years. The printed word is on paper. How long will it last? The most you can expect of a book of paper to survive is two hundred years. Only time will tell."

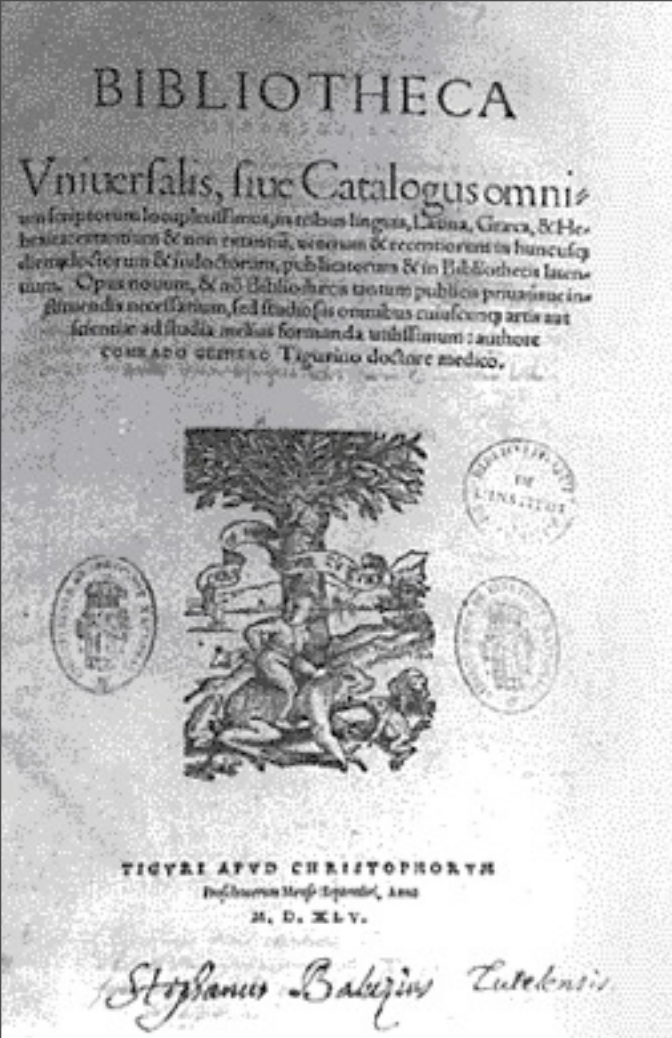
one solution

time-binding to space-binding



lockss

"lots of copies keeps stuff safe"



Antonfrancesco Doni, 1550: there are "so many books that we do not have time to read even the titles."

"That horrible mass of books... keeps on growing, [until] the disorder will become nearly insurmountable." Gottfried Leibniz, 1680

universal hopes

Conrad Gessner

Bibliotheca Universalis, 1545

[Latin, Greek, Hebrew]

"These Libraries in a few years, will be full and compleat, being furnished, not only with all the valuable and usefull Old Books in any Art of Science, but also with all the valuable New Books, so soon as every they are heard of or seen in the World"

--James Kirkwood, 1699
24-Hof112_Storage&Search-PD 33

overview

assignments

liberating information

'open' vs 'closed'

internet as library

beyond Babbage

where are
we?

Wife of Bath's Tale



"experience not authority"

"nullius in verba"

linear paths?



Numb. 364.

Beginning the Thirty first Volume.

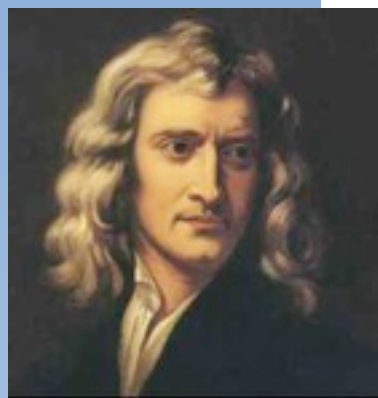
PHILOSOPHICAL TRANSACTIONS.

