How the Computer Became Information Technology

Thomas Haigh
The Haigh Group &
University of Wisconsin – Milwaukee

thaigh@computer.org
www.tomandmaria.com/tom

Social History of Ideas

- Historians have a rich appreciation of ideas like
  - Democracy
  - Progress
  - Whiteness
  - Liberty
  - Manliness
- These ideas are
  - Powerful
    - Have significance and power to historical actors
  - Slippery
    - Multiple definitions
    - Change over time
  - Enlisted and reshaped by many different groups
- Unwilling to use as neutral analytical categories

Information and Historians

- My argument: Information is a similar idea
- We need a social history of information
  - Mostly there isn't one.
  - Nunberg, Klein, Bowker have done relevant work
- We should be careful about how we use the concept to frame our own questions
  - Information concepts naturalize a certain view of the world...
  - Will return to at the end.

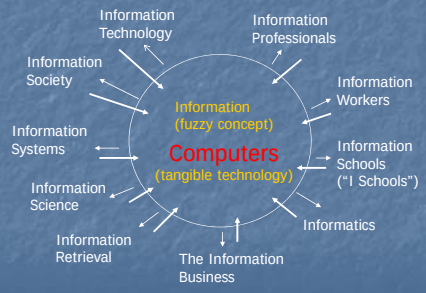
Information Today

- Almost all businesses have a "Chief Information Officer"
  - Some have dozens.
- The computing department is usually called "Information Systems Division"
- Computers are usually called "Information Technology"
- Corporate IT staff are called "Information System Specialists" and similar titles
- "Informatics Schools" address IT applications

Information as a Site of Expertise

- Trust me I'm a....
- Professions/technical occupations requires a demarcated object of expertise
  - Which is social constructed
  - Creation of a subjective world in which nature and validity of expertise is self-evident
- How/why/when does information become such a site within business & management?

The Information Cluster

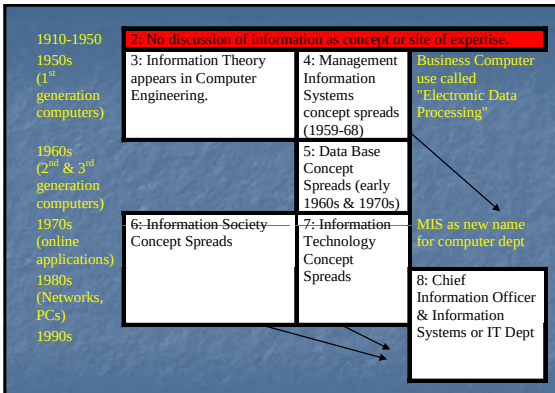


Information Was About Informing

- OED shows word "Information" used back to 1450
  - Root is in act of "Informing"
    - "For your information" on a memo
    - Tourist information office
    - US Constitution: President "give Congress information of the state of the Union"
- (Analyzed by Geoff Nunberg – "Farewell to the Information Age")

"Information as a Thing"

- Title of a paper by information scientist Michael Buckland, distinguishing
  - Information as process (informing)
  - Information as knowledge (known by someone)
  - Information as a thing (synonym for fact/data)
- My claim is that 3rd meaning is
  - New
  - Now dominant
  - Inseparable from computer technology
  - First popularized as a site of expertise



2: The Absence of "Information" In Business Prior to 1950

How much can Leffingwell save you?

THIS IS HIS GUARANTEE:

With an office force of	Saving
2— 9 persons	10 per cent of your time
10— 24 "	15 per cent of your payroll
25— 99 "	17 per cent of your payroll
100—1000 "	20 per cent of your payroll

These figures are meant to be taken literally. They are a conservative estimate by Mr. W. H. Leffingwell, President, W. H. Leffingwell Company, efficiency engineers, of the savings which you can expect from the application of his methods to your office work.

"Too good to be true," you may say. But when you consider that he decreased the payroll of an Illinois concern 40%, that he cut the force of one department of an Ohio concern from 25 to 5 employees, that he has effected wonderful economies in concerns facing practically all kinds of conditions, isn't it worth while at least to investigate these claims, especially when it costs you nothing?

