

Experimenting and Innovating with New Technology in Changing Environment

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Abstract

Traces briefly the historical development of IT applications in libraries since 1980s along with the challenges of digital era. Emphasizes the need to restructure, improve and innovate library services in the context of changing library scenario. Suggests that libraries should be ever ready to change from one landscape to another as warranted and dictated by new technology. Concludes that libraries should give more importance to basics functions of libraries and evaluate them from time to time to find better methods and tools required for improved management of resources.

Keywords: Semantic Web, Library 2.0, Innovation, Web Technology, CD-ROM, Digital Era, Barcode, RFID

1. Introduction

Library profession after being stable for a quite long time, started changing since late 1950s (Rayward, 2002). However, in India, more changes started taking place since 1970s which further went on changing more frequently than before. Hence, this profession is also being called as a changing profession (Young, 1996). Librarianship quite often has been in transitional stage and there was always something new to adopt and apply. More changes started with the advent of computer culture which provided many solutions to the complex problems of libraries. Computers seemed to offer librarians prospects of more efficient processing, improved services to library users, saving money... facilitating resource sharing and library cooperation, all concerns central to their traditional operations (Reynolds, 1993). There have been new trends, new developments and approaches to handle and disseminate information. As soon as profession stabilizes in one environment, there was another call to update and shift

to another new environment which is created by the society itself in changing conditions. Information seeking behaviours of library users have also been changing with changing environment. Therefore, it has been always a challenging task to manage these frequent changes and adapt to new environment. It has been competitive and difficult to cope up with these changes. Up-to 1960s our professional was almost stable dealing with collection, organization and dissemination of printed resources only. Profession had long experience of handling these traditional resources, therefore had developed expertise in managing them. Libraries were limited to serve their own communities and constituencies with limited resources available with them. Research activities were mainly around classification, cataloguing, indexing, thesaurus building, information storage and retrieval, etc. Library education was quite compatible with the practice whereas, today we find wide gap between the two. Library education today is not able to produce right manpower required in the present digital age.

There is no doubt that the impact of computers is all pervasive in the society and everyday life of almost everybody started being affected and influenced. It



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may not be wrong in saying that every new ICT has influence on librarianship, having every possibility of its application in information organization and management. Though every new technology has been knocking at our doors with certain challenges, yet these challenges have been also adding prestige to the profession, giving more opportunities to bring visibility to our functions and services. The old image of libraries and librarians is changed today in the presence of virtual libraries.

With the advent of computer applications in India during 1970s and 1980, there was a shift from manual system to automated or semi-automated system to store and disseminate information. Some automated indexing systems were evolved to manage library resources. Bibliographical databases at national and international level started coming up in diskettes, magnetic tapes and CDs.

2. Changing Scenario

IT applications changed the old traditional scenario of librarianship. Availability and accessibility of information became much easier. The old definition of library itself changed. The jurisdiction of libraries started going beyond institutions and space. The bibliographical control of world literature which was once an impossible task was made possible by application of technology. Earlier libraries used to be proud of their rich collection. It is now service dominated based upon virtual collection available anywhere. Libraries today are not expected to manage their own collection only but have to make use of external resources irrespective of their location. We are now in the age of universal/world librarianship. BBC once reported that the phrase of 'bookless libraries' arrives with a dull, oxymoronic thud, enough to get the blood of bibliophile boiling (Hicks, 2013). When we used to read the book by F.W.

Lancaster on paperless society published during 1970s, we could hardly imagine that his prediction would prove true so soon and profession shall have to manage 'bookless' libraries in future, with their own complexities, quite different to management of print resources.

3. My Experiments with New Technology

The purpose of this brief narrative is to revisit Indian librarianships during its take off stage to automation during 1980s.

