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The Social and Intellectual Development of Library and Information Science

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ABSTRACT

The background of the project is partly found in a long tradition within library and information science (LIS) of meta-analyses on the field, partly in a science studies discussion on research fields and their contextual relation to wider academia, fields of professional practices and professionalization processes. The general purpose of the project is to analyze the social and intellectual development and organization of LIS; and to investigate the impact of the close relation to the practice field, as well as the relation to the academic world in general. Based on the general purpose of the project and results and interpretations of the four articles attached to the thesis, three questions were stated for discussion in the thesis proper, concerning: the effects of a dual origin and LIS as a discipline, a field of research and a field of practice, the purpose of meta-studies and implications in terms of identity and perception of LIS; and competition and cooperation with other fields of research. Because of the heterogeneous nature of LIS, a variety of methods and materials was used in the different articles; and methodological issues on limits and bias in bibliographic databases – and the implications on the perception of research areas with varying publication and citation behaviour – were discussed. The analyses were performed against a theoretical framework, providing key organizational characteristics of scientific fields, relating to social, intellectual and contextual aspects, in combination with theories on scientific and disciplinary development, professionalization and interdisciplinarity; but also, for analytical contrast: alternate theories on the development of the sciences since 1945. LIS shows two distinct paths of development: research areas developing out of other fields of research; and a disciplinary development originating out of the field of practice and institutions for educating practitioners. Analyzing meta-studies of LIS, the picture of a field with a vague identity and a diverse self-understanding, even in terms of core characteristics, emerges. The relation to the wider academic community is characterized by diffuse boundaries towards, and competition from, other fields of research. In general, LIS is a fragmented field with a multitude of wildly varying research areas; and with large variations in terms of organizational setting; which together with a vague identity and diffuse boundaries, as well as the close connections to the field of practice, might contribute towards explaining problems LIS have been experiencing, establishing itself in academia. However, there are also signs towards an integration of a number of LIS research areas, as well as an increase in interdisciplinary cooperation, contradicting theories suggesting a further fragmentation; and supporting ideas on the sciences developing towards e.g. interdisciplinarity and applicability of results.

Key words: library and information science, sociology of science, scholarly communication, organization of research fields, disciplinary development, academization, professionalization, scientific journals, informetrics, visualization, literature studies, web site content analysis

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By Fredrik Åström

Contents

The Attached Articles:

Article I – Åström, F. (2002). 'Visualizing library and information science concept spaces through keyword and citation based clusters'. In: H. Bruce, R. Fidel, Peter Ingwersen & P. Vakkari (Eds.). *Emerging frameworks and methods: Proceedings of the fourth international conference on conceptions of library and information science*. Greenwood: Libraries Unlimited, 185-197.

Article II – Åström, F. (2004). 'Library and information science in context: The development of scientific fields and their relations to professional contexts'. In: W.B. Rayward (Ed.). *Aware and responsible: Papers of the Nordic-international colloquium on social and cultural awareness and responsibility in library, information and documentation studies (SCARLID)*. Lanham & Oxford: Scarecrow, 1-27.

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Article IV – Åström, F. (2006). 'Becoming a discipline: The institutionalization of library and information science in the Nordic countries'. *Journal of documentation*. Submitted.

Foreword

This project is primarily the product of a number of social and intellectual contexts. Although the authorship, including all errors and omissions, is mine, I am greatly indebted and grateful to all the people in all those contexts without whom, this thesis project would never have happened. First of all, I would like to thank everybody at the Sociology Department, Umeå University for creating a great work environment and an excellent place for hiding pianos. In particular, I would like to mention my supervisor: Professor Olle Persson, for good and friendly support in every way at all times, for invaluable advice and help through-out the process; and also, for a very good time and cooperation working with the LIS masters program at Umeå University. I would like to thank PhD Rickard Danell for a thorough reading and invaluable comments at my dissertation seminar. My gratefulness also extends to Kristina Hjalmarsson and Maritha Lundgren for great help with arrangements for the printing and defence of this thesis.

