

Information Science Abstracts: Tracking the Literature of Information Science. Part 1: Definition and Map

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Information Science Abstracts (ISA) is the oldest abstracting and indexing (A&I) publication covering the field of information science. A&I publications play a valuable “gatekeeping” role in identifying changes in a discipline by tracking its literature. This article briefly reviews the history of ISA as well as the history of attempts to define “information science” because the American Documentation Institute changed its name to ASIS in 1970. A new working definition of the term for ISA is derived from both the historical review and current technological advances. The definition departs from the previous document-centric definitions and concentrates on the Internet-dominated industry of today. Information science is a discipline drawing on important concepts from a number of closely related disciplines that become a cohesive whole focusing on information. The relationships between these interrelated disciplines are portrayed on a “map” of the field, in which the basic subjects are shown as a central “core” with related areas surrounding it.

Introduction

Information science and the industry associated with it have changed so radically in recent years that they bear little resemblance to their appearance even a few short years ago. The changes are dramatic, striking, and simply amazing. And not only do the changes continue unabated, but the *rate* of change has increased so much in recent years that it is a gargantuan task to keep abreast of the changes and their effects. One excellent way to track the changes that have occurred in a field is to consult its abstracting and indexing (A&I) publications. Such publications not only record the history of a discipline by collecting and indexing its literature but (assuming they are of high quality and have a knowledgeable editorial staff) they can serve as “watchdogs” of changes.

This article presents a brief historical review of one of the major A&I publications in information science—*Information Science Abstracts* (ISA)—and then in more depth it

reviews much of the past work that sought to define “information science.” From this review, a new working definition of “information science” and a subject mapping of the field have been derived. The definition and map are suitable tools that can be used to guide the selection of material for inclusion in ISA. Finally, some of the distinctions between information science and its most closely related discipline, librarianship, are discussed. The ultimate goal of this research was to develop a new subject classification for ISA; however, before one can classify the subjects making up a discipline, one must first develop the foundational definitions.

I first became involved with ISA in 1996 as Sr. Technical Editor, and was astonished to learn that a working definition of information science had never been developed for this major A&I publication. This article rectifies that deficiency. It reviews the various definitions of information science that have been promulgated over the years and derives a definition consistent with the present environment that will guide the coverage of ISA.

The recent history of ISA may not be well known to *JASIS* readers, so it is briefly recounted here.

History of ISA

Early History

ISA began publication in 1966 under the name *Documentation Abstracts*, and assumed its present title in 1968 (Lipetz, 1993); before that, A&I coverage of the literature of information science was scattered in various other publications. ISA was the first A&I publication to focus on information science, and it has published continuously since then, making it the oldest A&I publication in the field. In the early 1980s, a nonprofit consortium consisting of representatives of eight professional societies in the library and information science field was founded under the name Doc-

umentation Abstracts, Inc. (DAI),¹ whose sole purpose was to ensure the continuation of ISA as a viable A&I publication. DAI's assets were the name, copyright, and content of ISA. DAI entered into a contract with Plenum Press, Inc., a major publisher of books and journals, to publish ISA. Plenum provided an editor, and production was done by Plenum's subsidiary, IFI/Plenum Data Corp. (the producer of the CLAIMS patent databases). DAI maintained loose oversight of ISA through periodic Board meetings with the Plenum staff. As on-line databases developed, IFI/Plenum Data established contracts (still in existence) with the Dialog service, which mounted the ISA database as File 202, and with SilverPlatter Information, Inc. to distribute it on CD-ROM.

ISA was marketed by Plenum on behalf of DAI, with a significant marketing effort for the online and CD-ROM versions being done by Dialog and SilverPlatter, respectively. Revenues were collected by Plenum, and DAI received a portion of them as the database owner. Because DAI was a nonprofit organization, it retained the revenues and used some of them for professional purposes, one of which was the sponsorship of a yearly grant awarded to an information science professional to conduct research.

In 1995, Péter Jascó of the University of Hawaii received the DAI grant. Jascó studied the journal coverage of ISA, compared it to other A&I information science databases, and reported that the quality of ISA was significantly lacking in several areas. Jascó's report (1997) ultimately led to the termination of DAI's contract with Plenum and the acquisition of ISA by Information Today, Inc. (ITI) on June 1, 1998.² With the sale of its only publication, DAI is in the process of disbanding and distributing its assets to the eight sponsoring societies.

ITI quickly addressed and corrected the quality deficiencies identified by Jascó, and began to market ISA through its own marketing channels. Plans are currently underway to make ISA available on the Internet.

ISA Today

ISA is structured as a conventional bibliographic database. Figure 1 depicts a typical record from the ISA on-line database as it appears on the Dialog service.

