

An Operational Definition of the Information Disciplines

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ABSTRACT

The author and Mary Niles Maack set out to develop the content for an up-to-date edition of an encyclopedia intended to cover all the major information disciplines in an integrated fashion. This effort arose from the belief that all the i-disciplines have core interests in common, and that the commonality needs to be brought out in the structure, organization, and content of the encyclopedia—without denying the inherent differences between the fields as well. This plan led to four years of effort in designing the encyclopedia, recruiting authors for its entries, and organizing the resulting array of entries in a classification that reflects the major topical areas of the information disciplines. The resulting design of the encyclopedia can be seen as an operational definition of the i-disciplines. The design effort and its results are described.

Keywords

Information disciplines; i-disciplines; Encyclopedias, Operationalization of concepts; Disciplinary definitions; Social studies of information

1. A NEW ENCYCLOPEDIA FOR THE INFORMATION DISCIPLINES

The author and Mary Niles Maack contracted in 2005 to edit the Third Edition of the *Encyclopedia of Library and Information Science*, as Editor-in-Chief and Associate Editor, respectively. We did not, however, want an encyclopedia solely of traditional LIS. We felt that the information disciplines covered a much broader range than that single field, and that it was time to produce an integrated reference tool for a much wider array of information disciplines. We felt that the iSchool movement well reflected that broader range, and we set out to design the encyclopedia to be a unified expression of the full array of the information disciplines. In the process of that four-year effort, we gained a deeper understanding of the

information disciplines, and found a way to integrate those disciplines into a single seven-volume encyclopedia, which appeared at the end of 2009 [1]. The resulting design of the encyclopedia can be seen as an operational definition of the i-disciplines. (Conceptual definitions describe a phenomenon in principle; an operational definition describes the particulars that will stand for that conceptual definition in a specific situation.) This article describes that effort and its results.

In fact, we would have liked to name it the *Encyclopedia of the Information Disciplines*, and may do so in the future. We believe, however, that this edition is transitional, that buyers and readers accustomed to the prior *ELIS* title need to see how LIS can be integrated with the other information disciplines. At the time we began, “information disciplines” was not a widely-used phrase, and we did not want to lose readers through the use of a title so unfamiliar. We did, however, make the title plural: the *Encyclopedia of Library and Information Sciences*, to better reflect the range of coverage.

In our invitations to prospective writers for the encyclopedia, we described the effort as follows:

We are endeavoring to make the forthcoming Third Edition into an authoritative guide to the 21st century information disciplines—we’re including informatics, information systems, knowledge management, archives, records management, museum studies, bibliography, document and genre studies, and social studies of information, along with LIS. We are working with the assistance of a 50-person international Editorial Advisory Board of premier researchers and practitioners from all these domains. We believe this online and multi-volume print edition will constitute a substantial addition to the literature of all the information sciences.

The encyclopedia has just been published.[1] It contains 565 article-length entries, ranging from 1000 to over 20,000 words each, averaging between 5,000 and 8,000 words. My objective here is to describe not so much the practical sequence of developing the contents list, but rather the intellectual process we went through. (The author was responsible for most of that effort, with invaluable input from the Associate Editor.)

2. MAJOR ISSUES IN THE DEVELOPMENTAL PROCESS

Three principal issues arose in the development of the contents list for the encyclopedia, discussed below. A fourth issue, raised by a reviewer, will be addressed below as well.

2.1. Professional or Academic?

The list of fields given above has a strong professional tilt; as a practical matter, many information disciplines are most visible in society in their professional manifestations. But we in academia, especially, know well that the information disciplines also contain a rich body of research and theory that is growing larger by the day. The information disciplines are most assuredly also *academic*. Furthermore, no profession is truly a profession without a body of theory underlying and infusing practice with a deeper meaning than quotidian transactions would imply on their own. In a word, the answer to the above question is: Both. The encyclopedia addresses both research and practice in ways to be described below. There is surely no longer any question that there is a body of theory in the information disciplines both driving professional practice and providing enrichment to

many other academic disciplines in a purely intellectual exchange.

Information *professions* concern themselves with gathering, evaluating, organizing, storing, retrieving, and making available information to users. Information as an *academic body of research and theory* is concerned with 1) describing and understanding the universe of recorded information of all kinds (the physical question), 2) studying human beings seeking and interacting with information in all contexts (the social question), and 3) putting people together with information by means of information technology (the design question) [2].

