Issues and Challenges in Management of Information Resources

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Abstract

Information is an important resource. In many ways information management is different from a traditional library administration. Mostly it involves management of change and management of electronic sources. Issues and challenges related to information management are discussed in this paper.
1 Introduction

Advances in information technology are transforming the mode of the work, communication and information media. At the same time, the global nature of the modern organization has dictated the development of convenient and economical methods of electronic data exchange. This series of events has in turn necessitated changes in the ways information sources are managed. The implications of these changes to libraries are significant. Librarians therefore need to consider alternatives to current structures and modes of management. Further, with the information exploding at exponential rate and user needs becoming narrow, complex and interdisciplinary, libraries have evolved to become information providers rather than mere document providers.

Information, a self-regenerative resource, is a key economic element. It is a socio-economic product. Planners, policy-makers, R & D personnel, academicians, etc. realize that it is an important resource for their day-to-day activities. It is an instrument of social change, a non-depleting resource, a commodity subject to economic analysis.

The amount of information in any discipline doubles once in every seven to ten years. In this sense we can conjecture that information grows at an “exponential rate”. Further, it is equally important to note that “information become obsolete (its use becomes less and less) within a span of 7 to 10 years from the date of its first publication. Also it is very difficult to collect, process, store and retrieve information in interdisciplinary areas. It is in these contexts, role of information technologies is considerable and their intensive use is a necessity

Information, an invaluable resource, is being disseminated, transformed and communicated in a variety of environments. Generally, information is being transformed / communicated directly among members of the invisible colleges, peers, and scientists in laboratories/fields, etc. Person to person dialogues, counseling, demonstrations, exhibitions, seminars and conferences are increasingly being used for information
exchange and technology transfer. The three different communication models are one to one (--- person to person), one to many (--- person to group), and many to many (one group to another). Further, each medium and method of communication have their advantages. Also, the social characteristics, such as cultural, language, political ideology, legal sanctions, level of development, etc have their impact on information flow.

The basic steps in the process involved in information handling are information generation, collection, storage, processing and dissemination, utilization and feedback. The development of a system to handle information is the most complex and it involves considerable investment. Social activities of such dimensions have to be planned and guided to give maximal benefit to all sections of the society. This is in general the objective of the Information Management IM).

2 Objectives
In this paper an attempt has been made to discuss a few issues and challenges in IM with emphasis to electronic resources.

3 Information as a resource
Horton in 1982 (5) defined information resource as content (— information in a file / document) and as supporting tools (— infrastructure, personnel and capital investment.) Further, Horton argued that treating information as resource means treating it as (5):

- Something of fundamental value, like money, capital goods, labour or raw materials;
- Some thing with specifiable and measurable characteristics, such as method of collection, utilities and users, a life cycle pattern with different attributes at each stage, and interchangeability with other resources;
- An input, which can be transferred into useful outputs that are beneficial to achieving the organisation’s goals;
- An expense for which standard costs can be developed as cost accounting techniques can be used to monitor and control;
• Something that presents to top management a variety of development choices, e.g. making trade-off decisions between information-intensive and manpower-intensive investment; between teleprocessing and manual processing activities; or between maintaining an information product or service in house, or buying from an external source.

4 What is IM?

There is no universal definition of IM though numerous discussions about the meaning, content and use of IM has taken place ever since the concept evolved in the 1980s. However, there are lot of opinions about IM and the following are felt to fall within the scope of this paper.

Keary (4) defines IM as a methodology for identifying all existing information resources within an organisation whether paper or electronic and it is more than management of IT. Taylor and Farrell (6) distinguish IM from other related concept like MIS, end-user computation, IT, system analysis and design, data management etc. They opine that IM is the exploitation of more efficient use of information for decision-making and planning in an organisation by managing information resources. In simple words, IM is not only about managing the processes of selection, collection, processing, controlling and dissemination of information but also enabling the effective use of information. In Benner’s words (8), “Information management shall help an organization to recognise and use the potentials of the information resources and information technology (IT)”.