ISA records are indexed using a controlled vocabulary containing approximately 1,200 "Descriptor" terms that was originally based on a version of the *ASIS Thesaurus*. Addi-

DIALOG(R)File 202:Information Science Abs.
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00223964 9803964
ISA Document Number in Printed Publication: 9803233
Visualizing a discipline: an author co-citation analysis of
information science, 1972-1995.
Document Type: Journal Article
Author (Affiliation): White, R.D. (Drexel Univ, Philadelphia, PA);
McCaib, K.W.
Country of Affiliation: United States
Journal: Journal of the American Society for Information Science
Publication Language(s): English
Source: Vol. 49 Issue 4 p. 327-355 Apr 1, 1998 58
An extensive domain analysis of information science is presented
in terms of its authors. Among the findings revealed in tables and
graphics are: (1) the disciplinary and institutional affiliations of
contributors; (2) the specialty structure of the discipline over 24
years; (3) authors' memberships in one or more specialties; (4)
inertia and change in authors' positions on two-dimensional subject
maps; (5) the two major subdisciplines of information science and
their evolving memberships; (6) "canonical" authors who are in the
top 100 in all three subperiods; (7) changes in authors' eminence
and influence over the subperiods; (8) authors with marked changes
in their mapped positions over the subperiods; (9) the axes on which
authors are mapped, with interpretations; (10) evidence of a
paradigm shift in information science in the 1980s; and (11)
evidence of the general nature and state of integration of
information science.
Descriptors: AUTHORS; BIBLIOMETRICS; CITATION ANALYSIS; INFORMATION
SCIENCE
Subject Class Header (Number):Information Science and Documentation,
Primary and Secondary Sources (01.01)
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FIG. 1. Typical ISA record.

tional terms were added to ISA's vocabulary more or less randomly over the years. Because ISA's controlled vocabulary has long outlived its usefulness, ITI has decided to update it and, hopefully, reindex the entire database. Although there are several potential sources for a new vocabulary, it has been felt appropriate to base it on the revised and updated second edition of the *ASIS Thesaurus* [now called the *ASIS Thesaurus of Information Science and Librarianship* and edited by Milstead (1998)].

Abstracts in ISA are organized into seven broad subject classifications, each of which is further subdivided. Each abstract in the printed version appears under the most relevant classification; in the electronic version of the database, all subject headings are searchable. (The subject classification is also outdated and in need of revision. Part 2 of this series will describe research that builds on the definition and map described here, resulting in a new subject classification for ISA.)

What is "Information Science"?

Historical Review

Before developing a new subject classification and index terms, it was necessary to define ISA's subject coverage. (As noted above, a working definition of "information science" had never been developed by Plenum.) This process began by turning to some of the early definitions of information science for guidance.

Attempts to define information science appear to have begun in the late 1960s. The American Society for Information Science (ASIS) changed its name from the "American Documentation Institute" to its present name in 1970; the name of its journal was also changed at the same time. Shortly thereafter, Harold Boroko, then president of ASIS, challenged the membership to develop a definition of information science. Several authors responded to Boroko's challenge, and others have expanded on the topic in succeeding years. The following discussions were helpful:

¹ The members of DAI were the American Chemical Society Division of Chemical Information (ACS/CINF), American Library Association (ALA), American Society for Information Science (ASIS), American Society of Indexers (ASI), Association of Information and Dissemination Centers (ASIDIC), Association for Library and Information Science Education (ALISE), Medical Library Association (MLA), and Special Libraries Association (SLA).

² ITI is a major commercial publisher of books and journals for the information industry and is also the organizer of such well-known conferences as the National Online Meeting, Computers in Libraries, and Internet Librarian.

- (1) Hoshovsky and Massey (1968) suggested an “output-oriented” societal definition, in which information science was regarded as a body of knowledge providing an understanding of the means through which society’s information needs are met. They differentiated between data, knowledge, and information as three steps in a process, each building on its predecessor, with information at the highest level. They also observed that knowledge exists in three places besides the minds of people—documents, computer tapes, and memories—and they suggested that market research, economics, and information ecology are three neglected areas of information science. Finally, they state that the “documentation industry” is different from information science (although they admit that documentation is an essential component of information transfer). Hoshovsky and Massey’s definition is well reasoned, and includes many elements of information science that were relevant not only at the time their article was written, but continue to be relevant today. Their distinction between data, knowledge, and information is especially attractive [although one might place knowledge on a higher level than information, as did Lucky (1989) in his book, *Silicon Dreams*]. Their definitions of the three knowledge repositories are also relevant (although advances in technology have made computer tapes largely obsolete).
- (2) Klemptner (1969) analyzed the intellectual content and activities of information science, starting with the definition then published in ASIS brochures, which described information science as “investigating the properties and behavior of information, the forces governing information transfer, and the technology necessary to process information for optimum accessibility and use.” Klemptner divided the field into three segments—conceptualization, storage and transmission, and utilization—and he listed the technologies or activities needed in each segment (see Table 1). He also discusses the important distinction between libraries and librarianship on the one hand and information science on the other—a distinction of importance to ISA in the effort to

differentiate it from its competing databases. Klemptner’s concluding statement, “The field of information science is concerned with the study of both men and machines,” is one of his most important, and is a major consideration that should not be lost sight of.