Bottom line: the information disciplines are both academic and professional; both theory and practice, and those dimensions are reflected in the design of the encyclopedia.

2.2. Sciences or Humanities?

The author has argued elsewhere [3] that the information disciplines are meta-disciplines; they cut across the entire conventional academic spectrum that ranges from the arts and humanities, through the social sciences, natural sciences, and mathematics and logic. The content of the information stored and organized by practitioners of the information disciplines can range across all kinds of recorded knowledge, all subject matters. Just as educators teach all kinds of subject matter, and journalists pursue news in every domain of life, so also do people in the information disciplines address all kinds of information. *The meta-disciplines shape the subject matter of all the traditional disciplines according to the social purpose of the meta-discipline.* In that sense we range across all the conventional disciplines. See Figure 1 below.

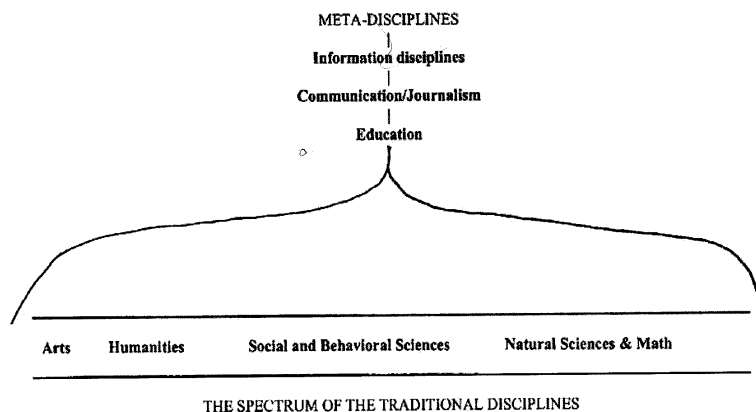


Figure 1: The meta-disciplines shape the subject matter of all the traditional disciplines according to the social purpose of the meta-discipline.

What distinguishes the information disciplines from the conventional academic spectrum, is that *whatever the information content*, the information disciplines' objectives are to understand the domain of information and the human relationship to it at a theoretical level, and to develop practical skills of organization, retrieval and dissemination of information to address real-world problems at a professional level.

For historical reasons, almost all of the disciplines on the conventional academic spectrum have some connection with the information disciplines. Often, the first information work in a field is done by people in that field, in response to pressing needs for organizing and retrieving information in that discipline. As was noted elsewhere:

From where, then, do the new information disciplines arise? The fundamental engine of development is *need*. Human beings want to retain informational resources, and, after a very short time, these resources collect at such a rate that some principles of selection, organization, etc., need to be brought to bear, in order for the resources to continue to be available for effective use. (In earlier centuries, the rate of collection was so slow that the need was not as easily seen or acted upon. That situation has changed dramatically in the twentieth and twenty-first centuries.) As resources collect, interested individuals recognize the problems and then resolve them through theoretical and professional development of ideas and practices. Those individuals either draw upon earlier information disciplines or invent or re-invent solutions to their problems.

In almost all these cases, however, the interested individuals come out of one or more of the traditional academic or professional disciplines. Drawing on these individuals' education and experience, a perspective, a cognitive style, an emotional tone, and a body of knowledge are all brought to bear on the informational problem. Thus, for example, the need to organize historical archives was first tackled, usually, by historians. The need to store and retrieve radiological records first became known to medical personnel, and thus members of the medical professions were among those who first attacked the problem of radiology informatics. As a consequence, the writing and thinking in archival theory is strongly humanities-oriented in character, while a more technical approach, seated, above all, in the needs of medicine, drives radiology informatics. [3]

If we look across the full range of disciplines covered in the encyclopedia, it soon becomes evident that both scientific and humanistic forms of research and practice are to be found in the several fields. Participants in the several information disciplines have brought their training and cognitive styles to bear on information questions. For example, archives, museum studies, and bibliography tend to draw on strong humanities modes of thought, while science and engineering clearly drive informatics, information systems, etc. Thus, to label properly the i-fields addressed in the encyclopedia requires us to refer both to *the information sciences* (roots in the sciences) and to *the disciplines of the cultural record* (roots in the humanities). (Other information disciplines display a social science approach to their research areas, as in LIS, records management, and social studies of information. The social sciences, in turn, draw upon both scientific and humanities cognitive styles.)

