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FIVE YEARS, FIVE VOLUMES AND 2345 PAGES OF THE ANNUAL REVIEW OF INFORMATION SCIENCE AND TECHNOLOGY

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THE ANNUAL REVIEW OF INFORMATION SCIENCE AND TECHNOLOGY (ARIST) [1] is now 5 years old. In these 5 years ARIST became not only a very much used and quoted tool, but also an established institution. This is testified by the fact that each of the five volumes was the year's most frequently and most comprehensively reviewed book in the field. The ARIST effort is unparalleled in great many fields.

Currently we are entering an era of intense concern about and reactions to science and technology. All sciences and technologies are subject to questioning, scrutiny and evaluation both inside and outside of their subject areas. The world-wide repeated phrase: ". . . we have come to the end of the honeymoon with science and technology . . ." paraphrases the situation most aptly.

Scrutiny of a field may be attempted by a scrutiny of its important literature items. With 5 years and five volumes ARIST invites and affords a perspective. This review is attempting in broad brushstrokes to be a critical examination of the underlying structure, and literature base as well as the achievements of the ARIST effort as a whole.

PURPOSE OF ARIST

The stated purpose of ARIST is ". . . to describe and appraise the development in information science and technology during the past year". It is also stated that ARIST ". . . became established as the foremost current awareness and reference tool available to professionals in information sciences". Furthermore the term "review" in the title carries its own implication as to purpose. Are these purposes achieved? The answer is neither simple, nor could it be objective. It all depends, of course, on interpretation of concepts. For instance, what is "information science" and what is "information technology"? What is implied by "review"? What is meant by the terms "describe", "appraise" and "development" which are mentioned in the statement of purpose?

MAGNITUDE OF THE EFFORT

The biggest appreciation of the semidecade of ARIST comes from the realization that in sheer magnitude the five year effort is enormous. And even if nothing else, the amazingly punctual mastery of this magnitude deserves a lasting tribute to editor Carlos A. Cuadra, to assistant editor Ann W. Luke, both at System Development Corporation, to the staff,

to the advisors, to the authors. Let us not forget that each volume appeared on time for the annual meeting of the American Society for Information Science. It is of interest to examine even superficially this magnitude, because it sheds some general light on the effort of the field.

In five years ARIST compiled 2345 printed pages;—of these 2069 were text and 276 were indexes. Distributed over the five respective volumes there were 351, 444, 428, 471 and 371 pages of text and references with exclusion of indexes. It is tempting to speculate that the page growth in Vols. 1–4 and the decline in Vol. 5 also somewhat reflects the growth and the decline of the overall efforts in the field in years 1965–1969; it will be seen later that the distribution of the number of citations also reflects this growth-decline symptom.

There are two indexes in a volume: to a given volume and a combined index to previous volumes. In five volumes there were 276 pages of indexes which are exemplary and exceptional. To illustrate the magnitude of indexing effort: in Vol. 5 there are 93 pages of indexes.

The five volumes contain 66 chapters; respectively there were 12, 14, 13, 14 and 13 chapters. Thus, the simple structure as far as the breakdown in number of chapters remained basically constant over the years.

REVIEWERS

Of the 66 chapters, 64 were written by 82 authors (reviewers) identified by name and two chapters were written by collective authors identified as institutional "staff". An author was associated only with one chapter—thus each volume had a unique set of reviewers. Most chapters (47 to be exact) were written by a single author; 16 chapters were written by two authors and one by three. It seems that writing reviews is an individual effort, in contrast to writing science papers, which now more and more are authored by more than one author. Author distribution over the five volumes is also relatively constant; there were 13, 18, 18, 16 and 17 authors (with exclusion of "staff") in each volume.

All the authors are well known professionally. The affiliation of the 82 authors at the time of writing may be approximated as follows (with annual breakdown in parentheses):

Universities:	32 (4, 7, 9, 7, 5)
Consulting/research/service companies and institutions:	
Profit:	15 (1, 7, 1, 4, 2)
Non-profit:	12 (2, 1, 5, 3, 1)
	27
Government agencies:	10 (3, 1, 1, 1, 4)
Industry:	9 (2, 1, 1, 1, 4)
Professional societies:	4 (1, 1, 1, 0, 1)

