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1.0 Introduction

As I was flying in to Houston Thursday afternoon, in my personal helicopter from the arcology that used to be Redwood City, I used my wrist computer to run some current statistics, with sound and full-color animation of course, on the final stages of the death of print. [1] It's pretty much on schedule. Books have already disappeared, and the last print newspaper will probably cease publication this July. Supermarkets still sell something called mass-market magazines, but they're mostly semi-pornographic VR cubes, except for the few old-fashioned 3-D rags on digital paper. Well, there is one exception: all the paper that used to go into magazines, newspapers, and books is being used for the 300 monthly, weekly, and daily magazines offering reviews and hints to make TopView and NextStep Pentium run better together.

Awake now? Well, if you think any part of that opening view mirrors reality now, or is likely to within the next decade--or within my lifetime, for that matter--then you won't be happy with this talk. But then, why are you here in the flesh anyway? For full-blooded futurists, schlepping your body to a conference is hopelessly out of date. If it isn't on the network, it isn't worth bothering with. Right? But, well, you're here, so on with the talk.

2.0 Renouncing Inevitability

I read a lot about visions of the information future; how can you avoid it? I look for one particular word when people write about the future. That word is "inevitable." To me, the word has three fundamental meanings:

- First, it means that the case being argued is weak. If the logic and facts will sway reasonable listeners, there's no reason to claim inevitability. But when you don't have the facts on your side, it's always good to stop discussion by saying, "Well, it's inevitable."

- Second, it frequently means that the speaker knows that listeners may find the prediction unappealing. If something is desirable, we hardly need to be told it's inevitable.

- Third, it usually means that the prediction will be very expensive, and that the speaker wants to take resources away from other things.

In my experience, "inevitable" is usually part of a would-be

self-fulfilling prophecy: something a speaker or writer wants to see for his or her own reasons. I find the word to be an almost irresistible invitation to start poking for the flaws in the prediction--and they're usually not hard to find.

One of the slogans for this speech might be "Renounce Inevitability." Don't use it in your projections, and don't accept it from other people.

Let's look at the four key words in the title: dreams, devices, niches, and edges. After that, I'd like to spend a few minutes on hopes and dangers.

3.0 Dreams

We don't lack for dreams of the future, and that's probably a good thing. Prophets and visionaries can also be called dreamers. It's not an insult by any means. I believe in dreamers. We need them, and we should honor them. F. W. Lancaster began dreaming of a paperless future many years ago. Ted Nelson dreamed of hypertext years before there were personal computers; his vision of universal hypertext even carries the dreamlike name Xanadu. Way back in the late 1960s, Fred Kilgour left Yale to pursue his dream of a nationwide system of shared cataloging.

Michael Hart dreams that a trillion texts will be used thanks to his efforts, with good old ASCII as the basis for the dream. Steve Jobs dreamed that the cute little Macintosh would become the universal computer--and, later, that NeXT computers would become even more universal than Macintoshes. There are many others, in and out of our field.

We need dreams. We need dreamers. We need visionaries and prophets. But we also need to deal with dreams coherently.

3.1 Harvesting the Dreams

Ideally, we should be able to harvest the dreams: taking from them the best that they offer, while setting aside the chaff. For there is almost always chaff. Every dream constitutes a simplification; every dream focuses on one aspect of the future. Almost every dream carries with it the seeds of a nightmare. We need to recognize the simplifications inherent in most projections. We need to harvest the dreams, not adopt them on faith. Honor the dreamers; don't believe in the dreams without placing them in context.

Take the most nearly realized of those dreams, that of a single national shared bibliographic facility. Would we really be better off if OCLC was, in fact, a single universal bibliographic network, the only source for bibliographic data? Would you be happy with the notion that OCLC's management had total control over that aspect of your budget--or RLG's management, for that matter? Probably not--and yet, OCLC is actually a very narrow dream from a quarter-century past. It deals with a little patch of the information landscape, certainly far narrower than the vast reaches projected for Project Xanadu or the universal scholar's workstation.

