CURRENT TRENDS AND FUTURE PROSPECTS IN INFORMATION TECHNOLOGY

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1.0. NETWORK HABITS

Network access to information is becoming a work habit. While the origin of this habit forming computer lies in e-mail, which is largely non-interactive, the culture is now rapidly spreading into interactive computing, what is generally known as online. Indian libraries are still in the learning phase. Hence the theme chosen for the conference is not only highly appropriate but worth repeating.

Academic and research libraries are the main players of this conference. While networking is not a new concept to them, IT based networking as a tool for connectivity and information exchange is still a new experience. IT support is a critical need to make their dream of nationwide resource sharing a reality.

I come from the background of library profession but work for a commercial organisation which produces and markets information products. Access to information is the main focus of our business. IT is our critical infrastructural need, without which our business will come to a halt. I am a highly IT biased librarian. Hence, I feel honoured by the organisers of CALIBER '95 for choosing me as a theme speaker of the session and am highly thankful to them. My theme presentation will address IT as a tool which will impact two key service functions of a library system -- (1) access to, and (2) delivery of documentation.

> The currently available products and technologies that are creating and promoting network access to information.
> The emerging technology trends and their likely impact on network based information delivery system.
> How Indian libraries are responding and going to respond in coming years; and
> What should be our strategy for effective use of IT to promote

network access to information faster than we did so far.

2.0 CHALLENGES AND OPPORTUNITIES

The emergence and growth of library networks depends largely on the developments outside the library profession. These networks which are considered as the value added services of telecom, need and depend on :

* Reliable Data Networks for connectivity and delivery
* Computing Technology for Storage and Processing
* Electronic Publishing for Information Resources;

They become more visible because of these very technologies. Hence, the libraries and the library profession are more exposed in the network and IT world. This is both a challenge and opportunity. The challenge is to address many unfamiliar and even controversial issues such as fast changing technologies, a vast array of new products offering confusing choices, free access vs fee based resource sharing, related copyright issues and many administrative issues. The exposure equally gives an opportunity for libraries to integrate with IT environment and to become more dynamic, as against passive store houses of yesterday. In effect the IT is throwing an opportunity for libraries to change from introvert and reactive nature of yesterday to an extrovert and pro-active nature.

3.0 CURRENT TRENDS

The decades behind us created information explosion but with not enough information usage promotion. The current decade can be called information usage explosion which is the real visible benefit of IT. With too many information products, services and access channels competing and complementing, users have bewildering choices. Lack of knowledge, familiarity and cost-benefit analysis may lead to wrong decisions. Fortunately, there is enough material regularly published which can aid intelligent decision. I will try to discuss the current trends in the background of currently available products and services.

3.1 Access

* Access channels have multiplied with many networks. A database like MEDLINE is available today from over a dozen sources, through online, CD-ROM, site licensing, OCLC and INTERNET.
* Online is back to the center stage.

> OCLC's First Search has created waves by bringing down the costs and taking online to a large number of end-users in academic libraries through Campus LAN to OCLC. From 6,000 searches a day in October 1992, OCLC has reported an increase to 14,000 searches a day by March 1993 (Arnold). E..... Library at Texas A&M University finds First Search online more economical than CD-ROM. (Jackson & Buchanan)

> Silver Platter has introduced network access to a good majority of its CD-ROM databases through INTERNET. Its ERL (Electronic Research Library), a new service, allows users to licence software and databases on hard-disc or CD-ROM to provide campus wide network access facility.

> Monsanto, a Fortune-500 chemical company found it economical to shift from CD-ROM to online/Dialog. They were subscribing to eight databases on CD-ROM. (Williams)

* CD-ROM and multi-media market and usage continue to grow at astonishing rates and more so outside USA. Between 1992 and 1993, the growth was 58% in academic and research market (Fleming). Migration continues from print to CD-ROM and publishers have started making major investments. CD-ROM drive installation base is expected to double from 1.5 million in 1994 to 3 million in 1995 (Source : Sony Corporation)

* INTERNET is redefining network access to information. It has created a global user base of a few million users. INTERNET has made networking the libraries an almost over night task. There is hardly any college or university library in USA which does not have an INTERNET address. Many of these libraries have developed service provider capability. OPACs of many university libraries like Stanford are available for access through INTERNET. Every major online host like Dialog, DataStar, STN are accessible through INTERNET.

* Network access has moved beyond books and journals. Newswires, TC Scripts, Speeches, Electronic Discussion Groups are all becoming part of the network world. Referral Service has become very popular through various INTERNET user groups. If you have a question for which you need expert

help or answer, broadcast it on INTERNET. Some one is very likely to come to your help. A new INTERNET service of 1994 called World Wide Web (WWW) is facilitating access to text, still images, video and sound clips by way of integrated and often beautifully designed pages.

