

Information Science: What Is It?*

In seeking a new sense of identity, we ask, in this article, the questions: What is information science? What does the information scientist do? Tentative

answers to these questions are given in the hope of stimulating discussion that will help clarify the nature of our field and our work.

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• Introduction

Now that the American Documentation Institute has voted to change its name to the American Society for Information Science, many of us have been forced to try to explain to friends and colleagues what information science is, what an information scientist does, and how all of this relates to librarianship and documentation. Those of us who have tried to make such explanations know that this is a difficult task. As an exercise I decided to prepare an answer to these questions at leisure rather than under the pressure of a direct inquiry. Let me state at the outset that I don't think I have *the answer*. It is hoped that this paper may provide a focus for discussion so that we can clarify our thinking and perhaps be more articulate about who we are and what we do.

• Definition

The term "information science" has been with us for some time. In his chapter on the "Professional Aspects of Information Science and Technology" (1) in the *Annual Review*, Robert S. Taylor provides three definitions of information science. These have many points in common as well as some differences in emphasis. The definition that follows has been derived from a synthesis of these ideas.

Information science is that discipline that investigates

* This paper was prompted by the suggestion, made by ADI Headquarters to the members of ADI, that the diversity of members and interests in the organization would be better represented if the name of the society were changed to American Society for Information Science.

the properties and behavior of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability. It is concerned with that body of knowledge relating to the origination, collection, organization, storage, retrieval, interpretation, transmission, transformation, and utilization of information. This includes the investigation of information representations in both natural and artificial systems, the use of codes for efficient message transmission, and the study of information processing devices and techniques such as computers and their programming systems. It is an interdisciplinary science derived from and related to such fields as mathematics, logic, linguistics, psychology, computer technology, operations research, the graphic arts, communications, library science, management, and other similar fields. It has both a pure science component, which inquires into the subject without regard to its application, and an applied science component, which develops services and products.

If this definition seems complicated, it is because the subject matter is complex and multidimensional, and the definition is intended to be all-encompassing.

Obviously information science is not the exclusive domain of any one organization. Traditionally, the American Documentation Institute has been concerned with the study of recorded, that is, documentary, information. This is still our main emphasis; however, the work is now embedded in a larger context. Librarianship and documentation are applied aspects of information science. The techniques and procedures used by librarians and documentalists are, or should be, based upon the theoretical findings of information science, and conversely,

the theoretician should study the time-tested techniques of the practitioner.

• The Need for Information Science

Information science as a discipline has as its goal to provide a body of information that will lead to improvements in the various institutions and procedures dedicated to the accumulation and transmission of knowledge. There are in existence a number of such institutions and related media. These include: *books* for packaging knowledge; *schools* for teaching the accumulated knowledge of many generations; *libraries* for storing and disseminating knowledge; *movies and television* for the visual display of knowledge; *journals* for the written communication of the latest technical advances in specialized fields; and *conferences* for the oral communication of information.

These institutions have served, and continue to serve, very useful functions, but they are inadequate to meet the communication needs of today's society. Some of the factors that contribute to their inadequacies are:

1. The tremendous growth in science and technology and the accelerated pace at which new knowledge becomes available and old knowledge becomes obsolete;
2. The fast rate of obsolescence of technical knowledge, so that the old graduate must go back to school and update his skills;
3. The large number of working scientists and the large number of scientific and technical journals which exist today;
4. The increased specialization which makes communication and the exchange of information between disciplines very difficult;
5. The short time lag between research and application that makes the need for information more pressing and more immediate.

As a result of these pressures, the existing methods for exchanging information have been found wanting. Information science has not kept pace with other scientific developments, and now there is a need to concentrate efforts in this field and to catch up. If communication and information exchange procedures are not improved, all other scientific work will be impeded; the lack of communication will result in a duplication of effort and a slowing of progress.

The importance of information science and the reasons for the current emphasis upon this discipline are thus clear: The need to organize our efforts and meet the new challenges finds a concrete expression in the American Society for Information Science.

• Information Science Research and Applications

As was pointed out in the definition, information science has both a pure and an applied aspect. Members of

this discipline, depending upon their training and interests, will emphasize one or the other aspect. Within information science there is room for both the theoretician and the practitioner, and clearly both are needed. Theory and practice are inexorably related; each feeds on the work of the other.