3.1. Advent of CD-ROM Technology

The first noticeable change in Indian librarianship was perhaps during late 1970s and 1980s when new media of communication like, diskettes, tapes and CDs having large storing capacity started appearing on the library scene. Among all of them, CD-ROM technology in particular made a significant impact on libraries. All important international bibliographical databases started changing from print media to electronic media and became quite popular among users. Browsing of all these databases became much easier and simple with multiple retrieval and access points. Correspondingly, 'Current Contents' service of ISI also started coming in diskettes format with many added features which were not possible in print version. It also provided facility of extending profile based current awareness services. The use of computers started in libraries mostly for house-keeping jobs. That time storage capacity of hard disc of PCs was as low as 40-80 Mb. Library software were yet to enter in Indian libraries except a very few. This was the first challenge before the profession to deal with the new media of information which had its own problems in their procurement/subscription, maintenance and use. It was CD-ROM technology which changed the scenario. That time

we could not think that this technology is going to be replaced so soon. The use of CD-ROM databases was also responsible to certain extent to promote computer culture in libraries. Users became independent in using these resources. Their only dependence on library staff was for the procurement of original articles cited in the databases. Users that time had the patience to wait for inter-library loan which used to take 3-4 weeks, even sometime more. It was challenging to cope with this change as staff was not having required skill, aptitude and knowledge.

During my professional career, I experimented with the introduction of following services during 1989-90.

- i) Subscription to CD-ROM databases and 'Current Contents' on Diskettes
- ii) Conversion of card catalogue to online catalogue
- iii) Creation of some in-house databases using CDS/ISIS

During 1994-1998, I was mainly engaged in developing computerized agricultural related databases for SAARC countries and establishing university network with internet connectivity, etc.

From 2000 onward, I was again engaged in teaching and research, developing institutional repositories and taking up assignments as University Librarian, advisor and consultant to some University libraries.

Knowledge management is one of the recent topics being discussed in the present era, where sharing of knowledge and experiences among professionals should be emphasized. In view of this, I thought of sharing my experiences of passing through various phases of the profession. This may give insight to the past and the present scenarios of our changing profession.

3.2 What did I Learn from Experience and Experiments?

Librarianship had to undergo many changes from time to time in the past and same trend is likely to continue in the future also. My experience to introduce new technology, managing changes which we may loosely call innovation also is summarized as under:

- ▶▶ There is not complete acceptance to adopt new technology, unless it is well established. In the initial stage, people were not found interested to have even free Internet connectivity which has now become fabric of everyday life of common people.
- ▶▶ There is quite often resistance to bring any change in the present system which needs dynamic leadership and willingness of the staff to cooperate.
- ▶▶ Adoption of new technology requires special skill and expertise, which institutions may not have.
- ▶▶ Organization support is essential for successful implementation of any plan.
- ▶▶ Strategic planning and its prior approval from the authorities can prove helpful.
- ▶▶ Innovating, restructuring need thinking and creativity. Library is work extensive profession and its leadership and staff are too busy in their routine work to find time to be creative and innovative.
- ▶▶ Profession is at the doorstep of more and more complexities and challenges which needs expertise and specialization.
- ▶▶ Users on one hand have high expectations from the library on the other hand they are passive and non-interactive. They need special

programme of orientation to involve them in library activities.

- ▶ Maintenance of e-library and e-resources is a serious problem and there is always a risk of disappearance of their data. I had developed two digital repositories, one of them is having over 11,000 records. The servers of both these repositories are down for the last more than 6 months.
- ▶ Copyright issues are main obstruction in developing digital repositories. Academicians are hesitant to deposit their publications in digital repositories.

3.3 Compilation of On-Line Catalogue

The most important searching and retrieval tool for libraries has been library catalogue which also went through many changes in its forms and types. The first priority of all libraries was to convert their card catalogue to computerized catalogue. Most of the libraries started their automation with the compilation of on-line catalogue. It was a gigantic task for big libraries with large collection to convert their catalogue to online catalogue. This huge work was not possible with the existing staff members. Many libraries had to out-source this work in the absence of adequate staff in the library to take up this job. This target was achieved in quantity but not in quality. The quality had to be compromised to complete the job. If our online catalogue is not accurate, it defeats the very purpose of automation. To my experience, our on-line catalogue lacks proper description and content analysis particularly where this work was out-sourced to non-professional bodies. There is hardly any chance in future to correct these records.

During 1980s, we did not have good number of library management software. However, this gap was soon filled up and libraries in India started using library software for management of their all operations during early 1990s.

