WHAT HAPPENED TO THE TECHNOLOGICAL INNOVATION IN LIBRARIES?

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ABSTRACT

Substantial investment has been made in major bibliographic utilities and in large and small bibliographic record handling facilities in various types of libraries. The principal and almost exclusive product of this industry to-date has been the creation and handling of bibliographic records. These machine controlled bibliographic records so far are not being used directly for user service. Only their derivation products on card, paper, or microform are used as the service tool, with most of their traditional limitations. The bibliographic network operations continue the support of the traditional catalogue, without taking full advantage of the technology to enhance the potential of information service directly to the user at an economically acceptable cost.

OU SONT LES INNOVATIONS TECHNOLOGIQUES DANS LES BIBLIOTHEQUES?

RESUME

Un montant considérable d'investissement a été versé afin d'améliorer les plus importants services des bibliothèques ainsi que dans le système de classement des ressources documentaires des bibliothèques de différent calibre. Le produit principal de cette industrie a été la création de différentes méthodes de garder les archives bibliographiques. Les lecteurs ne peuvent pas apprécier totalement les améliorations de méthodologie dans le maniement des archives bibliographiques. Nos lecteurs ne peuvent que profiter d'une certaine dérivation de ces améliorations, par exemple, l'information abrégé sur de petites cartes ainsi que le microfilm. Les opérations des réseaux bibliographiques sont un support pour les catalogues traditionnels sans prendre avantage de la technologie qui pourrait augmenter le potentiel des services d'information directement pour le lecteur et ce plus économiquement.

North American libraries are well on their road of building networks to communicate bibliographic records and in doing so to share the use and cost of library resources more widely. Substantial investment has been made in large and small bibliographic record handling facilities both in the private and public sectors, particularly in the major bibliographic utilities.

Around this investment and its operation has emerged a strong biblio-technical and biblio-political enterprize. The principal and almost exclusive product of this industry so far has been the creation and handling of bibliographic records as distinct from the service of providing information about specifically relevant library resources directly to the user public. Whether or not the massiveness of the accumulated bibliographic record base is required for the essential needs of direct user service remains to be seen. In terms of direct user service the computer based technological innovation is still to establish its role and its cost effective impact.

In the current traditional situation the catalogue is both the source of bibliographic data and the service tool. Although in the automated record environment the machine controlled biliographic record has the full potential of being the source for direct and much expanded user access, none the less so far it is being used only as a production base for computer printed catalogue cards, paper printout, or microform. The automated record is still practically unavailable to the user public as a flexible, direct and in-depth source for his own access to the wanted information. The development of the bibliographic record distribution networks appears to have mechanized the manual catalogue system, without taking full advantage of the technology to enhance the potential of true information service directly to the user within his relevance context and at an affordable cost.

THE LIBRARY CATALOGUE

Experimentation with computer assisted bibliographic record handling in the early sixties led soon to the realization that the truly meaningful role for the computer was to extend access to a broader spectrum of information resources than served by the traditional library catalogue. The objective for the technological innovation was seen not as an enhancement of the traditional bibliographic technique, but as an opportunity to create a directly user oriented service. The now almost forgotten King report provided the first imaginative integral scheme for this future vision. "Benefits of automation ... In the long run, however, the most significant effect of information will be the focussing of the services of the library on the individaul user for optimal satisfaction of his research needs". (King 1964)

The expectations of library automation in the mid-sixties were oriented towards information retrieval. Access to the information or

references to discrete information units was the then dominant theme. It was recognized to be a difficult task, involving a wide spectrum of problems to be solved, ranging from semantics, to cognitive logic, to technology of information storage and processing. Within these considerations it was also recognized that machine assisted management of bibliographic records is a more easily reachable and logically introductory goal. The direction of technological innovation in libraries swang towards computerized management of the bibliographic record - convincingly and apparently lastingly.

This change in the direction had major implications for the future. The original objective to harness technology for the benefit of the information user was soon displaced by the substitute and less complex objective to apply technological innovation to the manipulation of bibliographic records. The period of nineteen seventies is a success story of truly innovative and immaginative exploitation of the computer for bibliographic record handling, management and replication in print and COM form. However, notwithstanding this achievement, the resulting service essentially remains the use of the customary catalogue record in its traditional setting and within constraints of the entry system which had been evolved for the catalogue card technology.

The user seeking information remains as far removed as ever from his hoped facility of access to information. The automated control of bibliographic records has not yet accorded to the user any of the originally strived for benefits of having the computer to support his active and reactive exploration of his potential information environment - his world of subject terms and of the classified universe of knowledge, the integral parts of books. Nor has the emergence of bibliographic record service utilities brought the user closer to his information sources, only involved him in an ever larger universe of bibliographic records. And the process continues.