W.H. Leffingwell

- Leader of Scientific Office Management Movement
  - 1910s-1930s
  - Influenced by Taylor
  - Expert on office systems and technologies
- Tried to create new profession of Office Manager
  - Broad authority over administrative systems and procedures
  - Supervision of all clerical workers

Leffingwell, from 1925 textbook

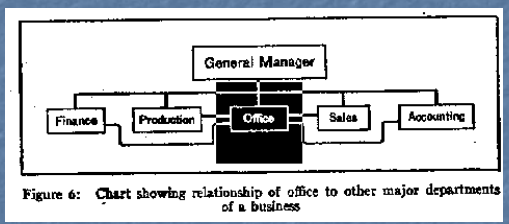
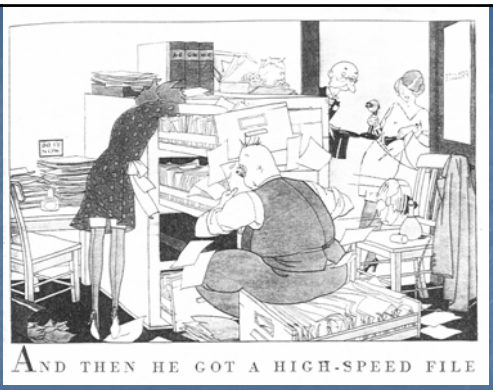


Figure 6: Chart showing relationship of office to other major departments of a business



Advertisement from System Magazine, mid-1910s

The Power of File Cards

"... Acme visible records force their owners to use the facts - profit by them, save money by them, stop losses before they get started.... Its successful operation in your business will be automatic..."

(Advertisement for Acme file cards, System magazine 1932)

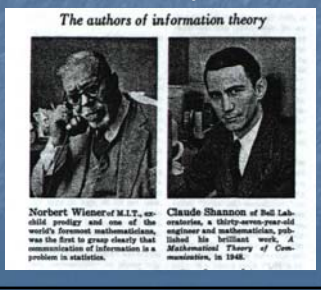
Systems, Facts – NOT "information", IT, information systems, etc

3: Information Theory and Computer Engineering in the 1950s

1910-1950	2: No discussion of information as concept or site of expertise.		
1950s (1st generation computers)	3: Information Theory appears in Computer Engineering.	4: Management Information Systems concept spreads (1959-68)	Business Computer use called "Electronic Data Processing"
1960s (2nd & 3rd generation computers)		5: Data Base Concept Spreads (early 1960s & 1970s)	
1970s (online applications)	6: Information Society Concept Spreads	7: Information Technology Concept Spreads	MIS as new name for computer dept
1980s (Networks, PCs)			8: Chief Information Officer & Information Systems or IT Dept
1990s			

Information in the 50s

- "Information Theory" – fashionable & novel during late 1940s, early 1950s

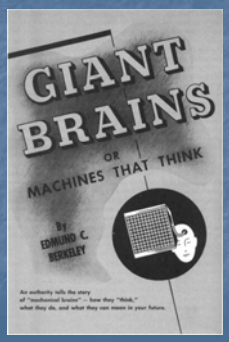


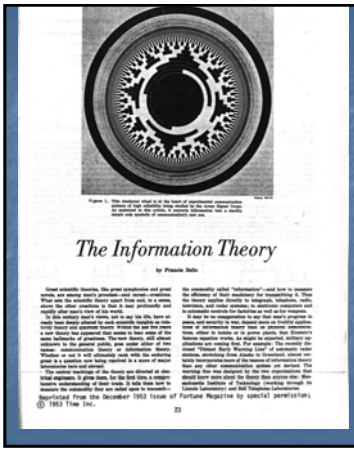
Shannon's Information Theory

- Generalized representation of digital communication
  - Message from Sender → Receiver
  - i.e. a process of INFORMING
- But rapidly taken up within computing engineering
  - Signals constantly flowing between parts of the machine
    - E.g. Tape drive → Memory → Register
    - No human is involved in the process
  - Blurs line between transmission & storage

Giant Brains, 1949

- Computer as the latest and most powerful "physical equipment for handling information"
- Like nerve cells, writing, human gestures
- Earliest statement of this concept?




The Information Theory

Information Theory Arrives in Business

- Fashionable
- Scientific
- Powerful
- Ill-defined

Fortune, 1953

4: Management Information Systems

1910-1950

1950s (1^{st} generation computers)

1960s (2^{nd} & 3^{rd} generation computers)

1970s (online applications)

1980s (Networks, PCs)

1990s

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6: Information Society Concept Spreads

7: Information Technology Concept Spreads

MIS as new name for computer dept

8: Chief Information Officer & Information Systems or IT Dept

The Computer Enters Business


The Chromium-Plated Tabulator: Institutionalizing an Electronic Revolution, 1954–1958

Thomas Haigh
Cotby College

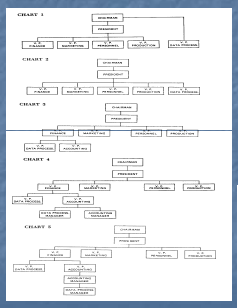
Early corporate computer use as Data Processing

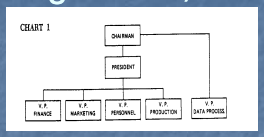
Haigh, Thomas. "The Chromium-Plated Tabulator: Institutionalizing an Electronic Revolution, 1954-1958." *IEEE Annals of the History of Computing* 23, no. 4 (2001): 75-104.

