GROWING USER INFORMATION DEPENDENCE
AND ITS IMPACT ON THE LIBRARY
AND INFORMATION SERVICE FIELDS†

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The now widely accepted description of the new post-industrial society as defined by Daniel Bell clearly points to an emphasis on the provision of services rather than on the production of goods. In part this is true because improved technologies for agricultural and industrial production now allow a smaller and smaller proportion of the population of the Western world to supply even the increasing demands for the food, the clothing, the shelter, and the material goods which at one time took all of our strength and all of our energies. This change is certainly coming to your part of the world as well, as advances in science and technology are absorbed and applied. The growing emphasis will be on the provision of services — in part because having others do things for us is an indication of our growing affluence and wealth — in part because the number of potential services increases as our imagination and desires constantly stay one step ahead of what we have — and in part because increased efficiency and increased performance also bring with them increased complexity.

Through the 19th century and into the early 20th, man was relatively self-sufficient and much in control of his own course of action. Now we sit by the side of the road for several hours waiting for a tow truck, because the car has broken dow and

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because arrangements under the hood have become so complex that one can’t even get anything any more. One hundred and fifty years ago our forebears might have been able to build their own house. Now we wait 2 weeks for someone to come and give us an estimate on fixing a squeak in the heating system.

How does all this apply to information? We certainly know that the provision of information, in its various guises and forms, is among the most rapidly growing if not the most rapidly growing of the service professions. Although we might find such a definition of information somewhat too broad for the concerns of this audience, it has been suggested that in the developed countries we already spend or are about to spend more on information (if you include the media) than on capital goods.

However, even applied to the more narrowly prescribed bounds of information as we are more accustomed to using it, the growth has been startling. Georges Anderla\(^1\) has projected the world’s literature growth in science and technology at 8% year. While others have quarrelled with this projection of rapid increase, Dale Baker\(^2\) of the Chemical Abstracts Service reported as far back as 1976 that the chemical literature, at least as covered by his service, was still taking less than 10 years to double, a projection which closely matches Anderla’s. Baker reported that, in 1975, Chemical Abstracts included the abstracts of 324,000 papers and books, and with the addition of patents, over 454,000 total documents, more than twice the figure for 1965, and a rate which will have put just this one information service at a level of over 1,000,000 document announcements per year by 1986. However, the growth does not simply stop there. Because, with the increased availability of machineable data bases, our access to this growing file of literature has also increased. To what extent? Nobody really knows. But certainly we are beyond the constraints of information access as defined by the holdings of the card catalog of your local library for books, and shelf copies of abstract-index journals for the periodical literature. The growth of data bases was estimated by Martha Williams\(^3\), in her 1977
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article in the Journal of the American Society for Information Science, to be from fewer than 20 in 1965 to over 300 publicly available data bases in 1977, with better than 50 of these now available on-line. These are, of course, far and away the largest of the data bases. The rate of growth since then has further accelerated. A good student for 1982 would certainly be in thousands, not hundreds.

Lee Burchinal, the former head of the U. S. National Science Foundation's Division of Information Science and Technology projected even somewhat larger numbers than Professor Williams.

In a paper presented at a U. S. -- India binational seminar, he described the startling growth in on-line searches. In the U. S. alone, and from a beginning in about 1968, on-line searches had grown to 1,000,000 per year in 1975, and were expected to surpass 4,000,000 by 1980. We have no accurate numbers for that year, but we can be sure the estimate was conservative, as the projected rate of growth for new technology frequently is. Where is the potential limit? It is impossible to predict with any accuracy. Experience tells us that, in dealing with new concepts, while we are usually overly optimistic in predicting what will happen in the next year, we are invariably well below target in estimating what will happen 10 years from now. Even assuming that all of the 1975 searches were performed by or for scientists or engineers, an assumption both simplistic and inaccurate, it would still only amount to a half a search per year per scientist or engineer, and even the 1980 projection of 4 million searches only permitted the average technical professional one search every six months.

It seems inevitable that, in an atmosphere of so much growth and development, change will be rapid and continuous. It seems almost as inevitable that complexity will increase, despite the protestations that this ought not to happen. Part of the reason, it seems to me, is built into the growing inter-relationship of subject disciplines, at the very time when these disciplines, become
ever narrower and more specialized. Another part of the reason comes from the political and economic factors which govern the generation and dissemination of databases.