However, though scholars and practitioners may bring a certain cognitive style with them from their undergraduate or other graduate educational experiences, in the end, most develop the conceptual and research approaches that are most effective for their area of specialization in the i-disciplines. So, for example, the art historian working on improving access to arts information may discover that he/she also has a knack for systems analysis when developing an interface for arts information resources. Most people coming into the information disciplines from other fields find that their awareness and skills must broaden out to encompass a wider range of techniques and approaches than were typically used in the home discipline.

In the selection of topics and of prospective authors for the encyclopedia, we included people with all of the various academic backgrounds and cognitive styles reflecting both scientific (nomothetic) and humanities (idiographic) styles of research, thinking, and writing.

2.3. Why Museum Studies?

It is likely that the most controversial decision in the development of the encyclopedia was the choice to include museum studies. Elsewhere [3], the author argues this in greater detail. Suffice it to say here that museums of all kinds select and display works of art and historical and archaeological artifacts of our cultural heritage. They display the results of our biological and geological research in science museums. Thus, museums, too, range across all forms of knowledge, and are concerned with evaluating, collecting, storing, and making available both heritage materials and scientific knowledge. Furthermore, with the growth in collections of online images, many museums are developing a digital presence as great as that of any library or archive. These commonalities have been recognized by the U.S. federal government in the creation of the granting agency, the Institute for Museum and Library Services (IMLS).

2.4. Relation to Computer Science?

One of the reviewers stated that the structure of the encyclopedia “reflects tradition more than context in that computation is diminished.” I could not disagree more, but am glad that this issue was raised, as it had not been addressed explicitly in the earlier draft. For all sorts of good and necessary reasons, computer science looms very large in most of our iSchools. Nonetheless, it is *not* the case that “iSchool = computer science school.” From the beginning, it has been understood that iSchools represent a new departure in a world of growing information technology and IT use; iSchools are not simply sites of computer science applications, or branches of computer science departments.

What then is it that iSchools teach? Because computer science is so important in the world and in the universities today, it is often the only part of the information disciplines that is seen and readily understood by people outside our field. Furthermore, computers are concrete and visible in most people’s lives, while information is less tangible and less well understood as a phenomenon of direct study and work-related activity. There is a real risk, consequently, that computer science and its various branches will come to be seen as virtually identical to the i-disciplines, and will drive the development of the iSchools in universities.

But there is a reason that iSchools have the name they have. There is a unique perspective that the information disciplines bring to the table. Computers are vital to all modern information disciplines, but so is an understanding of information technology *from the standpoint of the information and the information users*, not just from the technology side. iSchools are called what they are because the people that graduate from them understand how information operates in society and in people’s minds, they understand how to design information systems to respect the nature/structure of the information, and the nature of the human patterns of use of them, and the larger social and cultural context that embeds that information technology. Good information access, retrieval, and use must also be designed from these other perspectives to be optimally effective in society. Computer science may be the engine, but it is not the whole automobile, nor the automobile drivers and riders, nor the system of roads—all of which must be understood and designed and integrated into a single effective system.

There are many encyclopedias of computer science. It was an encyclopedia of the information disciplines that we needed, and *ELIS* is intended to fulfill that need. *ELIS* does, in fact, deal with computer science in many ways, but it does so by looking at computer science from the perspective of the information disciplines, rather than looking at the information disciplines from the perspective of computer science.

3. THE FINAL STRUCTURE OF THE ENCYCLOPEDIA

3.1. Rejecting “Silos”

The Introduction to the *Encyclopedia* notes the following:

Both the Editors and the Editorial Advisory Board agreed that we did not want parallel “silo” groupings of entries on the several disciplines. The purpose of this edition is to address these related disciplines in a way that both demonstrates the unities across the fields, as well as recognizes their uniquely distinguishing characteristics. Thus, the choice of topics reflects this persistent duality; some authors address a topic across the disciplines, other authors specialize in what they know best. In many cases, but not all, what has been learned in one field can be applied in others. Fund-raising techniques used in one non-profit area can usually be utilized in another non-profit area. On the other hand, only librarians are likely to need information about serials vendors, and only museum professionals have to address trafficking in art objects.[1]

Making the decision not to create parallel sets of entries identical for each component discipline was an interesting challenge, and resulted, I believe, in much richer and more integrated contents for the encyclopedia than would have been brought about otherwise. Editorial Advisory Board members were invaluable to this process, providing many topics from their areas of expertise. For this Editor, developing the contents list felt like a snake shedding skins. Dozens of distinct spreadsheets were developed in the process, and each type of spreadsheet went through multiple versions.

