ANGST & ANTICIPATION
HOW WILL WE FIT IN THE NEW INFORMATION AGE?

Ronald G. Dunn

ABSTRACT
Information, long the domain of scholars, small publishing houses, government agencies, associations, and not-for-profit organizations, has become big business. The U.S. government speaks of building information highways and infrastructures to support a shift from an agricultural and manufacturing society to a culture based on information flow. Publishing companies increasingly are owned by a few large media conglomerates. And information services are becoming one with consumer electronics appliances, cable TV, and telephone service. "Online" is suddenly a household word. Though the members of the National Federation of Abstracting and Information Services (NFAIS) played a prominent role in launching the modem information era more than 20 years ago, it is by no means clear how we will fit into the information economy that is emerging now. In this paper, Mr. Dunn examines the factors that will influence and determine the future roles that NFAIS members will play in the coming Information Age.

Introduction
A dozen years ago at the 24th NFAIS Annual Conference of March 1-3, 1982, when I was a relatively young marketing executive at Chemical Abstracts Service, I presented a paper called, "Tbe Changing Roles of Information Producers and Vendors."

I opened that presentation by saying: "This is the first NFAIS Conference I've ever attended." Since then, I've had the pleasure of participating in - or at least showing up for a drink at - every annual NFAIS gathering. I've been privileged to serve in a variety of official positions and several less formal roles in the Federation, culminating in my term as NFAIS President from 1987 to 1988. During these dozen years, I've developed pleasant and durable friendships with many people in the NFAIS community, including several in this audience, who have, in a very real sense, shaped the "Information Age" that I will speak of today.

Only now, with the retrospection that Miles Conrad lecturers are supposed to exhibit, can I begin to truly appreciate how important NFAIS has been to me, both professionally and personally. Because of my high regard for the Federation, I am particularly gratified at being chosen to deliver the Miles Conrad Memorial Lecture.

I must confess that my remarks today, while not quite stream-of-consciousness, are more in the nature of recollection, reflection, and rumination than an attempt to provide any sort of dramatic new insight. In considering how the member organizations of NFAIS - represented by many of you in this room - will fit in the Information Age of the future, I'm going to revisit and try to weave together a number of themes and issues that I've spent the last twenty-odd years thinking about. Here are some questions I'll be touching on, but not necessarily answering in any definitive way:

* What is the true nature of the markets NFAIS members serve?
* What role should the government play in developing,
supporting, and providing information services?
* What lessons can we learn from consumer-oriented information services?
* Whatever became of those elusive end users?
* How can we innovate intelligently to prepare for the future?
* How long can our current businesses hope to survive?

Incidentally, just so you'll know where I stand on the question posed by the title of this paper: I think the members of NFAIS will fit quite comfortably in the "new" Information Age, and I'll share several reasons why I believe that's so.

Before I go any further, I should also confess that I never met Miles Conrad. But I have known and worked with - or near - 18 of the 26 Miles Conrad lecturers. Several of them, including Dale Baker and

Russell Rowlett - both of whom have been my bosses, my mentors, and my friends - have influenced my life and my career more than they may ever know. And to the extent that they, and the other Miles Conrad lecturers I have known, represent the values and principles of Mr. Conrad, I can only conclude that he must have been a truly special person.

No, I did not know Miles Conrad. But what I've heard of him leads me to believe he showed the kind of decisive leadership that many of us - usually in hindsight - call vision.

How We Began
*The Federation' sounds ... like a galactic mass
born out of Star Wars (although in reality it was
born out of Sputnik)"* 1
> - Stella Keenan

The year was 1958 when Miles Conrad championed the founding of NFAIS. At the time, the Soviets had just launched Sputnik; and in Washington there was growing concern that the United States was slipping behind in science and technology.

In those days, much to the chagrin of the U.S. publishing community, VINITI, the All-Union Institute for Scientific and Technical Information in Moscow, could credibly argue that it was superior to Western A&I services like Biological Abstracts (BA), Engineering Index (Ei), and Chemical Abstracts (CA).