I think it can be argued that rapid development of machine-readable files has been greatest precisely where artificial interference and constraint has been the smallest. Data base development in an open economy tends to come from three sources — government, professional societies, and private industry. While the publicly avowed motivation and value system as between professional societies and private corporations may differ, in reality the factors which drive decisions are basically the same. In both cases there is usually a genuine belief that the data base being created will meet a need — if it did not how could you sell it? The need for financial validation is equally the same. Neither societies nor companies have hidden gold reserves from which to finance a money-losing abstract-index service, and members of a society are as loath to subsidize a charitable undertaking as are stockholders in a corporation. Studies which the Indiana University Graduate Library School Research Center have undertaken for the National Science Foundation (NSF) on the economics of the publisher-library interaction convince us that the economically motivated decision model differs only in the nomenclature applied. What is labeled a profit in industry is called a surplus in professional societies, and both are essential if there is going to be further innovation, development, and growth, as there must be in any meaningful and dynamic system.

Several years ago a regional network of academic libraries in the United States criticized *Psychological Abstracts*, a professional society product, for an increase in price for on-line database access. I was not and am not sufficiently familiar with the financial constraints, nor do I want to be, to be able to comment on the validity of this price change, but the simple and perhaps simplistic suggestion that the publisher should forego a price increase because the information for the data base is already in machine-generated indexes and thus therefore relatively free
of cost ignores both the economics of publishing and the factors which motivate pricing decisions. The determination of the extent to which a data base competes with, or perhaps in some instances enhances, the sales potential of published indexes, is part of the overall marketing strategy which any publishing organization must develop, professional societies no less than commercial organizations.

It becomes an absolute essential that for a data base to be developed effectively, to meet the objectives perceived by its originators, it must be developed selfishly. By that I mean that if the charter which your program has set for itself requires the inclusion of certain information, that inclusion is no less valid simply because some other data base also decides, for its own reasons, to cover the same information. In fact, while the material being included may be the same, it is likely that the difference in orientation of subject scope will almost automatically account for differences in treatment and display. Even data bases which presumably cover relatively neatly defined subject areas are not immune to interpretation. Take chemistry. Does anyone really know where chemistry ends and biology begins? Or physics? What is the difference between physical chemistry and chemical physics? If academic departments within universities cannot agree on lines of demarcation, it is hardly reasonable to expect that producers of abstract/index publications and data bases who, if they err, must err on the side of inclusiveness, would do so. The problem is further compounded by the emergence of inter-disciplinary problem orientated data bases, concerned with such broad topics as energy, pollution, and nutrition. It can be assumed that virtually everything covered in these data bases will be contained in subject data bases as well, although the emphasis of approach might very well be totally different.

Government produced data bases generally show this same lack of consistency, depending on the mission statement of the agency involved. As an example, in the United States the Department of Defense concerns itself with controlling and announcing
all documents produced by and for the Department of Defense, regardless of subject, while the National Aeronautics and Space Administration is concerned with all documentation related to space, regardless of originator, and definitely including some Department of Defense reports, those concerned with space, as NASA defines it.

Producers of abstract/index tools and data bases have been quite defensive about the extent of their overlap coverage. A study undertaken by the National Federation of Abstracting and Indexing Services (NFAIS) and published in February 1977 points out that, among 14 major scientific and technical abstracting and indexing services, only 21% of the 26,000 journals scanned were scanned by two or more services. Furthermore, only 23.4% of the articles in those journals which were covered by more than one service were in fact included more than once, a two-level approach which could lead you to conclude that less than 5% of the articles were in fact double covered.

Perhaps so, but it would also be of significance to know whether or not these articles were any more important (in terms of frequency of retrieval) than the body of literature as a whole. I suspect they might have been.

In any case, the presumption that duplication is unnecessary duplication is easily open to challenge. As the NFAIS report points out “Even when two or more services do index the same article, this does not really imply unnecessary duplication, because the intellectual analysis of the article content by each service is intended to serve the particular needs of its users. For example, a research chemist’s approach to a secondary service for identifying the literature he needs may be entirely different from the approach by an engineer, whose subject terminology may be completely different from the chemist’s.”