The Apple dream of a graphical computing future really began with Lisa, and reached remarkable real-world fruition with the Macintosh--but it did not, and will not, sweep away other PCs. Is that loss of a dream a bad thing? You Macintosh users: do you honestly believe Macintosh prices would be lower if Apple

dominated the personal computing marketplace? Would color monitors for Macs be cheaper or better if Macintoshes could not now use boring old VGA displays? I think not.

Dreams tempered with reality produce progress: never simple, almost never linear, but frequently quite impressive. Honor the dreamers. Harvest the dreams. But always be aware that dreams--or projections, or visions, or (God help us) new paradigms--almost always ignore the complexities of life. If your own good sense says that a dream isn't plausible as it stands, or that it would in fact be a nightmare if carried out, believe in yourself more than in the dream. One person's utopia is another person's dystopia--and any utopia, frankly, would probably be a pretty unpleasant or boring place to live.

4.0 Devices

On to devices, the things with which we move. Not necessarily forward, at least not all the time, but we move nonetheless. I may spend more time on devices than they really deserve--but then, they're always fun. Technological dreams depend on devices to make them real--but we tend to place unwarranted faith in devices.

4.1 Technolust

I call it technolust, and I'm prone to it once in a while, just like most people (particularly most men, I hasten to add). As a few of you know, I'm eating a little crow about trailing-edge computing and my dislike for Windows, since my new home computer is only trailing edge by Silicon Graphics standards and this talk was written using Word for Windows. And I must admit that I really, really like my new computer--CD-ROM drive, big high-resolution monitor, huge high-speed hard disk and all.

But I'm basically a tool-user. An avid tool-user at times, but a tool-user. A true technophile would certainly bring a notebook computer to this conference--or, better yet, a Personal Digital Assistant like Apple's Newton. And the heart of the technophile was beating strong when PACS-L had suggestions that future library users would be wandering around with PDAs in hand, accessing the library's catalog through infrared links, scanning in pieces from books on the shelf, and so on. We can get rid of those clunky terminals! Of course, if some poor slob doesn't own a PDA--but then, libraries aren't really for the common folk. Are they?

Apple's Newton is new enough so that it's only a little obsolete. It isn't on the market yet, and there's no firm date set for it. The price will be "something under $1,000," which certainly suggests that every library user should have at least one of them handy, doesn't it? Of course, Newton may be a poor example; as I understand it, it's basically a personal calendar and appointment book with room for note-taking.

Personally, I use a DayTimer for calendar and appointment needs. Costs about $18 a year; then again, I could probably get by with a $4.95 Weekly Minder. I understand that there's now an electronic DayTimer program to run on pen-operated portable computers, actually developed with the company's cooperation. This $200 program, when combined with a $1,000 computer, will give you all the functionality of a $20 DayTimer, as long as you keep replacing batteries.

But why would you want to do that? If you suffer from terminal technolust, the answer is that everything's better if a computer is involved--as might be the case with the person who opined on PACS-L that it's better to have a thousand technical failures in the marketplace than do things the same old way.

The heart of technolust is an unwillingness to deal with the real world. New is always better; technology is always a good thing; once something works, it's time to look for the next new wave. But we live in the real world. Some of you probably still use something less than 486 CPUs on DOS machines--or, horror of horrors, use DOS itself rather than Windows 3.1 or OS/2 2.0. Some of you Mac users don't have Quadra systems. My guess is that at least half of you don't have high-speed laser printers at home, that perhaps more than half don't have true-color printers; that one or two of you don't have V.32bis modems; and that oh, ten or fifteen of you haven't found it necessary to build a local area network for your home computers. Is it possible that one or two of you still live without color monitors at home, or even use something as crude as an AT-class machine, just because you don't seem to need anything more for home computing?

