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Library and information science: practice, theory, and philosophical basis

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Abstract

This paper presents different facets or aspects of Library and Information Science (LIS) from a theoretical and philosophical perspective. It begins with the presentation of different attitudes towards LIS and the divergence between LIS as a knowledge producing and knowledge utilizing area. It goes on to discuss the different labels for the discipline, its institutional affiliations and some technology driven paradigms. Fields of LIS practices, examples of concrete research problems and the fundamental concepts are introduced as are subareas, theories, related disciplines, and approaches (''paradigms''/metatheories). Also a short presentation of research methods and basic philosophical assumptions is included.

Keywords: Library and Information Science; Theory and practice; Professional strategies; Technology driven ''paradigms''; Philosophical approaches

1. Three basic attitudes towards LIS

Some colleagues in Schools of Library and Information Science are very busy teaching issues such as the Internet, information storage and retrieval, bibliography, thesauri, computer issues etc. (or in the management of information services), often with great success both economically and educationally. It is common in schools of library and information science to give *practical instructions* in the use of information sources and information technology. This does not

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indicate that these colleges see themselves as theoretically oriented. Even less they see themselves as being researchers and part of a "science".[1] We can call these people "*library and information technicians*" or "*library and information managers*".

Other colleagues do not see our field as a discipline in its own right, but have a broader cultural background mostly in the humanities, which for them is the essence of the field. We can call them "*the culturalists*". They seem not to be very motivated to engage in the development of the field as a special research discipline with its own theories, terminology, and so on (and identified in disciplinary journals and databases such as *Library and Information Science Abstracts*). Instead, they are often engaged in cultural studies of various kinds and may identify themselves with other fields of scholarship or (social) science and publish in the journals in other fields.

A third group of people is engaged in library, documentation, and information studies (or science) as a research area in its own right. We are very few in numbers, both in a single LIS-school and cumulated on the international scene.[2] The question is, whether there are enough qualified researchers in the field to keep it alive. Floyd and Phillips (1997) documents, that authors writing in LIS journals have very little time to do research. "Despite pressure to publish — applied both internally and externally — few librarians worked for institutions with written policies specifying how much time employees could spend on research. Only 19% of the authors [in a survey of American LIS journals] indicated their institution had such a policy, with an average of 4 h per week allowed for research" (Floyd & Phillips, 1997, p. 85).

The single individual can of course combine elements of "the library and information technicians/managers", "the culturalists", and "the library and information scientists". She or he can at one time engage more in one kind of these activities and at another time in one of the other kinds. The important question for the field viewed as a knowledge-producing domain is whether enough people are continuously engaged in research.

2. Kinds of useful knowledge for librarians/documentationalists/information specialists

Library and Information Science (LIS) is a professional domain drawing on many kinds of knowledge. LIS is both a knowledge producing field and a knowledge utilizing field, and it is only a minor amount of this knowledge, which is produced by researchers identifying themselves as researchers in LIS.

- Broad cultural knowledge
- Knowledge about the different domains communicated/promoted (e.g. music, law, medicine)[3]
- Knowledge about the philosophy and sociology of science
- Economic and administrative knowledge

[1] Although some of them may hope that one day they will have time to concentrate on such theoretical problems, and some deep understanding will reveal itself, and they will succeed in becoming researchers.

[2] The strengthening of the PhD programs in this field in the Scandinavian countries can hopefully help to increase both the number and the quality of *library and information scientists* in this part of the world.

[3] Hay (1990) is a review article about subject specialism in academic libraries.

- Knowledge about specific information sources, such as databases, Internet resources, etc.
- Knowledge about information technology (IT)
- Language and communication skills
- And much more

Such kinds of knowledge are required in information work, and are often taught at schools of LIS. It is more seldom (and more difficult) to focus of LIS from a research perspective: to identify researchable problems in the field — and to try to build the profession on a scientific basis. It can also be a serious dilemma to concentrate on narrow research problems because practice demands broad knowledge of many kinds.

2.1. Some professional strategies: specialization/generalism and form/content

The Swedish librarian and information specialist Lena Olsson describes in her PhD dissertation (1995, pp. 234–237) the professional strategies within the library/documentation/information science area. Her point of departure is a figure, which corresponds to Fig. 1.

The first dimension is form vs content, which in the main is constituted by a differentiation between technical form on the one hand and the content of knowledge, information or subject matter on the other hand. The other dimension concerns the attempt to develop a generalist competence vs a specialist competence.

Historically, the different professional groups within LIS have adopted different strategies in relation to the development in information technology (IT) and computer science. The "documentalists" [and the "research librarians"] for the main part adopted *a content-oriented strategy* in the sense that they obtained, applied and developed the bibliographical databases in order to retrieve the content in journal articles and reports in different advanced ways. General librarians, however, adopted *a form-oriented strategy* by trying to produce a completely satisfactory library catalogue by utilizing computers.

According to Olsson the figure further shows that librarians can develop professional roles

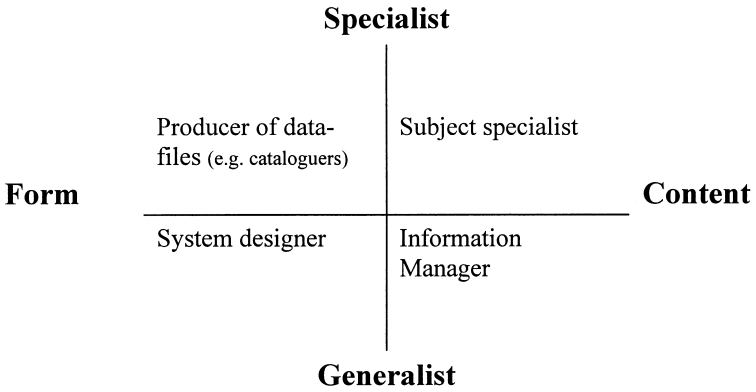

Fig. 1. Olsson's (1995) model for professional strategies.