- (3) A short article by Giuliano (1969) provides a helpful differentiation between information science and librarianship. Giuliano suggests that librarianship should be defined in terms of knowledge transfer, rather than in terms of a place or a building. He then enumerates some of the basic concepts of what we have come to regard as information science: “assembling of knowledge, its systematic organization, its storage, its retrieval and dissemination,” and he also states, “Information science comprises the set of research and development undertakings necessary to support the profession of librarianship.” In defining ISA’s subject coverage, Giuliano’s work is illuminating, especially his analogy to the medical profession, in which he points out that the people who work in hospitals are not called “hospitalitarians” but “medical professionals.” Giuliano states that the field of librarianship developed along different lines, concentrating on institutional library procedures rather than knowledge transfer. This observation has provided helpful guidance in deciding what areas should or should not be covered by ISA. (It is important to recognize that Giuliano’s article was written when library professionals operated largely in an intermediary role between information sources and users. In today’s Internet age, end users have a much broader role, and play a very active part in information gathering. Librarians are just one of the many users of information; they may also function as end users, gathering information for themselves.)
- (4) Harmon (1971) reviewed earlier work that contrasted documentation and information retrieval, and concluded that information science is an interdisciplinary field that includes such topics as behavioral science, classification, transfer, and language and linguistics. He concluded that information science is closely related to communications and behavior. (Of course, in 1971, the computer industry as we know it today did not exist. Today, Harmon would probably include computer science and technology as closely related to information science.)
- (5) Farradane (1980), in response to a letter suggesting that information science is not a discipline in its own right but a branch of cybernetics, linguistics, and psychology, rightly pointed out that this is not true, stating that information science encompasses much more and is therefore not a “nonstarter.” He suggested that information science is concerned with the “nature of thought and its expression and communication . . . determining and matching the communications to the needs or thought patterns of users.”
- (6) Diener (1989) enumerated some of the fundamental characteristics of information: it is an entity, it is not consumed when it is used, and can be reproduced without loss of content or meaning, it is societal, and it is intangible. (This analysis supports the viewpoint of several other authors (see, e.g., Hawkins, 1987) that information is a commodity.)

TABLE 1. Conceptual framework for information science (according to Klemptner, 1969).

<ol style="list-style-type: none"> 1. Conceptualization segment <ul style="list-style-type: none"> • Indexing • Abstracting • Classification • Thesaurus building • Subject heading work • Document selection • Development of interest profiles 2. Storage transmission segment <ul style="list-style-type: none"> • Analysis of storage transmission channels • Networks • Efficient organization and administration 3. Utilization segment <ul style="list-style-type: none"> • Relevance assessment • Management appraisals • Evaluation of community satisfaction • Satisfaction of national or international cultural, ethical, recreational, or sociopolitical goals

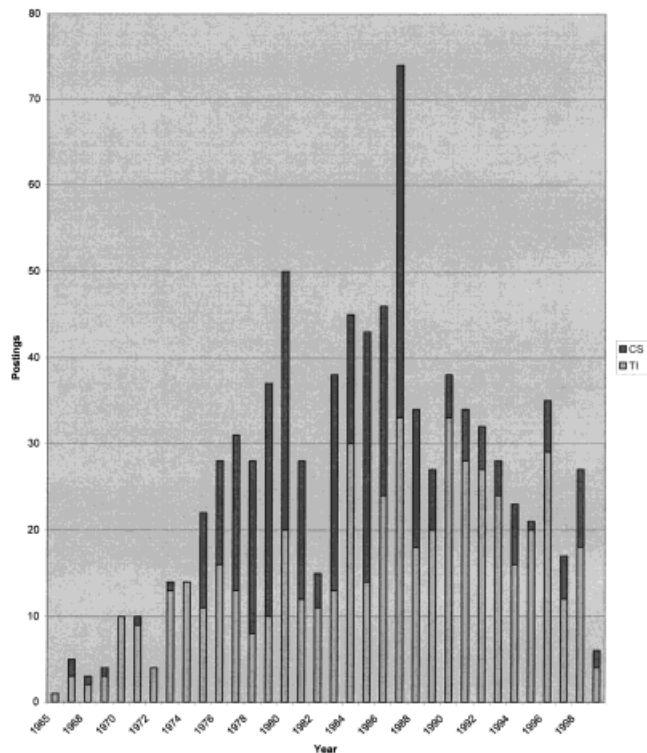


FIG. 2. Postings with both “library” and “information science” in ISI’s title (TI) and corporate source (CS) fields.