What happened to the technological innovation that in the early sixties promised a much more effective access to information?

THE ADOPTION CYCLE OF NEW TECHNOLOGY.

The communication of innovations is a lengthy and complex process. The adoption of innovations not only takes time, but also affects variously oriented people in different ways and within varying time limits. Rogers and Shoemaker (Rogers and Shoemaker 1971) in their study of the communication of innovation conclude that only 2.5% of the population are 'innovators', 13.5% are 'early adopters' of innovations, and additional 34% constitute the 'early majority'; the other half of the population comprises the 'late majority' of adopters (34%) and those who lag far behind.

In the library field the innovators were those who in mid-sixties dared to break new ground by embracing a most progressive technology for its application to a conservative and literary oriented area of management. In the late sixties and early seventies the 'early adopters' had created a number of functional bibliographic record systems. This was followed by the sudden wave of 'early majority' of adopters who were eager 'to be with it', 'to join the network'; it all of a sudden was fashionable, it was

accepted, and it became unavoidable.

It became unavoidable, necessary and natural to accept the machine handled bibliographic record as the fundamental building block for the edifice for which the plan and drawings had been conceived and created almost a hundred years earlier for services that were defined for and rooted in the capabilities of the old-fashioned and solid building block - the 3 x 5 card. During the past twenty years the library has neither examined the base elements of this century old edifice, the old service strategies, and the guide posts of the service road, nor has it truly reappraised its available and potential tools for the newly emerging service. The 'network' of machine readable bibliographic records has not changed much in terms of methodology for the benefit of the user, although it has done much for the library and its traditional bibliographic record management.

Thus, it appears that the evolution of the new technology in the library has become side-tracked during its cycle of early adoption. It started out with the objective to assist the library user to gain detailed and accurate access more quickly to his desired information. In the process of pursuing this objective the bibliographic record became the focal point of concentration for the attainment of that objective. In this process, as it happened, the bibliographic record presented many specialized and challenging problems which in turn created a more concentrated technological development for and around the bibliographic record. The bibliographic record utility and the bibliographic record network emerged, concentrating on bibliographic records. Accumulations of bibliographic records per se do not constitute information service, although they may help resource sharing. Nor is there a significant service enhancement in the mechanized handling of bibliographic records as such compared with manual handling. In all this development the information service objective has been left aside. There are now lots and lots of building blocks surrounding us, but there is yet no visible plan around for a new edifice.

If Rogers and Shoemaker are correct then we can anticipate that, as we are still in the period of the early majority of adoption of the new technology, only about 30% of the libraries in North America are yet fully committed to the new technology as it presently evolves. If the events should be assumed to run the predicted course, the bibliographic record utility service organizations have still a considerable market for their present bibliographic record product. Moreover, since the late adopters will also be encouraged to acquire the utility services in the rising demand, the re-orientation of the new technology towards the support of services aimed more directly to the information user could be very long in coming. Unless something is done about it.

THE FUTURE PERSPECTIVE

The present orientation of the new technology towards the bibliographic record and the progressively widespread commitment to bibliographic record systems and record utilities, is beginning to show some signs of strain. The requirement for standards predicated as the basis of biblio-

graphic record oriented utility services does provide for a uniform product and widely distributed application potential. But with this gain comes also an unavoidable problem - the individuality of the local catalogue has to be sacrificed for the upholding of the standard without which the utility services cannot evolve into an efficient service network.

In practice the bibliographic records which function in a specific library are considerably indivdualized and aligned to correspond to that library's holdings. As the editions, variations, translations and completeness of a specific library item differ from one instance to another, so should differ the reflection of this individuality in the bibliographic records for the item from library to library. As the user needs of each library have been identified and the bibliographic records compiled to meet these individual needs, so should differ the reflection of the individuality in the items and content of the bibliographic records from library to library. All this indicates a conflict between the locally required version of the record and the standardized record in the utility data base.

As the experience of holding bibliographic records in common for multiple institutions accumulates, the essential need for individuality of bibliographic management emerges more clearly, and the flexibility to operate local in-house systems emerges more and more as a practical necessity. Experience indicates that not all bibliographic information, considered important for the universal library environment, is necessary in a local system, and vice versa. It is becoming increasingly evident that in bibliographic utility environment the uniformity in the interpretation of bibliographic information is bound to receive priority at the expense of flexible and economical exploitation of machine oriented bibliographic data features for the individual participating library.