4. Innovative Library Services

Rightly said that libraries are innovative places (Peacemaker, 2014) where there are opportunities and compulsions to innovate and restructure our systems and services. Libraries are expected to bring something new from time to time to their users in the form of product or services. Successful innovation should be able to give not only something new to implement but that should also be useful. The first requirement for successful innovation is to look at a change as potential opportunity instead of threat (Drucker, 1990). Innovation is about new product, tools, services or processes, bringing forth which had not been there before (Osugwe, Ezeani and Anyaoku, 2013). This may not be strictly innovation. But bringing any change or attempt to do and implement something new and deviating from the established practices is often problematic, but such changes with newness are welcomed believing that change is always good. Most of us like to continue with the existing practices unless compelled to change. It is only your staff members who should be willing to change and innovate. Innovative strategies are to be implemented by the organization and its staff. It requires favourable and supporting organization culture, which many organizations may not have. Innovative libraries become leading competitive changing service providers which are more technically oriented and rarely use the skill of external providers (Von Hippel, 2010). The main problem being faced by most of the libraries today is dependence on external agencies for assistance, which are

hardly available. The need of the day is to have qualified and competent library staff with all of them having computer knowledge to manage library network and solve day-to-day hardware and software problems. Our present library curriculum is not able to produce required manpower. Unless internal manpower is fully trained in IT applications, we cannot think of innovations. Even newly introduced services may miserably fail in the absence of competent staff. In the present digital era, technological leadership and technologically savvy staff are the minimum requirement not only to implement innovations but also for sustainability and survival of the profession. Professionals have to be creative to devise new methods and tools.

Peter Drucker (1954) has identified following innovation goals for business which are equally relevant to librarianship also:

- i) New products or services that are needed...
- ii) New products or services that would be needed because of technological changes that may make present products obsolete
- iii) Product improvement needed ...
- iv) New process and improvement...
- v) Innovation and improvements in all major areas of activities.

Librarianship has been more dynamic since 1970s and 1980s particularly due to the impact of technology which has provided us all requisites to restructure, improve and innovate our activities. Profession has been often standing to the occasion by way of launching new information products and services from time to time. Library being a service organization always aims at to give maximum to its clientele in the form of services and products. Therefore, li-

braries have been creating new products, services, using new tools and techniques from time to time.

4.1 Significant Innovations

Internet changed the whole scenario of librarianship. Our resources changed, users acquired different behavior to use information, dominated by convenience and comforts. Their dependence increased on Internet resources, losing interest in visiting libraries. They started compromising with the quality over convenience and ease of accessing information 'anywhere any time'. It was a signal to libraries that they have to compete with the available services on the net and shift completely to network environment for sustainability. What could be more challenging than this to make this shift! At the same time, Web was also in the process of improving its services for added connectivity, collaboration and interactivities in creation and sharing information.

4.1.1 Web 2 and Lib 2

With the progress of Internet services available on Web, libraries also thought of introducing these services. Web-1, Web-2 and Web-3, some of them having social nature were defined and the services like wikis, cloud computing, Mash-Up and social networks like facebook, twitter, blogs, tagging, Podcast, RSS, etc. started appearing on web. This opened a new platform for the web users to communicate, interact and collaborate. Social contacts to discuss matters of common interests started multiplying on the web and became most popular communication channel among people around the world.

Libraries also wanted to catch up with the wave and were enthusiastic to introduce web-enabled services termed as Lib-2 and Lib-3. For more than a decade, profession has been discussing Lib-2 and its services in many conferences and seminars including in

present one. How many libraries could adopt its services is known to all of us. Moreover, effectiveness of social networking for academic purpose to me seems to be questionable. To me membership of professional groups to discuss and interact on common issues could be more productive. The question is how much time we professionals can afford for social networking and provide services defined under Lib 2. Moreover, all such services need to be brought under the umbrella of our other services for improved access. To be interactive with our users' group is always good which can also be done through other channels. The users have always been in our focus, and library staff has to be in contact with them to help them and know their needs. The main objective of the every library is to create and provide need-based services first, then to catch up other areas where they also could be interested. The scope of our services has been changing from time to time with the changing needs of our users and advances in technology. No doubt that technology has multiplied our services, hence, we are compelled to prioritize our services according to affordability and usefulness. We should not be fascinated to borrow everything which is available on web and apply in libraries. Nevertheless, there is a need to evaluate the usefulness of the services applicable to our patrons and offer them whatever is required and useful to them.