Social History of Data Processing

- Strong ties to Punched Card work
  - Fairly low status work
- Data Processing Management Association
  - Group for DP supervisors
- Seek collective mobility
  - Tied to position of corporate DP departments
  - Computing staff rise with the computer up the corporate ladder
  - Seek new identities, claims to expertise to accomplish this

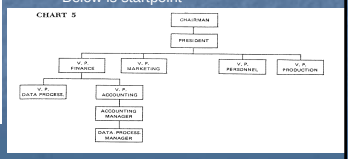
A Manifesto in Org Charts, 1969





Closeups: above is endpoint

Below is startpoint



Management Information Systems

- Coined in 1959 by American Management Association group
  - "The Continuing Seminar on Management Information Systems"
  - Elites of the "systems", management consulting and computer vending communities
- "Totally Integrated Management Information System"
  - INFORMS each manager of what he/she needs to know to make decisions
  - System include models, forecasts, projections
  - Used directly by top executives

Haigh, Thomas. "Inventing Information Systems: The Systems Men and the Computer, 1950-1968." *Business History Review* 75, no. 1 (2001): 15-61.


Thomas Haigh

Inventing Information Systems: The Systems Men and the Computer, 1950–1968

During the 1960s, many academics, consultants, computer vendors, and journalists promoted the "totally integrated management information system" (MIS) as the destiny of corporate computing and of management itself. This concept evolved out of the frustrated hopes of 1950s corporate "systems men" (represented by the Systems and Procedures Association) to establish themselves as powerful "generalist" staff experts in administrative technologies. By redefining the computer as a managerial "information system," rather than a single technical extension of punch-card "data processing," the systems men sought to establish jurisdiction over corporate computing and to replace accountants as the primary agents of managerial control. The apparently unlimited power of the computer supported a new conception of information, defined as the exclusive domain of the systems men, assisted by operations research specialists and computer technicians. While MIS proved impossible to construct during the 1960s, both its dream of all-encompassing automated information systems and the resulting association of information with the computer endured into the twenty-first century.

During the late 1950s and early 1960s, a new and exciting concept swept through corporate America: the "totally integrated management information system" (MIS)—a computer-centered computerized system designed to span all administrative and managerial activities.

Very Influential in 1960s

- Endorsed by
  - Management writers
  - Computer consultants
  - Computer companies
- Impossible to realize with technologies of the day
  - Backlash begins around 1968


MANAGEMENT INFORMATION SYSTEMS

Some dreams have turned to nightmares

COMPUTER-BASED MIS

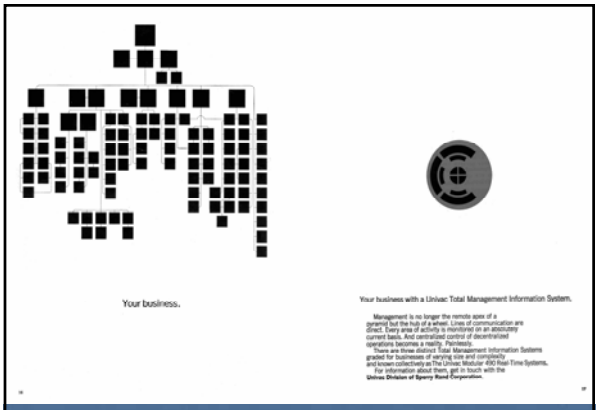
Power of Information

"When complete information is available, the policy or decision may already have been made. Another way to say this is the facts speak for themselves and require only a formal acceptance and stamp of approval by the line executive rather than a decision."

(McDonough, Adian. "The Scope of Management Systems: Past, Present and Future." In Total Systems, edited by Alan D. Meacham and Van B. Thompson, 20-24. Detroit, MI: American Data Processing, Inc., 1962.)

MIS Will Realize Potential of computer...