These individualized elements are powerful and essential features in the local operational systems practice and for machine based retrieval. To date little has been done to assess and to harness them for serving the real needs of the individual users. It is therefore not surprising that a new trend is beginning to emerge in library automation. This is the accelerating return to local computer based and specific task oriented systems, although this time to the much more economical mini-computer. The emergence of the on-line catalogue (if it still should be called a catalogue) is another aspect of this trend. Yet another is the acceptance of the self-standing communications processor as an independent systems entity connecting the library's own individualized systems service to a chosen utility for drawing specifically required data or functional services.

This development in turn points out the widespread confusion behind the term network. Is network a bibliographic network utility serving large number of clients? Is network a linked operation of utilities? Or, is network a mutually linked operation of individual libraries, in which the first priority is given to the requirements of the users of this library and then, subject to these requirements, the linking takes advantage also of the specialized, unique and valuable services of the utility as and when required?

This network problem has a very close and vital connection with the cost and affordability of technologically innovative user service.

Our present knowledge of the actual cost of using utility services is limited to the creation of bibliographic records. This cost at current prices is in excess of a dollar per record, exclusive of terminal equipment and record storage costs. We also know that search oriented processes - memory utilization, index maintenance and activation, storage access, and the execution of logical functions - consume most of this cost. This poses a very interesting and important question - can voluminous large scale centralized data base search activity ever be an economically feasible strategy? Or is the avalanche-like spreading of the free-standing local file based, but heavily communications oriented mini-computer systems, and micro-computer function systems, an indication that there is a more elegant and less costly way to meet some of the more pressing information needs of the library user? If there has been any strategic planning by librarians then it has been overtaken by technological development.

THE TECHNOLOGICAL DEVELOPMENT

Among the constant stream of new advances in technological innovation there are three that are of particular importance to the adoption of new technology in the library environment.

Distributed data bases. Current experience indicates that maintaining full integrity of the formalisms and definitions of the complete MARC record in a very large scale universal data base is a task that eludes complete control, fully flexible serviceability to the participants, and operational economy of the data base for specific end uses. The difficulty exists both in the single common denominator of data definitions, as well as in the disparate functional approaches by the user institutions that have to be satisfied by the universal systems mechanism which services the universal data base. The alternative strategy of distributed data bases can, through the use of dynamic linking mechanisms, substitute for the single, universal mandatory standard. This leaves greater flexibility in the accommodation of local requirements from the local data base, while at the same time maintaining a minimum common standard of essentials without requiring complete uniformity. The added cost of storage, because of data redundancy, is not as significant a factor as it was a few years ago.

Distributed multi-processors. Distributed data bases permit local processing that meets local requirements and at the same time sustain a required set of common service functions. This frees the local processing system from having to be fully functionally compatible with the larger system environment at the applications level. Compatibility is required only at the common level of data definition and in the important operating and communications systems functions.

Local processing that can be functionally related to other processing environments has become feasible and economical with the mini-computer, through its progressively more standardized interfaces and emulation techniques, its processing power, and its storage capacity.

Network Communication. Present communications technology and recent introduction of new data communication services have already made interactive data communication less sensitive to long distance costs. The

trend toward distance independent tariffs and the rapidly expanding use of data communication service in a wide variety of business situations indicates that data communication is emerging as an essential and economically feasible service. In conjunction with the availability of distributed multiprocessing capabilities and local data bases, data communication facilities are becoming the catalyst for a transition from centralized information processing configurations to decentralized, distributed configurations which can be readily drawn upon to perform a greater variety of individualized tasks.

CONCLUSION.

These developments, and many others related to them and arising from the power and economy of the mini-computer and the new digital communication techniques, can be expected to impact automated information access by the information user. In this process further new technological innovations will emerge and they in turn can be expected to compete with the presently prevailing intermediate large scale uniform automation services. In fact, this process has already begun and is evident in the emergence of on-line reader access to some library catalogues. The spreading of the direct inter-active approach is being facilitated by the visibility of service effectiveness in efficiency for the end user, in the analogy to automated services in other areas, and by expected cost benefits.

In order to facilitate progress we must be prepared to understand the limitation of our past services to our users, and to appreciate that the creation of a bibliographic data base is of little value in itself. Until now we have concentrated on the creation of large data bases rather than their utilization. This has led us to develop the computer for shared input as a cost effective technique to create rather than to utilise large data bases. It is time to examine whether the data bases we have created can help their users at a cost which we can afford. In so doing we must remember that the computer can provide a more innovative approach to both the retrieval and dissemination of information through library functions than our present efforts have attempted. The adoption of the new technology should regain its initial and more ambitious objective. Now this can be done.

In the longer run the scale of the benefit to the user will be measured by our awareness of our past lessons, our understanding of present and future technological trends and, above all, our acceptance of change for the pursuit of the true objective.

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