There is no denying of the fact that all our services need to be web-enabled and our whole library should be reachable and accessible on modern devices without the restriction of time and space. But it should always be ensured that libraries must first perform their basic functions, then to embark upon other subsidiary services which are endless and non-achievable.

4.1.2 Semantic Web

Another hot topic of discussion is semantic web and its services. Due to proliferation of resources available on the net, it started becoming difficult to retrieve relevant records. On a single click under a single command will retrieve many thousands of records and it becomes difficult to sort relevant records out of the retrieved records. The need to combine and link different related resources available under different formats available in different location was felt so that related material are retrieved on web with highest recall and precision value. With this background web of data was conceived known as semantic web. This concept was not new to the profession, we were aware about syntactic and semantic relationships and have been attempting to coordinate resources manually or through automated coordinating indexing systems. The oldest and orthodox method in use was through see and see also references to link related resources. Therefore, concept of linking similar resources through cataloging, classification, indexing, subject headings, etc. is established practices of librarianship. Citation indexing was also performing similar function by combining citing and cited references together. The only difference in old techniques and semantic web is that latter uses intelligent technology for the purpose of integrating related subject areas. Libraries in earlier times used to assign subject headings from list of subject headings then had to shift to use thesaurus for the purpose so that similar subjects are coordinated and brought together according to their relationship. In FRBR model developed by IFLA also prescribes relationship that operate between entities. This conceptual schema is based upon entity-relationship so that users can have their resources at one place with a single click (Chandel, 2013). Se-

semantic web enables us to navigate among semantically equivalent data which has its genesis in the core of librarianship. It is only old technique of hyper linking with new terminology of semantic web. This has undoubtedly widened the scope of web services and simplified the process of managing resources using artificial intelligence. Theoretically and conceptually profession is fully familiar with these developments, but its application needs further work for successful implementation. However, some of the library software has introduced some of the features of Lib 2 as well as of semantic web. We may use any tools and techniques appropriate for our purpose after ascertaining their suitability and usefulness. But complete dependence on artificial intelligence for processing of information may not yield good result. Combination of human intelligence and artificial intelligence would be perhaps ideal which does not seem possible to manage uncontrollable resources. There would be more and more dependence on machine readable data retrieval in near future. Library may borrow and implement any new technology subject to affordability and appropriateness for our purpose but not at the cost of our valued basic services.

4.1.3 Bar Code and RFID Technology

Bar code and RFID technology proved highly useful to the libraries which were not primarily devised for libraries. Similarly most of such technologies which have been developed for other purposes have their applications in libraries also. In view of the applicability of bar code in libraries for identification and use particularly for circulation and security, libraries started adopting this technology to save the time of the users and the staff as well. This also had the potentiality of accessing and retrieving of informa-

tion in most easiest way. It not only required new equipment but also had to handle all such documents once again which were recently catalogued. It was again a new challenge to apply this technology, which required additional funds, and more manpower with improved skill. Some of the libraries with large collection had to outsource this work. Having done this, improved RFID technology came into being which gradually matured from 1980-1990 (Yu, 2008). No doubt that RFID has additional advantages required in circulation and taking inventory, however it is also not without limitations. Now the dilemma with the libraries having already done bar coding is whether to replace bar codes with RFID which has additional features over bar code or to compromise and continue with already adopted applications of bar coding. Those libraries which are yet to go for bar coding and RFID, they also have to take decision for the preference of either of the two with full justifications in view of higher cost of RFID as compared to bar code.

5. Back to Basics

I feel that following services deserve priority over other Hi Tech services:

- i) Develop comprehensive informative and interactive library website
- ii) To provide one click approach to its all resources
- iii) Update your website regularly and upload new products and services
- iv) Bring visibility to your services by applying appropriate technology
- v) Adopt business model to promote your services by identifying key activities, key resources, key partners (who could collaborate in cooperative

venture) developing customer relationship, etc. (Business Model Foundry, 2014).