* Client Server environment is becoming order of the day giving more processing power to the user terminal. With this GUI will become a standard for online terminals. A wide choice of over 50 software products are available for capturing and post-processing the search results of either online or CD-ROM search. Products like Procite, Biblio-link, End Notes, Reference Manager, offer facilitation to capture external data to build local database. A recent review compares the features of 43 bibliography formating softwares (Stigleman).
* The legal issue of copy-right for wider distribution, even if it is free, is being addressed by many service providers. Recently, DIALOG introduced DIALOG ERA which allows legal copying and distribution of down-loaded data by paying a small fee. The information providers are compensated by royalty payment.

The current developments clearly suggest that access is becoming more media independent and network dependent.

3.2 Searching and Post Processing.

* Natural language Searching is enhancing precision in online search results.
  > West Publishing, a legal online host, was the first to introduce its natural language search interface called WIN (Westlaw is Natural).
  > Dialog followed suit by introducing TARGET its natural language search interface.
  > Many Search-engines like PLS (Personal Library Software) have incorporated natural language searching used in some of the CD-ROM titles too.
* Hyper-text is becoming a standard with most full text databases like Grollier Encyclopedia, Compton Multimedia (Britanica) etc. INTERNET's WWW offers this capability.
* Retrieval systems are becoming more powerful allowing crossfile searching, weighted ranking, duplicate removal, etc.

Bibliometric tools are becoming part of search software. These tools are enabling searchers to obtain the kind of answers from the same databases which one could not have imagined earlier.

* Intelligent user interfaces to databases are emerging and acting as a kind of information filtering agents, integrating both internal and external networks and information resources. However, an interface developed by Standpoint Corporation is an example of information filtering agents that search, retrieve and integrate data from several electronic information sources including online databases, CD-ROMs, news-wires etc for a seamless network access and distribution within the organisation. These products customise the access to any user defined environment. (Roesler & Hawkins)

3.3 CD-ROM Technology

* Data transfer rate, a factor that determines the speed of the drive, is getting closer to hard-discs with new quad speed drives.
* Access time, another factor that determines the performance of CD-ROM is improving, (currently 180 mil. sec) but is nowhere near hard-disc.
* Developments in compression technology has made CD-ROM an ideal medium for storing images of full-text journals and archiving. With multi-session recording allowed by desk-top CD Publishing machines. CD-ROM is effectively replacing Microform for archiving.
* CD-ROM Networking has become order of the day. CD-ROM publishers are offering network versions of databases designed to improve the access and retrieval performance. Silverplatter's MEDLINE EXPRESS and Dialog's New Compendex plus are examples.
* DOS and Windows continue to be the main software platform for CD-ROMs in print. But the software products and capabilities are emerging to make CDROM resources accessible across a wide range of software platforms such as UNIX. Silver Platter's ERL is a good example.

3.4 OPAC & Retrospective Conversion

* Many commercial and non-commercial systems offer the service. OCLC, with its high cost, though non-profit, continues to lead the cataloguing market, particularly for current cata-

loguing. Public Access Catalogs on CD-ROM -- WLN's Lasercat, Bibliofile, Thomson's Atlas, OCLC and LC Bibles on disc have emerged as faster and economical choices for on-site retrospective conversion in a LAN environment.

3.5 Database & Document Delivery

* Bibliographic databases for journals have reached a saturation point. A journal like Nature is covered in over 20 databases. A leading Indian journal like Current Science is covered in 12 databases. But the coverage of Asian literature is relatively small which is an opportunity for us.
* Innovations continue in changing the face of access to Bibliographic databases.
  > Uncover offers customised Current Contents type of service free through INTERNET's E-Mail. The user pays only for document delivery if requested.
  > Many CD-ROM publishers like Silver Platter and UMI have incorporated software facilities to link the CD-ROM database to local library holdings.
  > KR (DIALOG) and UNI offer facility for tracking the usage to aid collection building.
* Database currency is improving. Some have almost zero log time between publishing and inclusion. Database quality is receiving attention.
* The trend is clearly in the direction of full-text databases. Over 5,000 journals are available online through various hosts. They are largely ASCII files and rarely carry full document (pictures and graphs omitted)
* Document delivery is going completely electronic for network delivery. Many exciting things are happening :
  > Ordering is substantially online. BLDSC receives 52% of its 35 lakhs requests (annual) for document delivery through ARRTTel, its online ordering system.
  > Online hosts are integrating online searching of bibliographic databases and corresponding document delivery through a hybrid network of online databases, CD-ROM discs with full document images and fax/modern interfaces. Dialog's Source One, a new remote access document delivery system delivers copies of retrieved patents and

articles for a few databases in 20 minutes by Fax. In a system like this the host computer containing the bibliographic database, the file-server connected to a juke-box of several hundred CD-ROM discs which carry full document images and a file-server supporting fax transmission and another file-server supporting E-mail delivery are all inter-connected.