Of the 32 university affiliated authors (reviewers) only 13 may be termed full-time faculty members in schools of information, library, or computer science. This rather seems a low number—does it tell something about the faculty (which in other scientific fields is the most frequent source for reviewing) or about the reviewer selection procedures of ARIST or that the field, as a whole, is not too strongly academically based? The remaining 19 university authors are affiliated with other departments, research/information centers or

libraries in that order. As a single group the majority of authors are either in profit or non-profit consulting/contract research or service business. An estimated 60 or even 70 per cent of authors are primarily engaged in some aspect of practical application. A great number of these performed research at one time or another, but the primary orientation of the majority of authors in their professional life is practice; very few authors can be classified as primarily working scientists. This, of course, imposes an orientation on the reviews more than anything else. (It was found out long ago that one has to look at the historian to understand his version of history.) Again it is tempting to speculate that the affiliation distribution of ARIST reviewers is representative of the affiliation distribution of information science and technology literature authors as a whole.

STRUCTURE AND RELATIONSHIPS

It is generally accepted that "information science" is the scientific discipline that investigates the behavior and properties of information as a phenomenon, of communication as a process where information is being transmitted, and of information systems that carry out the communication processes. The fundamental problem orientation of information science lies in the investigation of processes associated with man's communication of knowledge. As other sciences, information science branches into a basic (theoretical) and an applied (experimental, developmental) component. "Information technology", on the other hand, is not that well defined. In the broadest sense it is interpreted as anything that encompasses the practical aspects of information handling; in a narrower sense it implies the application of modern communication technology to information systems; and in the narrowest sense it means computers. At times term "information technology" implies only the engineering and hardware aspects, at times the systems analysis and operations, and at times only the software. There is ample confusion in the field as a whole as to what is information science and what information technology; and what is information practice; what is the structure of the field or fields; what are the internal relationships between the various works, efforts and directions; what is the cumulative knowledge gained; or in summary, what is the topological map, so that workers in the field can orient themselves approximately in the same sense.

The ARIST notion of what is encompassed by information science and technology can be to some extent extracted from its content structure. With slight modification this structure remained constant over the five volumes. Each ARIST chapter covers a general topic; in the first three volumes the chapters were presented in a single sequence. This did not show the relationships between chapters and since Vol. 4 ARIST is divided into four or five basic parts, each containing a number of related chapters; in Vol. 5 these were: (I) Planning Information Systems and Services, (II) Basic Support Tools, (III) Techniques and Systems, (IV) Special Applications and (V) Professional Aspects. Each part has a very helpful short introduction and summary.

Over the five volumes a regular planned pattern of chapter (topic) appearance can be discerned; there are the following four types of topics:

A. regular topics appearing under basically little changed titles in all five volumes (approximately 50 per cent of each volume):
   1. "Information needs and uses";
   2. "Design and evaluation of information systems" (in Vol. 2 this topic was presented in two chapters);
   3. "Document description and representation" (in first four volumes this topic was "Content analysis, specification and control");

4. "File organization and search techniques" (every volume had a slightly different title);
5. "Library automation";
6. "Professional aspects" (in Vols. 4 and 5 this incorporated "Library and information center management").

B. regular topics with different emphasis from volume to volume (some 20–40 per cent of each volume):

1. Hardware: Vol. 1: "New hardware development";
   Vol. 2: "New hardware development and product announcement";
   Vol. 3: it did not appear;
   Vol. 4: "Reprography and microform technology";
   Vol. 5: "Microform technology and reprography", "Computer technology" and "Communication technology".
2. Applications: Vol. 1: "Information systems appl.";
   Vol. 2: "Chem. comp. in inf. systems", "Appl. in medicine";
   Vol. 3: "Appl. in med.", "Inf. systems appl. in education"; "Inf. networks";
   Vol. 4: "Inf. networks";
   Vol. 5: "Management inf. systems". "Inf. systems in state and local governments".

C. topics appearing at planned intervals (some 10–30 per cent):

1. Information centers: Vol. 2: "Inf. centers and services";
   Vol. 4: "Abstr. and index. services in science and technology";
2. Vols. 2, 3 and 5: "Techniques for publication and dissemination of inf.";
3. Vols. 1 to 4: "Automatic language processing";
4. Vols. 3, 4, 5: "Document retrieval and dissemination in libraries and inf. centers" (in Vol. 4 these were two chapters).