Any assumption that an item of the literature belongs in one abstract/index tool or data base only is probably an extension of the premise in librarianship that every item in the collection deserves one particular place. We therefore spend a considerable
amount of time worrying about where exactly to park a specific item, letting users then worry about figuring out where we have hidden it. The totally reasonable suggestion that perhaps we ought, if we have more than one copy, place one in each of several locations within the system, is of course anathema to the values of the library profession.

Despite the somewhat defensive nature of the NFAIS study, and the almost obvious relief with which the investigators report the relatively small amount of overlap, it raises in at least this commentator’s mind the perverse thought that perhaps there isn’t overlap enough — that perhaps some degree of redundancy is still one of the most effective techniques for insuring retrieval. Those of us who have worked with retrieval problems from subject files probably realize, although we may be loath to admit it, that only the multiple approaches provided by computerized access have enabled us to do meaningful subject searches. The one or two or three necessarily broad subject headings attached to a manual catalog card make searching of subject headings highly unprofitable and many if not most subject searches are in fact carried out through the author or the title file.

One of the main reasons we continue to be concerned about the avoidance of duplication, and about the growing number of data bases, is because we are still wedded to the forlorn and injudicious hope that somehow we must allow the researcher to maintain direct contact with the publications in his field. Forlorn because there is little evidence that he is either interested or competent in doing so. Injudicious because the best hope for this profession and its practitioners, be they called librarians, information officers, or documentalists, is that of assuming the crucial role of information intermedia between the researcher and his literature.

Strategies for the development of information systems have consistently been based on the premise that the researcher or scholar is anxious to have more and new esoteric tools to permit him to access additional information sources. I am sure that
there are some individuals who fit that description, but most researchers and certainly decision makers with whom I have come in contact are not looking for more to read, they are looking for ways to cut down on the amount of reading they are doing now. This is behind much of the concern about overlap and presumed redundancy of information which prompts studies such as the NFAIS abstracting and indexing overlap study referred to earlier. My dealings, in particular, with scientists and engineers in industrial settings as part of my consulting assignments, yield a highly cautious reaction to the suggested implementation of mechanized selective dissemination of information, what are called SDI profiles. Their thoughts immediately turn to stacks of unread journals, and then fear that these stacks will ultimately topple over and bury them. They don’t want the journal issues for their own sake, they want to know if they contain anything germane to the solution of their present problem. I find these users generally dissatisfied with the tried and true library technique of routing journals. They arrive at inconvenient times, they contain much information of no interest, and yet there is a sense of guilt, at least among some, about holding up the journal from further distribution. And so many of them cross their names off the list and pass it on, pretending they have read it.

The designers of our abstracting-indexing services, data bases, and major information systems insist on and perpetuate the myth that their output is going to be used directly by technical professionals. I teach a course in the literature of science and technology at the Indiana University Graduate Library School, and my students learn quickly enough that with some significant exceptions such as Chemical Abstracts, the abstract/index and data base services pay not the slightest attention to the real needs of the real users of these information tools. Most of them, particularly those produced by professional societies, but also certainly including government services, are self-perpetuating clubs which pay little attention to the needs and preferences of the real users, in part because it is an embarrassment to acknow-
An embarrassment? Certainly politically so. I served for five years as Executive Director of the contract-operated National Aeronautics and Space Administration Scientific and Technical Facility. During that time the agency persisted, in its program design strategies and financial justifications, in describing the users of its information services as scientists and engineers, when we knew that virtually all of the document requests, and most of the machine searches, were performed for and by librarians and other information workers. The reason for this stratagem was perfectly obvious. Funds are far easier to justify and obtain for the support of front line bench researchers than for the support of libraries.

When the National Library of Medicine first designed its on-line MEDLARS system, it was with rosy justifications about men and women in white lab coats sitting at terminals, and perhaps rushing back to the laboratory or even the operating room, if you care to be melodramatic, to use the results of their information searches for instantly successful application. It never happened. The people at those terminals are librarians. A number of projects were aimed at the implementation of the premise that information systems should be geared to the common denominator of the interests and capabilities of the untrained scientist and researcher. A number of other research projects at various universities are aiming at this same premise, at making information access systems fit the level of competence of the ultimate user. It would be a harmless exercise, except for the fact that by reducing file structures and access software to a common denominator, we back away from the optimum capability which sophisticated file design and search strategies for uniquely structured data bases frequently offer us.