According to Tom Wilson(7), IM has no standard definition, but the basis of the idea can be found in one of Peter Drucker’s works: “The systematic and purposeful acquisition of information and its systematic and purposeful application are emerging as the new foundations for work, productivity and effort throughout the world”. Wilson then goes on to comment that notion of the economics of the future world depends upon the purposeful acquisition of information and it is at the root of the IM. Also at root is the idea that the systematic and purposeful application of information will depend
increasingly upon the application of IT. Two ideas, therefore, come together in the concept of IM: information as an important economic resource and IT as a tool for its effective management.” Wilson’s contention is that IM curriculum should therefore be composed of:

- The idea of the emergent “Information Society” and the need for information policies, and IT policies in societies and organizations;
- The notion of systems and “systems thinking and the exploration of these ideas in the design and development of computer based information systems and services;
- Information technology: Hardware, Software, and Telecommunications. Including such matters as the evaluation of software packages, and some exposure to computer programming;
- The Economics of Information: Costs, value, pricing policies, information as a public good and information as a product, budgeting information systems and services;
- The Evaluation of Information Systems and Services from the perspective of efficiency and effectiveness;
- The identification of users’ needs for information or as it is generally expressed in the IT management literature, “User requirements studies”.

Concluding, he remarks that “The idea of IM as an integrating concept is that it will lead to the definition of a specialisation myriad the information professions which can be applied to any organisation, including libraries, archives, and the myriad organisations which have needs for the organisation and handling of information”. From he above definitions including Horton’s view (that IRM is the management of both information content and its supporting tools), one can infer that IM covers the whole spectrum of information handling activities, technology and its role in information handling as well as various management activities practiced in institutions.

Management of e-libraries is quite different from the management of traditional libraries as there are certain differences between conventional libraries and e-libraries. A few important difference are given below:
CONVENTIONAL LIBRARIES | E-LIBRARIES
--- | ---
Sources (documents are located at one place; occasionally at different places – branch libraries) | Sources are distributed
Almost all sources (in a library) are selected on the basis of quality | No quality control is feasible!
Sources can be well organised by way of classification | Difficult to organise
Surrogates (catalogues) are available | Hardly available
Difficult to search the text | Easy to search the text
Authorship is an important concept | Not that important
Sources are controlled; one can keep track of the absence from its normal location in any libraries | Objects are transient – can disappear at any time – is a feature of e-library.
Quite often users have limited access to libraries | Access to every document by anyone; from any where
Librarians/Reference Liberians can help users in locating the required documents | Mostly the software can help the users in retrieving the desired information; hardly intermediate can help users
Well defined users group | No defined user group
Sometime fees are paid to become a member of the library | There are free access in Internet

5 Management of ‘change’: A basic issues in IM

To manage a wide use of information technologies and services, information centres are currently experimenting with a number of different reporting / management structure. In the first place, demographic shifts in both the work force and the information user base of many organizations have necessitated a reconsidering of Information Management. The technologies themselves are changing rapidly obliging those in change to look for new
opportunities and to rethink old strategies. Lastly a new generation of skilled and knowledgeable Information Technology users is exerting pressure on information services to perform and deliver as never before.

The management of "Change" is therefore an important issue in IM, particularly in the context of media and technology, as applicable to information work and services. The changes can clearly be seen in three different areas:

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<tr>
<th>Information Generation</th>
<th>Information Preservation</th>
<th>Information Retrieval</th>
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<tbody>
<tr>
<td>a) Writing</td>
<td>Paper</td>
<td>Card-index</td>
</tr>
<tr>
<td>b) Typing</td>
<td>Microfilm/Microfiche</td>
<td>Punched cards</td>
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<td>c) Carbon Copies</td>
<td>Magnetic storage</td>
<td>DBMS</td>
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<td>d) Electro-mechanical duplications</td>
<td>Video discs</td>
<td>DBMS with advanced features</td>
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<td>e) Typesetting</td>
<td></td>
<td>Free text databases, web pages</td>
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<td>f) Word processing</td>
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<td>g) Word processing with advanced features</td>
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<tr>
<td>h) Characters &amp; Voice recognition</td>
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Information systems have changed in structure/design from simple offline systems to batch and then to online; now the information systems are designed for the Net environment. All these changes have taken place in a span of 50 to 60 years; particularly, in the last two decades, these changes are rapid and tremendous. We even notice that the communication systems have changed from a simple postal service to telephones to telex and then to fax; now the entire communication is centered around e-mail/document distribution and computer conferencing. All these “changes” can be grouped as:

- technological changes
- socio-political, educational, and demographic changes
- changes in the Government policies
- changes in user needs and requirements
- changes in structure and dimension of information industry
Even in the context of ‘library automation’ due to the fast emerging Internet, the scope of the library automation is now being extended to handling of electronic journals, online information search, handling of CD-ROM databases. This trend raises several issues in Information Management; they are related to selection of information sources in different media and collection development.