Harvard Business Review - 1964

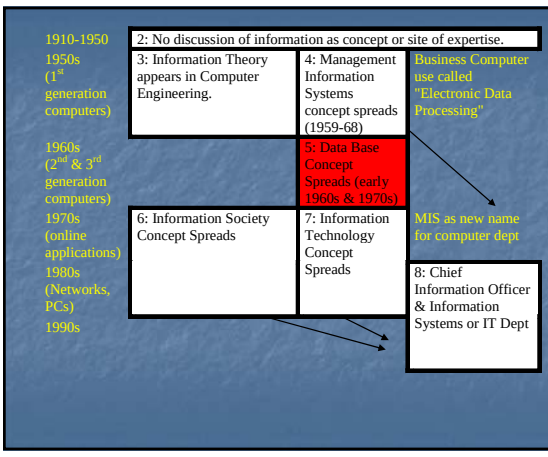


Univac Advertisement, Business Week 1965

Utopian Promises for MIS

"a more relaxed, leisurely management environment. The uneasiness will be replaced by a feeling of confidence in the completeness and timeliness of information and in the decisions based on that information...."

5: Database Management System & Databanks

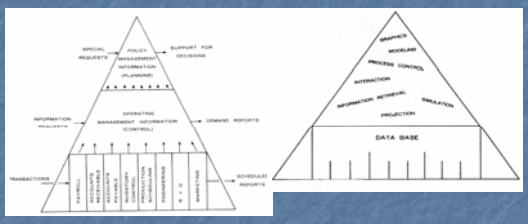


The Data Base

- "A veritable bucket of facts… into which information seeking ladles of various sizes and shapes are thrust…"
- Milton D. Stone, 1962


"A Veritable Bucket of Facts"
Origins of the Data Base Management System

Business Conception Rather Vague



- Shared pool of data between applications
- Data Base as technological foundation for MIS

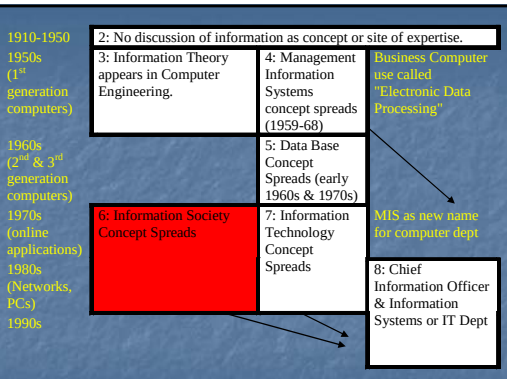
Extension of MIS?

- "Writings on MIS have waned recently and have largely been replaced by writings on the Data Base… the titles [of articles] are remarkably similar…." Richard L. Nolan, 1974
- SIMILAR: both about integrating corporate systems and providing managers with information
- DIFFERENT:
  - MIS – start by identifying all information needs
  - Data Base – build data repository to support querying and analysis as needed

"Data" not Information

- Data Base Management System
  - Specific kind of systems software sold from 1970s onward as data store
- NOT an "information base"
  - Information is still associated more with communication, not facts to be stored

6: The Information Society and the Information Age



1970s: Spread of Info Terms Inside Business Computing

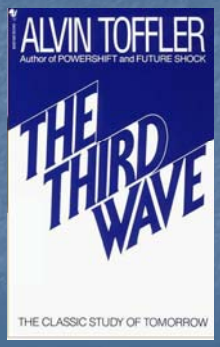
- 1972: Data Processing Management Association renames its show "Info/Expo"
- 1972: Business Automation magazine becomes Infosystems
- Management Information Systems becomes
  - New name for computer department
  - (as VP, MIS) New name for computer manager
  - Blanket name for computer education/research in business schools

Resurgence of Interest in Computers in 1970s

- First microprocessors and mass market chip 1970s
- Late 1970s also saw popularization of ideas of
  - Information technology
  - Information society/Post Industrial Society
  - Computer literacy
  - Microcomputer revolution

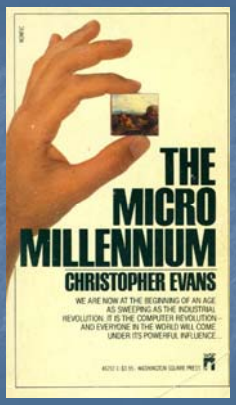
The Third Wave

- Futurist Alvin Toffler
  - 1980, influential example of "information age" thinking
- The Third Wave will
  - "sweep across history and complete itself in a few decades… Tearing our families apart, rocking our economy, paralyzing our political systems, shattering our values."
  - "Telecottages" & "Virtual organizations"
    - Everyone works from home