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Then we move on to the distributed environments… The Nordic LIS research community is a strong research environment, although geographically dispersed; and it is getting stronger. Not the least, among the PhD students, there is good research and interesting discussions going on, promising a further strengthening of Nordic LIS research. This cooperation, both on student and senior level, is manifested in the Nordic Research School in Library and Information Science (NoRSLIS) and the former Nordic Information Science Network (NordISNet). The NordIS-Net has provided funding for participating in conferences of great value to my PhD work; and the NoRSLIS has contributed with the organization of, and funding participation at, PhD courses, doctoral workshops; and not the least: with formalizing and strengthening the ties between Nordic LIS schools and departments. I am very grateful for the opportunity to be part of this network; and for the support provided by it.

I would also like to thank participants and organizers of the following fora; for good discussions and comments; and on one occasion, for the opportunity to publish my research:

- The 2001 NorFA Research Course in Bibliometrics – organized by professors Peter Ingwersen, Olle Persson and Irene Wormell, the Swedish School of Library and Information Science – and the Nordic Workshop on Bibliometrics in Stockholm the same year, also organized by prof. Persson, gave me plenty of opportunity to develop and discuss the first article.

- The 2001 research course on Communication and the Dynamics of Knowledge in Professional Contexts – organized by PhD Anders Forstorp at The Royal Institute of Technology in Stockholm – and the 2001 Colloquium on Social and Cultural Awareness and Responsibility in Library, Information and Documentation Studies in Oulu, Finland, provided me with an intellectual infrastructure for the work on my second article. In particular, I am indebted to Professor W. Boyd Rayward at University of Illinois, Urbana-Champagne, for plenty of help with both form and content of the finished article.

- At the 10th International Conference of the International Society for Scientometrics and Informetrics Doctoral Workshop, I received valuable comments on the research plan for the third article. My gratitude extends to the organizers, PhD Rickard Danell and PhD Birger Larsen, RSLIS; and of course, the panel of experts: professors Katherine McCaine, Drexel University, Bluma Peritz, Hebrew Uni-

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Finally, last but not in any way least, my family. There is the wider family: the Åströms, the Dahlgrens, the Djärvs, the Boréns and the Stiths. Without you I am nothing! And there is my immediate family: Jody, you've been carrying a far too heavy load for far too long now; and I can not ever thank you enough for being there for me. I love you ever so much! Felix and Elizabeth, you are the sunshine in my life, the song in my heart. I have missed you so much these last months!

God bless you all!

Lund, October 2006

"How long is a bibliometer?"

– Esa K. Marttila

Introduction

Library and information science (LIS) has been an academic discipline since the 1960's, but the history is much longer. Forerunners are primarily found in library science and information science. Library science dates back to the early 19th century, when Martin Schrettinger introduced the concept 'Bibliothekswissenschaft' in a handbook for librarians. In the 1870's, the Columbia School of Library Economics became the first university affiliated school for training librarians; and in the 1920's, the Graduate Library School was founded at University of Chicago, establishing library science as an academic field of research by the creation of a PhD program (Buckland, 1996; Schrettinger, 1829; Wiegan, 1999). The origin of information science can be traced to the late 19th and early 20th century; and the documentation movement in Europe. Problems concerning the management and diffusion of increasing amounts of scientific information were first defined by Paul Otlet. The origin of information science as a field of research is normally marked by information retrieval (IR), as conceptualized by Calvin Moers in 1951; and the development of experimental research on the use of computerized bibliographic databases. In the 1960s, the two fields merged as library and information science (Buckland & Liu, 1995; Rayward, 1997). The history of the development of library and information management techniques and tech-

nologies is of course longer than that. Methods for classification and cataloguing have been developed throughout the history of libraries, and library related research such as 'historia literaria' dates back to the 16th century (Vakkari, 1994a).

Performing meta-studies on the field is a long tradition within LIS: to define its boundaries and motivate its existence in academia, to promote particular views on how LIS research should be conducted, as well as to pursue an increased self-understanding of the field. This has been expressed in various ways: by setting research agendas for research to come (e.g. Brookes, 1974; Belkin, 1990; Hjørland & Albrechtsen, 1995), in historical studies on the field (Hahn & Buckland, 1998), by defining research areas through quantitative studies of LIS literature (Persson, 1994; White & Griffith, 1981; White & McCain, 1998) and by discussing the nature and main objectives of LIS (e.g. Borko, 1968; Ingwersen, 1992; Saracevic, 1999).