D. Occasional topics:

1. Vols. 1 and 2: "National issues and trends";
2. Vol. 4: "International transfer of inf.".

What does this structure reflect? Upon comparative examination one can discover that it mostly follows the pattern of large grants as awarded in the early and mid-sixties by the three major granting agencies: Dept. of Defense, National Science Foundation and National Institute of Health. The grant pattern was in turn set in the forties and fifties when it was believed that the "information problem" consisted of application of computers to manipulation of a large number of indexes. As a result the term COMPUTER was treated in super-capital letters and everything else in very small ones. ARIST followed that stance too. The heavy emphasis is on application of information technology (particularly computers) and aspects that infringe upon it and not on information science. As a matter of fact from ARIST no clear distinction can be derived between information science, information technology and information practice; there is no way to discern theory from experimentation from practice from announcements or even promises. It cannot be said often enough that the fundamental difficulties of the field as a whole can be traced to the failure to distinguish between science and technology, the fundamental problem thus is a lack of structure and specification of relationships. ARIST was not a leader in that respect—it simply followed the confusion of the field, it reflected it faithfully. This is a pity, because one would expect that clarification and delineation of the topological map of the field as a whole would be one of the major purposes of a review such as ARIST.

There are works in the field that are concerned with theory or experimentation. The nature and object of these works changed over time. Since ARIST's structure was frozen, problems of what is meant by a topic, which include these works, had to arise. For instance: in the past few years there were very few studies on evaluation or design of information

systems, but the chapter continues, now reporting all kinds of studies that deal with experimentation which is not at all restricted as being aimed at design or evaluation. The chapter on uses and needs continues although user studies are on the decline; literature structure studies and bibliometrics became in the last few years a vital area of study—these studies are buried in part in user chapter and in part in evaluation chapter. From ARIST one cannot discern that this area is rapidly developing. A number of other similar instances can be brought to attention.

As far as relationships are concerned, each reviewer is by necessity forced to construct his own topic organization, his own map and structure within which he classifies and reports work; thus the reviewer's background and orientation is the determining factor. Unfortunately, these structures differ from year to year, thus in cases where even the name of a chapter may be the same, the approach, organization and structure is not: there is no relation. Furthermore, in the same volume there is no attempt to relate works between different chapters. Each chapter is in total isolation from the others. Again in this ARIST could not entirely be blamed. It followed the prevalent practice of the field as a whole—many works are indeed prepared in vacuum, with little cumulation and coordination of knowledge. Still, ARIST should have tried to tie together the chapters within a volume and from volume to volume.

Another quite evident problem of ARIST which deals with structure and relations is the restriction imposed by the annual schedule. While it is convenient for all, readers and publishers, to issue the review on an annual basis, the actual work reported does not fall into such a neat pattern. Reviewers, being restricted to report on one year's work are not able to encompass the roots and framework which might have stretched over a number of years. It is no accident that the first volume of ARIST was by far the best: the authors were permitted and required to incorporate in their topic the whole historical and conceptual framework of the subject reaching over as many years as necessary. This provides an important clue and the most important suggestion of this review: instead of structuring ARIST annually on basically identical topics, wouldn't it be better to commission state-of-the-art reviews to cover topics as a whole in their full synthesizing framework (as monographs in science are done), and repeat these topics only when significant progress is apparent? Or as a compromise, ARIST could be divided into two parts: one, state-of-the-art monographs as mentioned and two, a larger annotated critical bibliography incorporating most items published in the previous year. In that case ARIST would accomplish something that is badly needed: it would provide synthesizing monographs and it would cumulate and relate knowledge.

In conclusion, in its structure ARIST faithfully reflects and follows the problems, pitfalls and failures of the field as a whole. As a matter of fact, it is a most useful tool for identifying and dissecting them.

LITERATURE CITED

The reviewers constantly stress that the literature selected for citing and reviewing was only a fraction of literature that was collected and that exists. Thus, the literature cited neither is, nor does it claim to be, all-inclusive. This is natural and correct; for one, book-publishing economics pose constraints, and furthermore (as often mentioned in reviews) an inclusion–exclusion judgment is being made. Obviously, one can agree or disagree with the criteria for that judgment; at the end an examination of citations provided this reviewer with reasons for disagreement.

In five volumes there were some 7350 citations distributed as follows: 1106, 1594, 1665, 1654 and 1331 citations. These are *not* unique citations; naturally, there is some overlap (i.e. some citations appearing in more than one chapter or more than 1 year) however, the overlap is surprisingly low. The number of citations grew from Vol. 1 to Vol. 4 and fell off in Vol. 5. As asked previously, does this reflect the growth and decline of the efforts in the field (after all the drastic cut-back of grants started in 1968/69)? Or is it a reflection of book publishing economics and constraints? Or just a coincidence?