For the Months of *January, Feb. March and April.* 1720.

The CONTENTS.

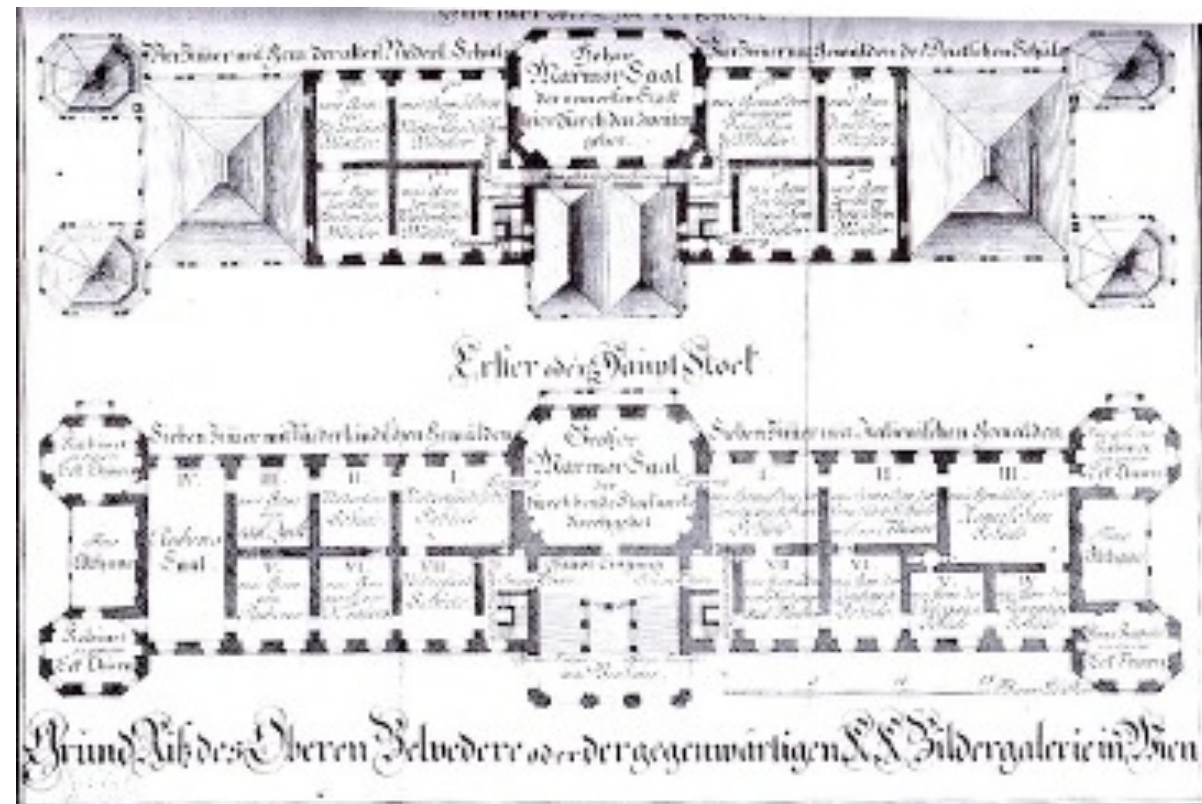
- I. *Some Remarks on a late Essay of Mr. Cassini, wherein he proposes to find, by Observation, the Parallax and Magnitude of Sirius.* By Edmund Halley, L. L. D. Astron. Reg. Geom. Prof. Savil. & R. S. S.
- II. *An Account of the External Maxillar, and other Salivary Glands: Also of the Insertions of all the Lymphatics (as well above as below the Subclavians) into the Veins; which Glands and Insertions have not hitherto been mentioned, or not truly described by any Authors.* By Richard Hale, M. D. Reg. Soc. & Col. Med. Lond. Soc.
- III. *De Peste Constantinopoli grassante. Auctore nupero V. Cl. Emanuele Timone, M. D. Hoc scriptum ab Auctore Clarissimo, qui Constantinopoli per multos annos Medicinam fecerat, Excellentissimo Ablegato Britannico, Roberto Sutton, Eq. Aurato, traditum, ejusdem Equitis permisso, cum Societate Regia communicavit idem R. Hale, M. D.*
- IV. *An Account of a Luminous Appearance in the Air, seen at Dublin on January the 12th, 1720.* By Philip Percival, Esq; Brother to the Right Honourable the Lord Percival, F. R. S. and communicated by his Lordship to the Royal Society.