- (7) In response to Diener, Bohnert (1989) suggested that the name for the field used from 1950 to about 1970—information retrieval—be retained. She also observed an increasing trend to combine “library” with “information science” in the names of bibliographic services and academic departments as well as in the titles of publications. Figure 2 shows the results of a search on the June 1999 CD-ROM version of ISA for articles having both terms in the title. Bohnert’s observation was true as of the date of her article, but since then, the number of articles with both terms in the title seems to be decreasing over time rather than increasing.
- (8) Williams (1987–88) also compared information science to medicine, observing that both are amalgams of a variety of other disciplines and listing 14 disciplines that relate to information science. She suggested that these disciplines help solve problems relating to the generation, organization, representation, processing, distribution, communication, and use of information.

The works cited above all cover the time period through the late 1980s. Interest in defining information science seems to have waned following Williams’ article, but recently, several highly relevant articles have appeared. They are discussed separately below because of their significance.

- (1) Rayward (1996), in an introduction to a special issue of *Information Processing & Management*, reviewed some of the history of information science and some of the early disagreement as to what comprises information science. He quotes at length from Machlup and

Mansfield (1983), who describe a “narrow” discipline of information science that might become part of either library science or computer science. In fact, this “narrow” definition is an excellent list of many of the disciplines and technologies that are currently at the forefront of information science: communication, classification, bibliometrics, information exchange (networking and telecommunications), access control, regulation, user behavior, and human factors. Rayward suggests that information science is really a composite of “chunks” of other disciplines such as those listed by Machlup and Mansfield.

- (2) Bates (1998) discusses many of the indexing issues involved for digital libraries in the current Internet-dominated era. Much of her work will be relevant to ISA in the future when the proposed reindexing of the database occurs, but it is of note here that she mentions several fields closely related to information science, among which are cognitive science, computational linguistics, and artificial intelligence. Bates (1999) followed up her initial work by describing some of the less obvious characteristics of information science, making the following cogent points: (a) information science cuts across several conventional academic disciplines; (b) the domain of information science is the universe of recorded information; (c) information science is the study of the gathering, organizing, storing, retrieving, and dissemination of information. (This definition is discussed further below.)
- (3) Morris and McCain (1998) derived the structure of the medical informatics literature and in the process mentioned the following topics relevant to that field: “cognitive, information processing, and information management tasks,” logic, mathematics, computer science, behavioral science, decision theory, artificial intelligence, systems analysis, and industrial psychology. Their topic list is remarkably similar to that of Bates.
- (4) Ding, Chowdhury, and Foo (1999) used author cocitation analysis to study changes in information retrieval between 1987 and 1997. They examined the works of 39 highly cited authors, from which they were able to group together those working in similar areas. For the last half of the decade, they found that the authors could be grouped into the following clusters: (a) information retrieval (IR) model; (b) IR techniques; (c) user perspectives of IR; (d) user (on-line) information seeking and retrieving behavior; (e) information seeking and retrieving model (user searching strategies); (f) general IR theory; and (g) IR system design and evaluation. These are all topics relevant to the area of basic information science research.
- (5) McCreddie and Rice (1999), in the first of an extraordinarily detailed pair of articles, derived a general model of access to information. As part of their analysis, they have described the concept of “information,” addressing not only the underlying concepts, but also the access-related issues, the common concepts of the information seeking process, and the influences and constraints on access to information. They characterize information in the following four ways: (a) a resource or commodity consisting of messages that can be produced, purchased, and distributed; (b) data such as