Bibliometric investigations demonstrated that analyses of citations may illuminate many elements of which a literature and subsequently a field is composed. Thus, some general analyses of the citations in ARIST are presented here. However, because of the magnitude of work, only the citations appearing in Vol. 5 were analyzed. The 1331 citations appearing in 13 chapters of Vol. 5 can be approximately grouped by origin into following four classes:

J: 699 citations were from journals; these included journal articles, feature items, news announcements and all other items appearing in journals.
R: 343 citations were to technical and other reports, brochures, news and public relation releases and other irregular items not generally available.
P: 232 citations were to proceeding papers presented at meetings, conferences, symposia, etc.
B: 57 citations were to books or parts thereof.

The J,R,P,B breakdown for individual chapters is presented along with other data in Table 3. Conclusions:

1. In sciences and technologies the prime impact communication medium is journals, especially those with rigorous peer review procedures. Only some 50 per cent of ARIST citations are to items in journals. The term "items" is deliberately used instead of "articles" because an analysis revealed that quite unsuspectedly a large proportion of citations from journals are not articles, but news and publicity items, announcements, features, etc.
2. The next highest cited items, some 25–30 per cent, were to reports (technical and other) and to all kinds of items printed without any constraints. It is amazing that this literature, which is completely uncontrolled qualitatively, still attracts so much attention. Very few of these items are worthwhile, and those that are end up anyhow as journal articles. It is strongly recommended that the technical report and especially brochure literature should be abandoned for ARIST reviewing, with very, very few exceptions. Some while ago the technical report literature was important, there were no journal outlets; however, this is not true any more; ARIST does not reflect that change.
3. Proceeding literature (some 15 per cent) is somewhat qualitatively controlled, but that depends upon the given conference organization. Startlingly enough, many of the proceeding citations are to papers presented at conferences that did not issue any published proceedings—thus these are completely inaccessible.

Because various analyses of literature have observed that no other literature is as important in science and technology communication as journal literature, a further analysis of the 699 journal citations is attempted. The 669 citations come from a total of 165 different journals; 87 different journals provided only one citation each and 83 provided two or more citations each. The frequency distribution from highest cited journal down (with journal names given up to frequency 5) is presented in Table 1.

This literature distribution can be grouped into zones of journals producing approximately equivalent number of articles, as expressed by Bradford law [2] and as modified to achieve a maximum distribution and thus a minimum nucleus [3] as shown in Table 2.

Conclusions from Tables 1 and 2:

1. The journal literature in Vol. 5 is distributed according to Bradford; the Bradford multiplier is relatively constant between zones—or as constant as found in a number of other literature studies; the Bradford distribution indicates a sort of regularity in the literature as observed in a number of fields; the regularity provides, if desired, orderly means for controls, corrections and investigations of literature; the regularity is encouraging—there are many fields and bibliographies where this regularity cannot be found.

TABLE 1. FREQUENCY DISTRIBUTION OF JOURNALS CITED IN VOL. 5 OF ARIST

No. of journals	With no. of citations:	Journal name
1	49	J. Am. Soc. Inf. Sc.;
1	28	Spec. Libr.;
1	27	Book Production Industry;
1	26	Coll. Res. Libr.;
1	25	J. Chem. Doc.;
1	18	J. Libr. Autom.;
3	17	ASLIB Proc.; J. Doc.; Libr. Resour. & Tech. Serv.;
1	15	Bell Labs. Rec.;
3	14	Datamation; Libr. Trends; Program;
1	13	Harv. Bus. Rev.;
2	12	Bull. MLA; IEEE Comp. Gr. News;
1	11	Bus. Automation;
5	10	Drexel Libr. Q.; Inf. & Rec. Mgt.; Nat. Microf. Ass. J.; Pub. Weekly; Sci. Inf. Notes;
2	9	J. Syst. Mgt.; UNESCO Bull. Libr.;
2	8	Data. Proc. Mag.; Libr. Q.;
4	7	ALA Bull.; IR & Libr. Aut. Lett.; Mgt. Sci.; Wilson Libr. Bull.;
4	6	Bell Syst. Tech. J.; Inf. Stor. & Retr.; Libr. J.; NFSAIS News;
8	5	Chem. & Eng. News; Comp. & Aut.; Data Syst. News; FID News Bull.; Fortune; IEEE Spectrum; IEEE Trans. Comp. Tech.; Larc Report;
8	4	
14	3	
19	2	
82	1	