V. Of



serendipity & abundance to selection & organization

kunstkammer to museum
encyclopaedias





Edward Gibbon
1737-1794

cataloguing: the endurance of order



Melvil Dewey
1851-1931



Dewey Decimal



Library of Congress

Thomas Jefferson --Denis Diderot -- Francis Bacon

curriculum, *n.*

View as: [Outline](#) | [Full entry](#)

Pronunciation: /kəˈrɪkjʊləm/

Forms: Pl. **curricula.**

Etymology: Latin, = course, career (*lit.* and *fig.*): see above.

circling around

A course; *spec.* a regular course of study or training, as at a school or university. (The recognized term in the Scottish Universities.) **curriculum vitae** *n.* the course of one's life; a brief account of one's career.

Text size: [A](#)

Quotations: [Show all](#) | [Hide](#)

search, *v.*

View as: [Outline](#) | [Full entry](#)

Pronunciation: /sɜːtʃ/

Forms: *α.* ME-15 **serch(e, cerche, ME sorche, ME-15 sarche, searche, 15 sarych, scarche, ...** ([Show More](#))

Etymology: < Old French *cerchier* (modern French *chercher*), corresponding to Provençal *cercar*, Italian *cercare* to seek, Spanish *cercar*, Portuguese *cercar* to surround < late Latin *circāre* to go round, < Latin *circus* circle. ([Show Less](#))

I. To explore, examine thoroughly.

encyclopaedia | encyclopedia, *n.*

View as: [Outline](#) | [Full entry](#)

Text size: [A](#)

Quotations: [Show all](#) | [Hid](#)

Pronunciation: /ɛnˌsaɪkləʊˈpiːdiə/

Forms: Also 16 in adapted forms **encyclopaedie- -y, -pedie, -pedy, -ped(e.**

Etymology: < late Latin *encyclopaedia*, < pseudo-Greek *ἐγκυκλοπαιδεία*, an erroneous form (said to be a false reading) occurring in MSS. of Quintilian, Pliny, and Galen, for *ἐγκύκλιος παιδεία* 'encyclical education', the circle of arts and sciences considered by the Greeks as essential to a liberal education (compare **ENCYCLICAL** *adj.* 1).

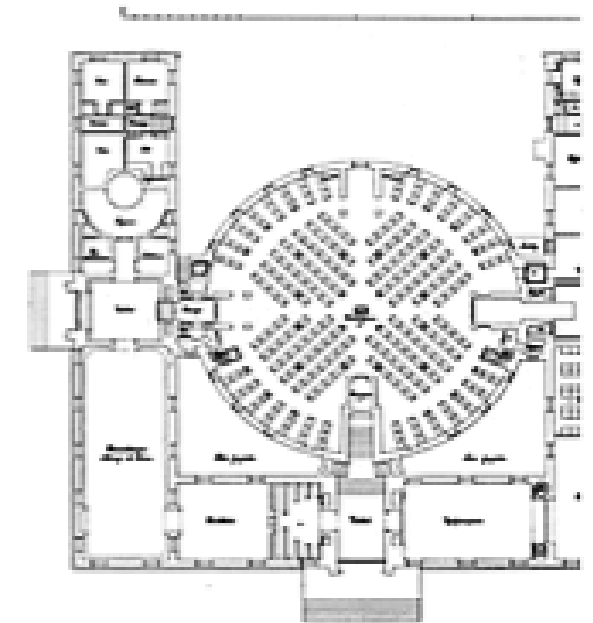
The spelling with *æ* has been preserved from becoming obsolete by the fact that many of the works so called have Latin titles, as *Encyclopædia Britannica*,

encircling

Smirke, British
Museum Reading
Room, 1851



Pelz/Casey Reading Room,
LOC, ca 1898



Asplund, Stockholm City
Library, 1928



Labrouste, Bibliothèque
Nationale 1868

overview

assignments

liberating information

'open' vs 'closed'

internet as library

beyond Babbage

where are
we?