It's ironic that more than three decades later, through a joint venture called Scitechinform, I played a prominent role in what proved to be an abortive effort to make VINITI's databases commercially competitive on a global scale. But that's another story for another lecture ...

Anyway, to get back to the 1950s, there was even talk of creating a centralized U.S. scientific and technical information service within the federal government to meet the Soviet threat.2 That could have meant the end of the A&I business as we know it.

Miles Conrad and others founded NFAIS to avert this threat, but also - as it turned out - to seize an opportunity. The U.S. government's initiatives in the area of scientific and technical information were not only the catalyst that brought us together, but also the spur we needed to modernize, automate, catch up, and forge ahead in what was emerging as an international information industry.

In many cases, government agencies - like the National Science Foundation and National Aeronautics and Space Administration (NASA) - were also the initial funding sources that helped us pioneer electronic publishing, develop databases, launch online retrieval services, and lay the foundation for the information industry we have built over the last 30 years.

Miles Conrad could not possibly have known that all of this would result, but he was clearly a man who knew how to size-up the situation, seize the moment, and take decisive steps. As I stand here today, I can't help wondering what Miles Conrad would say about the challenges we now face ... or how he would feel about the current government initiatives in information.

The Age of Aquarius
*"An advanced information infrastructure
will enable U.S. firms to compete
and win in the global economy."* 3
> - White House 1993

It seems I can't go anywhere these days without hearing something about the information infrastructure or the "information highway," the term used for the much heralded, long-awaited, and still unrealized merger of television, telecommunications, and computer technologies. In recent television commercials, MCI observes cryptically that though the information highway has no cars or speed limits, there are passing lanes ... which I guess is supposed to mean, that you can use information to forge ahead - and I certainly have no quarrel with that. But somehow, having just looked back on how things were in the late 1950s, I find myself pining for the simplicity of cold-war analogies and the tangibility of real products like 20 Mule Team Borax or Ford Mustangs.

Well ... as the experts tell us, the age of manufacturing is behind us - like so many bronze artifacts and clay tablets, having gone the same way as the plow. Apparently, according to these experts, we don't grow crops anymore. We don't mine things. We don't smelt iron ore. We don't manufacture. We don't distribute goods. And - perhaps as a result - we don't sell much of anything, either. Welcome to the Information Age.

I'm speaking with my tongue firmly in my cheek, of course. But somehow I'm troubled by the very popularity of the notion that we are living in a revolutionary new "Information Age." The sweeping concept of a new "Information Age" has strong emotional appeal, but I'm not at all sure what it actually means to you and me in practical terms.

In his Miles Conrad lecture in 1979, Don King pointed out that, according to estimates at the time, 50 percent of the U.S. gross national product was derived from information-related jobs.[4] The following year, Carlos Cuadra reminded us that the definition of information-related jobs was so broad that it even included "the people who sweep up the holes from punch cards."[5]

Since there are no computer punch cards anymore, I'm not sure who's counted in today's statistics, but nearly a decade and a half later, the White House is now estimating that, not one-half, but two-thirds of the workforce currently have information-related jobs.[6] At this rate, in another few years we'll all be shuffling paper for a living. (Or, perhaps I should say, in more modem terms, we'll all be exchanging e-mail and electronic documents for a living ... which - I can't resist the temptation to suggest - would make us all paperless paper-shufflers.) Where do people get numbers like this? And why do we believe them? What is an "information age?"

For 5,000 years or more the civilized world has been operating on information, which is the basis of all technology, be it bronze working, pyramid building, farming, manufacturing, or providing services. The fact that information underlies our modem society is not something terribly unique to this day and age. There certainly is a lot more information than there used to be, and it's a lot harder to find exactly what you want to know, but as for an economy actually being able to subsist on the creation and distribution of information - as opposed to subsisting on farming and the manufacturing of steel and other similar tangible goods - I have my **doubts.**

Stranger than Fiction

> *"Five years ago, postmodern man, or person,*
> *put the world of information at our beck and call."*[7]
>   - Columnist William Safire

In a recent essay in the New York Times, columnist William Safire observed: "Five thousand years ago, ancient man invented writing. Five hundred years ago, Renaissance man invented the printing press. Fifty years ago, modern man invented the computer. Five years ago, postmodern man, or person, put the world of information at our beck and call."