Yes, I'm guilty. My trailing-edge budget suddenly caught up with leading-edge capabilities, thanks to some folks in South Dakota, and I took advantage of it. Of course I suffer from technolust once in a while. I read PC magazines. They try their best to keep readers in a buying frenzy. But given the realities of money, time, and other interests, I usually find it easy to keep under control. So should you.

4.2 The Half-Inch Car

Surely all of you have heard the old chestnut about the pace of technological change in the computer field. It goes something like this: If cars had developed the way that computers have, a Rolls Royce would now cost $2.50 and get 1,000 miles to the gallon.

Here's the reality check: that Rolls Royce would be one centimeter long.

We all tend toward hyperbole and oversimplification--and we need to step back to place trends within broader perspectives. Technolust looks at each new device and projects all of its possibilities with none of the drawbacks. Technolust looks at a three-year growth projection and extends it across a decade, without noting that the resulting projections make no real-world sense whatsoever. Technolust makes no distinction between obsolescent--the state of most real-world devices--and obsolete, a different thing altogether.

You can plausibly say that anything that has reached the market is, to some extent, obsolescent: it is probably on the road toward being replaced by something newer. People are probably obsolescent; we're just not sure yet what will replace us. Certainly my new PC is obsolescent: it was available for sale, a sure sign. Obsolete is something very different: an obsolete item is no longer useful, having been wholly superseded by something newer. As one dictionary puts it, "No longer in use, or outmoded in design, style, or construction." New devices

don't automatically make old ones obsolete.

4.3 Failures and Successes

Here's an unnerving fact you need to remember whenever you consider marvelous new devices and trends. Most innovations fail. Sometimes before reaching the market; sometimes very shortly after; sometimes after a brief blaze of glory; and sometimes after apparently establishing solid markets.

Libraries have been caught by failures in media, both mass media and specialized media; we may well be caught by failures in electronic techniques as well. Remember eight-track tapes, an apparent success that eventually failed? Remember Beta--or, more significantly, the half-dozen videocassette systems introduced before Sony marketed Beta? I'll bet there are libraries that established Cartrivision or SelectaVision or V-Cord collections, and many libraries still use U-Matic tapes.

Videodiscs? At least half a dozen systems were attempted, dating back to 1928; the trail of failures pretty much ends in 1984, when RCA abandoned its dismal CED system. RCA managed to derail marketing efforts for LaserVision, keeping it from establishing an early large market share--but Pioneer stuck with it, and there's some reason to believe that LaserVision will be a long-term success. (Thanks to the industrial market, it already is.)

4.4 Information Technology Devices

The record in information technology is no clearer than elsewhere. Remember ultrafiche and micro-opaques? How about Cauzin Data Strips, a technology so successful that PC World was publishing software using the strips for a couple of years? Seen many 8" diskette drives for personal computers lately--or hard-sectored diskettes of any size?

I mentioned digital paper in the introduction to this talk. I remember talk of this medium as the hot new thing something like a decade ago--and every year or two, we hear that it will revolutionize storage as soon as it really hits the market. If it ever does. Now, of course, there's holographic storage. Not quite ready for market yet, but it will replace everything when it is. It's inevitable.

OK, CD-ROM was an instantaneous hit. Which is to say that the standards were established in 1983; the first products, for libraries, came out in 1984; predictions of instant mass-market success began in 1987; and those predictions are still being made. Meanwhile, libraries may still be the largest CD-ROM market--and we think, rightly, that they represent low technology. I think CD-ROM will continue to succeed (as a multiple niche medium, not a mass medium), largely because it rides on the shoulders of audio CDs, and those should have another ten to fifteen years left before they're supplanted.