TABLE 2. BRADFORD DISTRIBUTION OF JOURNALS CITED IN VOL. 5 OF ARIST

Zone	No. of Articles in the zone	Produced by no. of journals	Bradford multiplier
1	77	2	—
2	78	3	1·5
3	84	5	1·7
4	79	6	1·2
5	79	8	1·3
6	78	12	1·5
7	77	19	1·6
8	75	38	2·0
9	72	72	1·9
	699	165	

2. The core journals for Vol. 5 (zone 1 journals) were J. ASIS and Spec. Libr; these two journals produced approximately as many articles as the 72 journals together in the last zone.
3. The distribution reveals a great spread of journals producing only 1, 2 or 3 articles; the reason for this spread can be found from the analysis of data in Table 3.
4. The top producing 10 per cent of journals produced close to 50 per cent of articles; on the other hand the bottom producing 50 per cent of journals produced slightly over 10 per cent of articles.
5. From the frequency/journal list any reader can determine for himself the following: many journals that contributed citations with high frequencies (and thus are placed in higher zones) are not by any criteria scientific or technical journals or they do not have peer review procedures. For instance, Book Prod. Ind., Datamation, Program, Bus. Automation, Pub. Weekly, Inf. & Rec. Mgt., Sci. Inf. Notes, Data Proc. Mag., IR & Libr. Aut. Letter, Wilson Libr. Bull. etc. These journals even themselves do not claim to be scientific/technical literature. (This should in no way be construed as a criticism of these journals; they have valid and useful functions of their own.) It is just hard to explain and understand the presence of so many trade, popular, advertising and news journals contributing at relatively high rate to ARIST. If this is a true reflection of the field then the only conclusion that can be made is that the field has no serious substance as a science or technology, where "science" and "technology" is interpreted in the classic sense of the word.

A chapter by chapter analysis of literature origin and journal contribution, presented in Table 3, reveals (with additional analysis made, but with data not presented here because of lack of space) the spread of journals among different chapters which explains the reasons of journal proliferation. This further illuminates the structure of ARIST and possibly of the field. (Underlying the conclusions below are two assumptions: (i) since chapters represent subject areas, conclusions may be extended to the areas and (ii) sharing of a journal population between chapters is an indication of some kind of connectivity between chapters and thus, between subject areas.)

Conclusions from Table 3:

1. Chapters derived to a smaller or larger extent their citations from differing journal populations. Some chapters have a set of journals so different from other chapters that there is almost no overlap.
2. As to connectivity based on citing from a similar journal population two groups of chapters or subject areas emerged: closely connected and completely independent.
3. Chapters 1 (Inf. Needs and Uses), 2 (Design and Eval. of Inf. Systems) and 6 (Doc. Desc. and Repr.) are most closely connected with each other: on the average, they derive some 70 per cent of their respective citations from the same journals.
4. Connected with that group (but not as closely) are chapters 8 (Libr. Aut.), 10 (Current Aw. & Diss.) and 13 (Libr. and Inf. Center Mgt.): on the average they derive some 40–50 per cent of their respective citations from the same journals as above mentioned chapters 1, 2 and 6.
5. This first group's (chapters 1, 2, 6, 8, 10 and 13) centrally connected chapter is chapter 2 on Design and Evaluation. That chapter shares journals more than any other chapter within the above group. Thus design and evaluation may be interpreted as being either the core subject area or a catch-all topic, the latter would mean that it is not a subject area at all. Closely following chapter 2 in that respect is chapter 1 on Needs and Uses. It is my interpretation that these two chapters are not core subject areas, or even any subject areas, but that they are used as catch-all for all experimental and theoretical work.
6. As to their independence, the following chapters derived the given percent of citations from journals that appear only in that chapter:

   Ch. 5 (Commun. Technology): 88 per cent citations from journals unique to Ch. 5.
   Ch. 3 (Comput. Technology): 75 per cent.
   Ch. 9 (Publication & Distr. of Inf.): 73 per cent.
   Ch. 11 (Mgt. Inf. Systems): 63 per cent.
   Ch. 12 (Inf. Systems in State and Local Govt.): 61 per cent.
   Ch. 4 (Microform & Reprogr.): 46 per cent.
   Ch. 7 (File Org.): 33 per cent.