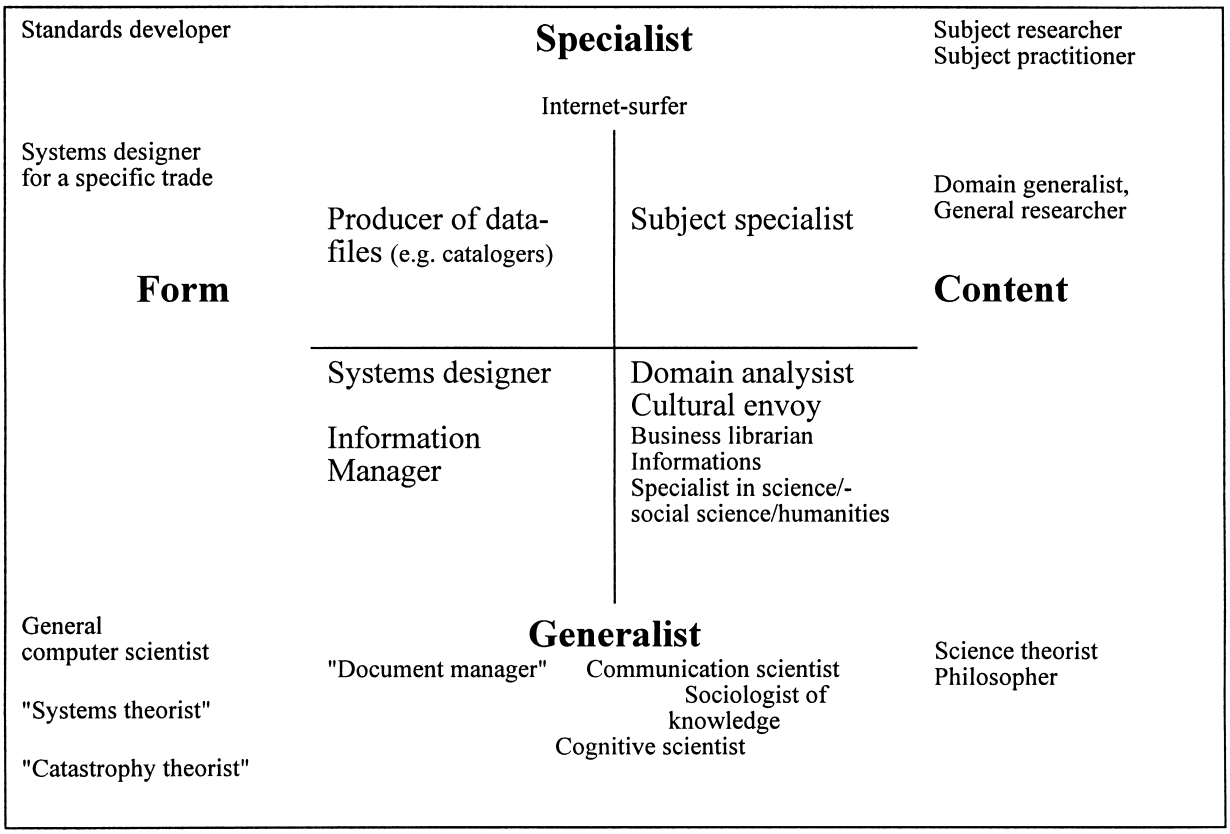

Fig. 2

as *specialists on form* and find work as cataloguers, bibliographical indexers or producers of datafiles which are developed by a certain kind of formatting [especially "the MARC-formats" and "the Anglo American Cataloguing Rules"]. *Generalists on form* are, for example, those who can develop and design new library and information systems. In this case it is the opinion of Olsson that the technical interest among librarians is too small and that a conversion of the profession is necessary if this strategy is going to be fruitful.

Librarians as well as documentalists have also aimed at a *content-oriented expertise*. Because the LIS-profession is an academic profession, *subject-specialism* has been regarded as a natural way to receive status as an expert. The scholar librarian has been trying to be as qualified in a subject area as his fellow researcher, who visits the library. However, because of the continuing specialization and the increasing competition among researchers it becomes — in the view of Olsson — impossible for the librarian to keep up with the researchers. In her view this strategy is doomed to fail.[4]

[4] "En bibliotekarie och dokumentalist kan endast ha en mycket ytlig kunskap inmom ett fåtal ämnesområden. Dette tycks vara en fåfäng strategi med förutbestämd undergång" (p. 236).

Olsson mentions that a favored professional strategy is what today *is* named *information management* [or IRM: Information Resources Management]. This strategy was in her opinion already introduced in Sweden by Carl Björkbom (1953) and has been taken up by schools of Library and Information Science as a progressive method for the development of the library profession.[5]

Olsson's treatment is historical rather than systematic. For this reason she does not penetrate deep into the problems attached to the respective roles of "information manager", "systems designer" and "producer of datafiles" just as her treatment of subject specialization is not particularly deep either. As an example we can see that many kinds of content-oriented generalizations are possible, but they are not mentioned in her book. However, her model is very thought-provocative and inspiring and I intend to use it for further analysis of the developing strategies for the LIS-profession.

A discussion of strategies for developing the LIS-professionals should include a description of the relations between LIS and other scientific and professional groups, including an analysis of their areas of competence. A huge number of different disciplines exist related to knowledge and information, to information technology, to the dissemination of information, to intermediating roles, to communicating and to the broader fields of cultural studies.

The question about specialization reveals a dilemma for LIS/IS: *Big libraries* and information systems can afford a huge range of specialists both in content areas (subject specialists) and in administrative, technical, educational and marketing issues (form specialists). But *small libraries* (especially small public libraries) and information systems must depend on "generalists", who are able to work in broad subject areas and with many kinds of functions. Overall, small libraries and small information systems therefore tend to be less professional compared to the big ones. Small libraries and information systems can, however, also be specialized and highly professional.[6]

It is very important to notice that content specialism and form specialism are not external factors which can be combined at will. You will never become a specialist in Chinese medicine by studying China and medicine as two separate subject areas. In a similar way, you will never

[5] As documentation of the trend towards information management, Olsson provides references to Svenonius and Witthus (1981); Garoogian (1991), to the development at Berkeley University in California (Anon., 1993) and to Cronin (1991).

[6] The educational requirements for smaller, general-purpose libraries, tend to be more "all-round", and seems more like a "middle" kind of education than a "higher education". The qualifications needed in an organization such as a hospital or a library is of course diverse: managers, computer specialists, doctors (respective librarians). Doctors/librarians should be specialized into diverse subject areas. Hospitals and libraries need to hire personnel with different educational backgrounds: only part of the staff is educated in medical schools or library schools. An important difference between hospitals and libraries is the fact that on the highest professional level medical specialists are all doctors from medical schools, but academic librarians are not typical librarians specializing in a subject area, but are persons educated in a subject area and given additional training in LIS. In this regard, libraries are more like *educational institutions*. At the lower levels teachers tend to be educated as teachers with some degree of subject specialism, whereas at the higher levels, teachers tend to be educated in a subject area, with some additional courses in educational methods. For example, teachers in music are, at the lower level teachers first, whereas at the higher levels they are music specialists first. In a similar way, in public libraries music librarians are librarians first, whereas in research libraries, they tend to be music specialists first and librarians thereafter.

learn about musical databases, music information sources, music user needs, music retrieval problems etc. by studying "music" and "information" as two separate areas and then combine your knowledge. Besides it is also a question of what should be understood by the study of information as pure form, in abstraction from all content.

The real challenge for information science is therefore to develop specific knowledge, which is *relatively independent* of subject knowledge, but which is not an empty abstraction. The parallel to education is to develop knowledge about the teaching of mathematics, music, chemistry, etc. ("didactics") which is neither identical with subject knowledge nor an empty abstraction which does not relate to the particular problems in each discipline.

In Fig. 2 are plotted some LIS-fields into Olsson's formerly presented model of the two dimensions: generalist/specialist and form/content. Fig. 2 is not intended as a complete catalogue of relevant subject fields but represents a view of how some relevant areas are related to LIS regarded from Olsson's model. We shall shortly comment upon the four quartiles in the model.

The specialized content-oriented function corresponds to the function as *discipline or subject specialist*. It is handled by traditional research librarians, documentalists and subject specialists (including some librarians in major public libraries; typical here is, for example, the role as *music librarian*). In my opinion, these people are not specialists in the same way as, for example, scientists or scholars at universities: They have an identity of their own with a much broader grasp of a whole domain, its information producers, communication channels, databases, subject language, user groups etc. It would be much better to describe them as *domain-generalists*.

The generalized content-oriented function corresponds to a broader education which is typically represented by a general cultural worker or envoy in a public library. With regard to research libraries and information centers, this function is that of a "domain analyst", who applies broad perspectives from communication studies, sociology of knowledge and "science studies" to the intermediating of information. A work such as Whitley (1984) *The Intellectual and social organisation of the sciences* could serve as an example of such generalized content-oriented knowledge.

However, the role as general knowledge workers is seen rather seldom in research libraries, information centers and elsewhere. Much more common is a "midway" position between the subject specialist and the general domain analyst. This is the role of librarians and information specialists who are not narrowly delimited to a single discipline, but to a superordinal area such as business and management, the media-sector, the health sector or the librarians who have a broad specialization in either the humanities, the social sciences, science or technology.[7]

The generalized form-oriented function contains competences which correspond to information technology (IT) without aiming at a particular content. The real experts in this area are computer scientists, engineers, systems planners, etc. General theories which give priority to form rather than content are *formalist theories* (such as "information theory", "systems theory", and "catastrophy theory"). The formalist theories confront the content-

[7] Notice that I do not — as Olsson does — look at IRM as a generalized content-orientated function, but as a form-orientated function.

oriented theories. Formalist theories have obtained outstanding results and general computer science is a very desirable expertise. However, the form-oriented knowledge tends to develop into a specialization which essentially concerns the content. For example, it is becoming more and more necessary for the computer industry to offer computer systems designed for a specific branch of trade.The literature on *systems design* is affected to a still larger degree by content-related philosophies (e.g. Hirscheim & Klein, 1989). For the same reason I find that the role as *information manager* becomes very abstract and superficial if it does not incorporate content-oriented principles. The important thing is to be able to manage information in ways which reflect the needs and characteristics in the domain where the system is applied.