Despite decades of definitions and discussions, the self-understanding of the field is still diversified. Different viewpoints from which the definitions has been made, has been greatly differing; and no-one has managed to present a generally accepted definition of LIS. There are, however, some aspects generally accepted as central for understanding the field. One is the multidisciplinary nature of the field, with a multitude of research areas, as well as theoretical and epistemological orientations.

Further, LIS is a field with a weak– or at least a greatly varying– position within academia, but with strong connections to the field of practice. Also, with developments in information technology and the dawning of the 'Information Society', LIS has found itself with competition from e.g. the cognitive and computer sciences, addressing similar research problems with competing views on how to study information related issues.

The development and organization of LIS is not only interesting for scholars within the field. From a science study perspective, issues such as research fields with large internal variations, external competition from other fields; and with close relations to professional practices; are of great interest. It is not uncommon for research fields to develop out of professional fields, or disciplines out of practice oriented professional training: the whole field of engineering studies went through the process in the late 19th century; and the close connection between fields of research and practice can be seen in both management studies (Danell, 2001) and the nursing sciences (Sundin, 2003). The extent to which different fields have succeeded in establishing themselves in academia differs greatly, though.

Aim and research questions

The general aim of the project is to analyze the social and intellectual development and organization of library and information science (LIS);

and the effect of its relation to the wider contexts of academia and the field of practice. To limit the scope, the three main aspects – social, intellectual and contextual – have been dealt with as follows:

- The intellectual aspects are analyzed in terms of how the LIS research field is organized into sub-fields and research areas; and how these have changed over time (Article III). In relation to this, effects of methodological variations on the perception of the field are also discussed (Article I).

- The analysis of the social aspects focuses on the institutionalization of LIS research through a case study of Nordic LIS (Article IV). However, the social aspects are also investigated through an identification of organizational characteristics for analyses of LIS development (Article II).

- The third, contextual aspect is discussed from a theoretical perspective in Article II; and investigated in relation to the social and intellectual aspects throughout the articles as well as in the thesis proper.

Based on the general aim, specific research questions for the four articles were developed. However, when relating the general aim and the discussion of the three aspects to the articles: three new questions emerged for further discussion:

- What are the effects on the development of LIS, of the dual origin of LIS, developing out of both the field of practice and out of other research areas; and, of LIS being a discipline, a field of research and a field of practice?

- For what purposes have LIS been defined by its own scholars; and what are the implications of the amount and variety of meta-studies in terms of the identity and perception of LIS?

- How has the increasing competition from – and to some extent cooperation with – other fields of research affected LIS?

Definitions

Although the purpose of the project is not to provide a comprehensive definition of LIS, a working definition is in order. The use of the compound term library and information science has been decreasing for about two decades. The 'library' part of the name has been abandoned in names of schools and departments to focus on the wider 'information' concept to identify the core of the identity of the field. There are even claims the compound phrase never should have been used. Saracevic (1999), for instance, argues that library science, or librarianship, and information science are separate fields, although with strong interdisciplinary relations. However, based both on tradition and on tendencies towards strengthened relations between library science and information science

over the last 15 years (Åström, 2007), the compound term LIS will be used, with library science and information science constituting the two main sub-fields. While information science study issues on information needs and uses, management and access to information, e.g. from behavioral and systems perspectives; library science focus on the organization, preservation and use of documents, issues originally addressed at library institutions; but also on other activities and issues related to libraries and library praxis, such as cultural policies and management issues.

A distinction is also being made between research fields and disciplines. Disciplines can be defined in terms of fields with a developed academic infrastructure, including professorial chairs and departments, the right of examination and to issue academic degrees. Research fields on the other hand, are basically areas of common research interests. Research fields can establish themselves as disciplines if they manage to develop sufficient academic infrastructures, but the two concepts are not synonymous; and one discipline can contain more than one research field.