7. None of the above seven chapters had strong ties (as the first group had) with any other chapters. The least connected (and then seemingly randomly connected) were chapters 12, 11, 9 and 7.
8. The independence of each of these seven chapters or areas may be interpreted as being the result either of (a) the background, orientation and interpretation of the reviewers—reviewers themselves

TABLE 3. LITERATURE DISTRIBUTION IN INDIVIDUAL CHAPTERS IN VOL. 5 OF ARIST

Chapter	Short title	No. of citations from					Top five journals that contributed citations at the given rate (ties for the 5th place included)	Unique no. of Journals
		J	R	P	B	Tot		
1	Inf. Needs & Uses	52	36	17	9	114	*JASIS* 8; *Coll. Res. Lib.* 7; *J. Doc.* 6; *Spec. Libr.* 5; *Nauch. Tehn. Inf.* (*Russ.*) 3;	25
2	Des. & Eval. of Inf. Syst.	53	50	29	2	134	*JASIS* 15; *J. Doc.* 8; *Spec. Libr.* 5; *CRL* 5; *Bull. MLA* 3; *Libr. Res. & Tech. Serv.* 3;	17
3	Computer Technology	27	9	19	2	57	*IEEE Comp. Gr. News* 12; *Datamation* 3; *IBM J. Res. Dev.* 2; *rest freq.* 1;	13
4	Microfilm & Reprography	61	16	15	2	94	*Inf. & Rec. Mgt.* 10; *NMA J.* 8; *Bus. Aut.* 5; *Datamation* 5; *Data Syst. News* 5;	21
5	Commun. Technology	50	14	25	3	92	*Bell Lab. Rec.* 15; *Bell S. Tech. J.* 6; *IEEE Spectrum* 5; *IEEE Tr. Comp. Tech.* 4; *W. Union J. Rev.* 3;	20
6	Doc. Desc. & Repres.	54	24	15	3	96	*JASIS* 16; *J. Chem. Doc.* 8; *Lib. R&T Serv.* 5; *ASLIB Proc.* 2; *J. Doc.* 2; *J. Libr.* 2;	25
7	Org. Maint. & Search of Mach. Files	9	22	18	5	54	*Comp. Surveys* 2; *RCA Inf. Sys.* 2; rest with freq. 1;	7
8	Library Autom.	107	37	34	4	182	*J. Libr. Aut.* 16; *Program* 13; *Drexel Libr. Q.* 8; *Lib. R&T Serv.* 7; CRL 6;	40
9	Publ. & Distr. of Inf.	57	16	25	2	100	*Book Prod. Ind.* 27; *Pub. Wkly.* 7; *Better Edit.* 4; *Data Proc. Mag.* 3; *Graph. Arts Mon.* 2;	18
10	Curr. Awar. & Diss.	88	48	6	2	144	*ASLIB Proc.* 11; *J. Chem. Doc.* 9; *Lib. Trends* 9; *Sci. Inf. Notes* 9; *Spec. Libr.* 8; *NFSAIS News* 6;	26
11	Mgt. Inf. Syst.	73	18	2	12	105	*Harv. Bus. R.* 13; *J. Sys. Mgt.* 8; *Mgt. Sc.* 7; *Bus. Aut.* 6; *EDP Anlzr.* 3; *Fin. Exec.* 3; *Syst. Proc. J.* 3;	31
12	Inf. Syst. in State & Loc. Gov.	15	34	18	4	71	*Datamation* 3; *Pub. Adm. R.* 3; *Soc. Ec. Plan. Sci.* 3; *Pub. Autom.* 2; rest freq. 1;	8
13	Libr. & Inf. Cent. Mgt.	53	19	9	7	88	*Libr. Q.* 6; *CRL* 6; *J. Chem. Doc.* 5; *Spec. Libr.* 5; *Wilson Libr. Bull.* 4;	23
	Total	699	343	232	57	1331		165*

* Not a sum but a union of unique Journals in all 13 chapters.

may be independently oriented, or (b) this may reflect the reality of these areas—the areas may indeed be independent, or (c) this may reflect the vacuum in which the work in these areas is performed —the areas are not independent but currently the work is.