Have I missed something? Has it suddenly become easy to go out on the networks and find a specific fact, locate a particular document, or answer a question without sorting through reams of electronic junk? Has it become simple to conduct an online search? Do our databases no longer produce false drops? Is it possible to quickly get a copy of one of the obscure original documents we cite? Is everything standardized? Did all that electronic mail moving around the world suddenly become urgent and important? Is information at our beck and call? It actually sounds like the politicians and columnists have been reading - and believing - our ads!

In preparing these remarks, I took the opportunity to review most of the speeches I have given over the past 12 years. It was an interesting exercise, to say the least. I observed that on numerous occasions I have been asked to talk about the future of the industry - always a provocative topic to address, as long as the people in the audience have short memories. Much of what I had to say in these speeches was truly forgettable. But I did find that my philosophy has been reasonably consistent for more than a decade, and that some of my views have stood the test of time. I'll be using excerpts from some of those talks today.

I am happy to say I was not embarrassed - or at least not much - by the things I said were going to happen. The reason I'm not embarrassed now about my earlier predictions is that I never promised you an information revolution.

I never stood before you and said printed publications would go away and be replaced by microfilm or, later, by online services. I never told you videotex would be in every home. And, I never told you CD-ROM would democratize information access by bringing the world's knowledge to everyone for two dollars a disc.

There is, I suppose, a safety net built into my approach of taking a somewhat conservative view of the world. But once again today, I feel obliged to run the risk of being accused of lacking vision, when I say, that as far as I can tell, there is still not much of a revolution going on. Sure, there's a lot of change in our operating environments, and we do face a lot of challenges, but that's been true for the past two decades. I'm convinced that the information highway we hear so much about is neither going to transport us quickly to a brave new world nor leave us hopelessly behind if we fail to jump on board immediately.

The *More Things Change ...*

> "I can't bring myself to believe the 'information highway' hokum.
> I've spent my career working for media companies, which
> don't seem terribly magical to me." 8
> - Columnist Allan Sloan

Columnist Allan Sloan, commenting recently in The Washington Post on the current Wall Street love affair with information companies, said that he had seen many fads come and go in his life and many will-o'-the-wisp money-making propositions come to nothing in the end. He implied that today's multimedia/information highway fad might suffer the same fate.

I can't help observing that for all the time we have spent for more than a decade talking to each other about new technologies and their potential threats and opportunities ... and for all the money we have invested in experiments and new ventures, our organizations are all still here and still doing fundamentally the same things we did when I first came upon the NFAIS scene in 1982.

All the time we have spent worrying about our future, the future has been coming and going like a wave that we rode, only to find ourselves at approximately the same spot we started from. The truth is: We are who we are. We do what we do. And what we do is important and has lasting value.

As an appendix to his 1977 Miles Conrad lecture, William Baker included the text from a 1958 report on scientific and technical information delivered to President Eisenhower. In reviewing the status of the information systems of that day, the report noted these kinds of information services in existence:

    * Primary journals and monographs
    * Abstracting journals
    * Data
    * Government research reports
    * PhD theses

None of this has changed, and I don't personally see any convincing evidence to suggest that it will change anytime soon.

For those of you who are saying to yourself, "Wait a minute now, what about online, CD-ROM, Internet, electronic this, and electronic that"... I can only say this: "The medium is not the message."

And I've been making this point for a long time. At the NFAIS Annual Conference in March 1986, when I was speaking as Director of Marketing for Chemical Abstracts Service (CAS) - which was, at the time, devoting tremendous energy and a great deal of money to the development of an international network for electronic distribution of scientific and technical information - I had this to say:

"Obviously, we're very proud of what we've accomplished in information delivery. But I'd like to begin my remarks today by stressing, as I'm happy to do from any soapbox that happens to be available, that CAS is, first and foremost, a database producer. The production of useful databases of very high quality is the heart and soul of CAS's business."