- objects or tactile phenomena; (c) representation of knowledge in the form of books and other media; and (d) a part of the process of communication, including human behavior relating thereto. This work is extremely helpful in formulating a general definition of information science because it characterizes the raw material with which the discipline is concerned, i.e., information.
- (6) Summers, Oppenheimer, Meadows, McKnight, and Kinnell (1999) present the Institute of Information Scientists' criteria for information science, which is divided into three major areas: the information science core area, information management, and information technology. They comment that this viewpoint shows "a relative lack of emphasis on understanding or knowledge of a theoretical basis to the profession," a sentiment with which we strongly agree. However, they go on to assert "it is probably unprofitable to try to draw a boundary around information science: the limits are constantly changing," and they feel that the best we can do is "point to major themes that fall within the scope of information science." Recall that our purpose here is a practical one: to define the discipline of information science so that it can be used on a daily basis by those tracking the field and its literature. This is a point of disagreement with Summers et al.; drawing a boundary around information science so that one can make intelligent decisions about what is and is not part of the field is exactly what should be done. When confronted with an article on basic research in information science that was refereed and published a respected journal such as *JASIS*, an Editor's decision requires little thought, and a boundary around the field is hardly needed. However, the decision is much more difficult (and may even be somewhat arbitrary) when considering a paper from an area on the borders of the field. Having a good idea of the boundary can be extremely useful in this case. It must be stressed that a decision to exclude an article from inclusion in a publication such as *ISA* is no reflection on its intrinsic quality or of the quality of the journal in which it is published; it is simply a decision based on its relevance to the subject. (In fact, the Editor of an A&I publication should *not* make any decisions based on his or her perception of the quality of an article—if it is relevant to the subject, it should be included. We also note in passing that the lack of such a boundary and a working definition of the field in the past were responsible for much of the poor quality of *ISA* in its role as a "gatekeeper.") We do appreciate and agree with the depiction by Summers et al. of the multidisciplinary nature of information science and their list of core activities in the field and the related fields that contribute to information science.
- (7) Buckland (1999) feels that we should not argue over the meaning of "information science," but should recognize that information becomes important because of its relationship to knowledge. (Lucky's book goes into more detail on this point.) He notes that the field has strong historical roots in documentation and methods (especially those based on computers) for handling, managing, and manipulating documents. He lists a number of subjects as appropriate for a graduate program in information science, some of which, such as economics of

information, information policy, and law, are outside the traditional research areas of the field.

- (8) Finally, in two articles, Saracevic (1997, 1999), one his acceptance address for the 1997 ACM/SIGIR Gerard Salton Award for Excellence in Research, and the other an essay prepared for one of the 50th anniversary issues of *JASIS*, analyzed and described many of the basic aspects of the information science field. Both of these articles are highly relevant to our subject here, and could be quoted extensively. I will resist this temptation, however, and give only some highlights.

In his 1997 address, Saracevic argued that information science is a branch of computer science, with computer science providing the infrastructure, and information science the context. He emphasized that content is the most important property of literature, and that information science is concerned with the interface between people and literatures. By the time of his 1999 essay, Saracevic had expanded and refined these ideas, listing three general characteristics of information science: it is interdisciplinary, it is connected to information technology, and it has a strong social and human dimension. He suggested that today's information science discipline has developed from three major ideas—information retrieval, relevance, and interaction—and recommends that the following newly emerging areas be included in today's concept of information science: interaction studies, multimedia and multilanguage information retrieval, digital libraries, and Internet searching. He specifically excludes such information systems as record or document management, decision support systems, as well as direct communication between persons from information science.

Saracevic also comments that information can be treated narrowly, as messages, or broadly, as cognitive processing or understanding. He distinguishes between computer science and information science, placing algorithms relating to information under computer science and the nature of information and its use under information science. Saracevic's work, drawing heavily on some of the same work we have reviewed above, is an excellent elucidation of the field of information science, and it has helped us greatly in our formulation of a working definition of the field suitable for *ISA*.

A recent proposal by ASIS president, Eugene Garfield, to change the name of ASIS is relevant to this study. Garfield's proposal is currently under considerable strong debate.³ [Note added in proof: The proposal to add "and Technology" to ASIS's name was recently adopted: ASIS is now ASIST.] It is not the purpose of this article to summarize or enter into that debate; however, the comments from the ASIS-L Listserv listed below discuss the nature and definition of the field of information science. (Some of them have been slightly edited, and attributions have been omitted

³ Further information and the complete text containing the quotations presented here can be found on the ASIS-L Listserv accessible via <http://www.asis.org>.

because of the informal and sometimes heated nature of the discussion):

“Information science . . . is a fruitful meeting ground for those interested in both human and technological factors, and for both researchers and practitioners.”

“Information science should include a strong social science component—the sociology of information use, for example, and the economics of publishing.”

“We live in an information society in which more people must manage more information, which in turn requires more technological support, which both demands and creates more information. Electronic technology and information are mutually reinforcing phenomena, and one of the key aspects of living in the information society is the growing level of interactions we have with this complex and increasingly electronic environment.”

“The core problem is the tight coupling of library science and information science—library science and libraries are the primary concrete reference points for assessing information science—rather than using many such reference points, including communications, information systems and computer sciences . . .”

“There are few cognate disciplines that connect systems view with human view, and have practical experience in consciously assisting people to become informed, to the extent that library and information science does.”