9. It happens that all the independent areas are related to developments in technology or to special practical applications. A good number of journals in these areas are not scientific/technical journals; these areas were the major source of the mentioned popular, trade, advertising, news, marketing and similar journals. Is this the reflection of journal communication patterns for these areas? Are these the only journals in these areas? Probably not—but if this were the case then one has to conclude that these areas are *not* subject areas in a standard scientific or technological sense but they may be areas in some other sense. The larger questions loom: if ARIST citation pattern is a reality what is then information technology as treated in the field? It certainly does not incorporate engineering. Does it then just reflect the rather naive popular and marketing aspects of something that engineers build? And applications for which the general principles lay elsewhere? Should then these areas be reviewed independently in ARIST in the present form?
10. Interesting sociological citation patterns may be observed. For instance: it struck me as inordinate that the third ranking journal (cited 27 times) in Vol. 5 of ARIST was *Book Production Industry*. This is not really a commonly cited journal in information science, information technology or library science. Analysis revealed that all the 27 citations came from chapter "Publication and Distribution of Information" written by P. D. Doebler affiliated with *Book Production Industry*. A sporadic check was made of the other 4 volumes: only one citation to an article from BPI was found in Vol. 3 and one in Vol. 4—both citations were to the same article. Thus, it seems that the first four volumes cited only one (or at most very few) article from BPI and the fifth cited 27. Other instances of reviewers' self-citation at substantially higher rates than cited by others can be found elsewhere in ARIST. The editorial controls of ARIST should be more rigorous.

Finally, to turn to the authors of cited literature. A very approximate analysis of indexes reveals that the 20 most frequently cited authors (regardless of type of literature) in the five volumes were from highest: G. Salton, H. Borko, D. G. Bobrow, R. F. Simmons, P. Atherton, F. W. Lancaster, C. A. Cuadra, R. R. Freeman, W. J. Paisley, T. J. Allen, R. V. Katter, D. W. King, R. M. Hayes, A. M. Rees, S. Herner, C. W. Cleverdon, E. M. Keen, J. Becker, F. G. Kilgour and D. J. Hillman.

The background of these authors varies widely; the single highest common background is library science—some 33 per cent have a library degree. Their places of employment vary; highest single employer was System Development Corp.—at one time or another some 25 per cent of these authors worked for SDC; none worked, except one or two for brief periods, for government. All of these authors were over the years major recipients of large government grants. At the time when their cited work was done not more than 20 per cent of them were also employed as teachers. In their work orientation not more than 10 per cent of the authors can be termed as primarily theoreticians; some 40–50 per cent are experimenters; the rest consultants and developers.

APPROACH TO REVIEWING

In a broad overview the approach taken by ARIST reviewers can be summed in one word: uncritical. With few exceptions, one cannot obtain an impression of what works were of higher quality, what of lower, what of no quality—more or less all items received equal treatment and equal quality weights. This general policy did not change throughout the five volumes. As an end result ARIST turned out to be in a large part a little more than an expanded annotated bibliography—at that, an extremely good one. Admittedly it is extremely hard to sort out quality work and arrange it according to some kind of a score, covering a short time period of 1 year, but it is my impression that at least few outstanding papers in each chapter could be singled out for a special treatment, even if this consisted of just calling attention to them.

By necessity ARIST developed a peculiar and contagious style that is being perfected over the years. The style consists of the following paradigm:

	( )		
(Author's name)	(citation number)	(variation of verbs denoting work)*	(object)

The uncritical attitude of ARIST is not due entirely to ARIST—it is a reflection of the field as a whole. A system of positive quality ordering and evaluation of works (outside of few journals) is quite unknown in the field, thus it is no surprise that it could not be established in ARIST to any larger degree. However, there were instances where quality evaluation was incorporated in some reviews. It is suggested that ARIST should significantly enlarge its role as quality evaluator of the field's work. This could be done by omissions: reviews could cut down the number of citations included for discussion, and present in detail only those that are considered of quality by an editorial board of peers; if necessary other citations could be simply appended to the chapter.

ACHIEVEMENTS AND OMISSIONS

The analysis, criticisms and recommendation in this review were done for only one reason: ARIST is an important and valiant achievement, it is a useful and badly needed tool—why not make it even more useful? Achievements? ARIST brought together widely scattered literature, otherwise completely bibliographically uncontrolled. Although one might disagree with its structural map ARIST did impose its own map, which is more than the field had; as a benefit the deficiencies of that map illuminated and exposed fundamental problems of the field which now could be rectified. Although ARIST did not go far enough, it did create the beginning of a tradition of critical evaluation by peers outside of individual journals. In its appearance and perseverance ARIST is dependable—which in itself is a great achievement. ARIST's major weaknesses are not entirely of its own making—they are a reflection of the weaknesses of the field.