My view hasn't changed. If CAS and the other publishers in the NFAIS membership ever start thinking that the form of delivery is more important than the substance being delivered, they're headed for trouble. The database production and publishing sides of your businesses may not have much "sizzle," but they make everything else you do possible and, to a very large extent, they still pay the bills.

So, to repeat, the medium is not the message, not even with consumer-oriented information services.

The Medium Is NOT the Message
> *"We're having a tremendous problem getting people*
> *to understand what it is."* 9
>   - Robert D. Ingle
>   San Jose Mercury News

If consumer-oriented electronic publishing could be successful anywhere, one would suspect it would be in Silicon Valley. But as the New York Times reported in February 1994, recent experiments by the San Jose Mercury News in online, fax, and phone delivery of newspaper stories have met with substantial consumer resistant. According to staff of the newspaper in San Jose, the services are costing millions of dollars but there are few takers, even at a low price. The reason apparently is that people are having a hard time understanding what electronic news is, why they need it, and most importantly, why they should pay for it.

The same newspaper article reports that Knight-Ridder spent about $50 million on its Viewtron electronic news service before giving up and shutting it down in 1986.

And it has been widely reported that IBM and Sears have spent over a billion dollars developing and promoting the Prodigy service - which after a decade is still not breaking even.

Wave after wave of multimedia machines have tried to make their way into our households over the past few years. But despite the best efforts of the likes of Philips, Kodak, and Tandy, very few of us have made room in our homes for these devices. It's little wonder, I guess, when you consider that a recent survey of VCR owners in America found that fully 16 percent of people who own VCRs have never even been able to set the clock.

Incidentally, the consistent failure of consumer-oriented information services to attract large numbers of customers willing to pay meaningful prices reminds me of our own frustrating pursuit of the elusive end user of scientific and technical databases. At the NFAIS Annual Conference in 1985, in a presentation entitled, "Why Front-End Systems: The Pros and Cons," I showed the following series of slides ...

Step 1 was always clear to me.

> **End-User Searching**
> **Step 1:** User Desires Information

And I always knew the desired outcome, Step 3.

> **End-User Searching**
> **Step 1:** User Desires Information
> **Step 3:** User Receives Excellent Search Results

But I could never quite figure out how this was supposed to happen, unless ... we add in Step 2.

> **End-User Searching**
> **Step 1:** User Desires Information

Step 2: A MIRACLE OCCURS
Step 3: User Receives Excellent Search Results

Regrettably, I'm not aware that a miracle has occurred since 1985. As far as I know, no one in the NFAIS community has yet cracked the direct end-user searching market in a financially significant and profitable way. In fact, it remains to be demonstrated that commercially important end-user markets exist for our kinds of businesses at all. But, I digress ...

Can anyone remember how long we've been talking about the threat of new technologies driving us out of business?

Survival of the Fittest
Well, as this quote from the bulletin of ASIS shows, it's been at least 15 years.

> *"The prospect of electronic publishing ...*
> *and a largely paperless society may appear*
> *as a threat and a danger. . ."* 10
>   *Bulletin of ASIS,* 1979

When I first entered this industry - back in the electronic dark ages - I was quickly advised that the print publishing business was threatened by a competing new technology. The new medium was cheaper to produce than a printed book, much easier to copy, and sure to be pirated by zealous librarians, copyright-defiant scholars, and unscrupulous foreigners. The medium that threatened our very existence in those days was ... microfilm.

Well, we survived the threat of microfilm, but then came worries about high-powered photocopiers, fears about pirated magnetic tapes, then videotex, downloading ... CD-ROM ... more recently, the Internet ... and now the information superhighway. So far, we've managed to cope with all the major technological changes that have come our way. But, the future, if nothing else, is always uncertain.