But how could you predict that CD-ROM, from little Philips with its lousy marketing, would be the successful optical medium? Around the same time that CD-ROMs came out, 3M announced OROM, with IBM also involved in its development; in 1988, it looked like a comer. So did DataROM, Sony's new system from the mid-1980s. OROM seems to have disappeared without a trace; DataROM may have mutated into Sony's MiniDisc, a recordable audio medium

that may or may not be suitable for data storage. (If it is, it will have much less capacity than CD-ROM; it gets its 75-minute audio capacity by throwing away most of the recorded information based on computer models of what you can actually hear at any given moment.) Drexel's LaserCard has been around for four or five years, at least, succeeding in niche markets and so far having no apparent mass-market impact.

We have a plethora of sure things on the market now; predictably, not more than one or two will succeed in any real way. On the consumer side, there are four or five different incompatible consumer disc video technologies: VIS, CD-Video, CD-Interactive, whatever. For PCs, there are the 2.88 MB diskette drive (well, IBM's behind it, so how can it fail--just like TopView, the PCjr, Micro Channel Architecture, XGA, and IBM's other sure winners), the 21 MB floptical drive, several incompatible removable mass-storage devices (Bernoulli being the lowest technology and longest lasting of the bunch), and the list goes on.

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4.5 Survival: Not Always Predictable

If you believed some prophets a decade ago, CRTs would be long gone by now--indeed, the imminent replacement of those old-fashioned vacuum tubes has been predicted for some two decades now. They are, to be sure, silly and archaic in terms of general technological development--but they keep getting better, making a moving target for replacement technologies. If anything, the gap between CRTs and thin-screen devices seems to be growing.

Speaking of dead ducks, consider hard disks. I saw several well-considered projections half a decade back that showed solid-state memory, with its far superior speed and resistance to crashing, becoming cheaper than hard disks within five years. That's true: RAM is now much cheaper than hard disk storage was five years ago, and even the kind of stable RAM needed for solid-state disks is about where hard disks were five or six years ago. But, of course, hard disks are a whole bunch cheaper and faster now than they were then. I can almost hear the engineers who have brought down the price of durable RAM: "Well, we made it for $100/megabyte; what more do you want?" Hmm. Right now, I'm paying $2-$3 per megabyte for hard disk storage; that seems like a good target. A tough one, though. Oh, and today's hard disk drives are at least ten times as durable as those of a few years ago; indeed, it's now pretty rare for a contemporary disk drive to suffer a mechanical crash.

4.6 Keys to Dealing with Technolust

I can suggest a few things to think about when dealing with new devices, new media, and the wonderful projections made for them:

- First, by and large, the new complements the old. Print did not destroy the oral tradition, although it extended its reach. Radio news did not destroy newspapers. Television changed radio, newspapers, and movies--but didn't destroy any of them. Home video changed the motion picture business--but motion picture studios take in more money than ever.

- Second, most new devices fail--and the ones that

succeed aren't always the ones you'd predict.

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- Third, new techniques can revive and sustain old technologies. That explains the continued success of CRTs and hard disks; it's also why start-up print publishers can produce fully competitive books far faster and less expensively than a decade ago.

- Fourth, most people don't adopt new devices because they're there. They adopt devices because they fulfill some need, real or imaginary; devices are tools for scratching itches. If the itch isn't widely felt, or if marketers can't communicate that this is the best way to scratch it, the quality of the device just doesn't matter.

5.0 Niches

The one thing we can be sure of is that the future will be at least as subtle and complicated as the present. That's not original, but it's true. The future is not one wave or one solid thing; it will be a complex set of niches, just like the present--only more so. That complexity may be helpful if we recognize it for what it is. There are no universal solutions, at least partly because all such solutions presume relatively simple futures. For that matter, there is not one universal problem. By recognizing that we are dealing with many niches rather than a single edge, many currents rather than a single wave, we may be able to focus on smaller and more solvable problems.

There's not much more to say about niches, except to note that there's nothing shameful or futile about being in a niche. A decade ago, LaserVision essentially failed as a consumer product--but it established a niche in industrial training. Thanks to that niche, the technology has survived and been profitable for firms that understood the niche. If LaserVision was only acceptable as a replacement for videocassettes, then it was a dismal failure.