"The camera hound"

breaking out

Photography applied to Catalogues of Books.— May not photography be usefully applied to the making of catalogues of large libraries? It would seem no difficult matter to obtain any number of photographs, of any required size, of the title-page of any book. Suppose the plan adopted, that five photographs of each were taken; they may be arranged in five catalogues, as follows:—Era, subject, country, author, title. These being arranged alphabetically, would form five catalogues of a library probably sufficient to meet the wants of all. Any number of additional divisions may be added. By adopting a fixed breadth—say three inches—for the photographs, to be pasted in double columns in folio, interchanges may take place of those unerring slips, and thus librarians aid each other. I throw out this crude idea, in the hope that photographers and librarians may combine to carry it out. ALBERT BLOR, LL.D.
Dublin.

Photographic Copies of Ancient Manuscripts.— Might not photography be well employed in making facsimiles of valuable, rare, and especially of unique ancient manuscripts? If copies of such manuscripts could be multiplied at a moderate price, there are many proprietors of libraries would be glad to enrich them by what, for all purposes of reference, would answer equally well with the originals. A.

[This subject, which has already been touched upon in our columns, has not yet received the attention it deserves. We have now before us a photographic copy of a folio page of a MS. of the fourteenth or fifteenth century, on which are inscribed a number of charters; and, although the copy is reduced so as to be but about 2 inches high and 1½ broad, it is perfectly

Notes & Queries, 1854, 1855

24-Hof112_Storage&Search-PD 41

crowd-sourcing

project gutenber

Michael Hart

University of Illinois, 1971

store, search, circulate

crowd-sourcing

project gutenber

Michael Hart

University of Illinois, 1971

store, search, circulate

Pan –Knut Hamsun

And the huntsman is myself, and she will give me a glance of her eyes that I may understand. And when she comes, my heart knows all, and no longer beats like a heart, but rings as a bell. I lay my hand on her.

"Tie my shoe-string," she says, with flushed cheeks. ...

The sun dips down into the sea and rises again, red and refreshed, as if it had been to drink. And the air is full of whisperings.