The specialized form-oriented function occupies itself with, for example, work of standardization, rules for describing documents in databases and formatting. As in the generalized form-oriented function important standards and procedures exist. Such standards and procedures can be important to know and to develop further. However, also in this case, a theory of pure form will rapidly encounter its limits. Different subject areas have different kinds of documents, which demand different kinds of descriptions. Standardization should not be regarded as a constraint imposed on a content, but as something generalized.

The job-functions typically related to the essential of competence of librarians, documentalists and information specialists concern information seeking in databases, on the Internet, in libraries, etc. They also include seeking information organized in different kinds of systems such as enumerative classification systems, facet-based classification systems, free text systems, etc. As shown in Fig. 2 the role of, for example, Internet-surfers, lies between the

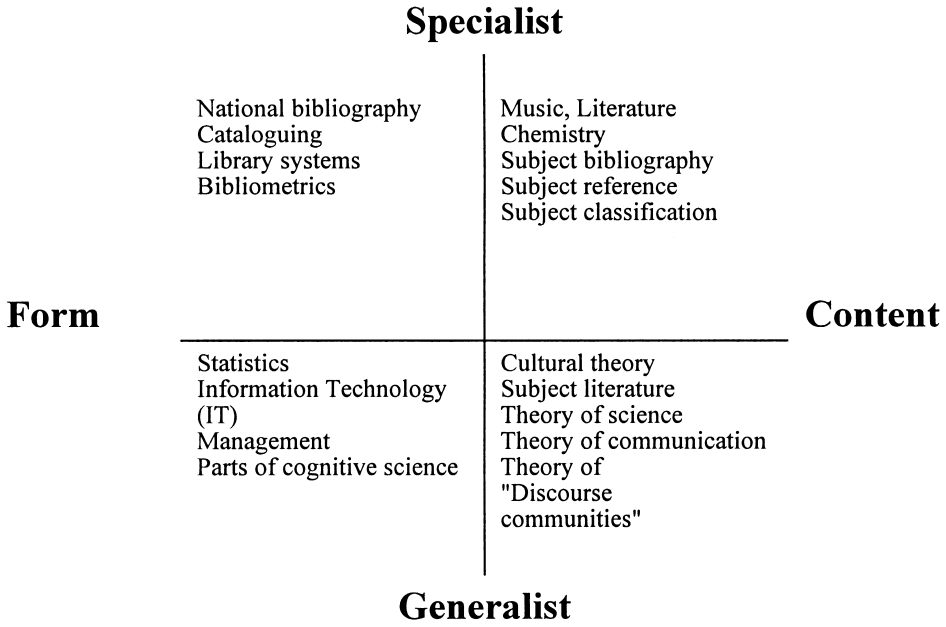

Fig. 3. Some LIS-disciplines placed in Olsson's model.

content-oriented knowledge and the technical, form-oriented knowledge. This is in my opinion typical of the essential competences of the profession.

Fig. 3 shows core subjects in the curriculum of LIS-schools analyzed from the same dimensions. In my opinion the central subjects are related to both form and content. *Bibliography* thus is most form-oriented in national bibliography, but most content-oriented when it comes to a theory of subject-bibliography and search strategies in online retrieval. *Classification* is most form-oriented in the descriptions of the great systems, in software for knowledge organization and in formal kinds of knowledge organization, but most content-oriented in the analysis of subject-structures, interdisciplinary relations, information structures in disciplines, etc. *Reference work* is generally more content related than bibliography. It is difficult to construct a theory of reference work without some basic knowledge about knowledge organization in such subjects as law or medicine.

In the rest of this paper I assume that I am talking to people engaged in contributing to Library and Information Science as a field of study, to its knowledge, concepts, methods, theories, and underlying philosophy.

3. The discipline(s)

Names commonly associated with the field include:

- "Library Science"/"Library Studies"
- "Information Science"/"Information Studies"
- "Documentation"/"Documentation Studies"/"Documentation Science"

and combinations such as:

- "Library and Information Science" (LIS)
- "Library, Documentation, and Information Studies"

1. The term *library science* (German: Bibliothekswissenschaft) goes back to a textbook by Martin Schrettinger, 1807, (cf. Kunze & Rückl, 1974, p. 267),[8] and *Department of Library Science* in Chicago existed in 1894. S. R. Ranganathan is the most known contributor to this field, and two of his main works use this concept: "Preface to library science" (1948) and "The five laws of library science" (1957).[9] Even the term is still used today (e.g. Olaisen, 1985), it is mostly replaced by "library and information science" (LIS). In 1969 *Library*

[8] Schrader (1983, p. 36 has translated Schrettinger's definition of Library Science: "[Library Science encompasses] all precepts necessary to the practical organization of a library, provided that they are based on sound principles and reducible to one principle ... [namely, that] a library must be arranged in such a way as to render speedily accessible whatever books are required to fill every literary need".

[9] In other works, however, Ranganathan uses the word "documentation".

Science Abstracts thus changed its name to *Library and Information Science Abstracts*.[10]

2. "The term *documentation* is a neologism invented by [Paul] Otlet to designate what today we tend to call Information Storage and Retrieval. In fact it is not too much to claim the Traité [Traité de Documentation, 1934] as one of the first information science textbooks" (Rayward, 1994, p. 238). In 1968 *American Documentation Institute* changed its name to *American Society for Information Science* (*ASIS*), which is another indication that IS developed from documentation.[11]
3. ASIS defined *information science* in the following way.
   Information science is concerned with the generation, collection, organization, interpretation, storage, retrieval, dissemination, transformation and use of information, with particular emphasis on the applications of modern technologies in these areas.As a discipline, it seeks to create and structure a body of scientific, technological, and systems knowledge related to the transfer of information. It has both pure science (theoretical) components, which inquire into the subject without regard to application, and applied science (practical) components, which develop services and products.[12]

Whether the above mentioned terms should be regarded as synonyms or not depends partly on the theoretical perspective. Different LIS schools in the world emphasize different aspects, as do different trends in the history of the field. People in schools of library and information science differ very much in their theoretical orientation and on what problems they focus. People focusing on the use of IT have a tendency to prefer the term "information science"[13] while people engaged in library history often prefer "library studies". I myself like the word "documentation" very much and find that "Library, Documentation, and Information Studies" is the broadest and most comprehensive name for our field.

Schrader studied about 700 definitions of "Information Science" and its antecedents from 1900 to 1981 and found that: "... the literature of information science is characterized by conceptual chaos. This conceptual chaos issues from a variety of problems in the definitional literature of information science: uncritical citing of previous definitions; conflating of study and practice; obsessive claims to scientific status; a narrow view of technology; disregard for literature without the science or technology label; inappropriate analogies; circular definition;

[10] See also Butler (1933) and Olaisen (1985).

[11] About documentation see also Briet (1951); Björkbom (1960); Farkas-Conn (1990); Lund (1995) and Woledge (1983).

[12] The definition is from 1975 cited here from Griffith (1980) p. 5. It is closely related to a definition given by Borko (1968). It implies that information is *a thing*, which can be produced, stored, transformed, and used. It has an implicit conception of information as being documents. This is not in accordance with the most recognized theories of information. It is much more common to look at information as some change in the receiver's knowledge or uncertainty.