3.2. A Different Way of Categorizing

Disciplines, especially ones with a professional element, are much more complex than may at first appear. Developing the encyclopedia contents was not just a matter of writing down various possible topics and then organizing them. Disciplines are also composed of people, organizations, standards, histories, projects, etc., and decisions must be made about all of these. Both because of the availability of some other biographical resources, and a dearth of historians writing on the many individuals that we might want to profile, we chose early on to exclude biographies of people. However, that still left many other components of these several disciplines.

In the end, we identified seven broad classes of material to include, subdivided into major sub-categories.

- Descriptions of the information disciplines and sub-disciplines themselves (Category 1).
- The core *research and theory* of the information disciplines (Categories 2 and 3).
- Those internal conceptual components that are distinctive to the information disciplines: 1) the information technology, 2) the information itself, and 3) the human beings using information (Categories 5, 6, and 8).
- The specifically *professional* skills and activities that information professionals engage in (Category 7).
- The social and economic infrastructure supporting the disciplines and professions: Institutions; and Organizations (Categories 4 and 9).

- The geographical and political dimensions: The national cultural institutions and resources of countries (Category 10).

- History (Category 11).

Figure 2 displays the broad conceptual structure of the final encyclopedia, with categories numbered 1 to 11. Both the online and paper forms of the encyclopedia will of course be alphabetical, but they will also contain a “Topical Contents List,” which groups all related entries together under the final chosen rubrics of the list in the figure. We do not have the space here to reproduce the entire contents, but an example entry title or two is given for each category in the topical list in Figure 2.

1. Information Disciplines and Professions

- General Disciplines *Information Science; Knowledge Management*
- Disciplinary Specialties *Biomedical Informatics; Music Librarianship*
- Cognate Disciplines *Artificial Intelligence; Epistemology*
- Career Options and Education *Careers and Education in Information Systems*

2. Concepts, Theories, Ideas

- Key Concepts *Information; Literacy; Work of Art*
- Theories, Models, and Ideas *Classification Theory; Information Society; Sense-Making*

3. Research Areas

- Cross-Disciplinary Specialties *Information Arts; Linguistics and the Information Sciences*
- Research Specialties *Webometrics; Personal Information Management*

4. Institutions

- Generic Institutions *Archives; Libraries; Museums*
- Institution Types *Corporate Archives; School Libraries*
- Named Institutions *Library of Congress; Louvre*
- Ancillary Cultural Institutions *Art Galleries; Historical Societies*
- Collections *Rare Book Collections; Test Collections*

5. Systems and Networks

- Information Systems *Knowledge Management Systems; Search Engines*
- Network and Technology Elements *Data Transmission Protocols; Intranets*

6. Literatures, Genres, and Documents

- Literatures *Grey Literature; Economics Literature History*
- Generic Resources *Digital Images; Folksonomies; Markup Languages*
- Named Resources *OAIS Reference Model; Resource Description Framework (RDF)*

7. Professional Services and Activities

- Appraisal and Acquisition of Resources *Digital Content Licensing; Museum Collecting*
- Institutional Management and Finance *Archival Management and Administration*
- Organization and Description of Resources *Cataloging; Museum Registration*
- Resource Management *Oral History; Serials Management; Version Control*
- User Services *Reference Services; Exhibition Design; Storytelling*

8. People Using Cultural Resources

- General *Reading Interests; Visitor Studies*
- Population Groups *LGBT Information Needs; Older Adults' Information Behavior*
- Subject Areas *Social Science Literatures and Users; Engineering Literatures and Users*

9. Organizations *Bibliographical Society; International Council on Knowledge Management*

10. National Cultural Institutions and Resources *Japan: Libraries, Archives, and Museums*

11. History *History of Records and Information Management; SMART System, 1961-1976.*

Figure 2: Main Topical Categories of ELIS, with some example entry titles.
 Italicized topics are examples in the stated category. Total encyclopedia entries: 565.

4. DISCUSSION

In line with the issues raised above regarding the selection of topics for the encyclopedia, note the following further points about the categories:

4.1. Disciplines and Sub-fields

The topics in the first category cover entries about the whole disciplines, their sub-fields, and education and careers in those fields. One of our hopes is that readers will discover how many disciplines and sub-disciplines there are in the information fields; indeed, they may be made aware of some other disciplines for the first time. We also include entries on a penumbra of cognate disciplines that have strong information components, but which may not see themselves as information disciplines per se. [Total: 76 entries.]