crowd-sourcing

project gutenber

Michael Hart

University of Illinois, 1971

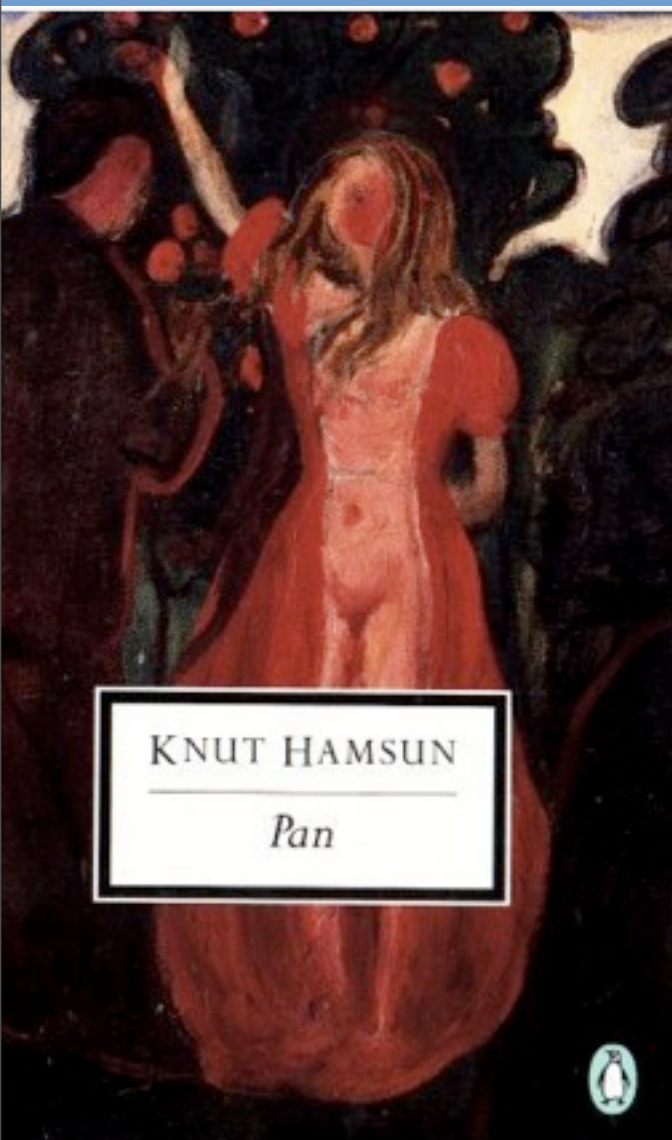
store, search, circulate

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crowd-sourcing

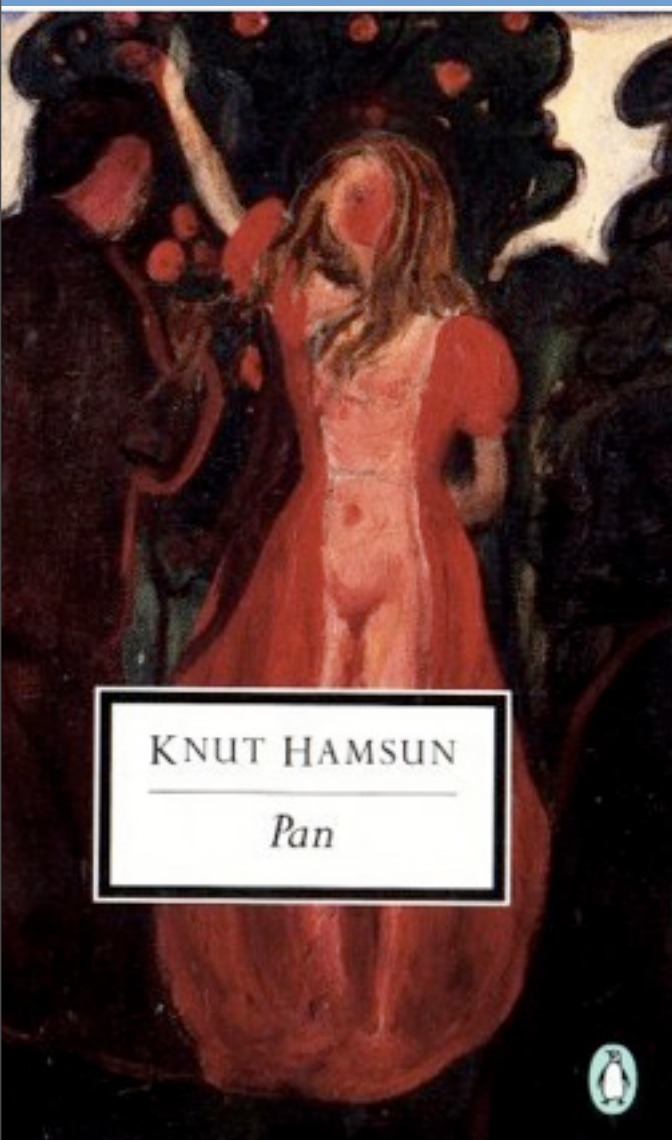
project gutenber

The hunter, that's me, and she will give me a sign with her eyes to make me understand. And when she comes my heart understands all, and it no longer beats, it peals. And she is naked under her dress⁷ from head to foot, and I lay my hand upon her.