“Social informatics is a part of information science . . . There is a huge body of understanding on how people relate to information, in various forms and channels, including computer-mediated, that is enormously valuable to any consideration of the social role of information technology.”

“There has been a tendency in both the academic and popular press to [equate] computer technology with automated information, that is, to assume that the “information” part of information technology is supplied by the fact that computers are involved. This stance ignores the information itself that is stored within the computer and fails to note the many ways in which the character of that stored information interacts with the design of the computer information system and with how human beings process information and the acts of information seeking.”

The foregoing comments are valuable because they represent the current thinking of professionals working in the field, many of whom feel passionate about their chosen discipline. Several of the comments clearly show that the field of information science is broadening, and the area of the social and behavioral interactions between information users is appropriate for inclusion into it.

A Working Definition of “Information Science” for ISA

The picture that emerges of the discipline of information science is that of a field drawing some important concepts

from a number of closely related disciplines and becoming a cohesive whole focusing on information. Williams’ definition, Saracevic’s discussion, Buckland’s suggestions, and Rayward’s historical derivations provide the most encompassing overviews of the field and well summarize the areas that ISA should cover. The disciplines listed by Machlup and Mansfield are also particularly significant. However, we also agree with the thoughts of Harmon and Farradane, both of whom feel that information science should also concern itself with communications and behavior among information users, and finally, we appreciate Giuliano’s helpful distinction between information science and librarianship.

Bates (1999) has quoted a long-standing definition of information science, observing that it has existed for at least the past 30 years. One might logically ask, therefore, why the present work was undertaken instead of simply adopting this definition for ISA. Primarily, the reason is because the field has radically changed in the past 30 years. Thirty years ago, there were no on-line databases, no industry based on producing and selling them to users, and certainly no Internet. In today’s world of the Internet and the World Wide Web, the concept of information has undergone a revolutionary transformation. We now must deal with new ways that information is recorded: HTML, XML, e-journals, e-books, ’zines, etc. Even the fundamental concept of a “document” has been challenged by the Web. In such a radically changed environment, a new definition of information science is highly relevant. Particularly in today’s Internet-dominated culture, information science must concern itself with the behavior of users and the means they use to satisfy their (often unrecognized) information needs. A large industry (with aggregate revenues of some \$15 billion annually according to some market studies) has grown up based on the selling of information and related products; although some pure researchers may contest the point, it seems apparent that the economics, markets, and players of this industry are also rightfully part of the practical side of the discipline of information science.

These concepts have been brought together into the following definition, to serve as the coverage statement for ISA:

Information Science Abstracts covers the world’s literature on information science—an interdisciplinary field concerned with the theoretical and practical concepts, as well as the technologies, laws, and industry dealing with knowledge transfer and the sources, generation, organization, representation, processing, distribution, communication, and uses of information, as well as communications among users and their behavior as they seek to satisfy their information needs.

Librarianship and Information Science

Perhaps the greatest difficulty one faces in deriving a definition of information science is how to distinguish it from “librarianship.” Several of the authors cited above addressed this question. Saracevic (1999) concludes that information science and librarianship “are two different

fields in strong interdisciplinary relations.” He notes that current research on OPACs has had the effect of drawing the fields closer together because OPACs are increasingly using some of the principles developed by researchers in information science, and he also suggests that the emerging area of digital libraries will have a similar effect. Bates (1999) takes a similar view, noting that the phrase “library and information science” has become common. She also notes that librarianship has a more service-oriented value system. Summers et al. (1999) cite earlier work suggesting that information science is an academic discipline rather than a professional activity. They also suggest that “information scientists” add value to their work by evaluation, and that “librarian” has a somewhat more negative image. These points can be hotly debated at length; we do not enter into such a debate here.

To help resolve this question, the subject classification of *Library and Information Science Abstracts* (LISA) was examined. Table 2 lists some of the differences. The left column lists the subjects that LISA covers that ISA does not. They are more related to librarianship. The right column lists the subject areas covered by ISA but not by LISA. These terms are more focused on “pure” information science. In general, ISA concentrates on the theoretical and practical aspects of the knowledge transfer process and its supporting technologies, while excluding coverage of basic librarianship issues such as library facilities, budgeting, personnel management, etc.⁴

Information Science Map

Having arrived at a definition of information science, one can then enumerate the specific subjects that should be included in it, as well as the closely related fields, to yield a selection guide for ISA. It was helpful to express the results as a “map” of the field, in which the basic subjects comprising information science are shown in a “core” at the center, with related fields surrounding the core—see Figure 3. The fields most closely related to information science are: computing technology, behavioral science, librarianship, statistics, communications, law and government, communication, and other subject disciplines. Each of these related disciplines, of course, has its own subject map, a portion of which would overlap information science. It is important to distinguish the subdisciplines that fall within the scope of information science and those that fall outside of it.

