



The Future of Search

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Overview



- Predicting the future...
 - Quotes from Leon Kappelman “The future is ours”
CACM, March 2001
- Where are we coming from?
- Generations of Search Engines
- The Role of Metadata
- Pervasive Search



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- Radio has no future, Heavier-than-air flying machines are impossible. X-rays will prove to be a hoax.
 - William Thompson (Lord Kelvin), 1899

- 
- This “Telephone” has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us.
 - Western Union, Internal Memo, 1876

- 
- I think there is a world market for maybe five computers
 - Thomas Watson, Chair of IBM, 1943




- The problem with television is that the people must sit and keep their eyes glued on the screen; the average American family hasn't time for it.
 - New York Times, 1949


- 
- Where ... the ENIAC is equipped with 18,000 vacuum tubes and weighs 30 tons, computers in the future may have only 1000 vacuum tubes and weigh only 1.5 tons
 - Popular Mechanics, 1949



- There is no reason anyone would want a computer in their home.
 - Ken Olson, president and chair of Digital Equipment Corp., 1977.

- 640K ought to be enough for anybody.
 - Attributed to Bill Gates, 1981

- 
- By the turn of this century, we will live in a paperless society.
 - Roger Smith, Chair of GM, 1986

- 
- I predict the internet... will go spectacularly supernova and in 1996 catastrophically collapse.
 - Bob Metcalfe (3-Com founder and inventor of ethernet), 1995

Overview

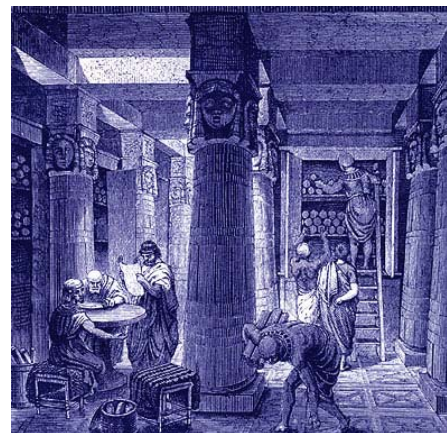
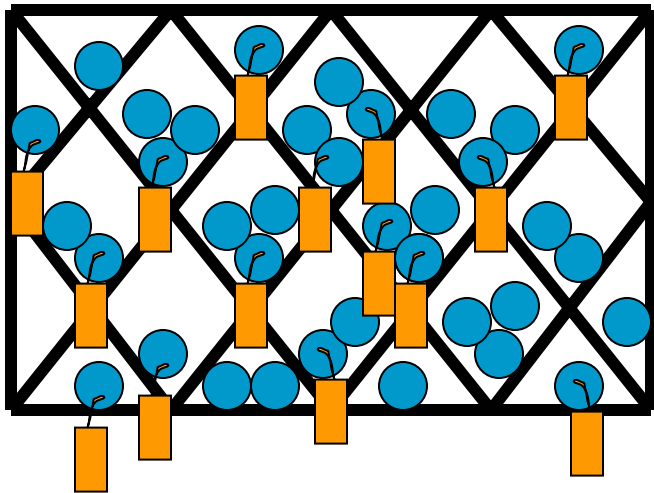
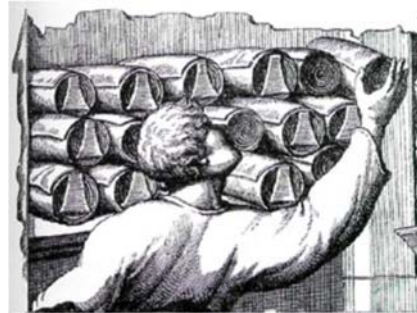


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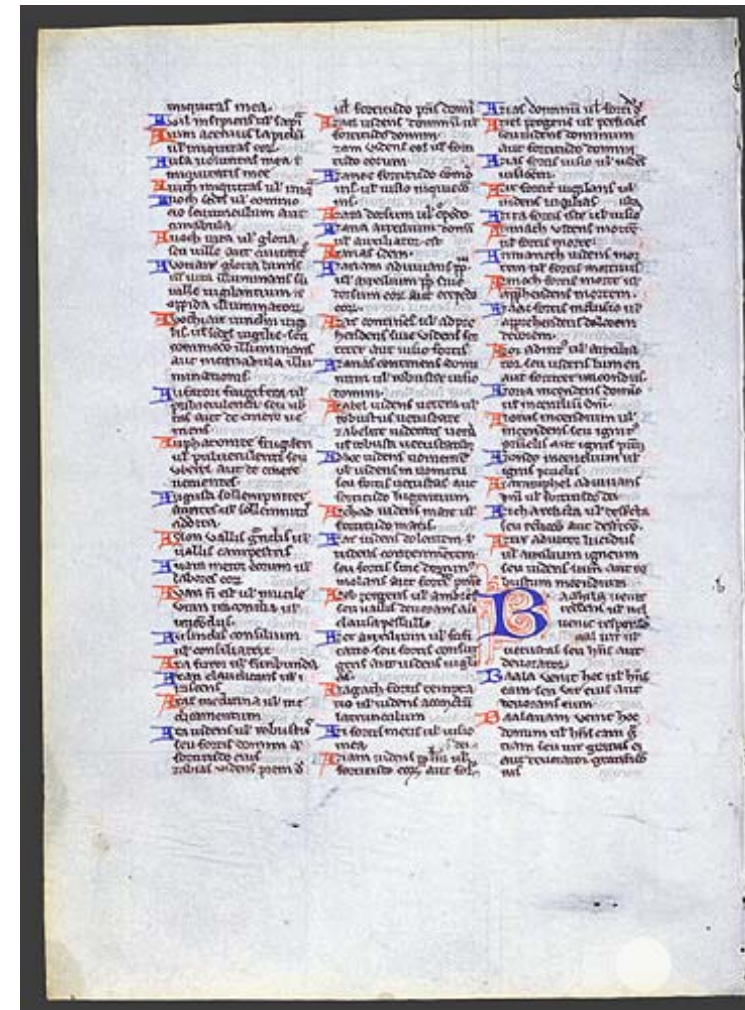
Origins

- Very early history of content representation
 - Sumerian tokens and “envelopes”
 - Alexandria - pinakes
 - Indices



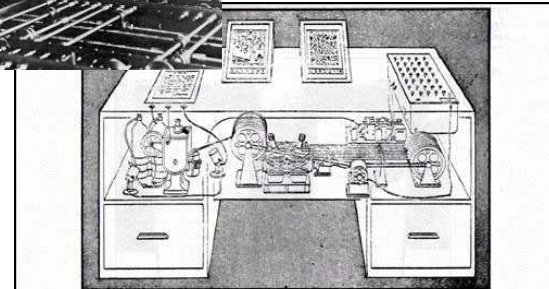
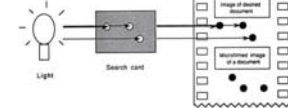
Origins

- Biblical Indexes and Concordances
 - 1247 – Hugo de St. Caro – employed 500 Monks to create keyword concordance to the Bible
- Journal Indexes (Royal Society, 1600's)
- “Information Explosion” following WWII
 - Cranfield Studies of indexing languages and information retrieval



Visions of IR Systems

- **Rev. John Wilkins**, 1600's : The Philosophical Language and tables
- **Wilhelm Ostwald and Paul Otlet**, 1910's: The "monographic principle" and Universal Classification
- **Emanuel Goldberg**, 1920's - 1940's
- **H.G. Wells**, "World Brain: The idea of a permanent World Encyclopedia." (Introduction to the *Encyclopédie Française*, 1937)
- **Vannevar Bush**, "As we may think." Atlantic Monthly, 1945.
- Term "Information Retrieval" coined by **Calvin Mooers**. 1952



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).

CHAP. II.

Influences of this Real Character in the Lords Prayer and the Creed.

For the better explaining of what hath been before delivered concerning a Real Character, it will be necessary to give some Example and Influence of it, which I shall do in the Lords Prayer and the Creed: First setting each of them down after such a manner as they are ordinarily to be written. Thro the Characters at a greater distance from one another, for the more convenient figuring and later lining of them. And lastly, a Particular Explication of each Character out of the Philosophical Tables, with a Verbal Interpretation of them in the Margin.

The Lords Prayer.

Our Father who art in Heaven, Thy Name be Hallowed, Thy Kingdom come, Thy Will be done, in Earth as in Heaven, Give us on this day our bread expedient: and forgive us our trespasses as we forgive them who trespass against us and lead us not into temptation, but deliver us from evil, for the Kingdom and the Power and the Glory is thine, for ever and ever, Amen.

1 2 3 4 5 6 7 8 9 10 11
 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43
 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58
 59 60 61 62 63 64 65 66 67 68 69 70
 71 72 73 74 75 76 77 78 79 80
 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

“What Dr. Bush Foresees”



Cyclops Camera

Worn on forehead, it would photograph anything you see and want to record. Film would be developed at once by dry photography.

Microfilm

It could reduce Encyclopaedia Britannica to volume of a matchbox. Material cost: 5¢. Thus a whole library could be kept in a desk.

Vocoder

A machine which could type when talked to. But you might have to talk a special phonetic language to this mechanical supersecretary.