The premise is, as I suggest, based on a myth — the myth that the ultimate users of information enjoy the process of search and discovery in the literature, and that they would prefer to do this themselves, given the option. It is more likely that they
do it, when they do it, because they don’t trust anyone to do it for them, or because somebody has told them they should do it themselves. Furthermore, they do it badly — I’ll come to that later.

Perhaps except for those involved in basic research (and even there only perhaps) individuals need information not for its own sake, but for the purpose of doing something else — of making a decision, of writing a report, of choosing an experimental alternative. They usually want and need the information quickly, simply, and with as little work on their part as possible. Mooer’s Law, that if it is easier to make assumptions and guesses than to dig for information you know is there somewhere, people will pretend there is no information and make assumptions and guesses, has been demonstrated over and over again to every information professional. Furthermore, most professionals fail to see the information gathering and evaluation process as one of particularly high gratification and reward. As George Shapiro of the University of Minnesota has pointed out, they identify with the library in terms of their own childhood, when they felt somewhat overawed and overwhelmed by the power structure which confronted them and the rules with which they had to comply. Now they have achieved power, prestige, and a salary at least twice that of the people who work in the library. They are certainly not going to expose to these people that there are tools they don’t know how to use. So they stay away entirely and pretend they don’t need information, or they send their secretaries.

I started this talk by pointing to the growth of service functions, and of the acceptance of delegating work to specialists, while at the same time feeling superior because, after all, these people work for us. One of the symbols of power is the ability to delegate work to others, particularly work we don’t want to do ourselves.

Twelve years ago a major corporation developed what was one of the earliest on-line interactive management information
systems. They placed a keyboard and cathode ray display into the office of every senior executive, with the promise that with the use of these terminals they could get instant reporting and updating on such important considerations as production status, unfilled orders, inventory, and cash flow. The system worked perfectly, but the executives wouldn’t use it. They wouldn’t use it because they perceived, and still perceive, of sitting at a keyboard as a clerical function, and of the need to ask and interpret their own questions as a lowering of status. And so these executives were provided information intermediaries, and the terminals were given to these staff assistants sitting in outer offices. These intermediaries would perform the searches and provide the information, either after being asked, or on an automatic updated basis. The executives went back to their comfortable methods of information access befitting their status — receiving digested reports and analyses, summoning people to their office for oral briefings, and using the telephone. Don’t confuse the growing fascination with video games with a presumed change in user habits. What some people like to do for fun does not affect the way they want to be seen as professionals.

However, in addition to dealing with the myth that information systems should be designed for direct access by the ultimate user, despite the fact that he neither uses them or cares to use them, and despite the risk that fitting the system to his level of understanding and training may dilute and downgrade information access, we deal with an additional myth. That is the myth that professionals know the literature of their field, and can make evaluative judgements about that literature — at least to do it better than librarians and information officers.

I was surprised when I came to an academic community after 25 years in government and industry, at the extent to which academic libraries have abdicated the selection process to their faculties. During times of affluence, when the real test of a high quality library was in its ability to identify and locate obscure materials which nobody else had, library bibliographic specialists
and acquisition officers had a prized and valued role. However, during the present time, when the number of easily identifiable potential acquisitions far outnumber the available funds, many librarians have reported, paradoxical as it may seem, that decision and evaluation procedures within the library have all but disappeared. Instead, we are engaged in a tortuous and highly political process of buying or renewing what we must, frequently involving the allocation by formula of materials budgets to various departments and schools, a process which guarantees that whatever imbalance and inequities now exist within the collection will be perpetuated and exacerbated. In fact, many of these highly prized libraries have disintegrated into little more than free book stores for the acquisition of materials for storage in faculty offices. I am not suggesting that the same practice does not also exist in many industrial or governmental libraries. It undoubtedly does, but perhaps not to the same extent.