To Be, or Not To Be
> *"Forecasting is hard ... particularly of the future."*
>   - Anonymous

So, what do we have to fear now from the Internet, NREN, or Data Highway 95? Let's talk about some of the alarming possibilities for the future.

First, for some scenarios that cause unrest among the primary publishers in the audience today:

1. Universities will take back the lead they once had in publishing scientific and technical papers by producing peer-reviewed electronic journals without any involvement by today's publishers.
2. Images of journal articles will move uncontrollably across the networks, escaping all attempts to enforce copyright controls and collect appropriate royalties.
3. Document delivery services will reach their ultimate extreme and, as a result, only one copy of each printed journal will be sold.

Now for some concerns of the secondary publishers here today:

> 1. Printed information services will die out entirely, making it difficult if not impossible to keep up the coverage and pay for the "first copy."
> 2. The substantial online revenues that we've grown accustomed to over the last 15 years or so will dry up as all usage turns to CD-ROM and its electronic relatives.
> 3. When the full text of journal articles is available electronically, there will be no need for abstracts and indexes, period.

Incidentally, in the final stages of preparing these remarks, I came across an interesting column by Barbara Quint.11 In the February 1994 issue of Information Today, Barbara discusses some of the same issues I've just listed here and concludes that primary publishers are headed for troubled waters as the "document delivery revolution" shifts the emphasis to individual articles rather than journals and as more articles are published exclusively in electronic form. She also concludes that the growth of what she calls "Interneted scholarship" may mean the beginning of a "brave new world for A&I

services." I recommend Barbara Quint's column to you as an interesting point of view that is somewhat different from my own.

My own belief is that, as ominous as some of our worries seem - and there is a modicum of truth in each of the scenarios I have listed - there is no reason to assume that any of them will actually happen, at least not to such extremes. Electronic publishing developments are more likely to create opportunities for us to tap new revenue streams than they are to make our existing products and services obsolete in the near term.

Threat or Promise
Here's one of my favorite quotes from ten years ago - it reflects the presumed opportunity and the tangible hazard of electronic publishing.

> *"By 1990 electronic publishing will be a $60 billion business.*
> *I'm just not sure if that will be $60 billion in revenues or expenses."12*
> - Anonymous, *Business Week*, 1984

Yes, there are experiments with electronic journals going on ... and they've been going on for more than a decade. Yes, there are people - mainly at colleges and universities - who see publishers as unnecessary middle-men, if not outright enemies of the most desirable form of communication: person-to-person among members of the invisible college. And yes, there are those who believe the world would be a better place if publishers could be short-circuited by the authors themselves self-publishing research results over the Internet.

But all this overlooks the fact that publishers truly add value in the process of making information public. Publishers select the material to begin with; they edit it; they ensure appropriate expert reviews and quality checks; and they package it effectively - all of which adds value to the material long before they distribute it. And - perhaps most important of all - publishers lend their reputations to the work they publish under their names and imprints.

Those who say they can get along fine without publishers are also underestimating the staying power of their own institutions, social traditions, and reward systems, which encourage print publication ... not to mention the egos of the authors - who even now in the late twentieth century, still want very much to be "published" in print.

As for widespread copyright violation in an electronic environment, I will not dismiss the potential for problems. But that's what we hire lawyers for. And the courts have been supportive of late, most notably in the Kinko's case, where a limit was put on the notion of educational usage being entirely exempt from copyright ... and in the Texaco case, where the concept of "fair use" in a corporate setting was significantly limited. Copyright is something we'll have to keep watching and managing, but copyright abuse is unlikely to wreck our businesses. We will survive.

And long before we find ourselves in a situation where we are reduced to producing only one printed copy of each journal, we - or more likely our descendants - will have come to terms with how to make a profit in a new kind of publishing environment.