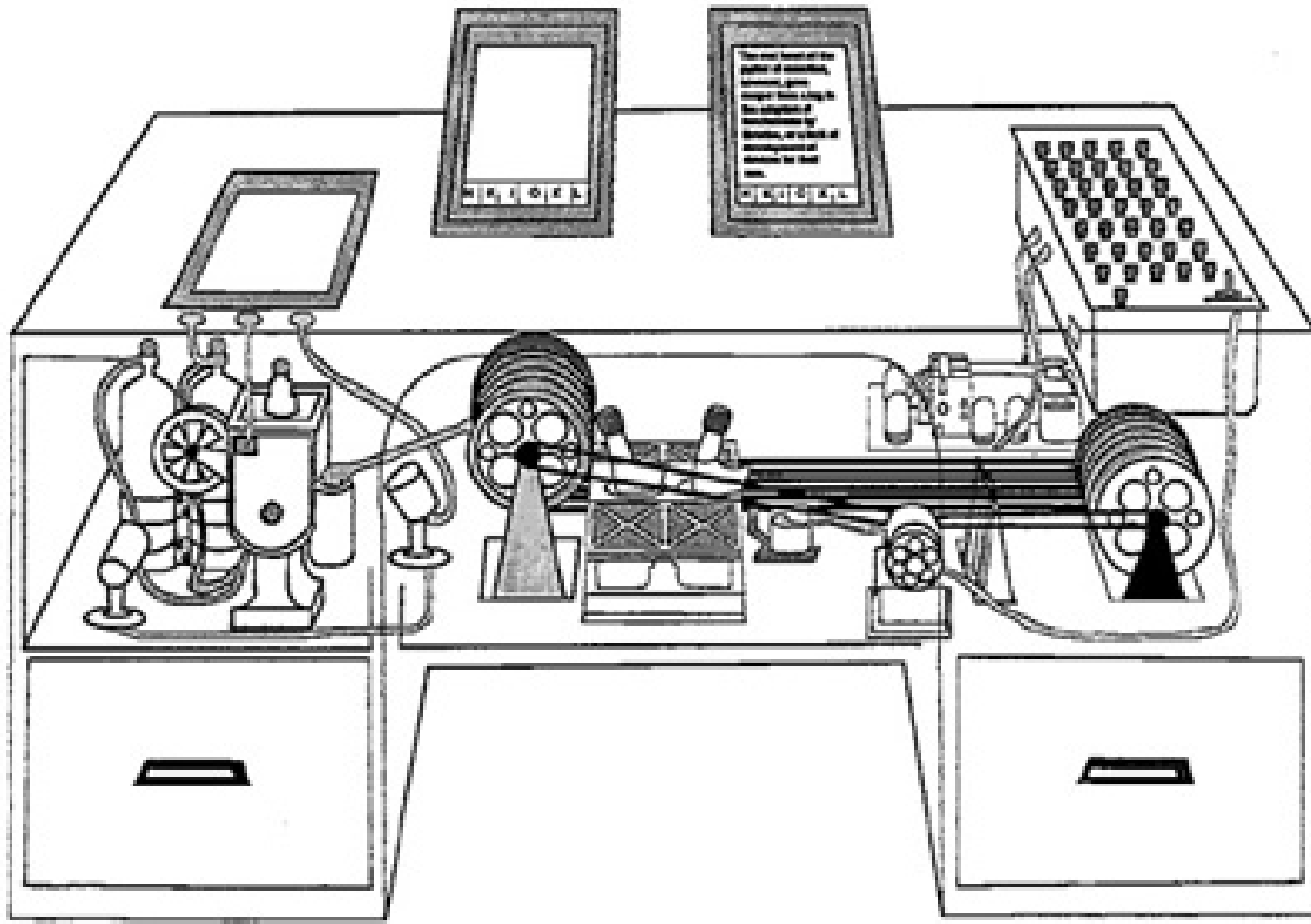
Thinking machine

A development of the mathematical calculator. Give it premises and it would pass out conclusions, all in accordance with logic.

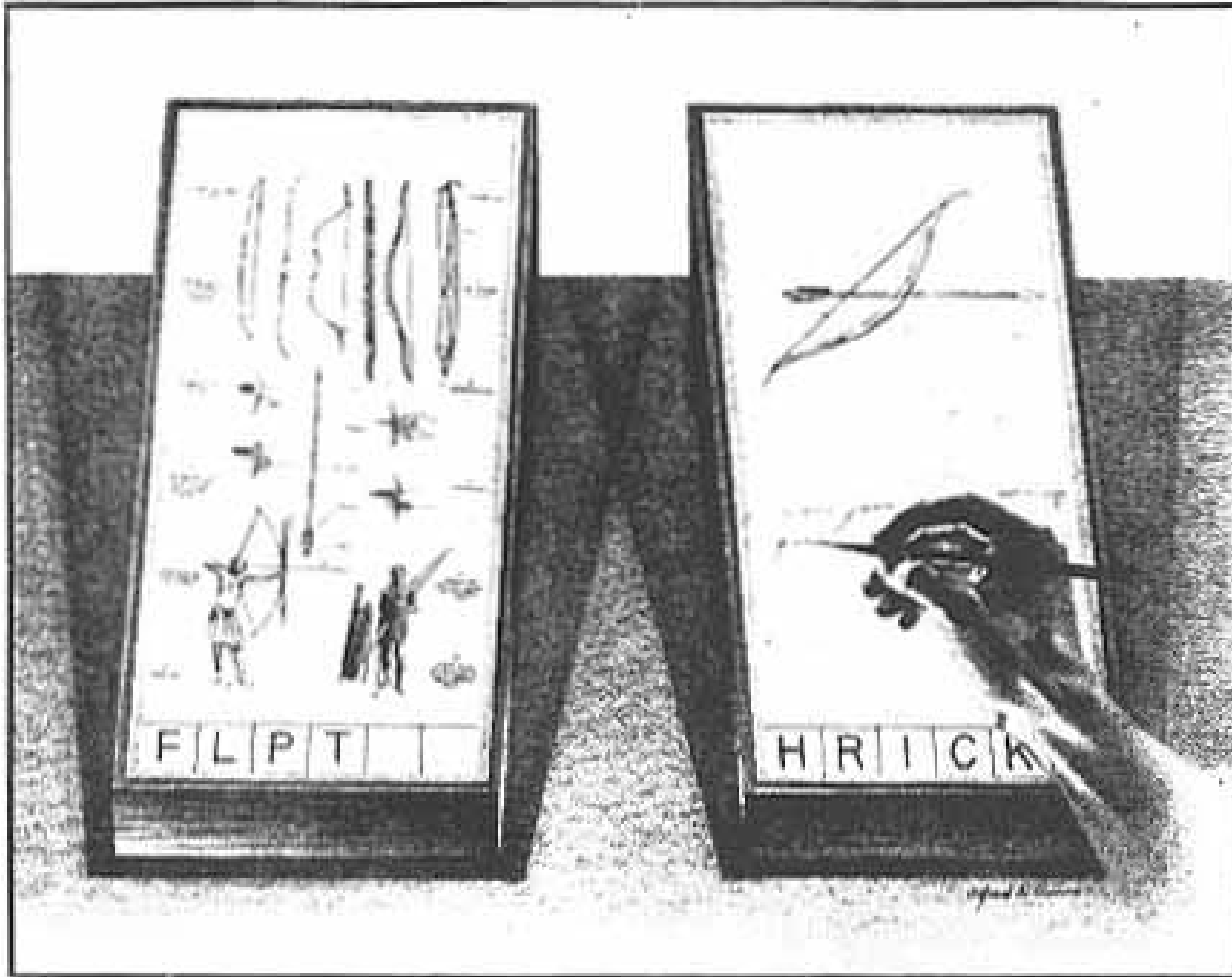
Memex

An aid to memory. Like the brain, Memex would file material by association. Press a key and it would run through a “trail” of facts.