Literature Review

This is by no means the first use of a map to portray the relationships between a field and its related disciplines. For

⁴ In practice, the definitions presented here are interpreted somewhat broadly when selecting material for coverage in ISA, so some articles on these subjects may be included, especially if they discuss other areas of information science as well.

TABLE 2. Librarianship vs. information science.

Librarianship subjects	Information science subjects
Archives	Artificial intelligence, expert systems
Buildings	Basic information science research
Exhibitions	Behavioral sciences
Furniture	Fuzzy logic/fuzzy searching
Library organization	Information industry/marketplace
Library use and users	Information professionals
Loans	Information technologies technical aspects (i.e. computing, Internet, telecommunications)
Management, budgeting, finance	Law/legislation/regulation
Materials	Natural language processing
Microforms	Reading (literacy)
Museums	Subject area databases
Nonprint materials	Types of literature
Old and rare materials	
Promotions	
Removals	
Types of library staff	
Users (various types)	
Vehicles	
World librarianship	

information science, several investigators have used bibliometric and other techniques to develop maps showing the relationship of information science to other fields. The following studies are relevant and provide helpful background in this area.

- (1) McCain (1995) used a codescriptor analysis of the 1993 issues of ISA and derived a mapping of the topics it covered. She concluded that ISA’s subject coverage centers on three major areas: databases and information retrieval, information management, and implementation of information technologies in libraries. (Several significant changes have occurred in the information field even in the few years since McCain published her results in 1993. The Internet has become pervasive, database and searching technologies have advanced, and electronic publishing has become widespread.) McCain (1998) also noted that the 1993 issues of ISA contain an unusual preponderance of patents. (Patent coverage in ISA was suspended in 1996 and has not yet been resumed.)
- (2) In an outstanding and extremely thorough study, White and McCain (1998) used author cocitation analysis to derive the subdisciplines of information science. They divided the field into two major specialties: experimental and practical information retrieval, and scientific communication as exemplified in bibliometrics, citation studies, and the like. Of special interest here are White and McCain’s 12 subdisciplines, or specialties, in information science: (a) experimental retrieval; (b) citation analysis; (c) on-line retrieval; (d) bibliometrics; (e) general library systems; (f) science communication; (g) user theory; (h) OPACs; (i) imported ideas; (j) indexing theory; (k) citation theory; (l) communication theory.