I submit that nothing in the real world today suggests that full-text electronic journals will replace the need for abstracting and indexing services. The state-of-the-art in information retrieval is a long ways off from being able to perform the intellectual analysis of a trained abstractor and indexer. And anyone who has tried to perform a full-text search in a large database on a higher level concept - rather than a specific word appearing in the text - knows that it is still an unpredictable and unreliable proposition.

Furthermore, there are tremendous logistical barriers to putting the full text of the world's scientific and technical literature online (let alone on compact discs). The A&I services represented in this room today cover tens of thousands of journals, which publish millions and millions of documents a year, not to mention staggering numbers of books, conference proceedings, and other kinds of documents.

These documents originate in more than a hundred countries all over the world and are published originally in dozens of languages. The scope and corpus of the material covered by A&I services simply defies full-text searching as we know it. Even if, as some claim, most scientists could get by with a few core journals, the few experiments in offering full-text journals online or on disc have been marginally successful at best. Though, without a doubt, researchers would like to have the full text of certain key documents delivered to their computers, the demand is not nearly as great as one would expect, based on the success of the services that have attempted to do this to date.

I firmly believe that abstracting and indexing journals in both print and electronic forms are going to be here for the rest of our lifetimes and then some.

As for online replacing print, CD-ROM replacing online, and Internet and the information highway replacing both, I remain a skeptic. The world of information services is very much a mixed bag in which various media serve specific market segments and satisfy different customer expectations and requirements. Who in this room doesn't use printed sources anymore? Of those who search online, how many of you are prepared to give it up completely for CD-ROM access?

And what about the threat of government information policy?

Fact or Fiction
Vice President Al Gore, speaking at the White House, gave this encouraging assessment of the proper role of the government in the information infrastructure.

> *"The public sector role is to create the wholesale database.*
> *The private sector can supply the retail market."*13
> <div align="center">- Al Gore, 1993</div>

As Alice B. Toklas would have said: "Interesting, if true." In my cynical moments, this reminds me of the punch line from a tired old joke: "I'm from the government, and I'm here to help you."

The risk of the government emerging as a direct competitor to our commercial information services is not a new threat. The current initiatives of the U.S. Patent and Trademark Office and the Library of Congress, both of which seem intent on providing commercial information services while keeping themselves wrapped carefully in the mantle of the public interest, are merely the latest incarnations of a recurring problem. But for the most part, we have been able to convince decision makers in Washington that they are better off working with the private sector than against it. Recent statements from the White House would tend to confirm that we have made our point.

Yet the threat is always there. No U.S. publisher is bigger than the federal government, and no data are more likely to fuel NREN and the information superhighway than this vast collection of low-priced information. Are publishers and online vendors at risk? To the extent that they depend on inexpensive access to government data, perhaps. But it's useful to remember that the MEDLINE database has long been offered by virtually every important online host in the world - at various pricing levels - despite the availability of NLM's own low-cost alternative. So even when the government decides to compete with us directly, it doesn't mean that we can't find ways to hold our own.

The More Things Change ...
We hold our own in part because what we do is inherently durable. This is another of my favorite quotes.

> *"Journals refuse to die, whether they are read or not."*14
> <div align="center">- Library Journal, 1988</div>

Most of the organizations involved in NFAIS specialize in providing scientific and technical information to professional markets. When we step back and look at the basic forces that drive these businesses, it's hard to identify anything that seems likely to seriously threaten our livelihoods.

As the scientific literature has grown rapidly over the past five decades, so has the number of practicing scientists. According to the National Science Foundation, there are more than twice as many physical scientists, life scientists, and environmental scientists in the United States now as there were

20 years ago. There are three times as many psychologists and engineers. And there are four times as many social scientists. These people all need access to information, and they drive the demand for our services.

Scientists are not going to quit doing research. They are not going to stop recording their results. They are not going to quit publishing these results in printed technical journals. And - as a result - they are going to continue to need help sorting through the vast output of information that the scientific community generates.

In fact, in a world increasingly cluttered with electronic mail, countless drafts of collaborative papers, unevaluated results, and amateur research that floods the computer networks daily, it would seem to me that A&I services are more necessary than ever. And I don't personally plan to trust Gobots, Robots, or Knowbots - by any name - to go out on the inter-galactic network, sort through all of the garbage, and bring back what I really need.