Tie my shoelace! she says with flaming cheeks. And a little later she whispers directly against my mouth, against my lips, Oh, you're not tying my shoelace, sweetheart, you're not tying . . . not tying my . . .

But the sun dips its disk into the sea and then rises again, red, renewed, as if it has been down to drink. And the air is full of whisperings.

An hour later she says against my mouth, Now I must leave you.



opening up again



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opening up again

And the huntsman is myself, and she will give me a glance of her eyes that I may understand. And when she comes, my heart knows all, and no longer beats like a heart, but rings as a bell. I lay my hand on her.

“Tie my shoe-string,” she says, with flushed cheeks. . . .”

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before my time



VIRTUAL COMMUNITY: HOMESTEADING ON THE ELECTRONIC FRONTIER

by HOWARD RHEINGOLD - [Computers](#) - 1899
[Limited preview](#) - [About this book](#) - [Add to my library](#) - [More editions](#)



Do Que É Feito O Pensamento

by STEVEN PINKER - [Psychology](#) - 1899 - 544 pages
Page 411

... no really good.7" Além disso, como ressaltou o linguista **Geoffrey Nunberg**,

embora de para imaginar o diálogo How brilliant was it? Veru INã



VIDA SOCIAL DA INFORMAÇÃO, A

by JOHN SEELY BROWN, PAUL DUGUID - [Computers](#) - 1899 - 300 pages

Com base em suas experiências profissionais como cientista-chefe e pesquisador-



Annual report of the American historical Association - Page 1

[History](#) - 1884

... Berkeley Seized Letters as Legal Evidence in the Paris Revolutionary Tribunal, 1793-1794. **Carla Hesse**, University of California, ...

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New Jersey history

by New Jersey Historical Society - [History](#) - 1971

... **Annalee Saxenian**, "In Search of Power: The Organization of Burch-PD 44 Interests in Silicon Valley and Route 128." *Economy and Society* 18

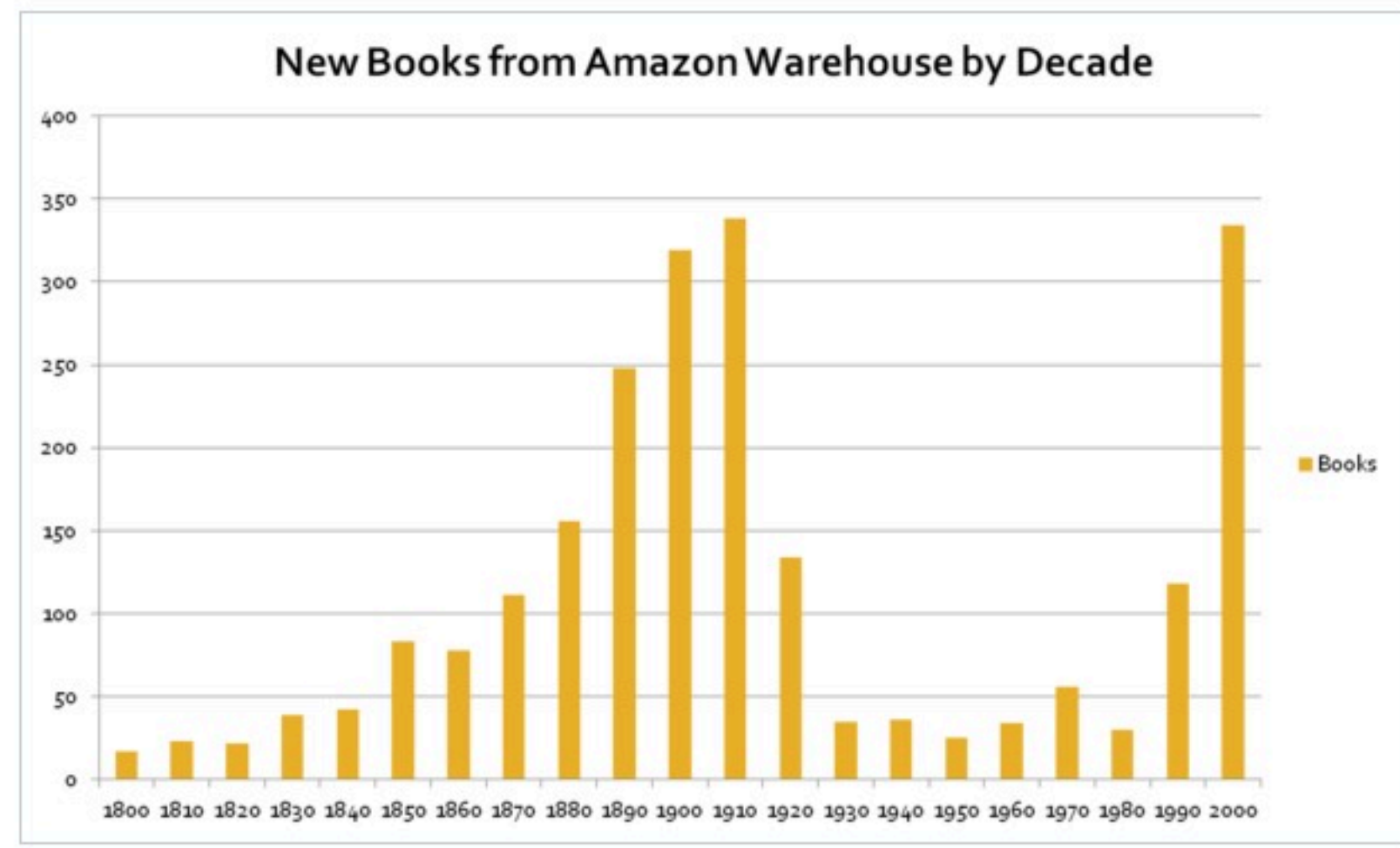
The Missing 20th Century: How Copyright Protection Makes Books Vanish