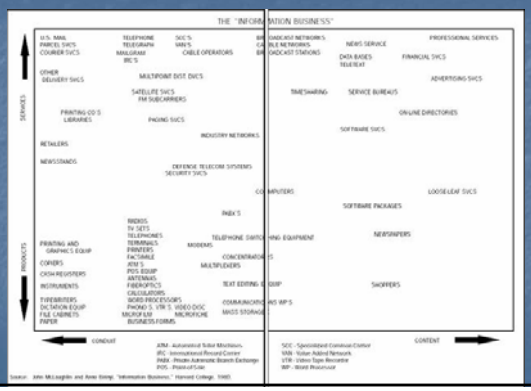


Micro Millennium

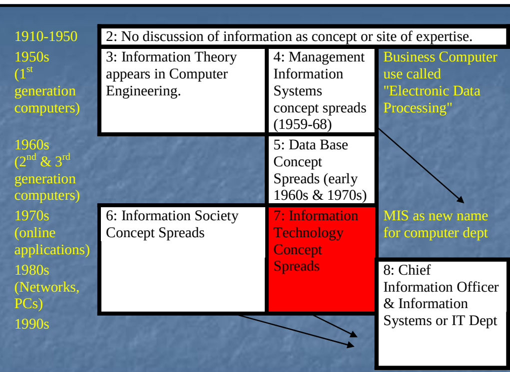
- Utopian best seller
  - Computer replace doctors and lawyers in 1980s
  - Human race largely retires
  - Ultra Intelligent machines by early 1990s
- Basic for a TV series
- "Could be the most important book of the next two decades" – Playboy



The Information Business (1980)

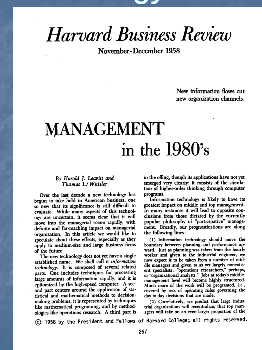


7: Information Technology



Information Technology

- 1958 – Harvard Business Review – "Management in the 1980s".
  - First use of phrase "Information Technology"?
- IT =
  - Computers +
  - Mathematical simulation +
  - Operations Research


Harvard Business Review
November-December 1958

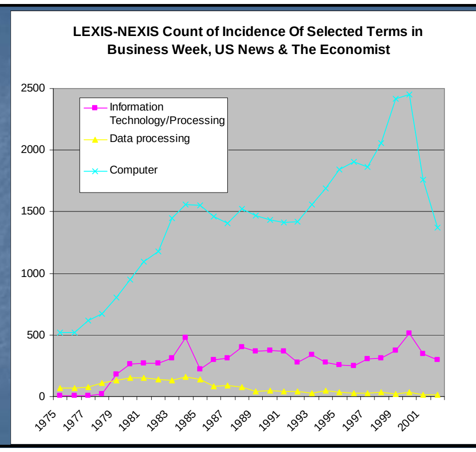
New information flows cut new organization channels.

MANAGEMENT in the 1980's

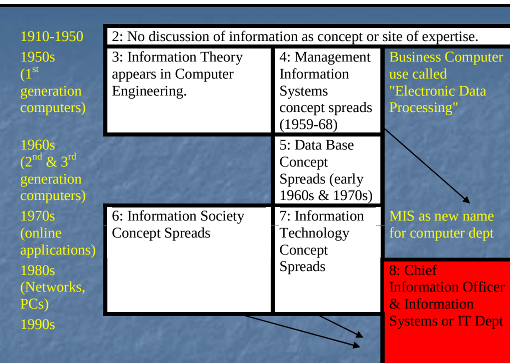
By Harold J. Leavitt and Thomas L. Whisler

Revived in 1970s

- IT receives few mentions during 1960s
- Revives in late 1970s
  - Along side Information Society, Computer Revolution, etc.
- Originally means
  - Computers + Telecoms
- Soon becomes a pretentious synonym for computers
  - Particularly in policy circles
  - (Today people talk about ICTs)



8: The Chief Information Officer



Chief Information Officer

- Phrased coined circa 1980
  - William R Synnott, head of Info Systems & Services for First National Bank of Boston
  - Promoted in 1981 book "Information Resource Management"
- CIO heads "Information Resource Management" department
- Prescriptive: the "CIO role does not exist except in the minds of imaginative leaders today."