[13] The background for the consequences of introducing the word "information" in the library and documentation field is treated in Hjørland (2000). In my opinion the effects of this terminological shift have not always been positive, but have caused much confusion.

and, the multiplicity of vague, contradictory, and sometimes bizarre notions of the nature of the term "information" (Schrader, 1983, p. 99).

Many problems regarding the meaning of "information" and "information science" remain unclear, and progress in the problem of "labeling" this field depends on a theoretical clarification, which again depends on the understanding of the relative merits and problems in the different approaches or "paradigms".[14]

4. Institutional affiliations

"*Library science*" is mostly done in "Library schools", the institutions where librarians are educated *qua* librarians.

Such schools tend to have a monopoly on the education of "general" librarians for public libraries. They also have important parts of the market for "special librarians"/"academic librarians" or librarians in research libraries, in private libraries (e.g. business libraries, libraries in the biomedical sector, etc.), and in the database industry.

In research libraries most professional positions tend to be filled with people having their main education from library schools, while somewhat less than half of the positions tend to be filled with subject specialists. Such subject specialist mostly has a master's degree or PhD in a subject (e.g. law, medicine, music, or history) and in addition a degree from a library school.[15]

"*Documentation*" and "*information science*" originally perceived themselves as alternatives to library science. They were mostly affiliated with research institutions (often in the technological fields).

Documentalists/information scientists made less priority to building and maintaining collections, and more to serving the users. Besides being more "service minded" they were more engaged in utilizing modern technology. Implicitly they often operated from a background in subject knowledge (but this was not at that time developed into some kind of theoretical view).

Since about 1975 documentation and information science has more and more been affiliated with schools of library science (often changing their names to "School of Library and Information Science", LIS), and more and more researchers publishing in journals of information science, have their affiliation with such schools (possibly due to both an increase in the interest of the library world, and a decrease in possibilities outside library schools).

The most critical question for developing a corpus of knowledge in librarianship, documentation, and information science, has in my opinion been the problem of subject knowledge: how to develop *general* knowledge, which does not dissolve into concrete subject

[14] Saracevic (1992) found that "library science" and "information science" are two different disciplines. Also Dissertation Abstracts International have one descriptor for "library science" and another for "information science" (the items indexed gives an indication of what these words mean for people writing dissertations, and what are the respective research profiles).

[15] In Denmark "general librarians" in research libraries are called "librarians in research libraries", while subject specialists educated as librarians are called "research librarians".

knowledge. One strategy has been to concentrate on IT-issues. Another strategy have been to psychologize (e.g. Belkin's concept of Anomalous States of Knowledge, ASK). My own strategy has been to develop what I call "domain analysis" (Hjørland & Albrechtsen, 1995). More on this in the section about theory. What I would like to ask at this place is this:

Is the content (and the truth) of research in LIS influenced by its institutional affiliations?

My answer is yes. Professional "knowledge" *is* to a large degree influenced by institutional ideologies. Psychologists, for example, tend to develop universal theories about thinking and cognitive development as opposed to domain specific theories, and librarians also tend to neglect domain specific factors in information work. The same is also the case with other professions. Sometimes "knowledge" in one discipline can be more or less implicitly in contradiction with knowledge in other disciplines or with general recognized knowledge. Such ideologies can be a barrier for the further development of the field, and also negative for the profession, which they were meant to serve.

It is important to develop a body of general and respected knowledge in LIS, but such knowledge should be based on a realistic philosophy, not on ideologies constructed to suit some unrealistic dreams. In my opinion LIS is a very important field of study with conditions to develop much relevant and respected knowledge.

5. Some technology driven "paradigms" in library and information science

5.1. Manual indexing and classification in libraries

(Especially books; mainly 1876–)

- Charles A. Cutter (1837–1903)
- Melvin Dewey (1851–1931)
- Henry E. Bliss (1870–1955)
- S. R. Ranganathan (1892–1972)

5.2. "Documentation" and scientific communication

Classification and indexing in subject bibliographies (especially journal articles; mainly 1895–)

- Paul Otlet (1868–1934)
- Establishing of *The International Institute of Bibliography* (from 1937 Féderation Internationale de Documentation, FID) and from 1986 to "International Fédération for Information and Documentation".
- UDC (1st edn. 1905–1907)
- S. R. Ranganathan (1892–1972)
- Brian Vickery (1918–)
- User studies (Bernal, 1948–)

5.3. Information storage and retrieval by computers (mainly 1950–)

- Cranfield (1951–) (''the archetypal approach'')
- Statistic approach
- ''the cognitive view'' (N. Belkin, P. Ingwersen, etc.)
- Expert systems and Artificial Intelligence
- (Natural language processing; Linguistic approaches)

5.4. Citation based retrieval (1963–)

- Research on the relative role of terms vs references in information retrieval
- Research on the semantic relations between citing and cited papers
- Research on citer motivation
- Research on sociological patterns in citing

5.5. Fulltext, hypertext and Internet (mainly 1990–)

- Research on fulltext retrieval and the utility of ''value added information'' (such as descriptors)
- Document composition studies
- Research on hypertext navigation and the optimal design of nodes and links
- Research on the efficiency of Internet Search Engines

Such technology-driven approaches have indirectly influenced theory, e.g. the introduction of the concept of ''information'' (''Information Science'') at the expense of ''document'' and ''documentation'' (see Hjørland, 2000).

The ambition of the field as a field of study is to produce general knowledge and principles, which can be used by new technology. However, new technologies have often ignored existing knowledge (e.g. Cutter's rules from 1876) and at a later time reinvented this knowledge. (Also today some people working with digital libraries have proposed to construct ''switching languages'' without knowledge of the experiences and research already done on this subject.)

The goal for LIS is to write a history of its theoretical development *abstracted* from the concrete technologies in which its principles have been studied. This is difficult because the general knowledge base is not well established. Also, the tendency has been that library and information science has passively used the technology without contributing to its development.

If LIS shall be able to contribute valuable knowledge, its focus must be abstracted from concrete technologies. One of my own suggestions for a research program in LIS is ''database semantics'' (see Hjørland, 1998a).

6. Fields of LIS practices

Like medicine, LIS is a discipline with primarily *a practical aim*. The aim of LIS have been

defined by Belkin (1977, p. 22): "Facilitating the effective communication of desired information between human generator and human user" (cf. Ingwersen, 1992, p. 11).

This does *not* mean that LIS (or medicine) does not have aspects of fundamental research, but that it is important to keep attention to that aim. This aim can be further specified:

- Information seeking/retrieval
- Classification and indexing
- Document selection and collection development
- Design of information systems
- Quality management of information services
- Teaching information/document/literature searching
- and so on

All forms of practice can be done as a generalist or as a domain specialist, e.g. as librarian or information specialist in music. One of the difficulties in formulating good research questions in this area is that the difficulties is often related to concrete problems in a specific library or database in a specific subject area. The problems in practical library and information work are often related to lack of time, lack of knowledge on local conventions, or lack of knowledge in the concrete subject area. Research questions on the other hand, must be abstracted from concrete practices, but be very specific. It is important that they make a definite contribution formulated in a way, which makes it possibly to be falsified. It is also important that it has general perspectives and can be applied on different technological platforms and in different environments.

It is also important to realize that applied research is different from a pragmatic-philosophical view. Applied research is programs where the question are asked by somebody other than the researchers themselves (and thus motivated by external factors), whereas fundamental research are programs where the questions are raised by the researchers themselves (and thus motivated by their curiosity and other internal factors). The pragmatic (or functionalist) view emphasizes the consequences of different perspectives, theories, concepts, and so on. In the last end science should serve practice (science is a part of the division of labor in society). However, pragmatic philosophers such as John Dewey realized that fundamental research is very important.