Angst & Anticipation
Last year, Art Elias observed,

> *"The evolution of ... information services, has followed*
> *a Darwinian survival of the fittest model."* 15
>
> <div align="right">- Art Elias</div>

So, will we continue to survive? Should we approach the future with anxiety or hope? Well, as is so often the case, a little of both would seem to be in order. In some respects it was more comfortable to be in the information industry in the days when it was the quiet domain of scholarly researchers and serious database producers and not a household phenomenon hyped out of all proportion. But times change, there is no turning back the clock, and we have no choice but to keep moving forward.

For the people in this room, I want to offer just a few words of advice: Keep your eye on the ball. Remember who you are and what your customers expect of you. Let the Baby Bells develop dial-in weather reports, sports updates, and horoscopes. Let the cable companies develop movies on request, video news clips, and home shopping services. Let the entertainment industry bring virtual reality to those who aren't satisfied with the real thing. All of this has very little to do with us.

The average American is never going to sit down on a Sunday afternoon and search Chemical Abstracts for kicks. They're not going to be overcome by urges to browse MEDLINE, NTIS, or other databases that we produce. We need to fit what we do to the needs of our customers, not to the technological visionaries' views of the world.

We need to stay focused on the right issues. I spoke to this topic in a paper called "Innovation in Scientific and Medical Information," which I presented to an Information Industry Association meeting in 1984.

In that talk, I referred to a book called Marketing High Technology,16 in which the authors distinguish between supply-side markets and demand-side markets for high-tech products. In a supply-side market, dramatic technological advances literally create markets and demand. Marketing programs usually follow the lead of R&D developments. High-tech advances of this kind are founded on a presumption of a market need, rather than on a careful analytical identification of customers' desires and problems.

On the other hand, demand-side markets are less chaotic and driven more by market considerations than by technology. In such markets, R&D's role is to extend and improve products and technologies in response to specific customer needs identified by marketing.

With that as background, I went on to say: "I believe that those of us who are engaged in providing scientific and technical information services are operating in demand-side markets. Our markets are mainly vertical, highly specialized, relatively mature, and relatively small. However, much of the advice that we hear today comes from people who are operating at the other end of the spectrum - on

the supply side. They advocate bold, risky technological innovation as the path to success, and they often downplay the role of careful market research and planning in innovation."

"However, I must emphasize again that all of us do not live on the cutting edge, and that some of us can succeed and grow only through steady, long-term progress rather than through quantum leaps of innovation. Some of us should ignore the siren's song of the high technologists."

Please don't conclude that I believe our only option is to throw in the towel and resign ourselves to a dull and tedious future.

Future Outlook

> ALICE: Cheshire Puss, would you please tell me
> which way I ought to go from here?
> THE CAT: That depends on where you want to get to.
> - Lewis Carroll
> *Alice in Wonderland*

The future is - as it has always been - in our own hands. There will be ongoing and continuing demand for the services we provide by the people we have historically provided them to. We're going to have to continue to make media choices and pricing decisions, to constantly seek ways to improve the quality of our databases, and to develop useful new products based on our customers' needs. And we're going to have to do everything possible to modernize our operations and to contain or reduce our costs - because to a very large extent, we are managing mature businesses at this point.

The coming information super-highway and information infrastructure certainly will bring new opportunities. For one thing, we may be able to return to the type of cottage abstracting and indexing industry that made our production processes so cost-effective in the early days. Our intellectual workers may be able to work at home in the future by telecommuting over the data highway. We all may be able to travel a little less. And just as the fax machine and cellular phone have made it possible for us to do things faster, we may see productivity increases from more networking, as long as we don't get distracted by the influx of unnecessary communication that these convenient technologies tend to encourage.

