Internet and Electronic Information Management

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Information Explosion

- Library collections double every 14 years ($2^{27}=134$ million books)
  - The Library of Congress has some 170 million items
- Documents on the Web triple every year
  - “Surface web”: 1-2 billion documents
  - “Deep web”: 550 billion documents

Source: BrightPlanet
Surface web – 1-2 billion documents

Deep web – 550 billion documents

Source: BrightPlanet
Growth of Information

Information Seeking

**Meno.** But how will you look for something when you don’t in the least know what it is? . . . even if you come right up against it, how will you know that what you have found is the thing you didn’t know?

**Socrates.** . . . Do you realize that . . . a man cannot try to discover either what he knows or what he does not know? He would not seek what he knows, for since he knows it there is no need of the inquiry, nor what he does not know, for in that case he does not even know what he is to look for.

*Source: Plato’s Meno (1971, p. 31-32)*
Some “Forecasts”

- “Who needs this [telephone] invention? We have a lot of little boys to carry messages.” Chief Engineer, American Postal Service, 1876.

- “Every town may wish to have one telephone.” Director General, American Postal Service, 1886.

- Telephone is not something that would interest millions. It is a facility for rich people; it is a commercial tool for those who could afford it.” Times, 1902.

- “I think that as many as five computers would be sold all over the world.” Thomas Watson, Chief Executive Officer, IBM 1943.

- “In the future computers would weigh as little as 1.5 tons.” Popular Mechanics, 1949.
Information Technology

- “…it is a mistake to suppose that any technological innovation has a one-sided effect. Every technology is both a burden and a blessing; not either-or, but this-and-that.” (Neil Postman)
- Reuters produces 27,000 pages of documents per second.
- information overload
- “analysis paralysis”
- “[t]echnology for producing and distributing information is useless without some way to locate, filter, organize and summarize it.” (Hal Varian)
Storage Costs

Transmission Costs

Price Development of International Bandwidth (logarithmic scale)

Globalization of Human Knowledge

“The whole human memory can be, and probably in a short time will be, made accessible to every individual...This new all-human cerebrum...need not be concentrated in any one single place, it need not be vulnerable as a human head or a human heart is vulnerable. It can be reproduced exactly and fully in Peru, China, Iceland, Central Africa, or wherever else seems to afford an insurance against danger and interruption.”

Source: Dyson (1997, p. 10-11)
Information Discovery, Description, Organization & Retrieval

- Discovery
- Description
- Organization
- Retrieval

Discovery
Description
Organization
Retrieval
Organizing Electronic Information

- Dynamically created web pages
- Transient nature of Web documents: average “half-life” of a web document is 44 days!
- Discovering new or updated web pages
- Losing both the content and its description (“metadata”)
Indexing

- Describing documents is not a mechanical process
- Machine vs. human indexing ("associative indexing")
- Existence or absence of certain words
- Statistical indexing
- Ambiguity in language
- Agreement on definitions
- Classification of terms
Collection Management

- Access to traditional vs. networked information sources (one source – one user vs. one source - multiple users)
- Increasing costs of information sources
- De-emphasizing ownership (“just in case” vs. “just in time” approach)
- “Ownership vs. access”
- Budgets devoted to electronic information resources increasing (%15-%20)
Increasing Costs

Collection Manager’s Responsibilities

- Separate policies of licensing, processing, maintenance, storage and usage need to be developed for certain networked information sources (e.g., Archived, Served, Mirrored, Linked)
- “instant gratification”
- Interlibrary borrowing transactions increasing while reference and circulation transactions decreasing
Impact of Remote Access

Graph 1

Reference transactions (-12%)
Total circulation (-6%)

Mass Production

- “Any customer can have a car painted any color that he wants, as long as it’s black” (Henry Ford)
- “unstandardized” goods and services (Alvin Toffler)
- “The Age of the Terrific Deal”: “as you want them”, “from anywhere”, “at the best price and highest quality” (Robert R. Reich)
Mass Customization

- An indication of a rich and complex society.
- “... pre-automation technology yields standardization, while advanced technology permits diversity.”
- Cheaper to produce personalized goods and services using advanced IT:
- “... as technology becomes more sophisticated, the costs of introducing variations declines” (Toffler 1970, p. 236)
Organization

- Mass production and distribution
  - “Mechanistical organization”
  - “continuous development”
  - Traditional education and training
  - Rigid / hierarchical administration
  - Economic models based on centralization

- Mass customization
  - “Dynamic organization”
  - Customer focused education / continuous education
  - Loose / horizontal administration
  - Economic models based on customization
Personalized Information Services

- Portals
- Personal banking services
- On-demand publishing, on-demand video
- Recognition of users and their rights
- MyLibrary
- Automatic current awareness, ToC services
- Electronic document delivery
- “desktop librarian” (www.liveperson.com)
- Recommender systems (e.g., amazon.com)
- Information agents
Welcome back, Debby!