If I had to guess which smaller computer companies will survive into 1994, I would probably include Tri-Star in the list. They've become specialists, designing high-end systems for CAD workers and others who need 17" to 20" monitors and systems that will support them. It won't make Tri-Star a billion dollar company--but I suspect they know that, and would rather be a profitable smaller company. They are establishing themselves as leading suppliers to a niche market: that's a recipe for success, as long as the niche stays healthy.

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Some librarians now decry a future in which libraries won't be the means by which most people get all of their information. But libraries have never been the sole, or even the primary, source of information for people. Good libraries serve many niches, but they never have served as universal sources, and they never will. If failing to do that means that libraries are obsolete, so be it--but nothing else will serve as a universal source, either.

More to the point, the library is an absurdly simplistic formulation, as is the patron. The corporate library for a

genetic engineering company has different needs, and serves very different patrons, than the library I use most often, the Schaberg branch of the Redwood City Public Library. The University of California at Berkeley Physics Library fills a very different niche than the Doe Main Library with its massive collections in the humanities and social sciences, and should allocate its funds differently between electronic and print media. So should the library at Foothill Community College--which, again, serves very different needs and has very different patrons.

5.1 Niche Solutions Solve Niche Problems

We need to recognize specific problems, so we can develop or evolve specific solutions. In the publishing field, for example, it's simply nonsense to say that "print on paper is too expensive" or "the economics of paper publishing don't make sense" or "it no longer makes sense to publish journals in print form" as generalizations. None of these statements are true in general.

I'm not here to propose solutions to the problems of libraries. I have had some radical thoughts as to how you identify the true problem journals in STM, the ones that really need to be dealt with in some manner--but I won't bore you with those thoughts here. Certainly, many people with far more insight and experience than I can offer have been working on these problems, and a variety of innovative solutions have been suggested.

When looking at the proposed solutions, I would suggest a few cautionary measures:

- First, try to find specific solutions for specific problems. Some solutions can indeed be generalized--but the more you generalize a solution, the more likely it is that you're solving the wrong problem.

- Second, look at all the implications of a solution, both short-term and long-term. For example, article delivery as a replacement for little-used subscriptions makes excellent economic sense--as long as the journals still have enough subscriptions so that the publishers don't jack up the cost of articles beyond reason. And if journals become purely print-on-demand operations, and are still in the hands of the big international publishers--well, they can pretty much charge whatever they want for the articles, can't they?

- Third, think in terms of multiple solutions, not one massive agenda that succeeds or fails. Personal computers have succeeded so brilliantly because of multiplicity and competition. If all the focus had been on developing the CPU, with one dominant provider each for video, memory, and mass storage, today's PCs would be curious beasts indeed, with high-speed CPUs throttled back by slow displays, slow RAM, and undersized, slow, crash-prone storage devices. Instead, many threads of development, many solutions, many competitors have addressed many different specific problems of PC performance--with phenomenal results by

any reasonable measure. Those results haven't always been easy, and many developers have fallen by the wayside--but the field as a whole has prospered.

6.0 Edges

Let's talk just a bit about edges: leading edges, bleeding edges, and trailing edges.

6.1 Everyone Can Be at Some Leading Edge

Everyone can be at some leading edge, at least in understanding a niche. The key is to define your niche appropriately, and to determine how important that leading edge is to you. You also need to understand that really staying on the leading edge in one field may hurt you in other areas, at least slightly, unless you can rely on others to stay well-informed in those areas on your behalf.

Can one person or institution really be at the leading edge of all information technology? Possibly, but I don't really see how; it's just too broad a field with too many distinct niches. Typically, institutions that assert themselves as leading-edge do so by careful definition: if they're not involved in it, it isn't leading edge.