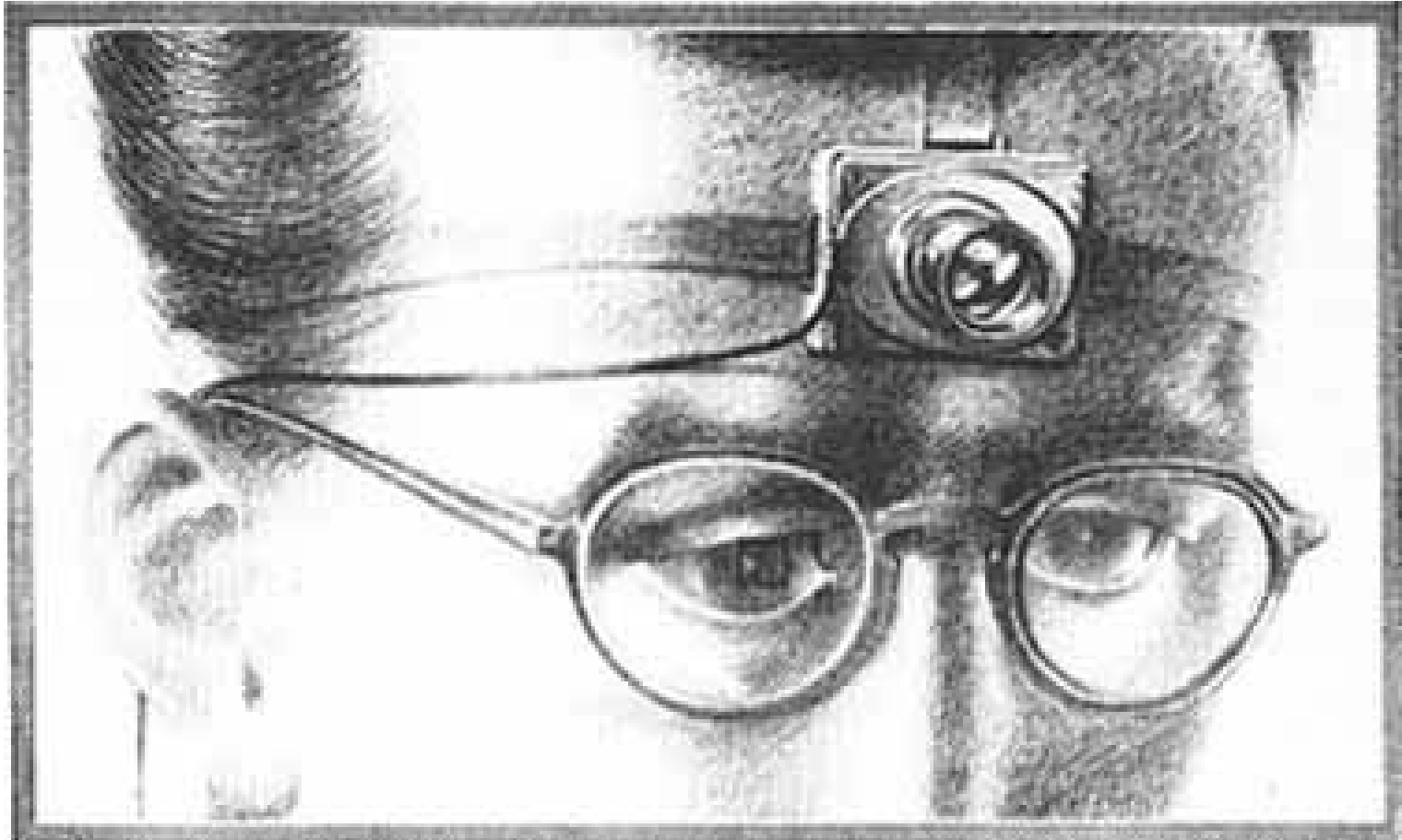
Memex



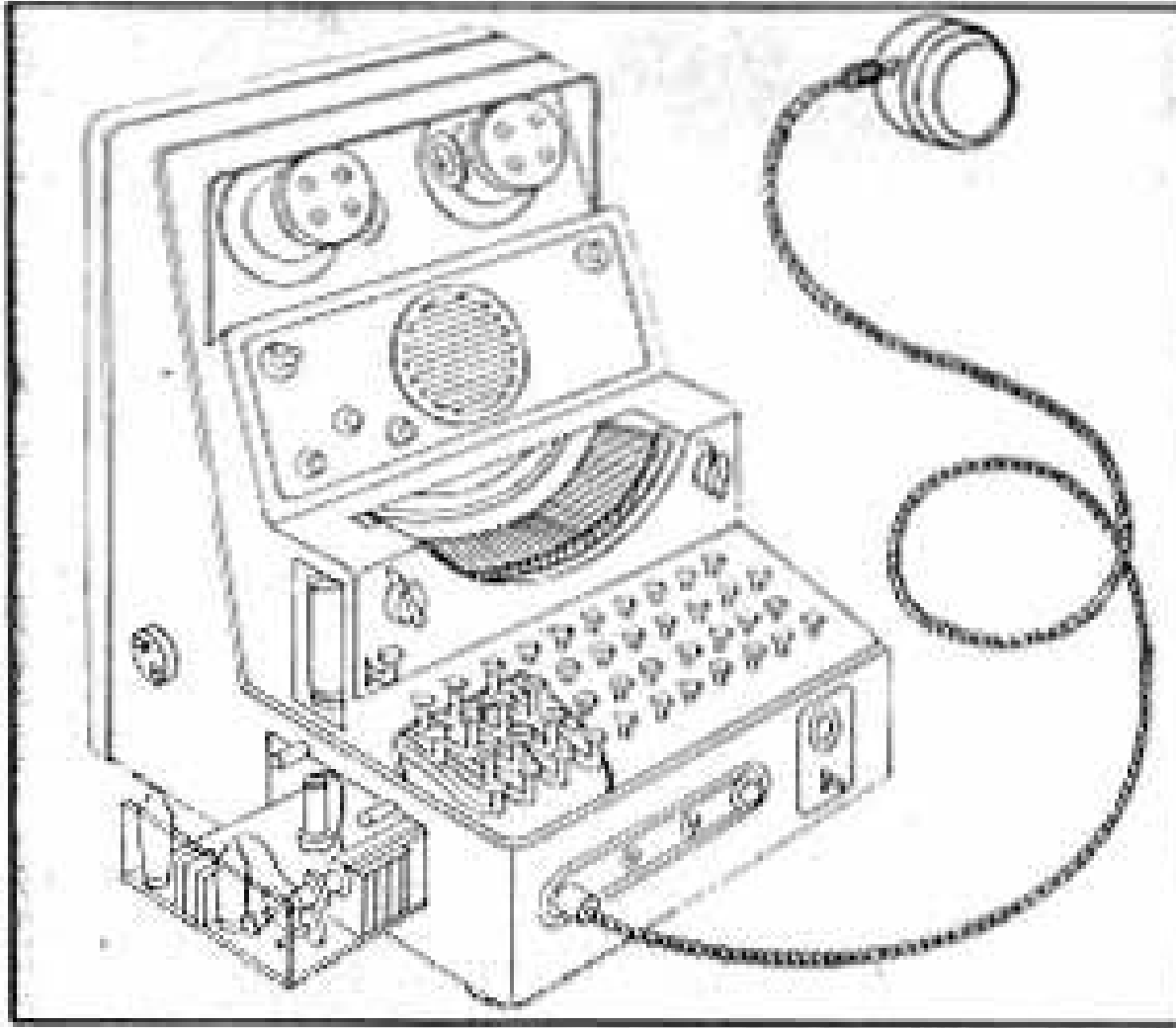
Memex Detail



Cyclops Camera



Vocoder: "Supersecretary"



Investigator at Work



- “One can now picture a future investigator in his laboratory. His hands are free, and he is not anchored. As he moves about and observes, he photographs and comments. Time is automatically recorded to tie the two records together. If he goes into the field, he may be connected by radio to his recorder. As he ponders over his notes in the evening, he again talks his comments into the record. His typed record, as well as his photographs, may be both in miniature, so that he projects them for examination.”



Memex



- “A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory.”



Associative Indexing



- “[...] associative indexing, the basic idea of which is a provision whereby any item may be caused at will to select immediately and automatically another. This is the essential feature of memex. The process of tying two items together is the important thing.”

The WWW circa 1945



- “It is exactly as though the physical items had been gathered together from widely separated sources and bound together to form a new book. But it is more than this; for any item can be joined into numerous trails, the trails can bifurcate, and they can give birth to side trails.”
- “Wholly new forms of encyclopaedias will appear, ready-made with a mesh of associative trails running them, ready to be dropped into the memex and there amplified.”

But the reality of IR was...



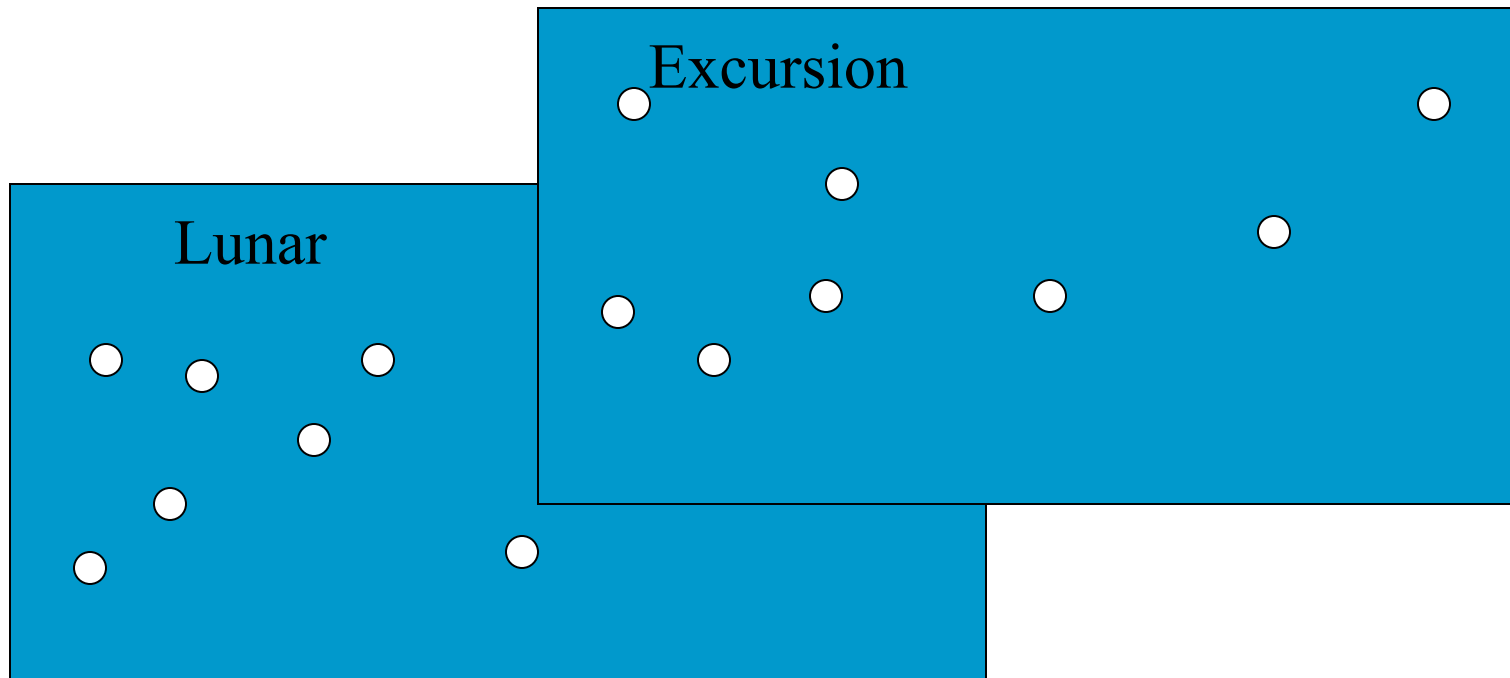
- Card-based systems
- Library catalogs (of course)
- Some microfilm-based systems (Goldberg, Shaw's Rapid Selector)

- But also keyword or topic-based IR systems using cards...