good for books?

MAR 30 2012, 12:51 PM ET 69

+1 175 Recommend 1k

Because of the strange distortions of copyright protection, there are twice as many newly published books available on Amazon from 1850 as there are from 1950.



Paul Heald

Name	Artist	Album
<input checked="" type="checkbox"/> Allegro Con Brio	Ludwig van Beethoven...	Alexander String Qua...
<input checked="" type="checkbox"/> Adagio Affettuoso Ed Ap...	Ludwig van Beethoven...	Alexander String Qua...
<input checked="" type="checkbox"/> Scherzo. Allegro Molto	Ludwig van Beethoven...	Alexander String Qua...
<input checked="" type="checkbox"/> Allegro	Ludwig van Beethoven...	Alexander String Qua...
<input checked="" type="checkbox"/> Allegro	Ludwig van Beethoven...	Alexander String Qua...
<input checked="" type="checkbox"/> Menuetto	Ludwig van Beethoven...	Alexander String Qua...
<input checked="" type="checkbox"/> Andante Cantabile. The...	Ludwig van Beethoven...	Alexander String Qua...
<input checked="" type="checkbox"/> Allegro	Ludwig van Beethoven...	Alexander String Qua...

going open

Name	Artist	Album
<input checked="" type="checkbox"/> String Quartet in E ...	Alexander String Quartet	String Quartets Op.5...
<input checked="" type="checkbox"/> String Quartet in E ...	Alexander String Quartet	String Quartets Op.5...
<input checked="" type="checkbox"/> String Quartet in E ...	Alexander String Quartet	String Quartets Op.5...
<input checked="" type="checkbox"/> String Quartet in E ...	Alexander String Quartet	String Quartets Op.5...
<input checked="" type="checkbox"/> String Quartet in C ...	Alexander String Quartet	String Quartets Op.5...
<input checked="" type="checkbox"/> String Quartet in C ...	Alexander String Quartet	String Quartets Op.5...
<input checked="" type="checkbox"/> String Quartet in C ...	Alexander String Quartet	String Quartets Op.5...
<input checked="" type="checkbox"/> String Quartet in C ...	Alexander String Quartet	String Quartets Op.5...