I'm probably not the right person to talk about the leading edge; it's never much occurred to me to worry about whether I'm there. Besides, the leading edge can get very confusing. If you're designing an information retrieval system to be used on campus-wide and library-wide information systems, using the Internet as a delivery mechanism, you need to understand the leading edge of character-based, non-graphic, command-oriented user interface design--which the hot new designers would tell you was obsolete a decade ago. It all depends.

They call it the bleeding edge, and that's not just a joke. As they say, you can always tell the pioneers by the arrows in their backs--that is, the ones that didn't get eaten by other pioneers. To really get out there on the leading edge, you probably need to commit to one particular technology in a big way. God help you if you make the wrong choice.

But, of course, if there are no pioneers, then the frontier will never be settled. If we never buy version one of anything, there won't ever be a version two. We need to take some risks--and we need to expect some failures as a result. That's part of progress, too.

6.2 The Worth of the Trailing Edge

Anyone here remember the last "Common Sense Personal Computing" article I wrote for Library Hi Tech? I concluded, correctly I believe, that it was no longer possible for me to claim that I could apply common sense to the personal computing field. Clearly, most of the full-time PC commentators had taken leave of their common sense in various ways; I couldn't even keep up with the field in its entirety, and had given up trying.

Well, yes, that was partly an attempt to shut down the series of articles. It didn't work; I was convinced to come back in a new guise, that of a trailing-edge commentator. That freed me from having to keep up with all the newest developments.

My choice of the term trailing edge was a deliberate poke at those who believe the leading edge is the only game in town. By the time I started the new series, I had already moved to an AT-class computer; in 1988, that wasn't quite trailing edge, although it certainly wasn't leading edge either. Ditto the 386/20 I purchased in 1990: not the lowest of the low, but really in the fat middle.

That said--and confessing that my current system is dangerously close to the leading edge, at least for Intel-based systems--I would also note that there's much to be said for the true trailing edge. When I travel, that's where I am. No notebook computer came on this trip; I don't own one. Fortunately, I don't travel every month, and I'm not such a hotshot that RLG can't do without my services for a few days. What do I take on trips? Well, that's when I catch up on science fiction magazines and, in heavy travel periods, paperback books as well. That's right; instead of a six-pound notebook computer, I carry a pound or two of magazines and books. Now that's the trailing edge. I love it.

To say nothing of this speech, of course. It's not as pure as the one I did at the University of Southern California in February; there, I didn't even have a microphone! But here we are: electric lights undimmed, no video projection system, no computer-driven overhead, no slides. Just you and me, in the non-virtual flesh. How retro can you get?

And if that bugs you, well, you shouldn't be at a conference. You should be on the Net, where the action is. Meanwhile, I'll stick with the trailing edge--when it works for me, and when it's all I need. I suggest you do the same; it frees your time, money and energy for the things that count. Sometimes, that means seizing the leading edge for a niche. Sometimes, it means taking a few days to watch the river run.

7.0 Dangers & Hopes

But enough of that. I'd like to offer a few hopes and note a danger. First, the danger.

7.1 Destroying the Library to Save It

Until recently, I regarded predictions of the death of print and "electronic everything" as being amusing and annoying. They seemed harmful only to the extent that people were wasting energy discussing and analyzing the projections rather than focusing on finding real (albeit less grandiose) solutions to real problems.

Then an incident occurred at a close friend's small liberal arts college library; a library that needs to increase its core print collection to serve the needs of the college's growing student body. My friend, the library director, has added CD-ROM and subsidized online searching as funds have permitted. She understands that the library can only serve its students fully through a combination of locally held material and strong access methods for everything else. The library was supposed to be on the campus development list to bring it up to reasonable standards.

Now the campus development officer comes to her and says,

"Why do you need to expand the library? I read in the Chronicle of Higher Education that the book is dying and everything will be electronic. Why should we waste our money on facilities you won't need in another five or ten years?"

I'm sure this isn't an isolated incident. And, while I suspect that my friend can do a good job of explaining the realities, some librarians may not be able to do so. It isn't just small academic libraries; public libraries can also run into this problem when trying for bond issues, for example. How do you make the case for better funding, part of it to be used to build or expand a building, when supposed authorities seem to think that books will go away in a few years?