Information is today available in different formats and media. For example, a bibliographic database is available in paper form, microform, CD-ROMs, online systems and on the Internet. The important question is how far it is possible to predict uses of the different types of information sources that exist today. Will we prefer:

- Printed materials
- Online databases
- CD-ROM databases
- Web sources

It is believed that the usage of printed materials is likely to decrease in favour of electronic media. CD-ROMs are often preferred instead of printed media since the user interfaces are likely to allow end-users to search for themselves. On the other hand, online services require unlimited budget and often these services are provided for a fee. Many electronic journals are now available on the web; libraries therefore must have the infrastructure to access web databases. Under these circumstances, an information manager has to make decisions about the purchase of online or CD-ROM or Internet sources. It is a difficult task. One must come out with a plan to use all the three media appropriately. Such a plan must provide flexibility, ease of use and access in a cost-effective way. These changes are related to the media of the information research and have impact on information management.

Users change their requirements very frequently for various reasons. Their culture and demographic characteristics also changes. All these changes require a careful watch and an information manager has to tackle these related issues. Changes in the structure and
dimension of information industry have reflected on information sources and thus have impact on the information management.

Clearly, institutions of higher education are being influenced by these very trends. From the library administrators’ perspective, the return on the investment in IT comes in many forms

- better management of services and support
- integration of the information technologies with library services
- access to a vast variety of electronic source of information
- better overall resource planning and
- staff training

Finally, we must also give much importance to “utility of information”.

6 Electronic sources of information

The beginning of information sources may be traced to man's earliest attempts to record thoughts, concepts, ideas, and events. Sir Karl Popper in his book "Objective Knowledge", recognized a world of objective knowledge which is the totality of all human thought embodied in human artifacts, as in documents and also in music, the arts, the technologies. He called this a third world. According to Popper's ontological scheme (1).

- world 1 is the physical world -- earth
- world 2 is the world of subjective knowledge or "mental states"
- world 3 is the world of objective knowledge
  -- the products of the human mind as recorded in languages, the arts, the sciences, the technologies; …

Brookes, in his work on 'Foundations of Information Science', discusses Popper's work in detail, particularly in the context of Information Science; In his article (1), Brookes points out that Information Scientists are directly concerned with the world 3, as explained by Popper. They are in fact the key sources of information for generations to come.
Electronic publishing has become a major topic in the world literature in recent years, particularly because of the developments in information technologies. Electronic publications -- all those publications which are in electronic or digital media -- are usually known as electronic sources of information. In early 70s, most of the electronic sources were available on magnetic tapes and some were online. These were of course, mostly secondary sources (-- bibliographical databases). Since then many developments have taken place. Today, electronic sources are available on CD-ROMs or on the Net; in the present day context, sources that are available on the Net are often referred to as online sources. These sources consist of reference documents (-- dictionaries, encyclopedia, directories, handbook, atlas, etc), data, research publications, journals etc. These developments had a great impact on libraries, changing user expectations; they force librarians to re-think:

i) the collection they have to develop
ii) the services that they provide
iii) the electronic sources that they have to acquire/subscribe

These changes lead us to alter the way we work at present.

The electronic media offer unique advantage for information transfers; e.g. flexibility, rapid delivery, low cost, compact storage and interactivity. It may even displace print as a major media of dissemination in foreseeable future. In recent years, two other 'media' have emerged in this context -- multi-media and hypertext media. The multi-media refer to the integration of data, text, image and sound within a single digital information environment. It is effectively being utilized in applications in education and training, business, health sciences, publishing, entertainment, etc. The hypermedia, popularly known as hypertext, is generally used to refer to information containing higher proportion of graphics and images and is almost always including video sequence or any form of animated information. In hypermedia, information is organised in non-sequential manner -- generally consists of nodes/chunks of information, may alter the way in which we read, write and organise information. Hypertext is an access mechanism. Links are
used in hypertext to direct the readers to additional or related information (like the footnotes, glossaries, in printed media.)

The CD-ROMs, one type of electronic sources (media), are increasingly becoming popular; its growth is increasing at an exponential rate. Further many books, particularly in the field of computer science, contain one or two CD-ROMs. Its organization is troublesome. If we remove the CD-ROMs from books and if we organise them separately on racks, librarians may face a problem while charging a book -- problem of selecting the right CD-ROM of the book which is being charged. On the other hand, if we keep the CD-ROM in the book itself, chances of that it is missing or damaging are very high. It is an issue, the librarians have to tackle in the near future. Apart from this, there are number of documents on CDs; for instance, encyclopaedia, databases, journals, etc are now being published on CDs.