Enjoy two days of readings and book signings during University Authors Days, January 30 and 31, 2001, in the D. H. Hill Library.

The NCSU Libraries is celebrating the career of N.C. Commissioner of Agriculture Jim Graham with an exhibit in the D. H. Hill Library and a virtual exhibit.

Research Library of the Future Panel Discussion: Join a panel of faculty, students, and administrators at a brown bag lunch to discuss this topic, Feb. 8, 11:15 A.M. to 12:45 P.M., Faculty Senate Chambers, D. H. Hill Library.

Message from my Librarian (about)

ALA Midwinter Meeting 2001

It's time to make plans for the ALA Midwinter Meeting 2001 if you haven't done so already! This year's meeting runs from January 12-17, 2001, in Washington, D.C.

11/20/00
Hello, yasar ahmet tonta
We think you'll like these items in:

1. **Bridget Jones : The Edge of Reason**
   by Helen Fielding
   Average Customer Rating: ★★★★★

Amazon.co.uk
Amazon.com recommends...

5. **The Little Book of Farting**
   by Alec Bromie
   Average Customer Rating: ★★★★★
   **Synopsis**
   "The Little Book of Farting" is a collection of wise and witty words from the great men of history, philosophy and literature as well as contemporary views on the subject and up-to-date scientific discoveries.
   [Read more]

   **Our Price:** 1.99

6. **Down Under**
   by Bill Bryson
   Average Customer Rating: ★★★★★
   **Amazon.co.uk**
   As his many British fans already know, bearded Yankee butterball Bill Bryson specialises in going to countries we think we know well, only to return with travelogues that are surprisingly cynical and yet shockingly...
   [Read more]
Disintermediation

- Intermediation requires centralization
- IT makes information management less centralized, more distributed
- IT → Disappearance of face-to-face communication with users
- “Re-intermediation”
- “6-D Vision”
  - disintermediation, demassification, decentralization, denationalization, despacialization, disaggregation (Brown & Duguid)
Archiving Electronic Information

- Preserving intellectual content (printed vs. electronic ones)
- Life of electronic media
- "Technology refreshment" or "migration"
- Integration of technology and content ("bundling")
- Preservation & archiving is based on "copying"
- Whose responsibility?
- Little money allocated for preservation
- Will be distributed in the digital environment among creators, rights holders, distributors, etc.

(M. Hedstrom)
Intellectual Property Rights

- Use of electronic information is also based on “copying”
- Authenticity
- Integrity (watermarks, timestamps, etc.)
- Payments (tax laws)
- Electronic rights management systems
- Identification of digital objects (DOI)
Information Management

- Production factors: work force, capital, and information
- Good management of work force + raw material = economic success
- “None of the resources used to create wealth is as important as information.”
- The investment to create, disseminate and use information contributes most to the economy
- Information is “lifeblood of development” and sine qua non of competition
Electronic Information Management

- ...management of information that is recorded on printed or electronic media using electronic hardware, software and networks.
- includes the description of strategies, processes, infrastructure, information technology and access management requirements as well as making economic, legal and administrative policies with regards to the management of electronic information.
What is a Digital Library?

Users → User interfaces → Objects

Web documents, e-journals, e-books, discussion lists, databases, personalized info svcs, links to metadata and print sources, etc.