Oversimplified projections of complete electronic access and the death of print pose clear and present dangers to our libraries. Projections of complete electronic access in the near term, disregarding or denigrating the long-term importance of print materials, also pose clear and present dangers to our libraries.

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7.2 Librarians: Think Before You Write

Among knowledgeable library people who write or speak as though print is on its way out, the problem is frequently one of oversimplification and concentrating on one particular problem to the exclusion of everything else. The severe problem of scientific, technical, and medical journals (and the admitted reliance of top scientific scholars on electronic means for much of their information) tends to be generalized to the whole of large research libraries and to all library users, scientists, humanists, and students alike. As a whole, books in the humanities haven't increased in price at anything like the ruinous pace of STM journals--in a very real sense, they aren't the problem.

Perhaps more to the point, large research libraries and smaller academic libraries (particularly those at liberal arts colleges or community colleges) have very different priorities and problems--and public libraries have yet another set of priorities and problems. But the people who publish come primarily from large research libraries, and tend to speak of "the library" as though all libraries are the same.

When any smaller library, struggling to meet its users' basic needs, fails to gain adequate funding because of arguments coming from large research libraries, we all suffer. To those who publish and speak in the field, I would just say: think about what you're saying and its impact on all libraries, not merely your own.

7.3 Enemies of Print: No Friends of Libraries

For the most fervid advocates of the death of print, this discussion will be meaningless--because to them, libraries are obsolete in any case. (So, from their perspective, are librarians.) Most such advocates really don't like books (or reading), and many really do seem to believe that the only thing that matters in any book is the independent paragraphs of information.

Fiction? Why would you go to all the mental strain of reading (and creating your own images) when you can play a graphic computer game or watch television? These neo-barbarians

will tell you that nobody reads anymore, anyway--and they're not really sad about that "fact." (Book sales continue to rise, albeit slowly.) I have nothing but contempt for this group--and sadness, as well.

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And just a little fear, the fear that even one library could be damaged or destroyed because of such people. Not that they would care: more's the pity.

7.4 Hopes

By now you know my hopes for the future of print and of libraries. I believe that print--books, magazines, newspapers--will survive as important media for the indefinite future. I also believe that electronic publishing and dissemination will grow enormously, displacing print where electronic does it better, but by no means sounding the death knell for the book. A future with both print and electronic resources.

I believe that people will continue to write linear prose and treasure its qualities, particularly for conveying knowledge, wisdom, and enlightenment and for entertaining. I also believe that hypertext will find more use where it serves best, not only in help systems but also to convey independent pieces of data and information and follow links among such pieces. A future with both prose and hypertext.

I hope that funding will improve for libraries, and particularly for strong support of the true expert systems in libraries: the wetware, the stuff between the ears of good librarians. I believe librarians will continue to serve their two key missions, to serve their users and preserve the culture. I also believe many users will get much of their information without the mediation of librarians--and there's really nothing new about that. A future with both librarians as intermediaries and direct access.

I believe that most libraries, except for some in specialized areas, will and must continue to maintain and build strong collections of print and other media, to serve the essential needs of their users. I also believe that libraries will and must rely more heavily on access to materials (and non-material information) that they don't own, and that they must find ways to share the risks, costs, and benefits of such access. I hope that librarians won't accept monolithic solutions to access problems; therein lies disaster. A future with both collections and access.

I believe librarians will reach beyond the walls of the library, providing some services electronically and gaining much information in that manner. I also believe that the library will stand, in the future as in the past, as the heart of every good academic institution and the soul of every city. I believe in the library beyond walls, but not the library without walls. A future with both edifice and interface.

That's what I believe, and what I hope for.

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Notes

1. This paper was presented at the Ninth Texas Conference on Library Automation, Houston, Texas, 3 April 1993.

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