It should also be mentioned, that an applied perspective can have negative effects on the development of a scientific discipline. Slife & Williams (1995, p. 221–224) writes about the behavioral sciences that there is an increasing emphasis on the application of knowledge to human problems (e.g. in education and therapy). They see difficulties with this emphasis. When our motivation is too much determined by contributing to the solution of real problems out there, we naturally become impatient. Although it is laudable to try and solve human problems as quickly as possible, in such a rush there is considerable temptation to claim a level of understanding that cannot be supported: it often results in a disdain for critical thinking and theory. This can result in techniques and practical strategies that are inneffective if not counterproductive. In my own understanding many techniques (e.g. treatments for cancer) can be tried one after another as a kind of "trial and error" behavior. This is not as efficient as insightful behavior based on deeper theoretical insights provided by basic research in, for example, the

biology of the cell. In the same way many practical solutions in information science may turn out to be inneffective or counterproductive because they built on insufficient or problematic theoretical presuppositions about meaning and its representation in databases.

The haste to find answers to seemingly practical questions may also according to Slife & Williams imply that these questions are themselves not well considered. We often need to ask more fundamental questions, which may not be easily addressed with empirical methods. Empirical work must always follow good theoretical work. Theoretical skills are important, including careful conceptual clarifications and careful thinking that brings many possible frames of reference to bear on whatever information we have. This involves reading broadly and situating the issues historically, so that we know where questions fundamental to theories come from, why they have been asked the way they have, and why we might be tempted to think about them in the way that seems so evident to us. Another way of putting this is, that especially in human, behavioral and social sciences, including library and information science, it is very important to have a historical perspective of the research traditions and to look at oneself as a part of a historical development. Such theoretical training ought to take place alongside developing empirical and statistical skills, and should be seen as necessary competencies for any behavioral or information scientist. Unfortunately, this is not the normal picture. We seem too often to have become content with the theoretical perspectives already available. Little attention is given to their adaquacy or the advisability of looking at a particular topic through the lenses these perspectives provide. Students of LIS should ask themselves: Who are the three greatest living theories in our field today? Who have made fundamental breakthroughs in our discipline? Which interdisciplinary trends and philosophical outlooks seem most promising?

Important concepts in the literature on the relationship between research and practice are *the Scientist-practitioner model* (Barlow, 1992) and *the reflective practitioner* (Schon, 1983).

7. Examples of concrete research problems

LIS can only become a science, if it is able to formulate researchable *problems*. LIS education should not just teach facts and know-how, but from the first semester illuminate what we do know, and what we need to know (needed research). If we are unable to create consciousness about needed knowledge and researchable problems, we are unable to educate researchers *and* professionals with a scientific attitude towards the field.

> Most important: unless we can formulate clear goals for our research, we may be unable to create a need for our research activities.

Some examples are:

- Developing new systems of classification and indexing (or evaluate and revise existing systems)
- Evaluate the coverage and quality of different databases
- Determine whether citation indexing is more efficient than term based indexing (a theoretical problem)

- Determine whether classification systems like Dewey or the UDC are obsolete? (a theoretical problem)
- Determine whether different kinds of domains/disciplines need different kinds of indexing principles? (A theoretical question)
- Developing subject guides in different domains of knowledge and mapping information resources
- Examine the needs for specific information services in concrete domains (such as medicine, music or psychology) or by concrete target groups such as high school students

Other kinds of problems may be formulated. Different views (or "paradigms") in LIS will emphasize different problems.

Everyone can scan the LIS journals and make up their mind whether they find that they express clear researchable problems or whether it is difficult to see what problems they try to solve. It is important that many people thinks about this and about how to improve the output (but first of all improve the formulation of problems).

I find it important that we try to formulate and discuss what problems lies in the heart of IS and what the consequences are regarding research strategies, metatheories, and priorities in our field.

8. Categories

Every discipline has its fundamental concepts or categories. In LIS they include (in alphabetical arrangement):

- Communication
- Concepts and meaning (semantics)
- Documents/Texts, Document/text retrieval
- Domains (of knowledge), disciplines
- Information, information technology (IT), information systems,[16] information seeking, information retrieval
- Knowledge, knowledge representation
- Literature, (especially subject literature)
- Media
- "Memory institutions" (libraries, archives, museums etc.)
- Relevance
- Users

Different views (or "paradigms") in LIS will emphasize different concepts and categories. Also different views and theories will provide each of these concepts with its own specific meaning. "Users", for example, are studied from very different perspectives, such as behaviorist, cognitivistic, hermeneutic, sociological, and domain analytic. Thus, the work with the

[16] The label "information systems research" is especially affiliated with schools of business and management, and tends to have its own journals as shown in Table 1.

Table 1
File 7

Set	Items	Description
S1	6585	INFORMATION(W)SYSTEM?
S2	51	S1(W)RESEARCH

DIALOG RANK Results
(Detailed Display)
RANK: S2/1-51 Field: JN = File(s): 7
(Rank fields found in 51 records — 22 unique terms) Page 1 of 3

RANK	No. Items in File	Items Ranked	% Items	Ranked Term
1	80	6	11.8%	INFORMATION SYSTEMS JOURNAL
2	127	5	9.8%	INFORMATION SYSTEMS RESEARCH
3	506	5	9.8%	MIS QUARTERLY
4	305	4	7.8%	INFORMATION & MANAGEMENT
5	906	3	5.9%	DECISION SCIENCES
6	1907	3	5.9%	INFORMATION PROCESSING & MANAGEMENT
7	757	3	5.9%	INTERNATIONAL JOURNAL OF INFORMATION MANAGEMENT
8	109	3	5.9%	JOURNAL OF INTERNATIONAL TECHNOLOGY

File 61:LISA(LIBRARY&INFOSCI) 1969–1999/Feb
S1 49 INFORMATION(W)SYSTEM?(W)RESEARCH

DIALOG RANK Results
RANK: S1/1-49 Field: JN = File(s): 61
(Rank fields found in 42 records — 18 unique terms) Page 1 of 3

RANK	No. Items	% Ranked	Term
1	11	26.2%	EUROPEAN JOURNAL OF INFORMATION SYSTEMS
2	4	9.5%	INFORMATION PROCESSING & MANAGEMENT
3	4	9.5%	INTERNATIONAL JOURNAL OF INFORMATION MANAGEMENT
4	3	7.1%	JOURNAL OF INFORMATION TECHNOLOGY
5	3	7.1%	KNIZNICE A VEDECKE INFORMACIE
6	2	4.8%	HEALTH LIBRARIES REVIEW
7	2	4.8%	INFORMATION AND MANAGEMENT
8	2	4.8%	INFORMATION MANAGEMENT REPORT

definitions and interrelations between the categories is a part of the fundamental research in LIS (whereas the examples of concrete research problems formulated in Section 7 were examples of research problems connecting theory with practice).

It is important to realize, that much relevant theory can be developed without using the term "information" or a theoretical frame which demands this concept (see, e.g. Lancaster, 1998). Besides much confusion is due to the fact that document retrieval has been termed "information retrieval" (See Hjørland, 2000).

Information scientists are not only using the concept of categories in analyzing their own field. Category is also an important concept in, for example, classification research. Ranganathan operated with five fundamental categories in his famous PMEST formula of classification: "Personality", "Matter", "Energy", "Space", and "Time". In philosophy the concept of categories have their own history, where Aristotle's 10 categories is one major contribution, and Ludwig Wittgenstein, who in his later writings developed the idea, that there can be no universal scheme of categories to be unveiled, let alone to be established by a theory. Clarity can be achieved only piecemeal, context by context, there is no short cut via an ideal language (cf. Thompson, 1967). As with every other concept, the concept of categories is dependent on the underlying philosophical view. The modern view is skeptical of the idea of a fixed set of categories, and the view that an ideal language or classification can be built on such a set (see also Eco, 1995).