As the electronic future unfolds, I expect that we also will discover new, incremental revenue streams as opportunities develop to repackage our content and create innovative value-added services tailored to the new forms of delivery media that will undoubtedly appear. But those opportunities will materialize only if we do the basic job right: Only if we continue to build relevant databases of excellent quality.

Having touched briefly on a wide range of ideas today, I want to conclude by saying that I myself have nothing but optimism about your continued success.

I would like to end my remarks by recalling comments from two presentations I delivered in 1982. First, at the 6th International Online Meeting in December 1982, in London, on the subject of "Why Secondary Services Will Survive and Thrive," I said:

"Certainly secondary services should not blithely go about their traditional businesses, oblivious to the changes going on around them. Even the strongest must change to survive. But, the changes will be gradual, not catastrophic. The essential function of secondary services will be needed as much in the foreseeable future as it is today. T'hat function is filtering unmanageable amounts of information down to a smaller number of items that are of interest to a user. The precise way in which we accomplish this filtering process undoubtedly will change. The successful secondary services of the future will be those that are adept at sensing market needs and users' preferences, and adapting their services accordingly."

And finally, I conclude today as I did in my first NFAIS presentation, several lifetimes ago, at the annual conference in 1982, by saying:

"One comforting thought is that no one in the information business, including your competitors, is blessed with sure knowledge of the future. We're all scrambling, and each of us has the opportunity to create our own special advantage. I hope all of you will."

With those thoughts, I guess it's time for all of us to go forth boldly into the new Information Age ... You go ahead. I'll be right behind you.

_____

References

1 Former NFAIS Executive Director Stella Keenan, "Signposts of the Past and Future," i *n Abstracting and Indexing Services in Perspective: Miles Conrad Memorial Lectures, 1969-1983* (Arlington, VA: Information Resources Press, 1983), 37.

2 White House Press Release, December 7, 1958. See *Abstracting and Indexing Services in Perspective: Miles Conrad Memorial Lectures, 1969-1983* (Arlington, VA: Information Resources Press, 1983), 186-187.

3 The White House, *The National Information Infrastructure: Agenda for Action*, Version 1.0, Part VI. Published on FEDWORLD, Fall 1993.

4 Donald W. King, "The Information Community: Its Dilemma, Opportunities, and Challenges," in *Abstracting and Indexing Services in Perspective: Miles Conrad Memorial Lectures, 1969-1983* (Arlington, VA: Information Resources Press, 1983), 212.

5 Carlos A. Cuadra, "Surviving the Eighties: New Roles for Publishers, Information Service Organizations, and Users," in *Abstracting and Indexing Services in Perspective: Miles Conrad Memorial Lectures, 1969-1983* (Arlington, VA: Information Resources Press, 1983), 231.

6 *The National Information Infrastructure*: Agenda for Action, 1993.

7 William Safire, "I Dream of Genie," *New York Times*, February 7, 1994, p. A17.

8 Allan Sloan, "Paramount Pitfalls, Class E Acts and Other 1993 Hits and Misses," *The Washington Post*, December 28, 1993.

9 William Glaberson, "In San Jose, Knight Ridder Tests a Newspaper Frontier," *New York Times*, February 7, 1994.

10 Martha Williams and Ted Brandhorst, "Future Trends in A&I Data-Base Publication," *Bulletin of the American Society for Infortnation Science*, February 1979, pp. 27-28.

11 Barbara Quint, "Building Foundations for the Future," *Information Today*, February 1994, pp. 7-9.

12 "Publishers Go Electronic-An Industry Races to Relearn the Information Business," *Business Week*, June 11, 1984, pp. 84-97.

13 Vice President Al Gore, speaking at the White House Conference on "Delivering Electronic Information in a Knowledge-Based Democracy," August 1993.

14 Dougherty & Johnson, *Library Journal*, 1988.

15 Art Elias, *The NFAIS Yearbook of the Information Industry*, 1993, Medford, NJ: Learned Information, 1993.

16 William L. Shanklin and John K. Ryans, Jr., *Marketing High Technology*, Lexington Books, 1984