- vi) Make your library a social hub, an inviting place with good ambiance where users may find something new on their every visit
- vii) Make your resources transferable to individual user wherever they are on their convenient devices
- viii) Let me again share my personal experience regarding content page service which I introduced recently in my library. This is oldest traditional service which almost every library used to provide in the past when there was no technology available, however this service was least used. This service proved not worth the efforts which were being put to generate this service. We shall also admit that most of our users are passive to receive most of our services which we develop after putting a lot of efforts. At times, we may be discouraged and disappointed when our information products are hardly used or are under-used. Experiencing the under-use of printed journals being subscribed by the library, I thought of digitizing the contents pages of these journals volume-wise and arrange them according to the departments so that department from their own desktop could browse the content pages of the each issue of the journal whenever needed. This was hosted on DSpace for wider accessibility with the understanding that these journals if not used as current journals may have their utility in future. Even the digitization of full text of the articles of some of the core journals could be thought of for internal use subject to the availability of staff to take up such job. I find such services more productive than to jump to

Lib-2/3/4. There can be many more such services which can be generated and disseminated with more effectiveness. Let the users decide what they need more and libraries should work-out the priority accordingly.

6. Challenges of 21st Century

Finally, we have reached 'information super highway' called digital era which is also full of challenges and opportunities with wide scope of innovations, development and improvements. Birkerts (1994) had rightly stated that the way people experience the world has altered more in last fifty years than in many centuries preceding. This change is more frequent and pervasive in the present century. 21st century has been recognized as a milieu of changes and challenges in information dissemination (Amos, Ristow and Ristow, 2004). There is not only high turnover of knowledge, but also out of control of humans (Shepherd, 2003). Who will have control over this exponential growth and how? Search engines alone or it would be collaborative librarianship. Future is quite fluid full of uncertainty. Considering the future of libraries during 21st century Young, (1996) had raised certain relevant questions. Only two of them are being reproduced here as a caution:

- i) Do we need libraries and librarians in a digital interactive cyber-culture of future where broad bandwidth and exponential increasing technological changes are re-shaping information age landscape?
- ii) Do recent technological trends threaten Libraries?

Such questions may not be threatening but warn us to be competitive to prove that librarianship can deliver what others cannot. However, profession

shall have to stand to the occasion and prove better than others. Kansas State University opened bookless engineering library to its students, providing electronic access to their prescribed reading material. They were also provided with the devices to use these resources independent of visiting physical libraries (Massis, 2013). The University of Texas also introduced its electronic Applied Engineering & Technology Library providing access to large number of e-books and e-journals to their students (Fish, 2010). Similar programmes have been experimented by many universities and educational institutions providing e-library on their curriculum to the enrolled students (Massis, 2013).

7. Conclusion

The present complex scenario has provided us opportunity to innovate, improve and think. Librarianship today has many competitors, challenging us to do better and better. Who can be the better organizers of information than the librarians who have professional competence in information management? But libraries are not able to use the available tools and techniques effectively due to lack of expertise. Library staff needs extensive education and training to handle the present electronic environment created by digital era. Libraries are today expected to serve as gateway to world literature irrespective of location. At the same time, our basic functions of collection building, organization, maintenance and dissemination of our own resources is equally important. Libraries should always be inviting social hub with excellent environment with all possible facilities and comforts, serving their users with the information products which are not available elsewhere. Expectations from libraries may be sky high which is not possible to meet, which needs to be prioritized according to the

requirements of the community. The philosophy of librarianship did not change, it is only tools and techniques which have changed and shall continue to change. This change has to be managed successfully. The vision of modern libraries should be global, but shall to act locally. Libraries' primary function is to serve their our own community first.

Innovation is not limited to adoption of new technology only, libraries should evaluate their existing services and improve upon them or replace if required with new products and services. All the aspects of librarianship like resource building, organization, maintenance, etc. need fresh look. There is a need to improve upon all these areas and activities. Every library is engaged in collection building of printed and e-resources, their processing, organization, maintenance and dissemination. The pertinent question is whether there is a scope of improving and innovating these operations. This must be explored for better result. There are many present and future professional challenges which should be met successful.

Let me conclude with the quote from 'A Tale of Two Cities' by Charles Dickens – That was [is] best of time, it was [is] worst of time with opportunities and challenges. Let us welcome 'best of time'.

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