> The complete technology is available today off-the-shelf to implement network delivery of documents if the network like ERNET can support. XpressNet by Article Express International and Ariel developed by Research Library Group (RLG) are two good systems for handling Fax or E-mail requests and delivery of documents.

* Electronic journals on network is a new breed of online database which is going to change the future of journal publishing. OCLC and AAAS partnership started the trend with the first Online Journal of Current Clinical Trials (OJCCT). Authors submit the articles to publisher through network, refering is done through network and the article is released directly through the network (Keytani). The CORE project at Cornell University in partnership with OCLC, ACS plans to publish selected journals on Chemistry as electronic journals.

3.6 Costs

* Bibliographic access costs are declining sharply.
* Document delivery costs may start gradually going up, as the publishers start controlling electronic Publishing and distribution.
* Telecom costs are the lowest today and will further decline in real cost as the speed and reliability improve dramatically with ISDN. Fax and network (email) delivery costs will almost become .....
* Electronic journals will be more affordable to subscribe.
* CD-ROM drives and networking costs continue to decline and the performance continue to improve.

4.0 EMERGING SCENARIO

* Hybrid databases will emerge, operating in RDBMS environment and offering multimedia capabilities.
* Intelligent search Interfaces will navigate the user across a di-

verse spectrum of database resources and software-hardware platforms, making technology more transparent. These interfaces referred as knowbot (Knowledge version of Robots) by Roester & Hawkins, will customise the interfaces to users choice and need.

* Voice recognition technology may eliminate key-board, and an entirely a new design of computing equipment may emerge. One online company called Westlaw has recently introduced online searching through voice interaction between the searcher and the host computer. The interface is called LawTALK (Hawkins).
* With wide-band frequencies available for data transmission, TV and Telephone channels will merge. The cable TV channels which deliver entertainment today may be delivering documents too. The library may become a transmission node of TV system. Portable video phones may become your interactive terminal.
* Multimedia will replace the reference collection in the library.
* Optical disc technology (CD-ROM) will enhance its capability to a level which will allow 10 fold increase in the storage capacity of CD-ROM like disc.
* Bibliographic information will become cheaper. But high quality analysed and filtered information will be most expensive than the technology used for managing and delivering such information.
* Electronic journals will change the current channel models for information delivery. The library will become a distribution node of electronic publishing system.
* The current curriculum structure of librarianship will soon go obsolete. An entirely new breed of information professionals will emerge which will play the role of system developer, facilitator, trainer and a consultant. Delivering documents will be taken over by technology. Searching for documents and information will be done by end users.
* Paper will still survive.

5.0 INDIAN SCENARIO

* Leading edge IT is available but, its full scale application is not happening at a pace faster than changes in IT.

* University libraries are lagging behind in IT applications.
  > There are very few campus networks.
  > We are yet to develop a model comparable to OCLC or WLN.
* Telecom remains an expensive, not-so-reliable and inadequate infrastructure. We have two major data networks used by academic and research community -- NICNET and ERNET. Both have links to Internet. But they are not interconnected within the country because of DOT policy. One ERNET node like IISC is not able to have interactive link to another node of ERNET like IIT. Kharagpur because of the DOT policy or monopoly and restrictions on network-to-network connectivity. Library networking has remained a piece-meal, batch-mode operation.
* Libsys has provided a relatively stable support for library automation. A few are joining the race including NIC which has licenced TECHLIB and BASIS+ from Informations Dimension Inc., a subsidiary of OCLC, to market and support in India.
* Computer culture is fast spreading. Thanks to CDS/ISIS in 80s and CD ROMs in 90s. The younger breed of librarians are displaying high level of computer literacy and even expertise.

6.0 STRATEGIES FOR SUCCESS

* Libraries should shift their focus from acquisition to access.
* Publishers and information providers should be involved as partners in building resources sharing networks.
* Users should be gradually made aware of the cost of information access and delivery - by a pay-for use.
* Library & Information profession should have a say in shaping the emerging data networks and information superhighways.
* The university libraries should aim to develop plan and become part of the campus network.

7.0 CONCLUSION

IT will remain and grow as a powerful intermediary between the user and information. IT will act as an invisible librarian, navigating the user through the electronics shelves. But, IT itself is a small part of the whole process of change. The libraries need to (or compelled to) re-

define their roles, retrain their staff, re-shape the work place, and become pro-active. In short, the libraries (and the librarianship too) will have to undergo a process of re-engineering if they are serious about planting IT into the library system. IT will not wait for them.

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