9. (Sub)areas of LIS

The subdisciplines or subareas of LIS are the internal specialization in the field. It can be expressed in the subjects taught at LIS-schools, in the system of journals in the field, in classifications used in handbooks and in bibliographies. Examples are:

- Search techniques in electronic databases and on the Internet
- Multimedia storage and retrieval
- Informetrics
- Scientific communication
- Library automation, Digital libraries
- User studies
- Library history
- Subject specialist, e.g. as music librarian — (All subareas of LIS can and should *also* be studied from a domain-specific perspective)
- etc.

The problem of listing and relating the subdisciplines of LIS is just one example on how to classify a knowledge domain. My view on the methods are presented in Hjørland (1998d), where I exemplify in another discipline. Basically I find that there exist four kinds of classification methods: (1) empirical methods; (2) rationalistic methods; (3) historical methods; and (4) pragmatic methods. Real life classifications are based on some combination of those four methods.

10. Theories of LIS

A theory in LIS is a theoretical explanation of information systems efficiency (including library efficiency), of user behavior, of the function of different search elements such as descriptors, citations, titles, and so on.

We do not have many explicit theories in LIS. It is a well-known fact that LIS lacks good

theories. Brookes (1989) has noted that it is important that information science should not be regarded as "a collection of practical skills without underlying theoretical coherence". However, it is difficult to name just one good example of a theory in IS and even harder to find one that is formulated in a precise way which makes it possible to falsify it (as Popper demanded, cf. Jarvie, 1998). Most work in the field is of a pragmatic nature, which resists scientific analysis and generalization. However, a lot of papers are published and much practical work is done without explicating any theoretical or metatheoretical assumptions.

Often theories from other fields, for example, psychology, sociology or management are applied, but they are not theories of IS, but theories applied in IS. Example:

- TQM (Total quality management)

Ranganathan's facet-analytic approach contains a theory of subjects, which I would call a theory. However, other authors, including Ellis (1996), do not count classification research as a part of IS.

- Ranganathan's theory of subjects

Also, what is called "information theory" is by many people — this author included — not regarded as a theory in IS, but a theory in computer science (compare Wersig, 1996).

- "Information theory"

Specific approaches such as algorithmic retrieval or citation based retrieval should not be termed theories, but they rest on a basis of assumptions, which can be termed "metatheoretical". Metatheoretic assumptions are broader and less specific than theories. They are more or less conscious or unconscious assumptions behind theoretical, empirical, and practical work.

> What should a theory of (L)IS look like?
> Information science is occupied with determining which factors affect the performance of information systems (e.g. libraries). A theory of a problem in LIS (e.g. indexing) must be able to provide a theory of *the essential factors* affecting the quality of that process (e.g. indexing).

The essential factors affecting the quality of information work are in my opinion the information specialists' (e.g. indexers') *interpretation* of user needs and of the information/text to be processed (indexed). An information specialist (indexer) *or any actor involved in information transfer* may have several assumptions, vague or conflicting ideas, or "theories" about the users, documents and subjects being processed (e.g. indexed).

Such theories are not of much interest to LIS to the extent that they are purely individual or purely universal. To the degree they are purely individual no common lessens can be generalized in IS. To the degree that they are universal they are simply trivial: nothing important has to be learned. *Our search in LIS must be for theories about essential, non-trivial factors affecting the quality of systems performance.*

This must be found in theories about information analysis, which tend to be relatively stabile, but not universal among the users. We do have such theories in the different "paradigms" (cf. Kuhn, 1962, 1970), in the different philosophical approaches to subject areas.

Knowledge of philosophical approaches to knowledge domains (e.g. hermeneutics and Kuhn's theory of paradigms) should in my opinion be essential reading in all schools of library and information science, and such theories should be cited in any serious book about indexing, classification, abstracting, and information seeking/retrieval. It might help indexers (and teachers/researchers in library schools) to look after broader perspectives or "paradigms" which may be very relevant for the users, but which are not necessarily explicated in the documents themselves.

> Because such philosophical perspectives need not be discipline specific, this kind of knowledge might provide information specialists (e.g. indexers) with the most useful knowledge which can be generalized across disciplines and thus taught in schools of library and information science. The thought that we may be able to develop IS without considering how different kinds of content and different kinds of social contexts influence principles of IS is a very serious mistake, which in my opinion must take the responsibility for the lack of progress in the field.

11. Models

All sciences operate with theoretical models of different parts of their objects. In LIS *the Monstrat Model* (Daniels, Brooks & Belkin, 1985) and *the Mediator Model* (Ingwersen, 1992, p. 203 ff.) are models associated with the cognitive view. The Mediator Model contains 13 functions in relation to information retrieval (cf. Ingwersen, 1992, p. 204):

The Mediator Model (cf. Ingwersen, 1992, p. 204)

1. Domain Model
2. System Model
3. User Model
4. System Model Adaptor
5. User Model Builder
6. Retrieval Strategy
7. Response Generator
8. Feedback Generator
9. Request Model Builder
10. Mapping
11. Explanation
12. Transformer
13. Planner

Such a model can be a valuable heuristic aid for analyzing IR-interaction. However, if it is considered a model of human mental functioning, and thought of as derived from research in cognitive psychology, it contains very problematic ontological assumptions.

In the domain analytic view (Hjørland & Albrechtsen, 1995, p. 418) models of the information structures and communication channels between producers, intermediaries, and users of knowledge/information in discourse communities are presented (Fig. 4).