Name	Artist	Album
<input checked="" type="checkbox"/> Op. 18 No. 2 in G Ma...	Allegro	Beethoven String Quar...
<input checked="" type="checkbox"/> Op. 18 No. 2 in G Ma...	Adagio cantabile	Beethoven String Quar...
<input checked="" type="checkbox"/> Op. 18 No. 2 in G Ma...	Scherzo (Allegro) & Trio	Beethoven String Quar...
<input checked="" type="checkbox"/> Op. 18 No. 2 in G Ma...	Allegro molto, quasi ...	Beethoven String Quar...
<input checked="" type="checkbox"/> Op. 18 No. 6 in B- M...	Allegro con brio	Beethoven String Quar...
<input checked="" type="checkbox"/> Op. 18 No. 6 in B- M...	Adagio, ma non troppo	Beethoven String Quar...
<input checked="" type="checkbox"/> Op. 18 No. 6 in B- M...	Scherzo (Allegro) & Trio	Beethoven String Quar...
<input checked="" type="checkbox"/> Op 18 No 6 in B- Major	La malinconia. Adagio...	Beethoven String Quar...

idiot savant?

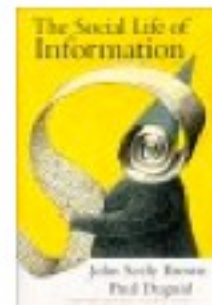


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Average Customer Rating:

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institutional reliability

Let us consider the matter in this way: If the wise man or any other man wants to distinguish the true physician from the false, how will he proceed?

.... He will consider whether what [the physician] says is true, and whether what he does is right, in relation to health and disease?

... But can any one attain the knowledge of either unless he have a knowledge of medicine?

... No one at all, it would seem, except the physician can have this knowledge; and therefore not the wise man; he would have to be a physician as well as a wise man.

--Plato, *Charmides*

capturing eyeballs



Horace Greeley
1811 - 1872

"We lose money on our circulation by itself considered but with 20,000 subscribers we can command such Advertising and such prices for it as will render our enterprise a remunerating one."

--Horace Greeley, *New York Tribune*, 1841

discerning eyeballs



Condé Nast
1873-1942

"Nast reasoned: 'If you had a tray with two million needles on it, and only one hundred and fifty thousand of these had gold tips, which you wanted, it would be an endless and costly process to weed them out. Moreover the one million, eight hundred and fifty thousand which were not gold-tipped would be of no use to you, they couldn't help you. But if you could get a magnet that would draw out only the gold ones, what a saving!'. Vogue was to be the magnet that attracted the gold."

Cox & Mowatt, "*Vogue in Britain*," 2011

Google™

gold diggers

Up until now most search engine development has gone on at companies with little publication of technical details. **This causes search engine technology to remain largely a black art and to be advertising oriented ...** we have a strong goal to push more development and understanding into the academic realm."



freedom or control?

and should we worry?

"You have zero privacy.... Get over it!"

--Scott McNealy, Sun Microsystems

"If you have something you don't want anyone to know, maybe you shouldn't be doing it in the first place."

--Eric Schmidt, Google

overview

assignments

liberating information

'open' vs 'closed'

internet as library

beyond Babbage

where are
we?

coming up

12 Apr: Advent of the Internet

Required reading:

- Berners-Lee, Tim. 2000. "info.cern.ch." Chapters 1-3 in *Weaving the Web*. New York City: HarperCollins.

Additional material:

- Nunberg, Geoffrey. 2002. "Will the Internet Always Speak English?" *American Prospect*, Nov. 30.2.
- Barry M. Leiner, Vinton G. Cerf, David D. Clark, Robert E. Kahn, Leonard Kleinrock, Daniel C. Lynch, Jon Postel, Larry G. Roberts, Stephen Wolff, "A Brief History of the Internet," The Internet Society.