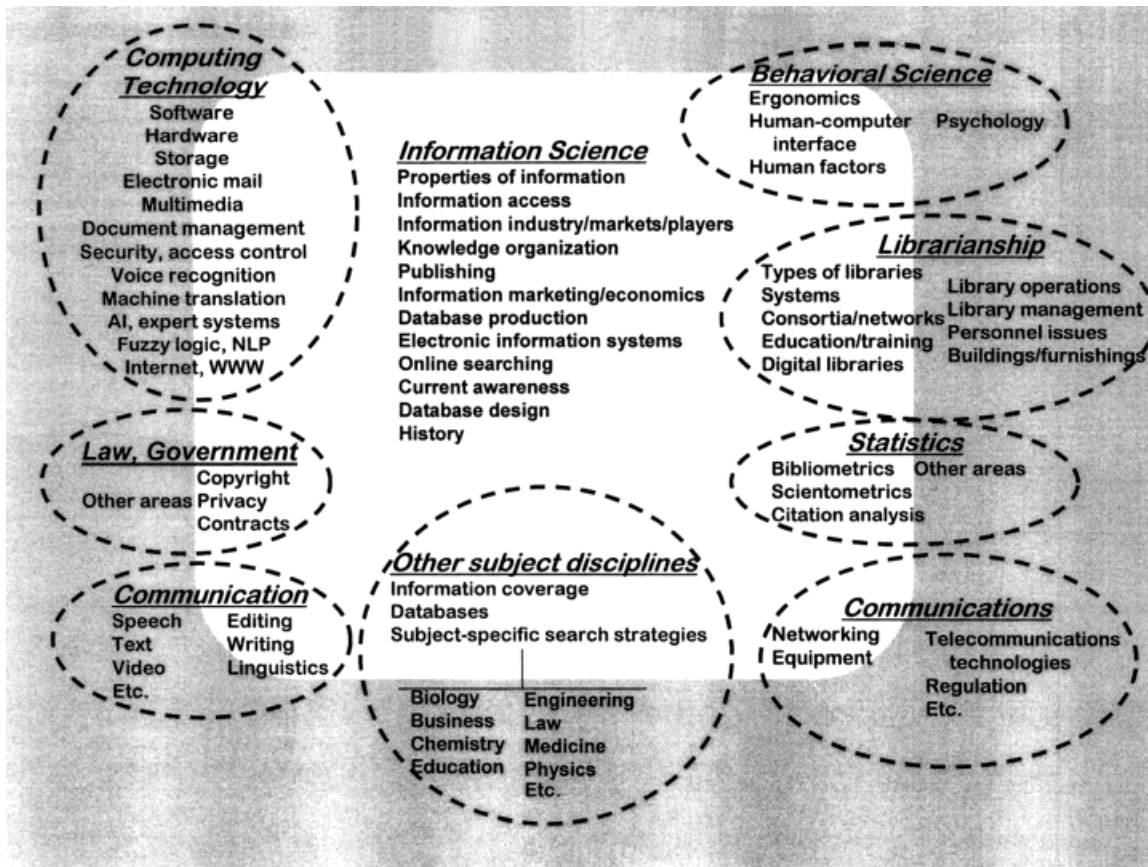


FIG. 3. Information science map.

- White and McCain went on to map the authors working in each of these areas and also the changes in the maps that have occurred over the years. Two of their conclusions are especially relevant: (a) information science is a versatile discipline that provides breadth and focus, and (b) it concentrates on “the human–literature barrier.” Perhaps more than any other study, this work has helped crystallize the concepts presented here, especially in preparation of the map.
- Using citation analysis and ISI’s *Journal Citation Reports*, Rice (1990) derived a list of 77 core journals in communication and library/information science. He then ranked and clustered the journals at several points during the decade 1977 to 1987, and concluded that there were two distinct subdisciplines in communication and three in library/information science. He also observed that changes occurred within each discipline but not across them.
 - Using data from 1973 to 1975, Small (1981) also derived a list of core journals in information science and listed several of the most highly cited articles in the field, clustering them by subject. Using multidimensional scaling techniques, he was able to map information science and develop a citation network with closely related fields. He concludes that information science is relatively isolated from the social sciences (he did not examine its relation to the physical sciences).

- Yerkey and Glogowski (1990) studied the appearance of abstracts on library and information science topics in a range of bibliographic databases covering other subjects. They grouped the articles into seven major subject categories: librarianship, libraries, library materials, organization and administration, reader services, technical processes, and information storage and retrieval. The largest number of postings they identified were concerned with library materials, organization and administration, and reader services. They listed the most productive databases in each category and the search strategies they used for each of the seven categories. Because their study focused on non-information science databases, ISA and its competing databases were not included, although they obtained their search terms from the subject classification used by *Library and Information Science Abstracts* (LISA).

Map Derivation

Figure 3, the map of the field of information science, was derived using the above definition of information science, some of the results of the studies cited above, and empirical knowledge of the field as gained from lengthy experience. In the central core of the map, the major subjects and subdisciplines of information science are listed. Disciplines outside the central core overlap the core concepts of infor-

mation science. The boundary between the core and external disciplines passes through the related fields; subfields relevant to information science are placed inside the boundary. All the central subjects and many of the related ones (especially those areas inside the boundary) are appropriate for coverage in ISA.

Conclusion

The turn of a year is traditionally an occasion for both anticipating the future by looking forward and for retrospection by looking backward. The beginning of a new millennium is an especially significant time. This millennium issue of *JASIST* is, therefore, a highly appropriate time to review the history of our field and to discuss some ongoing improvements in one of its major A&I publications—*Information Science Abstracts*. This article has incorporated both retrospective and forward views. Past definitions of information science have been considered, and from them, a new working definition for ISA to be used going forward has been derived. The definition reflects a progression from the previous document-centric definitions and accommodates the new Internet dominated technologies of not only the present, but also the coming initial years of the new millennium.

It is important to recognize that the definition of information science is not static. Particularly in such a fast-moving area and especially in the industry that is dependent upon its basic principles, change is a continuing fact of life. Paradigms change. Players and markets change. Technologies advance. New technologies appear, and old ones disappear. The concepts developed and presented in this article must be regarded as fluid; they are not expected to remain constant during the coming years. Indeed, one of the valuable functions of an A&I publication is to track the literature and to identify the changes (ideally early in their lifetime) so that information users will be aware of them and can make intelligent decisions in both the professional and personal areas of their lives.

As remarked in the Introduction to this article, one of the best ways of following changes in a discipline is by observing the changes in such “gatekeeping” materials as its A&I publications and databases. Gatekeeping publications are often the first to identify new trends and advances in technology; however, to accomplish this, those who compile and edit them must have a clear and definite understanding of the subject areas to be covered. The work described in this article has accomplished this result for ISA. By modernizing and updating its working definitions and pictorially elucidating them by means of a map, ISA is well positioned to continue as one of the leading A&I publications of information science.

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