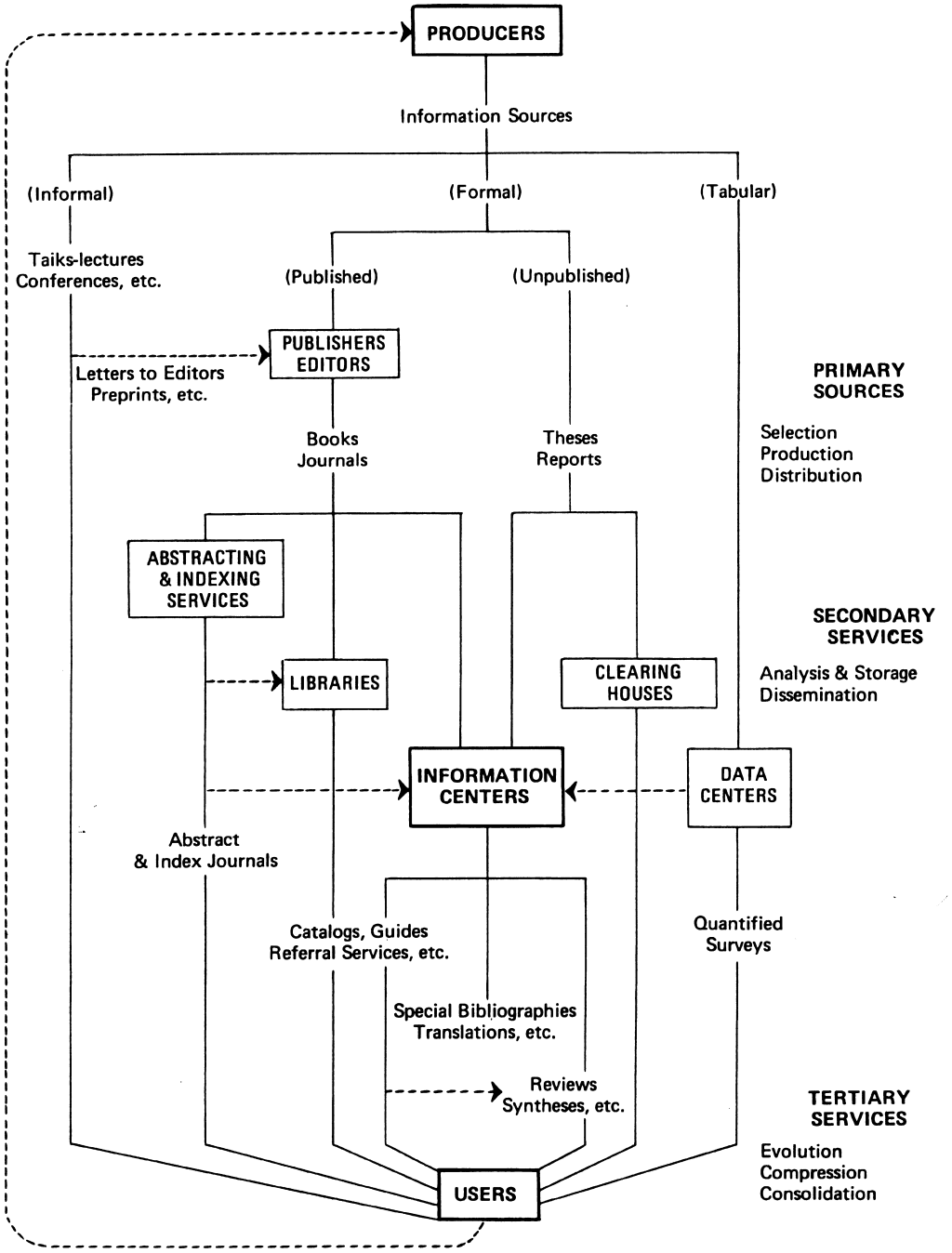

Fig. 4. The flow of scientific and technical information (Unisist, 1971, p. 26). Reproduced by permission of UNESCO.

Slife & Williams (1995, p. 220 ff) expresses criticism of the use of models on behalf of theories. They find that one manifestation of normal science in the behavioral sciences is a tendency toward model building rather than theorizing. The same is also the case in LIS. A Model helps us visualize how something might work and what variables should be taken into account. Often information scientists seem to be content building such models, testing them empirically, and modify or reject them. Correct models will supposedly be selected on a trial-and-error basis. The problem with this approach is that model testing does not question the assumptions on which the model was built. Models rarely expand our most basic understanding of the phenomena being modeled. There is no model, for example, that sheds light on the question of whether cognitivism or sociocognitivism best explains information seeking.

12. Related disciplines

Which related disciplines LIS draws on can be analyzed empirically through maps based on co-citation analysis. However it depends on the researchers theoretical orientations and thus on the dominating "paradigms" in the field. The related disciplines include:[17]

- Computer science (including "Artificial Intelligence")
- Communication studies
- Epistemology
- Linguistics (including computer linguistics, languages for special purposes, and lexicography)
- Mathematics and statistics
- Psychology and "cognitive science"
- Science studies
- Semantics
- Semiotics
- Sociology (especially the sociology of science)
- etc.

Mutual exchange of knowledge between disciplines is a sign of progressive science, whereas disciplinary isolation can be a sign of a degenerated research program.[18] One example of a related discipline is linguistics. There have been numerous chapters on automated language processing in *Annual Review of Information Science and Technology* (1966ff) and important contributions such as Bar-Hillel (1964); Hutchins (1975); Kuhlen (1986); Spang-Hanssen (1976); and Spark Jones and Kay (1973). In spite of this Warner (1991) concludes on the basis of a bibliometric investigation that there is a very limited export of knowledge from linguistics to IS.

[17] See also Ingwersen (1992, p. 4).

[18] The concepts of progressive vs degenerating research programs are introduced by Imre Lakatos (here cited from Chalmers, 1982, p. 80).

13. Approaches/paradigms/metatheories

There is no clear demarcation line between "theories", "approaches" (or: "metatheories", "paradigms") and philosophical positions. They are internally related and overlapping.

Metatheoretical assumptions are connected to philosophical views, and are often parts of interdisciplinary trends, which again may be connected to a "Zeitgeist". According to Ellis (1996) the most important metatheoretical approaches in IS up to now have been the "physical paradigm" and the "cognitive approach".

The most important approaches in IS are in my view:

- "The physical paradigm" (computer related approaches)[19]
- "The cognitive view"
- Different user-oriented views
- Different system oriented views
- "The domain-analytic view"
- Literature/document oriented approaches (including bibliometrics/informetrics)
- Semiotic,[20] hermeneutic, and related views
- Eclectic views
- etc.

It is important to analyze the most important books in the field and identify their theoretical orientations. Many books have no clear theoretical orientation, but are just a compilation of different investigations. This comes close to *the eclectic view*, which tries to use the most valuable from different theoretical positions.

Even most books subscribe (at least implicitly) to an eclectic view, the basic attitude will mostly reflect one of the other approaches.

It is important to realize that there is no neutral ground, no elevated platform from which to judge the different approaches. This does not mean, that one approach is as good as any other. It is important to analyze the strong and weak side of different approaches, and to bring to the field an accumulation of useful knowledge. It does mean that you cannot just do research without knowing and considering theoretical and metatheoretical issues.[21]

Eclecticism is also a theoretical choice with important implications. An advantage in the eclectic position is that it does not discard a theory on a prejudiced attitude. In principle, it should be more open in considering the strength and weaknesses of various positions. Although taking an eclectic approach to theory may seem to imply suspending belief in any given theory, it should be kept in mind-as Slife & Williams (1995, p. 46–48) write-that eclecticism is itself a theoretical position, which imply that it is desirable to suspend theoretical judgement and commitment. Such a suspension is not a logical fact, but it is in itself a theory

[19] Korfhage (1997) is a modern (and prize winning) textbook written mainly from the point of view of "the physical paradigm".

[20] Semiotics applied in information science: Brier (1996); Bøgh Andersen (1990); Karamüftüoglu (1996); Liebenau and Backhouse (1990); Mai (1997); Ørnager (1997); Petrilli (1993) and Prieto and Dascal (1994). See also Hjørland, 1997, p. 35n4.

[21] Hjøland (1998c) is a discussion of the approach in a recent dissertation about information seeking.

about how our research should be carried out. There are disadvantages of this view of theorizing. It may, for example, lead us to believe in theories that are mutually contradictory. Eclecticism is supposed to stand outside all the various theoretical positions in the field and to take all views equally seriously. There exists, however, no elevated platform, from which to evaluate different views. In not explicating the basis on which the theories are selected, evaluated and used, eclecticism is not taking any of the theoretical positions seriously. Just as a main problem with empiricism and positivism is that they believe in observations that are independent of the observer and his theoretical make-up, a main problem with eclecticism is that it presupposes a neutral ground from which to judge the different theories. Any given theory built on assumptions and have implications and only a small part of the assumptions and implications are carefully examined and explicated. The eclectic position is open to all the theoretical mistakes that it tries to avoid. Although eclecticism at first glance may seem to provide richer explanations because it is not bound to only one theory, it should be able to argue when and why a given theoretical view is appropriate. In doing this, the eclecticist becomes increasingly committed to a certain theoretical view. My conclusion is that eclecticism is to a certain degree a necessary view especially for the applied researcher. It should, however, be seen as an interim solution because the final goal in research is to establish a coherent theoretical view without internal contradictions.

Many interdisciplinary approaches in the humanities and the social sciences are potentially candidates for approaches in LIS. To introduce a new approach in LIS (e.g. semiotics) can be seen as an individual and collective investment. If it turns out to be unfruitful, the individual researcher as well as the field as a whole may suffer. However, if no researchers dare invest their time and efforts in such research, relevant knowledge will never be identified, and the field will not develop. It is important for the field, that there is a clear understanding of what approaches turned out to be fruitful, and which turned out to be dead ends. This implies that researchers should not feel unsafe, because they make mistakes, because mistakes (and the clarifications from mistakes) are necessary in scientific developments.

What is extremely unhealthy for research is a culture or climate in which researchers do not feel free to choose their approaches, but where some people use their influence and power to suppress the free exchange of views.