I would be the last person to suggest that libraries and information center be operated without paying attention to the needs of their users, but there is, I think, considerable danger in running them simply in response to the priorities and desires which they express, and the needs as they perceive them. To suggest that we may have more valid perceptions about their information than our users is, for the information sector, a radical new thought, but it is totally consistent with the acceptance of service specializations developing in other fields.

What can we say about information operations run to the specifications of their user communities? Well, for one, that expectations of information service are abysmally low. It might be expected that, by contrast, expectations for materials collection might be high, and this is generally true, but only for the very narrow and specialized area of the user's own competence, and not for the collection as a whole. Our users don't really care about the quality of the library, only about the quality of their part of it.

Almost without exception, in my experience, the determina-
tion that an information service was poor and needed substantial improvement came either from its own staff, or from a higher level of management, and never from complaints from its users. Expectations for analytical and evaluative services are almost non-existent, and this appears to be true even when this service could be provided by individuals whom the user might accept as fellow-professionals and practitioners in his own field. Certainly the concept of information analysis centers, so fervently put forward by Alvin Weinberg\textsuperscript{7} more than twenty years ago, has never really taken hold. In fact, the last several years have seen the demise of a number of information analysis centers, ostensibly because of budgetary pressures, but in reality because of a lack of interest. There is always money for things which people really want done.

My own experience in dealing with, in particular, scientists and engineers, points to a strong insistence on the development of a materials collection, but a materials collection based on tradition and experience rather than on newly evolving needs. The self-perpetuating and self-validating invisible college system is simply not geared to an awareness of newly evolving publication sources and publication formats, particularly when these require access to information in related or even unrelated disciplines in which the user has neither experience or training. This is not intended as a criticism. I believe that the fact that professionals in various disciplines can no longer keep up (if in fact they ever did) with needed information in their fields is neither surprising nor disturbing. They have other, perhaps more important things to do. What I think is disturbing is that we, as information professionals, expect them to keep up themselves, or allow them to pretend that they do.

User evaluations of their information needs tend not only to be narrow in scope, but also conservative. Known things will invariably outrank unknown things. One of the most disturbing findings of our federally sponsored study\textsuperscript{8}, to me, although many others hardly noticed, was the pattern of decision
priorities which emerged when large academic libraries no longer had enough money to maintain their historic practices of journal acquisition — namely, to renew everything already bought and subscribe to everything newly published. Forced to make reductions in their periodicals subscriptions, these libraries failed to renew some existing subscriptions, to be sure. However, to a far greater extent, their budget trimming took the form of not subscribing to newly published titles, despite the fact that they presumably knew or should have known that much of the most important information is only covered in new journals.

Librarians, of course, must bear their share of responsibility for this non-evaluative value system under which existing titles, no matter how useless, take precedence over new ones. Some of these are bound to have at least some potential, particularly in view of the recognition that many emerging discipline are covered only by new publications and not at all by old stand-bys. Certainly, the library workload system would be geared to renewing the existing subscription and foregoing the new title. However, the complicity in this process of our subject specialist users, and in many cases their out-right insistence on this value system, calls sharply into question the assumption that professionals in various subject areas are indeed the best qualified monitors of their own literature. On an after-the-fact basis, of literature they have once seen, without a doubt. But how can they judge the usefulness of information about the existence of which they know nothing, when in fact they believe they already see everything of importance to them? It is an absurd assertion, but nobody has ever challenged it. And so we have individuals working on similar projects, some the beneficiaries of large sophisticated information services, others dependent on the routing of twenty journals by the departmental secretary. And yet each insists that his information system is adequate. He must, how can he admit the contrary?

Who is the information user, anyway? If we are talking about the ultimate recipient of information service, be he or
she bench chemist, economist, or business executive, then I doubt that hopes and expectations have very much to do with the case. These individuals have for a long time suffered from a severe case of information over-supply, and they have rationalized what they find time to do as being adequate to their needs. After all, they are not paid to digest information, they are paid to do productive work. They have no choice, and if necessary they will lie to themselves and to others, or perhaps even train themselves to believe, when they assert that they have all of the information they need — or that they would have all of the information they needed if only we would provide them with these five journals which contain everything they need to know.