Some argue that the future of CD-ROM technology for information provision is however uncertain. It may continue to have a future as a medium for games, data and software. The number of CD-ROMs was increased from 2900 in 1992 to 13,000 in 1998. In addition to the CD-ROMs, there are number of other electronic sources; they are on the Net; they may be online databases, library catalogues, websites -- personal bio-data, profiles of the institutions, research publications etc., listservers, E-journals, reference documents and other electronic publications. Among them, E-journals are considered as most important, particularly for special libraries.

6.1 **E-JOURNALS**

A journal contains scholarly articles. It disseminates current information on research and development in a particular subject field. It is being published periodically (-- with continuity). Until recently, journals were available only in printed media; for sometime, they were also popular in the form of microfiche /microfilm. Now they are even available in electronic media. They are being processed and published (-- receiving, refereeing editorial work, etc) through electronic media. Such journals in electronic
media are often known as virtual sources, paperless journals, online journals, and most popularly known as e-journals. An e-journal, like any other serial is produced, published and distributed all over globe via electronic network. E-journals for all practical purposes may thus be defined as those journals which are available in electronic media; some may be available on CD-ROM; a few may be available only on online; some may be available both in electronic media and in print.

E-journals on CD-ROM are like having printed journals in the library, it of course requires hardware and software to search and read. It provides full text of individual or collected journals of various subjects. When a library subscribes an E-journal in CD-ROM some, they can preserve it for a long time like bound volumes, and we can use them whenever we want. On the other hand, online journals or the E-journals on the Net can be accessed at any time, from anywhere. Online journals can be searched using a number of online hosts like Dialog, etc. E-journals on the Net can be searched through the popular search engines; some times, we have to know the URL.

Vannevar Bush was perhaps the first one to describe an E-journal in 1967, as a part of Memex proposal. Unesco in the same year initiated a project "to test networking computers as a means of improving scientific communications". Its report was published in 1980 in electronic media. It is considered as one of the earliest E-publications. In 1976, New Jersey Institute of technology published first prototype E-journal named CHIMO. It was a weekly, read-only newsletter. Since 1990, many e-journals appeared in the market. The "Online Journal of Current Clinical Trial" was the first peer-reviewed scientific e-journal with graphics and completely searchable full text.

The numbers of electronic journals have increased steadily throughout the 1990s and this trend is predicted to continue. There were 97 e-journals in July’91; there are many new journals and newsletters available on the Internet. The NewJour is a mechanism for the announcement of new electronic journals, including those that are free and not-yet-published. There is a link to the subscription form for the NewJour discussion list, to which one can subscribe to receive the announcements and descriptions. On June 1998,
the list contained 5905 journal titles. On June 1999, the list contained 7898 titles. On March 2000, it contained 8474 (9)

By their very nature, electronic sources are volatile and they exist in a dynamic environment in which librarians are compelled to reassess assumptions and roles periodically. The broad realm of information technology mutates at an incredible pace with formats, programming languages, new companies, and new ideas emerging faster than the standards that shape to control and normalise the retrieval or display of the content for today's product -- in otherwords, "by the time we procure, study and implement information technology, it becomes obsolete" – This is a major issue for librarians!

9 Conclusion

A number of issues and challenges are associated with the usage of e-publications. Some of them are related to 1) accessibility, 2) awareness and coverage in secondary periodicals 3) access Vs ownership 4) journal organization 5) acceptability 6) accountability 7) presentation, archiving and accessing backtiles 8) readability 9) pricing 10) standardization and compatibility of h/w and s/w 11) bibliographical control 12) other sociological and psychological issues 13) shelf life 14) classification and catalogue

Many of the e-journals, publish articles without the refereeing process; thus authors may not get the recognition, particularly the selection/promotion committees in academic institutions. An objective of the e-journals is to provide quick access to articles, rather than ownership. Due to the inadequacy of the current legislation and the cost of duplication, copyright acts hardly protect the rights of the publishers as well as the rights of the authors. Further, the volatility of e-journals makes their preservation major concerns.

However, in the near future e-journals will become very popular particularly because of the possibilities of having linkages among users, documents, publications, web sites and
others electronic resources. More and more structured text is to appear in e-journals, particularly because of the developments in standards Generalized Markup Languages (SGML), Office Document Architecture (ODA) and Portable Document Format (PDF)

Information management is no doubt requires different skills altogether, particularly to handle electronic resources and to tackle “change.”

10 References


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