14. Research methods

The research methods in LIS are the methods used by researchers in this field to provide knowledge of the phenomena under investigation. (Research methods should not be confused with other professional methods used, in, for example, classification, library management, etc.) Examples of research methods are:

- Interviewing and survey methods
- Thinking aloud (in cognitive studies)
- Statistical methods
- Experimental research (especially the Information retrieval tradition)
- Theoretical methods including "Thought experiments"
- Behavioral studies

- Conceptual analysis
- Historical studies
- Comparative studies

Examples of texts on research methods in LIS are: Martyn and Lancaster (1981); Sandstrom and Sandstrom, (1995). Frohmann (1994a) introduces "discourse analysis" as a research method in LIS. Smith, Harré and Van Langenhove (1995) and Denzig and Lincoln (1994) represent many new ideas about research methods, which are relevant for LIS.

14.1. Methods vs methodology

The Danish/Swedish sociologist Joachim Israel writes: "The notion of "methodology" may be explained by comparing it with the notion of "method". Method, as often taught to undergraduate students, usually presents cookbook recipes how to conduct scientific investigations in an "orderly" way, without necessarily taking into account three aspects. First of all, one does not ask what kind of problem one is going to investigate, and, in consequence, one does not know whether the proposed methods are relevant or not for the research in question. Second, one disregards the fact that any method suggested can pose deeper lying problems regarding the philosophy of the social sciences. Third and finally, related to the second problem, one does not take into account problems of epistemology, i.e. how knowledge in general and scientific knowledge specifically, is brought about. As a first conclusion I want to stress that "methodology" as differentiated from "methods", is concerned with problems of the philosophy of the (social) sciences and of epistemology. "Method", however, refers to techniques only. Therefore the distinction between "methodology" and "method" is clear cut" (Israel, 1992, p 3).

Different theoretical approaches to LIS implies the relevance of different research methods (both the choice of theoretical framework and of methods are often quite unconscious). Some important methodological distinctions in LIS (and generally in the social sciences) are

- Methodological individualism
- Methodological collectivism
- Quantitative methodologies
- Qualitative methodologies

The view of the adequacy of different studies is strongly related to the kind of research approach favored. Logical positivism favored the view that methods are given a priori (independent of the research questions), while alternatives such as hermeneutics, phenomenology and forms of realism find that the method must reflect the object under study.

15. Basic philosophical assumptions

Few researchers have analyzed the philosophical assumptions behind different approaches in LIS.[22] It is my claim that different philosophical positions play extremely important roles in

[22] Exceptions are among others: Hjøland (1997); Nissen, Klein and Hirschheim (1991), and Olaisen (1991).

LIS, and that the benefits and problems of different approaches can only be understood from a philosophical perspective. Philosophical positions include those set out in Table 2.

Many introductions to these philosophical schools exist. One starting place could be the new *Routledge Encyclopedia of Philosophy, Version 1.0*, London: Routledge, Vol. 1–10. (Also available on CD-ROM.) A philosophical position is not something you choose like the color of your wallpaper. Philosophical positions are something you work out in order to solve theoretical problems in your research.

Table 2

Philosophical approaches	Introductions	Applications in LIS[a]
• [Social] Constructivism	Downes, 1998	Frohmann (1990, 1994b); Myers (1990); Tuominen and Savolainen (1997).
• Critical rationalism (Karl Popper)	Jarvie, 1998	Swanson (1977).
• Empiricism and positivism	Alston, 1998; Friedman, 1998; Kincaid, 1998	The dominant research traditions in IR, User Studies and and Bibliometrics are seen as instances of implicit empiricism (Hjørland, 1997). Example: Cleverdon, Mills and Keen (1966).
• Feminist epistemology	Code, 1998	Olson (1994).
• Hermeneutics and phenomenology	Howarth 1998; Inwood 1998	Benediktsson (1989); Budd (1995) (''hermeneutical phenomenology''); Capurro (1986); Cornelius (1996a, b), Dryfus and Dryfus; and Winograd and Flores (1987).
• Historicism	Thornhill, 1998	Historicist perspectives are often implicit in studies of the history of libraries, literatures, classifications etc. More explicit historicist perspectives are often connected to hermeneutic, pragmatic and historical-materialistic perspective).
• Marxist philosophy of science	Miller, 1998	Belkin (1975); Michajlov, Cernyj and Giljarevskij (1980); Staber (1978); Steiger (1973).
• Paradigm-theory (Th. Kuhn)	Hoyningen-Huene, 1998	Hjørland (1997).
• Postmodernism and Poststructuralism	Ermarth, 1998; Gutting, 1998; Sim, 1998	Miksa (1998).
• Pragmatism	Rorty, 1998	Blair (1990); Hjørland (1997).
• Rationalism	Markie, 1998	The dominant research tradition in classification research (Ranganathan/facet analysis) are seen as implicit instances of rationalism (cf. Hjørland, 1997). Example: Langridge (1976, 1989).
• Realism (including critical realism)	Collier, 1998; Fine, 1998; Keat, 1998	Hjørland (1997).
• Systems theory	Ryan and Bohman, 1998	Foskett (1972, 1974, 1980); Mansfield (1982); Marchant (1980); Mattessich (1982); Neelameghan (1974); Orr (1977); Parker (1970); and Strong (1982).

[a] Also in the neighboring disciplines such as psychology and linguistics can the same philosophical positions be found, see Malmkjær (1995a); Behaviourist linguistics, Malmkjær (1995b): Functionalist linguistics, Malmkjær (1995c): Rationalist linguistics.

All research, both inside and outside LIS, is influenced by some philosophical traditions. There is no escape from this. There is no neutral ground. You can be unaware of or silent about your orientation; but that only is a choice, where you are hiding the consequences of your research strategy.

Philosophical positions may be implicit or explicit, recognized or unconscious. Often researchers in, for example, the hermeneutic tradition are explicit about their philosophical approach, while, for example, researchers in the positivistic tradition are silent about this. Positivistic research is often silent because it conceives itself as "scientific": the only valid approach. Even the discussion of its own assumptions is often claimed to be "non-relevant" or "non-scientific". Therefore positivism is sometimes labeled "the invisible theory of science". Such a claim is of course both wrong and unscientific. The nature of science is to investigate its own assumptions and methods.

Different positions have different implications for the kind of theory and ultimately for the kind of practice done in LIS. In Hjørland (1998b) I analyze the following problems from three epistemological views (empiricism, rationalism, and historicism):

- Users, their cognition and information seeking behavior
- Subject analysis
- The methods of classification
- Information retrieval, text composition, and semantics
- The meaning of "information"
- The typology of documents
- Information selection, research evaluation, and collection development
- The nature of information systems
- The roles of information specialists

A rationalistic position as found in, for example, cognitive science, implies that the study of users' brains is an adequate strategy to obtain relevant knowledge in LIS. Such a position is in my opinion problematic because it leaves out the most obvious relevant perspective: that users' cognition, information needs, search strategies, and so on is influenced by their social and cultural background (including their educational background and professional role). Epistemologies with a historical orientation are better suited to conceptualize users in a way that is relevant for LIS. Although epistemology has a fundamental impact on all major questions in LIS, the method of classification represents my strongest argument because different approaches to classification are shown to reflect standard philosophical theories.

Philosophical studies cannot substitute empirical research, but can serve as better "looking glasses" through which researchers investigate the problems. Deep philosophical clarification requires much work, and more reading than the few introductions mentioned here.

16. Conclusion

This paper has presented different dimensions or facets of LIS: its labels, its institutional affiliation, its fields of practice, its fundamental concepts, its theories, metatheories, related disciplines, and underlying philosophical assumptions. The basic conclusion is, that these facets

are not independent, but influence each other in mutual ways. The deepest understanding of the field is provided by the study of underlying philosophical assumptions. This is, however, also the most neglected aspect.

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