As to its stated purpose (repeated at the beginning) here is a summary capsule judgement:

"describe":	yes indeed, it does it well;
"appraise":	by and large it does not;
"information science and technology":	it does not distinguish between them; it is largely oriented toward technology and practice not science;
"current awareness and reference tool":	superb for that use, but only for those who are already in the field; it does not claim to be and it is not for students and beginners;
"review":	it does only partially; it does not coalesce, evaluate, or criticize which is the basic expectancy of a review of this type.

* A sampling of verbs used in the ARIST style paradigm: discusses, provides, studied, has written, insists, proposed, reports, includes, observed, has shown, describes, used, presented, formulated, introduced, argues, applied, believes, provided, offered, took, viewed, announced.

Omissions? Two types: the first, those due to the weaknesses of the field have already been enumerated; the second, are related to the lack of detection, discussion and identification of major underlying trends, as well as philosophical and sociological reactions. From ARIST one cannot detect that there are some serious reactions underway, reactions which are transforming not only the points of view but also the field as a whole along with other sciences and technologies. It is possible that these reactions may undercut or even extinguish the field. (Remember what happened to machine translation?) Our major efforts were directed toward utilization of technology for provision of information from literature. Somehow, somewhere in the application of all this technology something went wrong. The basic literature information problems were not solved, or even dented, especially in comparison to the efforts and money invested. The failures cannot be ascribed to the technology alone—it is more correct to state that the base of the failure is our meager and naive understanding of the problems and processes to which technology was applied and of technology itself. The solution was equated with the problem.

The following facts were not recognized by ARIST (as paraphrased from *New Scientist*, January 14, 1971, p. 61): science has largely been confused with technology; both have been consistently oversold; technology has failed to deliver the goods; government and other funders have consequently become disenchanted. As a result, research, development and even operational budgets have been cut drastically; in many areas they ceased; management, users and the public have become bored with the whole thing, and are now in search for a new panacea based in humanism—we may be witnessing something like a new renaissance. We simply have to face these truths. It is a pity that ARIST up to now did not really help us in facing them. It should attempt to do so in the future. For the rational solution of a variety of man's problems society desperately needs, without question, better communication of knowledge worth having and thus better information systems based on better understanding of the properties of knowledge. This is the justification for facing these truths, for scrutiny, for continuing and intensifying work in information science and for ARIST.

SUMMARY OF MAJOR RECOMMENDATIONS

1. ARIST should completely revise its structure to reflect current directions. A positive and clear distinction should be made between (a) information science, (b) information technology and (c) information practice. Translation of efforts between these areas should be attempted. Announcements and promises should be treated as such.
2. The excessive orientation toward information technology in general and computers in particular should be balanced with treatment of other areas, especially those fundamental to the problems rather than those fundamental to the solutions.
3. Information science in particular should be treated, reviewed and interpreted as a science. Theory, when and where it exists, should be given a prominent review.
4. Relationships between works and topics should be exemplified. Knowledge should be cumulated. Instead of repeating essentially the same topics each year ARIST should commission state-of-the-art reviews to cover topics as a whole in their full synthesizing framework (as monographs in science are done) and repeat these topics only when significant progress is apparent.
5. ARIST may be divided into two parts: first, the state-of-the-art monographs and second, a critical annotated bibliography of the year's literature.
6. A qualitative judgement should be imposed upon literature cited. Priority should be given to articles from journals having peer-review procedures. News items, announcements, features, etc. from journals, if treated at all, should be treated separately. Citations to popular, trade, advertising and news journals should be held at an absolute minimum.
7. Technical report literature should be omitted with very, very few exceptions. In any case clear distinction should be made between report and other literature. Brochures, public relation releases and the like should be omitted completely. Papers presented at meetings that had no published proceedings should be omitted completely.

8. Self-citation by reviewers should not be excessive.
9. The approach to reviewing literature should be considerably more critical and evaluative. The reviews should not be expanded annotated bibliographies.
10. Attention should be paid to the reaction of the social and philosophical milieu of the field. The fundamental problems should be identified and discussed. ARIST should become a leader in that respect.

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