The researcher in information science has a broad field in which to pursue his investigations. A glance through the 566 pages (excluding the Glossary and Indexes) of the last issue (No. 14) of *Current Research and Development in Scientific Documentation* (2) shows a staggering range of projects being studied. The 655 project statements are organized into nine categories as follows:

1. *Information Needs and Uses*
Behavioral studies of users; citation studies; communication patterns; literature use studies.
2. *Document Creation and Copying*
Computer-assisted composition; microforms; recording and storing; writing and editing.
3. *Language Analysis*
Computational linguistics; lexicography; natural language (text) processing; psycholinguistics; semantic analysis.
4. *Translation*
Machine translation; translation aids.
5. *Abstracting, Classification, Coding and Indexing*
Classification and indexing systems; content analysis; machine-aided classification, extracting and indexing; vocabulary studies.
6. *System Design*
Information centers; information retrieval; mechanization of library operations; selective dissemination of information.
7. *Analysis and Evaluation*
Comparative studies; indexing quality; modeling; test methods and performance measures; translation quality.
8. *Pattern Recognition*
Image processing; speech analysis.
9. *Adaptive Systems*
Artificial intelligence; automata; problem solving; self-organizing systems.

In essence, information science research investigates the properties and behavior of information, the use and transmission of information, and the processing of information for optimal storage and retrieval.

Theoretic studies should not, and in fact do not, take place in a vacuum. There is a constant interplay between research and application, between theory and practice. As in most every scientifically based discipline, the researchers form a small but vocal minority. The bulk of the membership is applications oriented. These members deal, on a daily basis, with the problems and practices of information transfer. They are responsible for making the system work in spite of all inadequacies, and they develop improvements within an operational context. They need to be informed about the new techniques being developed and when these are proven, they need to apply them and evaluate them under operating conditions. Yet, it is important to recognize that, particularly in information science, there is no sharp distinction between research and technology. It is a matter of em-

phasis, and all members share a concern over a common set of problems.

Every scientific discipline needs an academic component, and so it is important to note that information science is now a recognized discipline in an increasing number of major universities. The subjects taught vary from school to school, probably more as a function of available professorial skills rather than any real difference of opinion about what should be taught. Such diversity is desirable. The field is too young, and it is too soon to standardize on a single curriculum, for a variety of programs encourages exploration and growth. As students graduate, they will exert a unifying and maturing influence on the educational program.

• Summary

By way of a summary, I will restate the questions and answers that led to this essay on information science. Again, I would like to add the caveat that these are not meant to be final answers but rather to serve as foci for further discussion and clarification.

What is information science? It is an interdisciplinary science that investigates the properties and behavior of information, the forces that govern the flow and use of information, and the techniques, both manual and mechanical, of processing information for optimal storage, retrieval, and dissemination.

What then is documentation? Documentation is one of many applied components of information science. Documentation is concerned with acquiring, storing, retrieving, and disseminating recorded documentary information, primarily in the form of report and journal literature. Because of the nature of the collection and the user's requirements, documentation has tended to emphasize the use of data processing equipment, reprography and microforms as techniques of information handling.

What does an information scientist do? Information scientists may work as researchers, educators, or applications specialists in the field of information science; that is to say, they may do research aimed at developing

new techniques of information handling; they may teach information science; and they may apply the theories and techniques of information science to create, modify and improve information handling systems.

Information science is an important emergent discipline, and the information scientist has an important function in our society.

• Postscript

This article was written and submitted to the Editor of *American Documentation* in September 1967. Clearly the members of ASIS are not the only people worried about the vocabulary of information science and technology, for in October 1967, Mr. Samuel A. Miles, a member of the Society of Technical Writers and Editors and also a member of ASIS, published a paper entitled "An Introduction to the Vocabulary of Information Technology" in *Technical Communications*, the journal for STWP. The general purpose of this paper was to familiarize the technical writer with the activities and the vocabulary of the information processor. To do this, Mr. Miles selected ten basic terms and their definitions from the proposed ASA standards and from the DoD glossary. These terms are similar to and supplement the terms in the Information Science article.

In this ecumenical atmosphere, it is good to know that other societies are equally concerned with the workings of information science, and it is a pleasant duty to reference the work of Mr. Samuel A. Miles.¹

References

1. TAYLOR, R. S., Professional Aspects of Information Science and Technology, in C. A. Cuadra (Ed.), *Annual Review of Information Science and Technology*, Vol. 1, John Wiley & Sons, New York, 1966.
2. NATIONAL SCIENCE FOUNDATION, *Current Research and Development in Scientific Documentation*, No. 14, Office of Scientific Information, NSF-66-17, Washington, D.C., 1966.

¹Miles, Samuel A., An Introduction to the Vocabulary of Information Technology, *Technical Communications*, Fall Quarter 1967, pp. 20-24.