4.2. Research and Theory

Key concepts, models, and theories are described in categories 2 and 3, as are social and cultural issues associated with the several disciplines. In particular, iSchools have demonstrated strong interest in the social and policy aspects of information. See also discussion of Figure 3 in next section. [Total: 130 entries.]

4.3. Areas Distinctive to the Information Disciplines

Categories 5, 6, and 8 address the information technology, the information itself, and people using information; these are the commonly mentioned heart of the i-disciplines and the iSchool curricula. It is often said that the iCaucus addresses the nexus of people, technology, and information. These three categories represent that core. In a very real sense, almost all entries in the encyclopedia deal with these three elements coming together in one way or another, each entry emphasizing one aspect or another. We believe that the nearly 30 entries on human information behavior (HIB) represent the first time an encyclopedia has addressed HIB in such detail. [Total: 111 entries]

4.4. Professional Elements

In category 7, the range of professional services and activities is addressed. It is here that the similarities and differences of the several fields are most in evidence. All the information professions share tasks that have much in common: Evaluation and

acquisition of resources, management of the institution holding the resources, organization of resources, monitoring and management of resources, and user services. Librarians study “user behavior” and museum professionals conduct “visitor studies.” These practices sound different, but they have much in common, and could no doubt learn from each other. As well, each profession has some areas or issues that are distinctively its own. [Total: 52 entries.]

4.5. Social and Economic Infrastructure

The Institutions and Organizations categories (categories 4 and 9) represent the physical and social manifestation of human aggregation around social tasks to be achieved and problem areas to be addressed, as these play out in the information disciplines. [Total: 114 entries.]

4.6. Geographical and Political Manifestations

A prime interest of Associate Editor Maack was to develop a set of entries that surveyed the cultural infrastructure, particularly with respect to libraries, archives, and museums, of as many countries worldwide as possible. Section 10’s entries, some on countries not often described in the literature, represent a strong start. [Total: 45 entries.]

4.7. History

Finally, we wanted the history of the information disciplines to be covered, and some entries in the last section, section 11, provide the needed historical perspective on the rest of the entries in the encyclopedia. The section includes entries on some topics not often dealt with historically, such as the history of word processing. [Total: 37 entries.]

5. SOCIAL AND CULTURAL STUDIES IN THE INFORMATION DISCIPLINES

Finally, the topical component likely to be of particular interest to iConference attendees is the section on research specialties, in particular, the social, cultural and policy aspects of the information disciplines. So, Figure 3 lists the all the sub-areas under “Research Specialties,” with example entry titles from those sections.

1. Bibliometrics, Scientometrics

Examples: Citation Analysis; Information Scattering

2. Information Behavior and Searching

Examples: Information Searching and Search Models; Knowledge Sharing Mechanisms

3. Information Organization and Description

Examples: Metadata and Digital Information; Moving Image Indexing; Topic maps

4. Information Retrieval

Examples: Recommender Systems and Expert Locators; Web Social Mining

5. Information System Design

Examples: Children and Information Technology; Design Science in the Information Sciences

6. Legal and Ethical Issues

Examples: Art Looting and Trafficking; Cyberspace Law; Piracy in Digital Media

7. Social Life of the Cultural Record

Examples: Open-Access Scholarship and Publishing; Politics of Representation in Museums; Sociology of Reading; Censorship and Content Regulation of the Internet

8. Social Relations in Information Technology

Examples: Collaborative Information Retrieval; Computer-Supported Cooperative Work

9. Social Studies of Information

Examples: Cultural Memory; Digital Divide; Information Policy—European Union; Information Technology Adoption; Organizational Learning; Social Informatics; Social Networks and Information Transfer

Figure 3: Main categories under “Research Specialties” with example entries

I believe that it can be seen from the lists in Figures 2 and 3 how much overlap there is in coverage between the encyclopedia and the iSchools’ curricula and faculty research interests.

6. CONCLUSION

The *Encyclopedia of Library and Information Sciences*, Third Edition, not only represents a blueprint laying out the nature and character of the information disciplines, but it also represents the fulfillment of that vision in the recent publication, in seven volumes, of the encyclopedia. It is to be hoped that this reference work will constitute an excellent representation of the i-disciplines, as well as play a

role in supporting the further development of those disciplines and their iSchools.

7. REFERENCES

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