Card Systems



- Batten Optical Coincidence Cards (“Peek-a-Boo Cards”), 1948



Card Systems



- Zatocode (edge-notched cards) Mooers, 1951

Document 1
Title: ksdj sjd Lunar
Author: Jones, R.
Abstract: Lunar uejm jshy
ksd jh uyw hhy jha jsyhe

Document 200
Title: Xksd Lunar sjd sjsjfk
Author: Jones, R.
Abstract: Lunar uejm jshy
ksd jh uyw hhy jha jsyhe

Document 34
Title: lksd ksdj sjd Lunar
Author: Smith, J.
Abstract: lksf uejm jshy
ksd jh uyw hhy jha jsyhe

Computer-Based Systems



- Bagley's 1951 MS thesis from MIT suggested that searching 50 million item records, each containing 30 index terms would take approximately **41,700 hours**
 - *Due to the need to move and shift the text in core memory while carrying out the comparisons*
- 1957 – *Desk Set* with Katharine Hepburn and Spencer Tracy – EMERAC

Selection



- “The heart of the problem, and of the personal machine we have here considered, is the task of selection. And here, in spite of great progress, we are still lame.
- Selection, in the broad sense, is still a stone adze in the hands of a cabinetmaker.”

—“Memex Revisited” (Bush 1965)

Historical Milestones in IR Research



- 1958 Statistical Language Properties (Luhn)
- 1960 Probabilistic Indexing (Maron & Kuhns)
- 1961 Term association and clustering (Doyle)
- 1965 Vector Space Model (Salton)
- 1968 Query expansion (Rocchio, Salton)
- 1972 Statistical Weighting (Sparck-Jones)
- 1975 2-Poisson Model (Harter, Bookstein, Swanson)
- 1976 Relevance Weighting (Robertson, Sparck-Jones)
- 1980 Fuzzy sets (Bookstein)
- 1981 Probability without training (Croft)



Historical Milestones in IR Research (cont.)



- 1983 Linear Regression (Fox)
- 1983 Probabilistic Dependence (Salton, Yu)
- 1985 Generalized Vector Space Model (Wong, Rhagavan)
- 1987 Fuzzy logic and RUBRIC/TOPIC (Tong, et al.)
- 1990 Latent Semantic Indexing (Dumais, Deerwester)
- 1991 Polynomial & Logistic Regression (Cooper, Gey, Fuhr)
- 1992 TREC (Harman)
- 1992 Inference networks (Turtle, Croft)
- 1994 Neural networks (Kwok)
- 1998 Language Models (Ponte, Croft)



The Internet and the WWW



- Gopher, Archie, Veronica, WAIS
- Tim Berners-Lee, 1991 creates WWW at CERN – originally hypertext only
- Web-crawler
- Lycos
- Alta Vista
- Inktomi
- Google
- (and many others)



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 - *Credit goes to Andrei Broder of Yahoo! for most of the following slides*
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Evolution of search engines



- First generation -- use only “on page”, text data

- Word frequency, language

1995-1997 AV,
Excite, Lycos, etc

- Second generation -- use off-page, web-specific data

- Link (or connectivity) analysis
- Click-through data (What results people click on)
- Anchor-text (How people refer to this page)

From 1998. Made
popular by Google
but everyone now

- Third generation -- answer “the need behind the query”

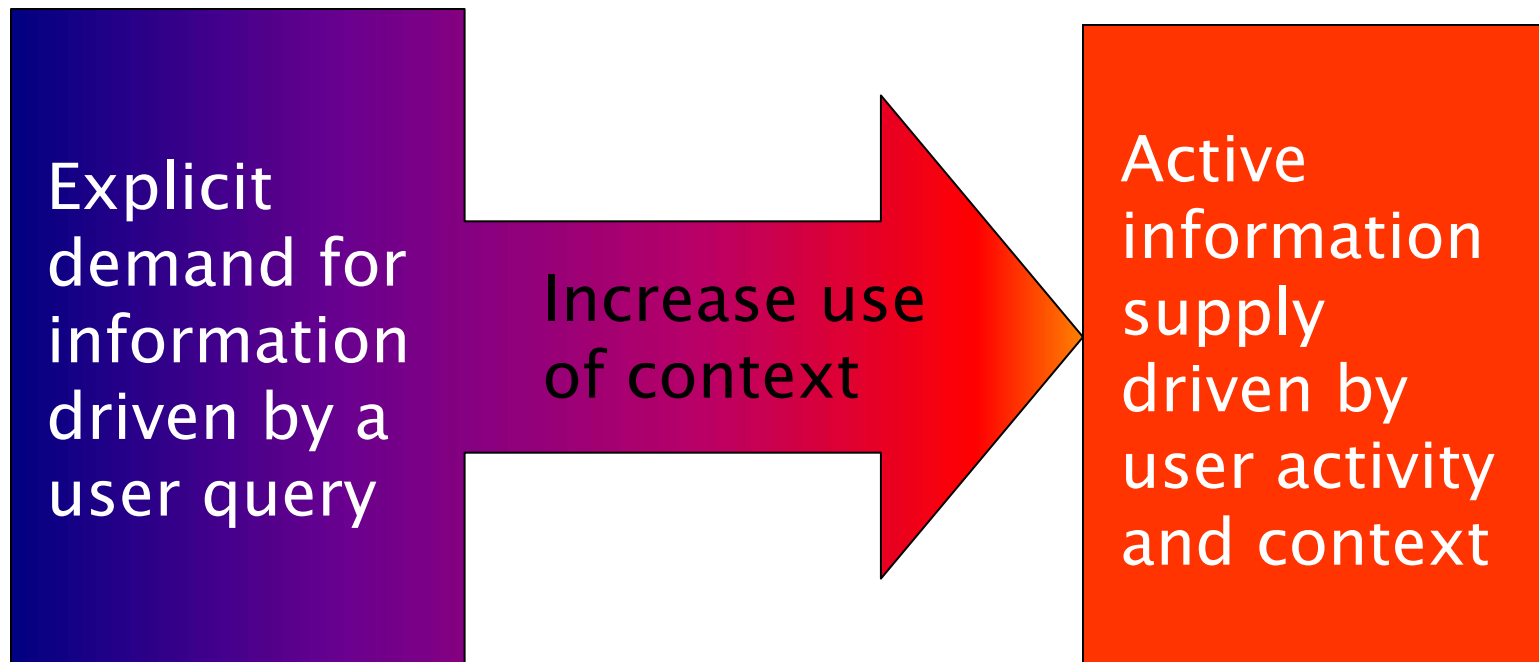
- Semantic analysis -- what is this about?
- Focus on user need, rather than on query
- Context determination
- Helping the user
- **Integration of search and text analysis**

The current
techhnology

Courtesy Andrei Broder



From Information Retrieval to Information Supply



Courtesy Andrei Broder

From Information Retrieval to Information Supply: Car Navigation: Maps → GPS



Then



Now...



Courtesy Andrei Broder

Social search



- The next chapter of the Web story seems to be collective but specialized sharing on a mass scale
 - Lots of communities driven by common interests and the availability of enabling tools
- Challenge: leverage “human computing”
 - metadata/user-generated content in the form of tagging, sharing, connections, reviews, etc
 - Flickr, Delicious, Blogs, Groups, Explicit Social Networks, etc
 - Social engineering/tools to stimulate HC: ESP game, MySpace, Human Experts, etc
 - Technical & UI aspects: how do we incorporate people’s opinion in search results? Recommender systems, reputation, networks, etc.

Courtesy Andrei Broder



The user: information needs



- Informational – want to learn about something (~40%)
 - Low hemoglobin**
- Navigational – want to go to that page (~25%)
 - United Airlines**
- Transactional – want to do something (web-mediated) (~35%)
 - Access a service **Mendocino weather**
 - Downloads **Mars surface images**
 - Shop **Nikon CoolPix**
- Gray areas
 - Find a good hub **Car rental Finland**
 - Exploratory search “see what’s there”

Courtesy Andrei Broder



But...



- Academia and Research are not the Web
- Other things are important as user needs,
 - Validity
 - Current theory and Information
 - Good research and papers to read and cite
- Suppose you are an undergrad and have a 20 page paper to write for your Astronomy class...