The development of new abstracting and indexing services, progressively narrower, specialized and therefore less self-sufficient, and of new machine-readable data bases with unique and complex search strategies and differing vocabularies or free text search, does nothing for these individuals except increase their anxiety. They don't need more information services. They already have more than they can possibly cope with. They want, if anything, less information, but they need answers to their problems.

If, on the other hand, the user is an information professional, trained and expert in the knowledge of data bases and search strategies, then not only do I see a meaningful utilization of the world's growing literature and the tools with which to access it, but also a promising future for those who now labor in this vineyard, unappreciated and underpaid. Not all of them, by a long shot. But enough of them, and enough of the new recruits attracted by the challenge and opportunity, to fill the ranks. However, to do this they must understand nomenclature, technology, and the problems confronting the organization they serve. More importantly, they must understand that the need is not for reports and journal articles, but for answers. I am, of course, talking about the concept of the information intermediary, and I am talking about a conscious and planned approach to remove
the user from primary contact with the literature, not to bring him closer to it. He’s never been that enamored with it in the first place.

However, old value systems and old prejudices die hard, and the implementation and acceptance of this professional intermediary concept will not be sudden or automatic. It requires, first of all, a belief by information professionals in their own role and their own importance. It requires an assertion and insistence that in fact the ultimate user professional really knows very little about the literature of his field, that he knows less and less all the time, and that the problems of solving his information needs are beyond his scope. Or, if it seems preferable, that he has more important things to do than worry about books, journals and reports. Acceptance of the need to rely on specialists is, after all, not that strange. We do it to an increasing extent in all other areas of our daily activities.

It requires, additionally, a shift from the preoccupation with materials to a concentration on answers. I foresee the information function as demanding and exacting, and its practitioners as meeting those requirements. The question to be addressed is: what is the need? Don’t ask the ultimate user what he would like you to look at or where he thinks the answer might be found? Fine if he volunteers suggestions, but don’t simply assume that he knows, or embarrass him if he doesn’t know, or force him to pretend he knows.

Finally, it requires an understanding by abstracting service and data base producers of who it is for whom their services are being produced, and some input by the real users regarding those services. In an increasingly interdisciplinary world it is foolish to insist that information services in a subject field are produced specifically and directly for the practitioners in that subject field. If these information service producers recognize their audience, then perhaps, and only then, can we achieve some consistency of approach, arrangement, vocabulary, and format. But only where this can be accomplished without dilution. Common
denominators tend to be small numbers.

What I am suggesting has, of course, major implications for the philosophy of the present self-service library. There are fields in which self-service will continue, either because the field is truly narrow, clearly defined, and highly specialized, or because research investigations are carried out, as they sometimes are in the humanities, over a lifetime and not in preparation for tomorrow’s meeting. These, however, also tend to be the fields in which information tools are sparse or primitive.

In applied science and technology, business and industry, and government, however, the need is not for the more sources of information for the ultimate consumer to scan — the need is for answers. If any of you doubt this, look at the recent development of commercial organizations whose sole purpose is to analyze and digest information contained in our libraries and information centers, and to apply it to problem solving — or at least, to synthesize, boil down, and comment on in terse, directly applicable statements. It is this need which the growing group of on-demand information services have recognized and addressed, because we have either failed to recognize the concern or refused to involve ourselves in it.

The capabilities of computer technology, and the funding support of concerned governments and industries, have allowed us to make remarkably rapid progress in the development of tools in many fields with which to come to grips with the problems of expanding literature, expanding inter-dependency, expanding specialization, and increasing time constraints. At present our tools, which will most certainly continue to develop as pressure increase and technology improves, already outstrip our abilities to use these tools, because of an insistence that somehow these must be geared to the ultimate user’s interests, abilities, and available time.

Optimum simplification consistent with or in conjunction with the maintenance of other values is always a worthwhile goals, but simplification as an end in itself in a desperate rearguard
attempt to make the system fit the wrong user is not the right answer. We in the more rapidly developing areas of the world have had both the problem and the opportunity of dealing with these shifting needs and shifting capabilities. We have not always chosen wisely, much of the time our actions have been unplanned and haphazard. As you approach these issues, and you certainly will and must, you have the chance to adopt what we have done well, to avoid what we have done badly, and to come up with new and innovative approaches of your own.

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