In the articles and the thesis proper, the term field of practice is not limited to librarians or libraries: it encompasses all occupations and organizations managing information or documents on a professional basis. As with the LIS field of research, the LIS field of practice is widely heterogeneous, covering a wide range of institutions and occupational specialties.

The term 'institution' is used as an umbrella term for all kinds of academic LIS units: schools, departments or sub-units at a department. The latter terms are used exclusively to describe particular kinds of organizations, such as the Department of Information Studies at the Social Sciences Faculty, The Royal School of Library and Information Science or the LIS-unit at the Department of Archive Studies, LIS and Museology (ALM).

Research overview

Library and information science

The identity of LIS has been debated through several decades now. The objects of research, the *raison d'être* for doing LIS studies, as well as research practices and interpretational frameworks, are all topics for discussion. Attempts at defining LIS and finding unifying concepts have been many and greatly varied. Both broader and narrower definitions of LIS have been suggested; and all of them have been criticized for various reasons. There are also a variety of reasons for studying the nature and development of LIS, e.g. for the purpose of self-understanding, to present or define the field in relation to other fields; or to promote ideas on how to perform research. Additionally, there are also great variations in terms of how LIS has been analyzed: from historical studies, over informetric investigations on research areas, to theoretical discussions on the nature

of LIS. Meta-studies on LIS have developed into a research area by its own right, making a comprehensive overview impossible. Therefore, what follows is a presentation of examples on different studies of LIS.

Historical studies on libraries are one of the longest research traditions in the library related field, with roots in 'historia literaria'. Analyzing methods and technologies for organizing and disseminating information, as well as the development of the LIS field, from a historical perspective are fewer; and are a relatively recent theme in historically oriented LIS. In the mid-nineties, two review articles were published, presenting an overview of historical studies in LIS. One was published in a special issue on the history of information science in *Information Processing and Management (IPM)*, an article also discussing problems of writing the history of a field without any consensus on the nature and identity of the field (Rayward, 1996). The other review article is Buckland & Liu's (1995) overview in *The Annual Review of Information Science and Technology (ARIST)*. The articles in the aforementioned *IPM* issues and *ARIST*, together with articles from two special issues on the same topic in *Journal of the American Society for Information Science* (*JASIS*), as well as some previously unpublished material was gathered in a volume called *Historical studies in information science* (Hahn & Buckland, 1998). The anthology covers issues on e.g. historiography, techniques and technologies, institutions and organizations, as well as theoretical topics.

General discussions on the definition and content of the LIS field can be found throughout the history of the discipline. Borko defines information science as: "an interdisciplinary science that investigates the properties and behavior of information, the forces that govern the flow and use of information, and the techniques […] of processing information for optimal storage, retrieval and dissemination" (Borko, 1968, p. 5). Librarianship is defined as "making graphic records as useful to society as humanly possible" (Shera, 1968, p. 63). Shera also introduces a discussion on the relationship between library Science, or librarianship, and information science, a connection that has been debated ever since. Vakkari (1994b), for instance sees information science as a totality out of which it is pointless to make a distinction between information science and library science. Ingwersen (1992) has a similar definition, however identifying library science as a research and development activity within information science. Saracevic (1999) distinction between librarianship and information science reaches further, defining the two as different fields, although with strong interdisciplinary connections.

These definitions are accompanied by discussions on general traits in LIS such as the history and social context of the field, the structure of LIS and its relations to other disciplines, the problems addressed and central concepts in LIS (Ingwersen, 1992; Saracevic, 1999), but also in a wider context of characteristics of research fields and ideas on the general de-

velopment of theoretical activities (Vakkari, 1994b). Based on a presentation on attitudes towards LIS and the relation between the research and practice fields, Hjørland (2000) discusses LIS from disciplinary and institutional viewpoints, as well as a structured overview of research paradigms, research problems, concepts, sub-fields and so on; and approaches issues such as the weak theoretical development in LIS.