Where do you go from here?



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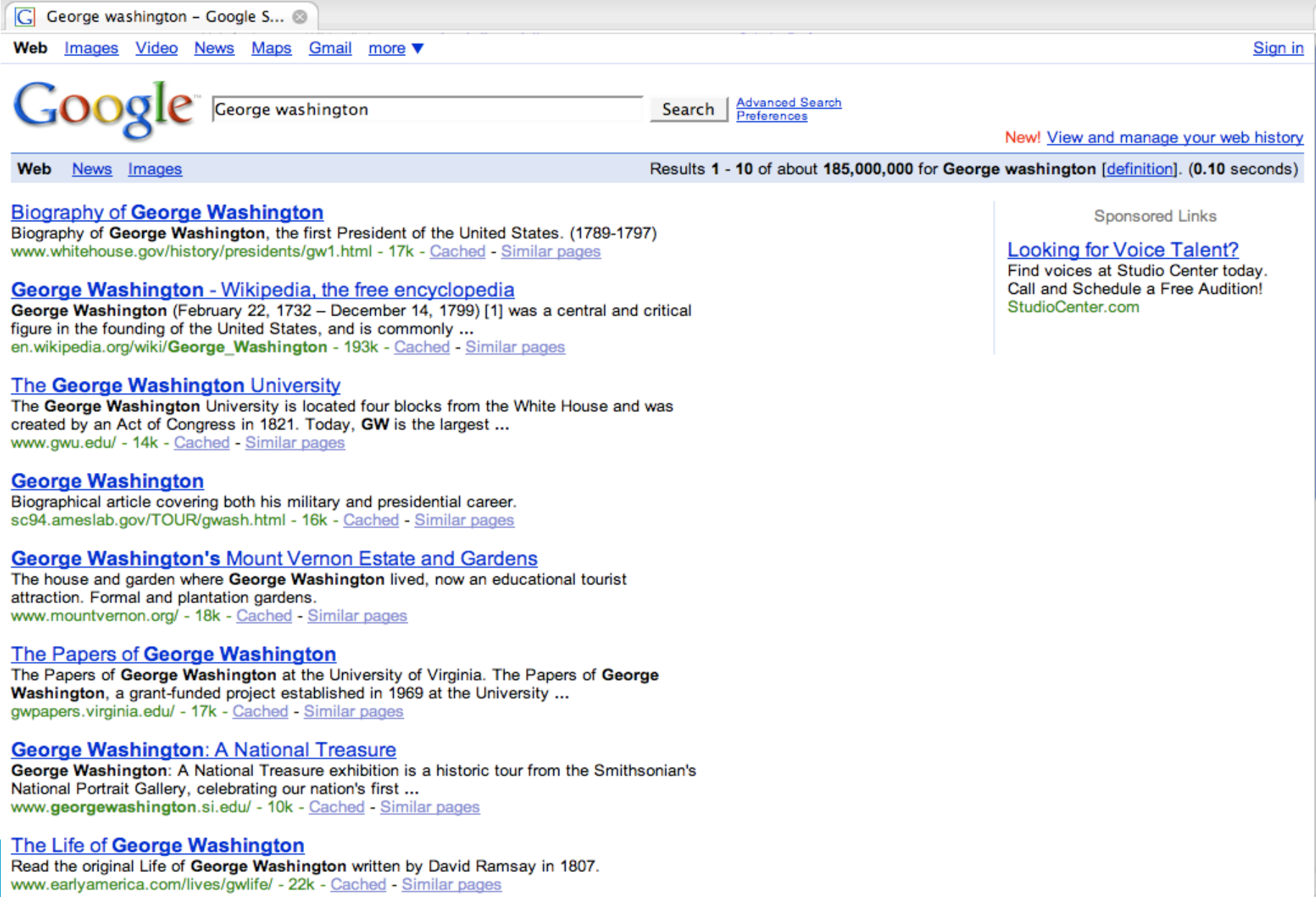
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What is missing?



- At Berkeley we have been looking at how the functionality of library reference collections have been largely overlooked, or poorly implemented (as sets of unconnected digital books) in the digital world
- This has constantly reinforced the central role of metadata in search, and led to the realization that metadata resources can constitute an infrastructure for improving search in scholarly environments

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The “Metadata” projects



Our work is based on four ideas

1. Understanding means knowing the context
2. Could the use of digital resources be made more like using a well-organized library reference collection?
3. How could it be easier to find context of any museum object, document, or performance: What is related to it in what it is, where it came from, when it originated, and who was associated with it?
4. Distinguishing WHAT, WHERE, WHEN, and WHO provides a useful infrastructure



Vocabularies are the key



Linking vocabularies WHAT, WHERE, WHEN

Library subject headings

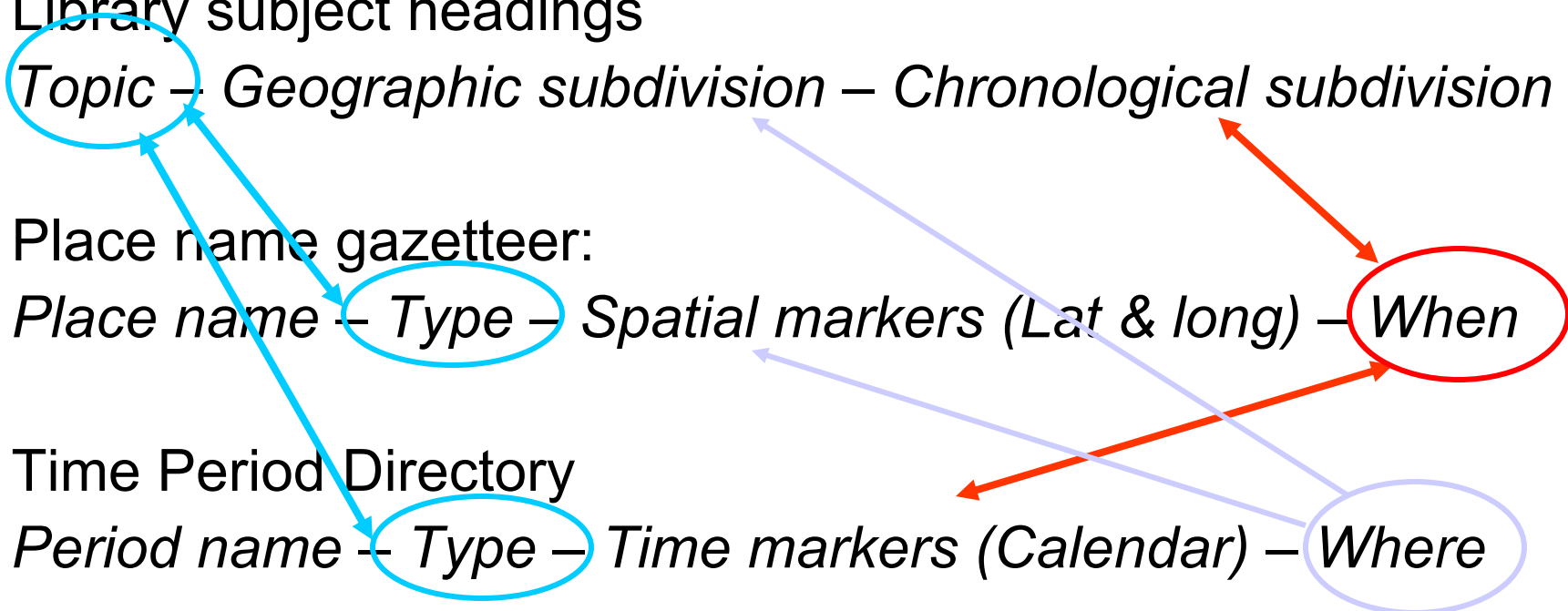
Topic – Geographic subdivision – Chronological subdivision

Place name gazetteer:

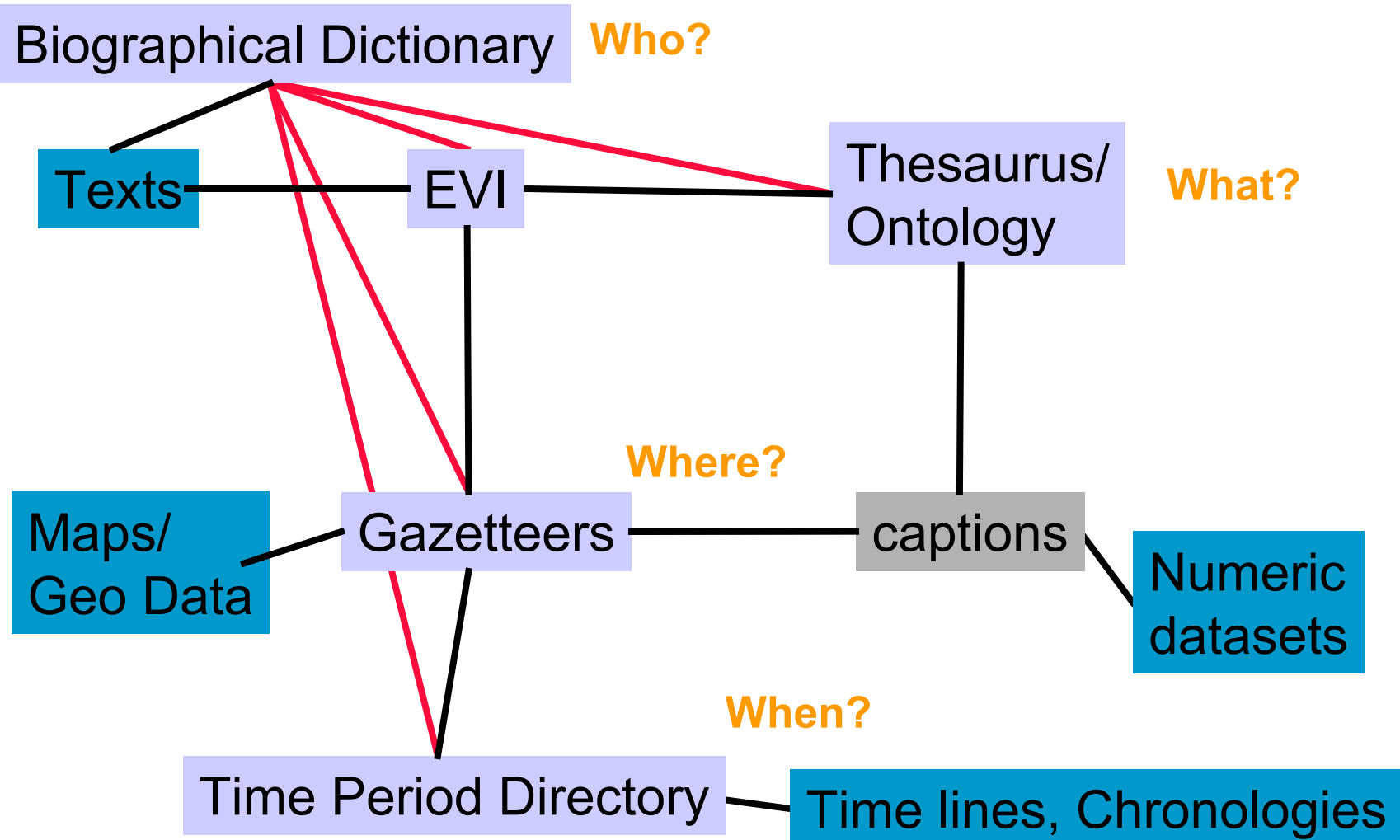
Place name – Type – Spatial markers (Lat & long) – When

Time Period Directory

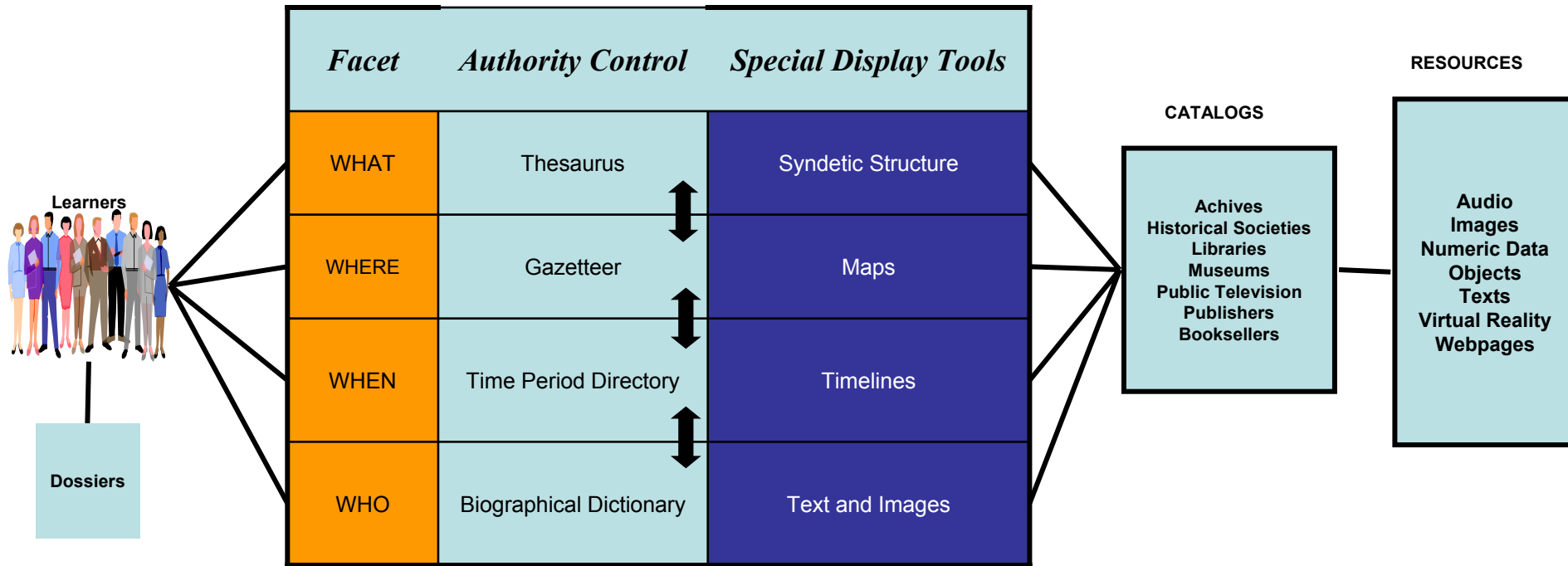
Period name – Type – Time markers (Calendar) – Where



Metadata Infrastructure – 4 W's



A Metadata Infrastructure





WHEN: Time Period Directory Timeline

Choose a Century

- 2700 to -1000
- 999 to 0
- 1 to 999
- 1000 to 1999
 - 10 Century CE
 - 11 Century CE
 - 12 Century CE
 - 13 Century CE**
 - 14 Century CE
 - 15 Century CE
 - 16 Century CE
 - 17 Century CE
 - 18 Century CE
 - 19 Century CE
 - 20 Century CE
 - 21 Century CE

13th Century

Historical Events

- Click on the plus sign to expand (minus sign to collapse)

China

BBC More

- Yuan dynasty, 1260-1368, China

Czech Republic

BBC More

- Mongol Invasion, 1242, Moravia (Czech Republic)

Denmark

BBC More

- Erik Glipping, 1259-1286, Denmark
- Erik Menved, 1286-1319, Denmark

Link to Catalog

Link to Wikipedia

WHO: Biographical Dictionary with complex relationships



Eric V of Denmark

From Wikipedia, the free encyclopedia

Eric V "Klipping" (1249– November 22, 1286) was King of Denmark (1259–1286) and son of Christopher I. Until 1264 he ruled under the auspices of his mother, the competent Queen Dowager **Margaret Sambiria**. In this period he was for some time 1261–1262 a prisoner in **Holstein** after a military defeat and afterwards he was for some years brought up in **Brandenburg**. He tried to enforce his power over church and nobility. His conflict with the former was brought to a satisfying result but in 1282 he was forced by the latter to accept an agreement (a "*handfastening*" – a kind of a Danish **Magna Carta**) which limited his authority. In the 1270s, Erik Glipping attacked **Småland**.

Life events
metadata

WHAT: Actions
prisoner

WHERE: Places
Holstein

WHEN: Times
1261-1262

WHO: People
Margaret Sambiria

Early Prototype interface



Support for the Learner: What, Where, When, and Who



Navigation Menu

[Home](#)

[Search](#)

Browse by:

- [World Region](#)
- [Location](#)
- [Time](#)
- [Map](#)

Search

Suggest catalog search terms for a query:

Number of suggested LCSH:

Suggested Library of Congress Subject Headings

Original Query

djengis khan

Rank Subject Heading

1 ghalih, mirza asadullah khan

2 genghis khan

3 mongol

4 khan, abdul ghaffar

5 pakistan

6 mongolia

7 bhashani, abdul hamid khan

8 india

9 polo, marco

10 mogul empire

Entry Vocabulary
Index suggests correct
LCSH with different
spelling

LCSH hierarchy for term

Related title words

Search LOC

Search Google

Search Wikipedia

Search WikiPeople

Search Events

Search Locations



Suggested Library of Congress Subject Headings

Original Query

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1 ghalib, mirza asadullah khan

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4 khan, abdul ghaffar

5 pakistan

6 mongolia

7 bhashani, abdul hamid khan

8 india

9 polo, marco

10 mogul empire

Related places

LCSH hierarchy for term

Related title words

Search LOC

Search Google

Search Wikipedia

Search WikiPeople

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Suggested Library of Congress Subject Headings

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7 bhashani, abdul hamid khan

8 india

9 polo, marco

10 mogul empire

Potentially related
people

LCSH hierarchy for term

Related title words

Search LOC

Search Google

Search Wikipedia

Search WikiPeople

Search Events

Search Locations

Suggested Library of Congress Subject Headings

Original Query

djengis khan

Rank Subject Heading

- 1 ghalib, mirza asadullah khan
- 2 genghis khan
- 3 mongol
- 4 khan, abdul ghaffar
- 5 pakistan
- 6 mongolia
- 7 bhashani, abdul hamid khan
- 8 india
- 9 polo, marco
- 10 mogul empire

Potentially related periods

LCSH hierarchy for term

Related title words

Search LOC

Search Google

Search Wikipedia

Search WikiPeople

Search Events

Search Locations

Library of Congress Hierarchical Subject Heading List

Subject Heading:

mogul empire

Broader Terms:

india--history--1526-1765

Used For:

mughal empire

moghul empire

Search LOC

Search Google

Search Wikipedia

Mostly in India 16th-
18th century

Cheshire II Search in the Library of Congress catalog:

Your search, encoded as *subject mogul empire*, was submitted to the *Library of Congress* server, 775 items were retrieved.

1. Akabarani yadamam [microform] / sampadako Jhaveracanda Meghani, Maganalala Satikumara. Ranapura, Kathiyavada : Phulachaba, [19]42. 82 p. : ill. ; 21 cm.

Notes: In Gujarati. Cover title. On Akbar, Emperor of Hindustan, 1542-1605. Includes bibliographical references. Microfilm. New Delhi : Library of Congress Office ; Chicago : Available from Center for Research Libraries, 1997. On 1 microfilm reel with other items ; 35 mm. (SAMP early 20th-century Indian books project ; item 15172) Master microform held by: ICRL.

Subjects: Akbar, -- Emperor of Hindustan, -- 1542-1605. Mogul Empire -- Biography.

Other Authors: Meghani, Zaverchand Kalidas, 1896-1947. Satikumara, Maganalala.

LC Call Number: Microfilm BUL-GUJ-222 (D)

Mughal Empire

From Wikipedia, the free encyclopedia
(Redirected from Mogul Empire)

The **Mughal Empire**, (Persian: *امپراتوری مغول*, self-designation *Gurk ānī*, Persian: *گورکانی*, which was also the self-designation of the Timurids in Central Asia and Khorasan) was an empire that at its greatest territorial extent ruled most of the Indian subcontinent, then known as



The Mughal Empire at its greatest extent.

Hindustan, and parts of what is now Afghanistan and western Pakistan (Balochistan), between 1526 and 1707. The empire was founded by the Timurid leader Babur in 1526, when he defeated Ibrahim Lodi, the last of the Delhi Sultans at the First Battle of Panipat. "Mughal" is the Persian word for "Mongol". The Mughal rulers were adherents of Islam.



Web

Mughal Empire - Wikipedia, the free encyclopedia
The alternate spelling of the empire, **Mogul**, is a word **mogul**. In popular news jargon, this is a successful ...
en.wikipedia.org/wiki/Mogul_Empire - 7

IO 1103 - Mogul Empire

1103.2: The **Mogul Empire**, founded by Babur in the mid-16th century, introduced Islam into the rich cultural mix of India dominated by Hinduism. ...
www.mcps.k12.md.us/curriculum/Socialstd/MWH/1103.html - 4k -
Cached - Similar pages

India before the British

Babar (1482-1530), a Turkish-Mongol prince from Afghanistan and the founder of the **Mogul Empire**, invaded India in 1526. His grandson Jalealuddin Mahomet ...
www.victorianweb.org/history/empire/before.html - 7k - Cached - Similar pages

Map Mogul - Antique Maps & Prints - India & Mogul Empire / Sri Lanka

Antique Maps and Prints for sale online Manufacturer: , Category: India & Mogul Empire / Sri Lanka.
mapmogul.com/catalog/index.php+cPath+1_41 - 43k - Cached - Similar pages



Mughal Empire

From Wikipedia, the free encyclopedia
(Redirected from Mogul Empire)

The **Mughal Empire**, (Persian: امپراتوری صفوی, self-designation *Gurkānī*, Persian: گورگانی, which was also the self-designation of the Timurids in Central Asia and Khorasan) was an empire that at its greatest territorial extent ruled most of the



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Find out more about this area.



Support for the Learner: What, Where, When, and Who



Navigation Menu

Home

Search

Browse by:

- World Region
- Location
- Time
- Map

Choose a Region

Africa

America

Asia

Europe

Pacific & Australia

Middle East

Central Asia

South Asia

East Asia

Southeast Asia

Choose a Location

All States

Major Cities

Mongolia

Select State

Select City

Select Country

Choose a Century

-2700 to -1000

-999 to 0

1 to 999

1000 to 1999

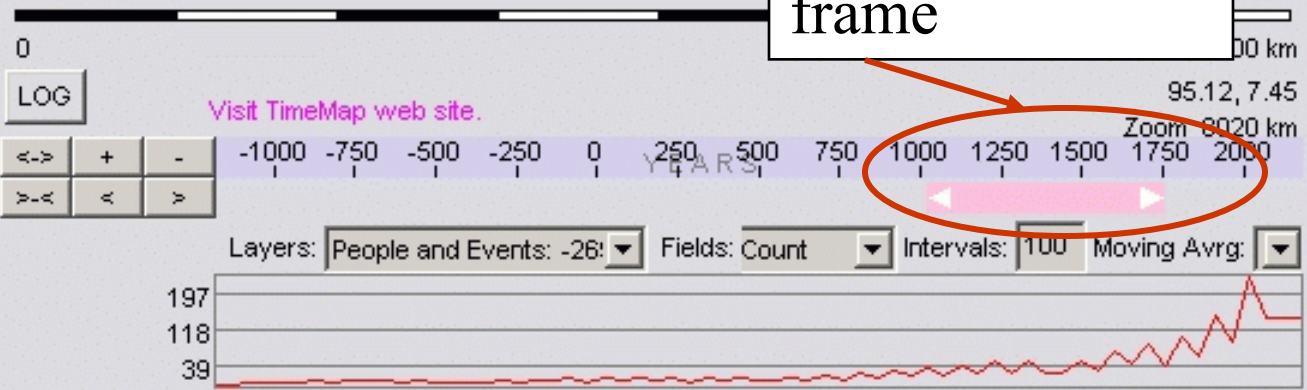
10 Century CE

11 Century CE

12 Century CE

13 Century CE

- Events: -2699 to -900 BCE
- Events: -899 to -1 BCE
- Events: 1 to 899 CE
- Events: 900 to 1999 CE
- People: -2699 to -1 BCE
- People: 0 to 899 CE
- People: 900 to 1999 CE
- People and Events: -2699 BCE to 1999 CE**



15th Century

India



More information about
the country of India...

Historical events which occurred in or near.....

+ Click on the plus sign to expand/collapse




People

+ Click on the plus sign to expand (minus sign to collapse)


MET Timeline of Art History


+ Click on the plus sign to expand (minus sign to collapse)


Art and Architecture Slide Library

- India, Asia 

Cultural Atlases

- ECAI South Asia - Examples, ECAI 

Search for more: this country 

this century 

More information about the country of India...



Berkeley Natural History Museums

Wikipedia

BBC

Ethnologue

CIA Factbook

India

From Wikipedia, the
For historical a
India (Hindi: भारत
officially the Repu
is a country in Sou
the seventh-larges
geographical area,
most populous cou
largest liberal dem
world. India has a
over seven thousa
and borders Pakist
west; China, Nepal
the north-east; an
and Myanmar to th
adjacent to the Ind
island nation of Sri

15th Century

India



Historical events which occurred in or near.....

+ Click on the plus sign to expand/collapse

People

- Click on the plus sign to expand (minus sign to collapse)
- Babur, the founder of India's Mughal Empire, 1483-1530

MET Timeline of Art History

- Click on the plus sign to expand (minus sign to collapse)
- South Asia, 1400 - 1600 a.d.

Art and Architecture Slide Library

- India, Asia

Cultural Atlases

- Begram Ivory and Bone Carvings, ECAI UCB
- ECAI China - Examples, ECAI
- ECAI Silk Road Atlas, ECAI
- ECAI South Asia - Examples, ECAI

Zāhir ud-Dīn Mohammad "Bābur"

Gurkānī (February 14, 1483 - December 26, 1530)

Babur

South Asia, 1400-1600 A.D.

Encompasses present-day Bangladesh, India, Pakistan, and Sri Lanka

Flamenco UC Berkeley Architecture Slides

A snapshot of Images from the UC Berkeley Architecture Visual Resources Library

Powered by Flamenco

Save Search History and Settings Return to Search New Search Logout

search

all items in current results

These terms define your current search. Click the X to remove a term.

LOCATIONS: Asia > India

910 items, grouped by LOCATIONS (view ungrouped items)

Refine your search within these categories:

PEOPLE (group results)

architect (248) historical figure (42)
artist (4)

PERIODS (group results)

17 & 18th Century (19) Islamic-Hegira, 622
19th Century (52) CE (181)
20th Century (129) Modern (181)

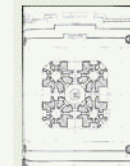
LOCATIONS: all > Asia > India

Agra (63) Andhra Pradesh (1)
Agra Fort (9) Avantipur (2)
Ahmadabad (24) Badami (5)
Ajanta (8) Bagalkot (1)
Allahabad (1) more...
Amber (1)

STRUCTURE TYPES (group results)

architectural elements (128)
book elements (1)
buildings (by design) (4)
buildings (by function) (719)
buildings (by height) (1)
buildings (by location or context) (15)

Agra (63)



Taj Mahal



Taj Mahal



Itimad-ud-Daula T...



Garden Pavilion

all 63 items...

Agra Fort (9)



Dehli Gate



Jahangiri Mahal



Moti Masjid (Pearl...



Amar Singh Gate

all 9 items...

ECAI Cultural Atlases: presenting history in its geographical & chronological contexts

- Begram Ivory and Bone Carvings, ECAI UCB
- ECAI China - Examples, ECAI
- ECAI Silk Road Atlas, ECAI
- ECAI South Asia - Examples, ECAI

Contributions from the **Huntington Archive of Buddhist and Related Art**

[Images of Sanchi](#)
 [Lost and Stolen Art of Afghanistan and Nepal](#)
 [Newar Artistic Traditions](#)



ECAI Silk Road Atlas

Land Empires Routes Cultures

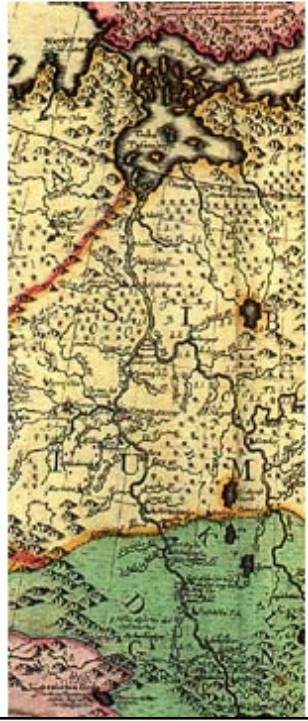
Routes

The travelers of the Silk Road include some of the great figures of human history. They include people from throughout Eurasia: merchants Ibn Battuta and Marco Polo, pilgrims Xuan Zang and John Mandeville. Beliefs, commodities, epidemic diseases, armies, and cultural practices traveled along the Silk Road. Until the age of steam and rail, travelers moved overland by caravan from town to town, and they moved from port to port by sailing ship.

The interactive maps depict two routes: Marco Polo's reputed travels to and from China in the fourteenth century, and a general route that archaeologists believe came into existence as early as the fifth century BCE.

Routes - Interactive Java TimeMap
Time enabled map showing explorer routes and empire expansion.

Mongol Video
Extension of Mongol armies through Eurasia during 12th - 15th centuries (25MB video file)



Evolution of artistic traditions.

of Sydney

Empire AD 1500 -
area with interior
on (AVI, 10MB)

- Begram:
New Perspectives
and Bone Carvings
Mehendale
- Abstract
 - Table of Contents
 - Volume I:
 - Volume II:
 - Plates
 - List of Figures
- Search the Ivory
- Dynamic Maps
- Begram, Afghanistan
 - Begram Site

Better interfaces are now available...



Robert I, 1306-1329 : Scotland

Event: Robert I, 1306-1329
Location: Scotland
Begin Date: 1306
End Date: 1329
Estimated Bounding Coordinates: North 56.0
West -4.0 South 56.0 East -4.0
Source: LCSH Authority ID: sh 85118835
Search for books on this period at the [Library of Congress](#) via the Cheshire system.

Directions: [To here](#) - [From here](#)

Pointer lat 55.755023° lon -2.468578° Streaming 100% Eye alt 527.60 mi

URL: <https://sherlock.sims.berkeley.edu/cgi-bin/CheshireZSearch.tcl?search=lcid+sh+85118835&target=lcauthplus&numwanted=20&format=html&recsyntax=marc>

Your search, encoded as *lcid sh 85118835*, was submitted to the *Cheshire LC Subject Authority file and Library of Congress catalog server*, 69 items were retrieved.

Resource Symbol Key: Wikipedia search for subject or person

1. Bannockburn : the story of the battle and its place in Scotland's history / [edited by Sydney Goodsir Smith]. [] : Scots Independent (Newspapers), [196] 20 p. : ill. (some col.) ; 28 cm.
Subjects: [Bannockburn, Battle of, Scotland, 1314](#)
[Scotland -- History -- Robert I, 1306-1329](#)
LC Call Number: [MLCM 83/2093 \(D\) DA783.41](#)

2. The life of Robert Bruce, king of Scotland. Edinburgh, Oliver & Boyd, 1810. 84 p. 14 cm.
Subjects: [Robert -- I, -- King of Scots, -- 1274-1329](#)
[Scotland -- History -- Robert I, 1306-1329](#)

Cheshire II Search Results for Cheshire LC Subject Authority file and Library of Congress catalog

Some issues with clutter...

The screenshot shows a Google Earth interface with a map of Rome. The map is densely populated with yellow pushpins, each connected to a text label. The labels represent various historical events and figures, such as "Republic, 265-30 B.C. : Rome", "Augustus, 30 B.C.-14 A.D. : Rome", "Constantine I, the Great, 306-337 : Rome", and "The five Julii, 30 B.C.-68 A.D. : Rome". The interface includes a search bar, a "Places" list on the left, and a "Layers" panel at the bottom left. The "Layers" panel shows various map features like "Primary Database", "Terrain", "Geographic Web", "Featured Content", "Global Awareness", "roads", "3D Buildings", "borders", "Populated Places", and "Alternative Place Names". The "View" dropdown is set to "Core". The bottom of the screen displays coordinates (41°54'41.52" N 12°29'25.33" E), a scale bar (12.77 mi), and copyright information (Image © 2007 DigitalGlobe, © 2007 Europa Technologies, © 2007 Cnes/Spot Image). The Google logo is visible in the bottom right corner.

Can be handled by the time bar

The screenshot shows the Google Earth interface with a map of the Eastern United States. A yellow outline highlights a region in West Virginia and Virginia. Several historical events are marked with yellow pushpins and labels: "John Brown's Raid, 1859 : Harpers Ferry (W. Va.)", "Siege, 1862 : Harpers Ferry (W. Va.)", "Siege, 1864 : Winchester (Va.)", and "Blockade, 1861-1862 : Washington (D.C.)". A detailed popup window is open for the first event, providing the following information:

John Brown's Raid, 1859 : Harpers Ferry (W. Va.)

Event: John Brown's Raid, 1859
Location: Harpers Ferry (W. Va.)
Begin Date: 1859
End Date: 1859
Estimated Bounding Coordinates: North 39.3253 West -77.7542 South 39.3297 East -77.7392
Source: LCSH Authority ID: sh 85059033
Search for books on this period at the [Library of Congress](#) via the Cheshire system.
Directions: [To here](#) - [From here](#)

The interface includes a search bar, a "Places" list on the left with checked items for each event, and a "Layers" panel at the bottom left. The map shows major cities like Pittsburgh, Philadelphia, Newark, and Jersey City. A scale bar at the bottom indicates 117 miles. The Google logo and "Eye alt 391.71 mi" are visible in the bottom right corner.

Conclusions: Pervasive Search



- Search is going to be everywhere, often working in the background attempting to anticipate what you want or need
- We are seeing some of this already on the Web search engines
 - for example...





bill clinton

Search Advanced Search Preferences

New! View and manage your web history

Web Blogs News Books Images Video Results 1 - 10 of about 38,200,000 for bill clinton. (0.15 seconds)

Bill Clinton Sponsored Link
www.ClintonFoundation.org Learn about **Bill Clinton's** current work and the **Clinton** Foundation

Sponsored Links

Buy Bill Clinton's Book
 Giving: How Each of Us
 Can Change the World
www.amazon.com

News results for bill clinton

-  **Bill Clinton** launches new book as campaign heats up - Sep 5, 2007
 NEW YORK (AFP) — Former president **Bill Clinton** has unveiled a new book on global ...
Bill Clinton, who would be the first US "First Gentleman," or male ...
[AFP - 156 related articles »](#)
- [Clinton Battles 'Distanced' Perception - ABC News - 485 related articles »](#)
- [Daytime TV's guests are Bill and Hillary Clinton - Newsday - 10 related articles »](#)

Bill Clinton - Wikipedia, the free encyclopedia

Online encyclopedia article on **Clinton's** life and presidency.
en.wikipedia.org/wiki/Bill_Clinton - 267k - [Cached](#) - [Similar pages](#)

Biography of William J. Clinton

Biography of William J. **Clinton**, the forty-second President of the United States (1993-2001).
www.whitehouse.gov/history/presidents/bc42.html - 18k - [Cached](#) - [Similar pages](#)

William J. Clinton Foundation

Bill Clinton (42st President: 1993-2001). A showcase of the **Clinton** Administration's legacy.
www.clintonfoundation.org/ - 26k - [Cached](#) - [Similar pages](#)

William J. Clinton Presidential Center

The William J. **Clinton** Presidential Center, situated on the banks of the Arkansas River in a beautifully landscaped public park, is one of the largest ...
www.clintonpresidentialcenter.org/ - 32k - [Cached](#) - [Similar pages](#)

American President: President Bill Clinton

In-depth information on President **Bill Clinton** from the Miller Center of Public Affairs.
millercenter.virginia.edu/academic/americanpresident/clinton - 26k - [Cached](#) - [Similar pages](#)

The "Unofficial" Bill Clinton

Enron and **Bill Clinton** - by Charles R. Smith, NewsMax Thursday, Feb. 28, 2002 Trade Trips to Russia, India, Bosnia and Indonesia ...
zpub.com/un/un-bc.html - 47k - [Cached](#) - [Similar pages](#)

Where is search going?



- Broder has suggested that search will become more integrated into work processes
 - This is even *more important* for scholarly and research work
 - Search should move beyond the “empty box” and develop dynamic context-related searches that allow the user to focus in on particular topics, branch into related topics, and reexamine a topic from different perspectives or disciplines

But in the Academic world...



- These kinds of context-based linking are happening already on the web and in commerce-driven applications
- Either we can give up and assume Google will do it all for us...
- Or we can continue to find new uses for the rich collections of metadata that we have been building over the decades, and demand that our search engines use that information to provide relevant context-driven information links





Thank You

Questions?