Distributed digital library: “everywhere and nowhere” R. Wilensky
Definition

“Digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities.” (D.J. Waters)
Components of a Digital Library

- Infrastructure
  - Networks connecting schools, workplaces, hospitals, homes, etc. to one another through copper/fiber cables or wireless communication systems ("information superhighway")

- Content
  - Information (data, sound, animation, etc.)
  - Distributed: "everywhere and nowhere"
Mechanical Approach to Information Management

- Application of IT to information problems
- Use of machine-engineering methods to turn data into something of use on computers (Davenport)
- Holistic approach
- “information ecology model”: Ecological paradigm sees information in relation to its environment
Attributes of Information Ecology

- integration of diverse types of information
- recognition of evolutionary change
- emphasis on observation and description
- focus on people and information behavior
Ecological Model of IM

Source: Davenport (1997, p. 34).
Information Environment

- Information environment: Core of ecological management
- Contains six components of information ecology—strategy, politics, behavior/culture, staff, processes, and architecture.
- Consists of the whole set of cross-relationships among information people, strategies and policies, processes, technology, information culture and behavior
Information Strategy

- Making high-level “information intent” explicit
- “What do we want to do with information in this organization?”
- Information strategies:
  - help organizations adapt to change
  - make information more meaningful for the whole organization by better allocating the information resources
Information Politics

- power of information
- deals with the governance responsibilities for management, control and use of information
- “...the way we organize information determines the way we organize people and the vice versa.” (Alvin Toffler)
Information Governance

Monarchy  Federalism  Feudalism  Anarchy

More centralized control  Less centralized control

Davenport, 1997: 69
Information Behavior & Culture

- How individuals, groups or organizations approach information
- Attitudes and behaviors towards information
- Different ways of using information (browsing, searching, sharing, hiding, ignoring, and USING)
- Information behavior & culture are toughest to change
Information Staff

- Content
  - librarians, information specialists, and indexers
- information technology
  - system designers, database administrators, network specialists, and programmers
- other information works
  - management accountants, business, market, or financial analysts
Information Processes

- how information work gets done
- determining information requirements
  - identifying how managers & workers make sense of their information environments
- capturing information
  - scanning, categorizing, formatting & packaging information
- distributing information
  - “pull” and “push” technologies to draw attention to available information sources & services
- using information
  - assessing the information use
Information Architecture

- guide to the structure & location of information within organization
- a set of aids that match information needs with information resources
  - Descriptive
  - Prescriptive
- Will not change culture and behaviors of information users & information staff
Organizational Environment

- No information environment exists in and of itself
- Information environment has to take into account
  - organization’s overall business situation
  - existing technology investment
  - physical arrangement
Overall Business Situation

- Organization’s business strategy, business processes, organizational structure & culture, & human resources.
- Integral part of the overall organization & involved in the creation & development of information strategies and processes.
Existing Technology Investment

- determines how the information environment carries out its responsibilities
- general technology investment guidelines:
  - A high degree of network interconnectedness
  - PCs or workstations on each desktop
  - network access to internal information repositories
  - network management software
  - sophisticated software packages
  - use of the Internet
  - Web: a new means of organizing and accessing information
Physical Arrangement

- Concerns with location of individuals & groups in relation to others with whom they work
- Consists of physical structures – building layouts, offices, furniture—in which people work
- Includes physical appearance and dispersal of information
- Facilitates or hinders communication and sharing of information within the organization
External Environment

- information ecology affected by external factors
  - government regulations
  - political & cultural trends in a country & in the world
  - business markets (customers, suppliers, competitors, regulators & public policy)
  - technology markets (infrastructural, current-use, and innovative technologies)
  - information markets (buying and selling information)
  - the competitors’ success or failures. Such factors are beyond the control of an organization
Interaction with External Environment

- *adapt* to the outside world
- *scan* that world for changes
- *mold* the outside world
Toffler on Information Management

- “Success in information management depends 5% on technology and 95% on psychology”
- 80% of the problems arise from people.
- “No company . . . will ever achieve a true competitive advantage without adopting more human-oriented approaches to managing it. . . It’s time to look to ourselves for the information answers.”
Conclusions

- “May you live in interesting times!” (Chinese proverb)
- “The trouble with our times is that the future is not what it used to be.” (Paul Valery)
- Proliferation of electronic information products & services
- Availability of information processing, storage & communication technologies
- Libraries & information centers are no longer “the only game in town”
- Evolving economic paradigms based on use, rather than ownership, of electronic information sources
Conclusions (cont’d)

- Dynamic information management
- Adapting to changes in information, organizational & externals environments
- Coping with business, technology, & market pressures
- Cooperating with other entities within their organizations to develop more innovative information services involving the use of both internal & external sources.
- Providing the best quality personalized information services
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