The CIO Concept

- Information is the new money
  - The key resource of 1980s business
  - But nobody is in charge of it
- CIO is the CFO of information
  - Information, not data processing or computers as site of expertise
  - Accounting – just one kind of information
- Sees as claim to corporate power
  - "Data processing connotes a technical limitation... it is important the right identification be established"
  - Information gives powerful corporate mandate
    - "issuance of corporate policy and instructions is, in fact, an information service."

Spread from 1986 Onward

- CIO concept widely featured in business press
- Badge of status among computer managers
- Often as new title for old job
  - Synnott says "There are a lot of fake CIOs.... It's like Santa Claus. They're on every street corner, but you know they're not all real."
  - Big firms create many CIOs!

The CIO Role

- Higher status, more managerial
  - "Technicians need not apply... Unlike their predecessors—the chief data-processing operating officers—CIOs are business managers first." (1983 article)
- Tied into tech transition to PCs, networks
  - No central monopoly on computer hardware or systems
  - More policy and standards setting
- Debate over background
  - IT or general business best?

Information as Area of Authority

- Still focused on technology & systems
  - Narrow reading of information, excludes
    - Brand management & advertising
    - Technical writing, etc.
- Not just computers, networks and databases (ie Information technology) but also their
  - Contents
  - Uses

Fuzziness of "Information"

- Is crucial – CIO responsible for
  1. "Information systems" to inform managers
  2. Responsibility for defining and managing corporate databases
  3. "Information technology" standards and infrastructure – ie computers & networks
- "Information" unites these three formerly distinct areas

Some Skeptics

"Information is no more than a linguistic convenience that saves you the trouble of thinking what you are talking about."

- Robert A Fairthorne, 1965

"Are We There Yet"

- Annual suvey in CIO magazine charts progress
  - % reporting to CEO or board (51% by 2002)
  - % involved in strategy formation, etc
- Progress is slow but real

9: Beyond Information

The Information Pyramid

- New, higher status realms above information
  - Knowledge
  - Data
- Reaction against association of information with computer achieved though IT, CIO

Chief Knowledge Officer

- Popular idea from late-90s onward
- Intended to be broader than CIO
  - Push beyond computerized systems
  - More focused on business
  - (Both originally promised for CIO & DBA)
- Like CIO
  - Well publicized movement to create position
  - Big variation between firms in adoption, role

Conclusions

We Have Seen

- The recent (post-1950) origins of
  - Information as a synonym for facts or data
  - IT, information systems & other info terms
  - Information as a commodity or fix for
- These developments were
  - Pushed by social groups seeking a broad and attractive domains for claimed expertise & products
  - Intimately bound up with the spread of computers into business

Identity Inflation

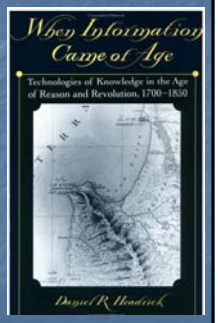
- 1950s: "Data Processing" is narrowly technical
  - Management Information Systems seems more managerial
- 1970s: MIS seems too narrowly technical
  - Chief Information Officer seems more managerial
- 2000s: CIO seems too narrowly technical
  - Chief Knowledge Officer seems more managerial
- Difficulty of blending technical & managerial roles, cultures, mandates
- Parallel:
  - Negro → Colored → Black → African American

Implications for Historians

- Spate of books and exhibitions in 1990s on origins of the information revolution in
  - Telegraph
  - Printing press
  - Encyclopedias
- Good: Challenge "rupture talk" of Internet boom
- Bad: Project current understandings of information into past

Example: Headrick

- IT revolution: 18th century
- Defines information as"data organized in a systematic fashion"
- Suggests a taxonomy of
  - information gathering systems (such as censuses),
  - information classification systems (such as taxonomies),
  - information transformation systems (such as statistics and cartography),
  - information storage and retrieval systems (such as dictionaries or museums)
  - information communication systems (such as messengers).
- No discussion of
  - Meaning of information to historical actors
  - Change in information concepts over time



D. R. Headrick, *When Information Came of Age: Technologies of Knowledge in the Age of Reason and Revolution, 1700–1850*. Oxford: Oxford University Press, 2000.

Why Is This Bad?

- Erases work of historical actors
  - Information system concepts discovered, not invented
  - And anyway, had been there all along
- Remove possibility of understanding what historical actors through they were doing
  - E.g. recasts the history of accounting in terms of information
- Accepts concept of information as a thing to be stockpiled, manipulated, transmitted, etc
  - Endorses information as a domain of expert knowledge

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