Studying the intellectual organization of the field in terms of sub-fields and research areas has been a topic for discussion as well as of quantitative studies of research literature. With the introduction of different co-citation analyses and tools for visualization, informetric studies became an interesting alternative for making cognitive maps of research fields. The author co-citation analysis was introduced by White & Griffith (1981), mapping LIS and finding five main areas: bibliometrics, scientific communication and 'precursors', together with a 'generalist' and an information retrieval area. About ten years later, Persson (1994) identified a similar structure when analyzing articles in *JASIS*, finding a bibliometric field, accompanied by one 'hard' and one 'soft' IR field. The basic structure was later confirmed when White & McCain (1998) used the author co-citation analysis for making a domain analysis, discovering two main sub-disciplines – IR and informetrics – and eleven research specialties. They compared the map of LIS to the one of Australia, with a heavily populated coast line and a sparsely inhabited interior.

Apart from defining what LIS is, a main feature in the discussions on the nature of LIS is trying to define what LIS should do, e.g. by introducing research agendas or programs. An early example is Otlets (1990) *The science of bibliography and documentation* from 1903: where some of the core problems for LIS are introduced. Based on a perceived lack of theoretical basis for LIS and the use of the term information, Brookes (1974) presents the 'fundamental equation'. However, the same lack of theoretical basis is still identified almost 30 years later, by Hjørland (2000) and further discussed by e.g. Pettigrew and McKechnie (2001). The 'fundamental equation' defines information as that which changes a knowledge structure; and the purpose of LIS is to interpret the equation. The 'fundamental equation' and the issues put forth by Brookes is considered one of the first attempts at introducing the 'cognitive viewpoint' in LIS, the effects of which has been discussed by e.g. Belkin (1990) and Ingwersen (1992; 1996). However, the 'cognitive viewpoint' has been criticized for a number of reasons. One is for being reductionistic, which both Benediktsson (1989) and Budd (1995) identify as a central problem in both the theoretical and the methodological development in LIS. Based on a discussion on past and present research orientations, they both propose hermeneutics as an alternative path for LIS to follow. Another critique against the 'cognitive viewpoint' has been the individualistic orientation, something e.g. Frohmann (1992) claims is threatening the social

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dimensions of theories. An alternative viewpoint has been proposed by Hjørland & Albrechtsen (1995), proposing 'domain analysis' as the way to understand information management and transfer. This program formulation for LIS research has also been followed up by a more specific presentation of applications of 'domain analysis' in a variety of LIS research areas (Hjørland, 2002).

Science studies

Interest for the development and organization of research fields is obviously not a topic limited to LIS. Scientific research has been analyzed from e.g. social, historical and philosophical perspectives, together forming the interdisciplinary field of science studies. Kuhn's ([1962] 1970) theory on scientific development, with paradigms and paradigm shifts as core concepts, is of great importance for introducing the social context as a main aspect in the development of scientific ideas. However, in Kuhn's footsteps, analytical dichotomies have been developed, enforcing a dualistic view on scientific development, restricting the possibility of studying and comparing the vast variety of ways of organizing research. This has particularly become an issue in post-1945 scientific development, where the organization of research has increasingly been affected by an applications oriented view on the *raison d'être* of the sciences, characterized by e.g. an involvement of a variety of funding agencies, transdisci-

plinary research teams; and also, a variety of standards for assessing research contributions (Gibbons *et al*, 1994). Development of science in terms of growth has been analyzed by Price ([1963] 1986), showing the exponential growth of scientific publications. However, it is not only the growth rate of science Price discovered through quantitative analyses of research literature.

He also discussed how highly productive scholars organize themselves and their co-workers into invisible colleges, 'visible' through networks formed by citation links between scientific papers (Price, 1986; 1965). The notion of invisible colleges was further elaborated by Crane (1972), studying the development of specific research specialties, their growth patterns and the dissemination of ideas within research areas, and emphasizing how ideas are spread as a function of interaction within social systems. The interaction between social and intellectual aspects of scientific development has been further investigated by e.g. Mullins (1973) in his analyses of theory groups in American sociology. How social and intellectual factors interact in the organization of scientific fields is one of the prime objectives for Whitley (2000) when constructing a framework for analyzing and comparing the development and organization of research fields. Scientific fields are coordinated and directed in various ways through the allocation of access to resources and reputation; and the

variations in the organization of this is based on different social and intellectual characteristics.

In the 'standard model' of the development of scientific disciplines, research areas and intellectual movements precede the disciplinary establishment. