Reengineering the Library for the 2nd era of the information age

by

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Abstract

We are entering the 2nd era of the information age in which enabling technology will allow information to be delivered as a seamless, borderless service to be used immediately by local or remote customers. This paper looks at why the library and information science profession must reengineer to take its rightful place in the new age. The discussions emphasize the requirements of a corporate library in this new age.

Introduction

We are entering the 2nd era of the information age, in which businesses and professions are experiencing a technology enabling transformation. To prepare for this new era, businesses are reegineering. This involves what are often radical redesigns of basic business processes, organizational structure, information technology, job content and flow, in order to achieve what is believed by some to be quantum improvements in customer-valued productivity. Business reengineering also includes three distinct phases namely: 1. developing a strategic vision, 2. analysing and designing the process, and 3. implementing a reengineering process. As processes are reengineered jobs are reengineered as well. It is believed that reengineering should create a bridge to the future by directly establishing links between mission-critical business or professional needs and the processes of the business or profession.

In addition, there is a growing group of people who believe that through reengineering businesses and professions can be re-optimized and, therefore, become more competitive if the entire enterprise is looked upon as a delivery system of goods or services that can exist as a seamless chain of value-added steps. That is, as these goods and services make their way to the consumer, value is added by each handler along the way without the final consumer realizing it.

Information professionals, especially in the corporate environment, must also be looking for ways to eliminate non-value-added activities from their services by employing the reegineering processes. It is no longer acceptable for these professionals to try to fine-tune outdated systems in order to serve their clientele. On the contrary, they must reengineer their library or information centre to deliver information using the most cost-effective electronic tools and products available in the industry. In addition, the library or information centre must seek to exist as a borderless service, a place where information can be sought wherever it exists and used immediately by local or remote customers. Business information professionals will have to make the adjustment as it will not be acceptable to send information via overnight mail except in rare cases - only real time information will be valued.

These are some of the fundamental realities that are reshaping the global information industry in particular and the business environment in general. This change has been largely due to the vast improvements in the technology which drives information access and delivery. It is safe to say that library and information professionals, along with other businesses and institutions are facing powerful external forces for change.

The Superhighway and Other Developments

One of the major change agent which will have a profound effect on the way libraries reengineer to meet the challenge is the **superhighway**. The term information superhighway dominates both the popular news media and the intellectual media. One would be hard-pressed to read a newspaper, a magazine, or a professional journal in North America, without encountering an article on the subject. The superhighway promises new ways of communicating, new delivery systems, and new ways of doing business.

In preparation for this new era, many regions in Canada are laying fibre optic cabling which will be the ultimate answer to the need for high speed delivery of information services to the home, office (both conventional and non-conventional), government, and private institutions.

The pioneers in the use of this technology are already delivering major services remotely via fibre optics or other communication methods. For example, online virtual reality training or interactive learning systems using multimedia, will deliver training to remote sites or to the office of an employee. It is, therefore, reasonable to expect that library and information services will be delivered in a similar way.

In Montreal, Canada, **Virtual Prototypes Inc.** in partnership with the **ADGA Group and Hydro Quebec,** has launched a $26 million INTERFACE project to develop leading-edge training technology that will provide online simulation training at the exact time and place the training is needed to support the individual and the company. Information services must be prepared to be delivered in the same way. If librarians fail to move in sync with these developments or fail to input to and impact these systems they will find themselves at a serious disadvantage in the marketplace as these developments have a real impact on the future of their business and profession.

One of the critical success factors in making the superhighway work for all concerned is interoperability. That is, the ability to move data smoothly along the highway despite the operating system which is sending or receiving the information. In addition, the convergence of hardware, software, and networking technologies are making the superhighway possible.

The next giant step forward in effecting this change has been the development of the "personal digital assistants" (PDAs) which allow a user to tap into information from anywhere at any time. Furthermore, PDAs allow us to look for information while going about other tasks. PDAs generally combine hand-writing and drawing recognition, free-form database management, communications, and some

artificial intelligence. In the future, we can expect to see PDAs respond to the spoken word. In addition, future PDAs will keep track of E-mail addresses, and fax and phone numbers so that a tap on the screen will trigger the device to send a message to its recipient without the user having to rifle through directories. It is estimated that by the year 2000 half of the computers sold will be PDAs. Rather than replacing desk-tops they will complement them, creating virtual offices by giving mobile users remote access to files and databases. It is imperative that the information professional ensures that some of these databases hold information generally provided by the library.

Information Providers

Many mergers involving billions of dollars as well as strategic business alliances are taking place in the information industry, underlining the seriousness of the players in this field. These players believe that vast new markets for information products and services will be opened.

The Internet, the first information superhighway, will play a key role in this new information age. The Internet has been in existence for several years and has provided information access to libraries worldwide, as well as to certain selected

private industries and companies. **The Internet** backbone is changing and it is opening up the network to a new class of users. It will bring information into the same devices people will use to view videos or to make phone calls. The thousands of Internet data servers and news groups, offering virtual community and free information ranging from government statistics to images of industry performances, will be available from the office or living room through the same user interface used to conduct a videoconference or order a pizza. However, if **the Internet** is to be used as a delivery vehicle for profit making information companies then provision will have to be made for usage-billing, while continuing to serve as nodes for government servers which are required to publish most of their data at no charge.

Middleware will have to be developed which will make visible and easily navigable the hypertext links implicit in the web of systems from which information of all kinds will be gleaned. A good example of middleware accomplishing this task is ***Mosaic***, developed for the National Center for Supercomputing Applications in Illinois. Businesses will have to learn to exploit these tools as information access is going to be a highly sought after commodity. Everyone will have access to the information but those with the experience in how to access it speedily and cost-effectively will profit from the information.

Improving Employee Performance

Research into reengineering projects in more than 100 companies in the United States and detailed analysis of 20 of these projects have revealed how difficult redesigns are to plan and implement, and how often they fail to achieve real business-unit impact. Two reasons for this are: 1. the process to be redesigned is not broadly defined in terms of cost or customer value and, 2. the redesign does not penetrate to the company's core thereby, changing roles and responsibilities, measurement and incentives, organizational structure, information technology, shared values, and skills. In other words, the culture must change to accept the new processes in order to achieve the benefits of reengineering. Research validates this belief as it has been found that only about 15% of reengineering attempts are successful.

When the library profession starts to reengineer it must not be discouraged by the slow rate of success it may experience as it will be going through a major paradigm shift. The important thing is to learn along the way and improve the reengineering process in a conscientious way. In the first place, the professionals must clearly understand why the shift is necessary, have a good understanding of where the profession is going, and involve the customers along the way. In order to achieve paradigm breakthroughs the profession must also establish stretch goals

- goals that seem impossible today and can only be achieved by challenging current assumptions about the profession and it processes. We must also be prepared to slaughter some sacred cows in the reengineering process.

It is expected that delivering information with products that include built in user readiness to the users, wherever that user might be, should result in improved productivity and performance.

Computer technology companies are reacting to this perceived demand of the information consumer by constantly improving the technology for information storage and delivery. The PDA (personal digital assistant) which has the ability to seamlessly tap into several points along the information highway into company product databases, inventory files, order desks and industry databases, is one response to this demand. Field technicians, stockbrokers, telecommuters in industries as well as workers in institutions will use these devices to access information. Most professions are predicting that by 2010 face-to-face interaction will be largely unnecessary. The PDA will keep 'flexiplace' and 'flexitime' workers connected to the information required to conduct business.

Consider this scenario: bank account manager John Profit is out on the road visiting a client, Mary Cash, who just got a hot tip about what she considers a

great investment deal and would like the bank to fund the venture. John Profit huddles with Mary over a PDA that is connected wirelessly to the bank's library services and as they talk about the deal John assesses the risk of the investment by querying the various business databases which the librarians have evaluated and acquired for this purpose. Colourful graphs show that the risk on this particular deal is minimal, moreover, it is likely to show an above average return on investment within two years. John Profit is sold on the idea and approves the loan for Mary Cash within an hour. John prints out a copy of the loan agreement by sending a copy to Mary's fax machine. Before John leaves he requests another meeting with Mary in 6 weeks. Mary reaches for her own PDA, points its infrared LED at John's and in moments they determine a time when both parties are available and confirm it in their PDA calendars. John Profit can now call on other business prospects and repeat a similar scenario, doing business successfully, cost-effectively and quickly.

John is satisfied that the librarian has provided specific, relevant, and readily available information when he needed it to make business decisions. Mary has confidence in John's judgement as she watched him do the risk assessment using leading edge technology to access the information as well as prepare the agreement in a timely manner. The librarian feels she is meeting corporate strategic goals as she has amassed the information and networked it in such a way

that the account manager could access it on the fly to complete his job with confidence knowing that he had the best information available to make an informed decision.

Today's workforce is increasingly mobile as most organizations and institutions are implementing the 'flexiplace' and 'flexitime' concept. In addition, they are enabling their customer base to have access to their services via advanced communication systems. The library must adjust to serve this moving clientele. Whether at their desks in the morning or on the road during the day or at night, the mobile workers need ready access to data and the library should be ready and able to meet this challenge through enabling technology. The librarian or information professional, will be expected to amass relevant, cost-effective information and make it available to these telecommuters, via the appropriate network and devices.

It is said that about 45% of VCR owners in North America cannot program their machines to make a delayed recording. This being the case, how can they be expected to derive a full range of benefits from the information highway. To achieve full benefits user/computer interfaces will have to be much friendlier in the very near future than they are today. Doug Trent of IBM coined the phrase "Human-Centric" meaning that information technologies must be designed from

the perspective of the people who will use them. "Human-Centric" systems are not yet commonplace. We will achieve human-centric standard when machines can understand as well as our colleagues do.

Despite the technological advances, it would be terribly shortsighted and naive to expect that simply dropping better technology into the hands of the workers can provide them with the indepth and intuitive value which the trained information professional brings to the job. This is especially true for now and the foreseeable future since there are no agreed upon standards for accessing the information nor delivering it and since the information is scattered across several systems and in a variety of media. Another obstacle is that not all of the information required is available in machine readable form. In addition, the vast majority of information consumers are lacking education that emphasize technological training and so must be brought up-to-date either by their employers or though their own initiatives.

Network Management

As organizations become increasingly dependent on information transfer, network

management will become more important to the entire organization. Products that work to industry standards are also critical to the management of networks and so information products which a library uses should be developed to meet these standards.

At this time, except for some of the hi-tech companies, most corporations do not have the necessary connections to allow information to be provided in an easy cost-effective way through a client/server networking environment, to all staff. Once this is rectified, the limits to the information that can be provided are virtually boundless. When the appropriate technology is in place information services can be supported from one central location. The organization can move to a fully centralized information system where staff can acquire information of all kinds, both internally produced as well as externally produced. In this environment, there should be a central database of manuals, a human resource management directory, technical product information, training information, and external electronic information, from which employees can perform a variety activities.

However, networking will only compound the information glut as more and more users are connected worldwide, tapping into existing data and contributing to the store themselves, making it increasingly difficult to sift through information in a

meaningful way. The **Internet** is a good example of an open system where users can shift from the role of consumer to provider on the system in a fairly seamless manner.

When all the pieces are in place, the trained information professional's main value will be in selecting, evaluating and acquiring information required to do business. The information professional should also be equipped to provide the training necessary to access and sift the information to achieve precision information retrieval in a fast, accurate and effective manner. This approach gives the organization the best of both worlds - decentralized access with centralized acquisition and management.

Competition for a piece of the pie will lead to players developing information networks which are unable to connect with each other because of different standards. To prevent this, an open system encompassing domestic and world standards will be necessary. However, committing to standards has never been easy in the industry as in this competitive environment, each player tries to be the first to bring his product to market with little regard for standards. If there are several standards used on the information networks then the consumers will demand interoperability, much as they did in the case of many of the proprietary

software. In the long run, the highway with the most content to offer and at an affordable cost will win the race.

Moving to the 2nd Era at the Bank of Montreal

Newspaper publishers have been offering online information services for more than 15 years and are continuing to develop test projects. It has also been at least two decades since other online systems vendors have put thousands of information databases at our fingertips. A user in a business environment is faced with a plethora of choices when seeking information since he has access to information such as financial, business and political news, lifestyle features, and global trends. In addition, the services overlap in many cases and are of different frequencies and quality. Even if the user wanted to, he/she could not sort it through in a lifetime. For this reason, an intelligent filter is required to glean only information that is of interest and relevant. The trained information manager utilizing the available technology can provide this added value.

The Bank of Montreal recognizes that the 2nd era is at hand and so has started to implement virtual libraries within the constraints of its available technology. For the past four years, the Business Information Centres have been selecting,

evaluating, and making available information germane to the Bank's business via the internal networks. The strategy is to provide information access to users regardless of time or place thereby, enhancing their productivity and business decision-making ability. For example, nearly 200 users access a real-time service called **NewsEDGE** which is a service developed by Desktop Data in Waltham, Mass. **NewsEDGE** provides access to more than 150 news sources such as newspapers, credit and financial wires, newsletters, and magazines around the world. **NewsEDGE** has over 1 million news stories which are at the fingertips of the users.

Research Stations

In order to facilitate access to electronic library products some **Research Stations** have been installed in certain areas of the Bank. From these **Research Stations** end users perform simple research activities such as querying the **CD-ROM** services or **NewsEDGE** . In addition to these shared-access **Research Stations**, individuals can also access the desk-top library products from their own workstations.

DIALOG Corporate Connection

To start to provide access to selected online services, the libraries are in the process of setting-up some accounts for DIALOG's outreach service which DIALOG has designed specifically to bring information directly to the desks of end users. Dialog will provide user ids in blocks of 25 accompanied by quick reference cards, tutorial guides, subject guides, and flyers for publicity. The system has an easy to use menu system designed for the occasional user.

These are some of the ways in which the organization is reengineering for the 2nd era. However, it is finding that as the demands on the client/server networks increase, cable transfer speeds at the workgroup level cannot keep up with the volume and size of information transfer demands. This challenge is slowing the pace with which the Business Information Centres can deliver information to the desk-tops of staff. Implementation of better delivery systems will require careful planning as well as the commitment of senior and executive management.

One important lesson is that it is highly recommended that the plan to implement desk-top libraries include more than the requirements of hardware, software and networking tools. It must also include acceptance from end-users throughout the process. It is not sufficient to ask users if they want to be self-sufficient unless

they understand what self-sufficiency means. To ensure their acceptance the system should be prototyped and demonstrated to them so that they can experience what the application will look like early in the process. This methodology will help the library or information centre to gain user acceptance and feedback and so ensure the success of the new system.

Despite the slow-down in the reengineering process and the resulting challenges faced in fully implementing a library system which will result in user self-sufficiency, the organization's technology vision still includes delivery of information to the desktop of all of its employees and is slowly laying the foundation for this to take place.

The Future

Many of the players in the information industry are experimenting with prototypes of future high-speed network services. For example, the **Interactive Cinema Group at MIT's Media Laboratory** is developing an interactive digital movie system that would allow viewers to download videos to their homes and, furthermore, customize the movie by choosing one of several endings, or even filtering out the sex and violence scenes. **The National Film Board (NFB)** in

Canada in 1992 launched *CineRobotéque*, a standalone video-on-demand service in Montreal. In one of over 20 cubicles at the NFB's viewing centre, customers can select any of the nearly 800 films stored on laser discs, and view them on the television screens in the cubicles. It is expected that within two years the NFB will use fibre optic networks to deliver this service across Canada.

Electronic subscriptions will be commonplace as the superhighway develops and publishers see this as a viable medium for delivering this type of information. The convergence of the computer, broadcasting and publishing industries into the multimedia sector has led many pundits to predict the demise of traditional newspapers and magazines. While this may be premature, a number of companies are already exploring alternatives to existing news and magazine formats. For example, ***Newsweek*** has launched a quarterly interactive CD-ROM video magazine. In addition, online electronic news services are sprouting up everywhere. Knight-Ridder's **Info Design Laboratory in Boulder, Colorado** plans to launch an online newspaper which will resemble the old-fashioned newspaper to be delivered via a hand-held, keyboard-free computer. Knight-Ridder's vision is that consumers could subscribe to the electronic version or buy it at the newsstand. The difference is that they would receive the electronic version over the wire at night or in the morning purchase a memory card, about the size of a credit card, which could be inserted into the hand-held device.

Conclusion

As far as transmitting information is concerned, borders no longer exist and Marshall McLuhan's dream of a global village dependent on information technology has become a reality. Three everyday household technologies - the telephone, the computer, and video - are being combined into one single extraordinary medium which will carry the message or the information.

Electronic highways of the next decade will offer new opportunities for users of information technology as they will deliver an astonishing array of new services to offices and homes and so change the way people work and play. Advanced networks will let students call up their homework electronically and do it on the screen. It will also let them attend classes without leaving their homes. Like telecommuters in the workforce they will expect to have access to library information without leaving their homes.

However, it is obvious that there is much to be done before the information superhighway replaces much of the job of the trained librarian. This being the case librarians who are willing and capable of reacting to the paradigm shift by shifting their focus, will be able to thrive as they become involved in the preparation for the new age of the superhighway.

Librarians have a tendency to want to be all things to all people, a tendency which dilutes the effect of mission- critical work. The corporate librarian needs to get rid of much of what he or she does and get good at what is valued and expand those services that are really mission-critical. It is also imperative that library educators make the shift by adjusting curriculum to meet this challenge. If we do not make the shift - at least in the corporate environment - we are likely to hear the statement "Who really needs libraries these days? Hardly anyone" .

We are in the age of revolution not incremental improvement and we have a chance to reinvent what library is, and what quality value-added library service is. Librarians cannot just react to the realities of today's information requirements they have to influence them. This is obviously no simple task, but it places exciting challenges and opportunities before the information professional.

There is no going back - the world is heading in the direction of advanced technologies. More and more intelligence will be added to networks and transmission facilities. Where we work is becoming less relevant, and will become increasingly governed by the nature of the task at hand. The technologies available are poised to shatter any remaining limitations on flexibility, in the very near future. The information technologies is placing complex functions within the reach of ordinary people and so is making them more and more self-sufficient.

However, a vast increase in communication power is required to transmit data through the links that join the superhigways being developed all over the world and organizations will have to decide to outlay the cost of acquiring the necessary communication power.

Information professionals with the right qualifications and the right attitude will have a place in the 2nd information era. As one writer said, "From the invention of the wheel to the invention of the computer, technology has always been a means to an end rather than an end in itself". The well qualified information professional will know how to use this technology as a means to meet the organization's strategic goals.

Like all major inventions, the data highway will profoundly alter society, perhaps in ways we cannot even imagine today. Part of this alternation will be in the way library services are delivered to the individuals in our society. However, no matter who controls the delivery systems into homes, businesses, and institutions, major technical, legal, and economic challenges remain for all involved before the data highway becomes as commonplace in our lives as the television or VCR.

So, while the information technology provider and the consumer are grappling with the development of the instruments of the 2nd information era the

information professional has a small window of opportunity to take ownership of the information profession. Those who are in the process of acquiring professional certification must insist that the educational institution provide them with the skills which are necessary for the new age. Those who are already in the field, must get themselves equipped through continuing education.

Finally, the library profession must be enhanced as a profession rather than simply as a service, in order that the information professionals may take their seats in the executive board room alongside other professionals such as lawyers or chartered accountants.

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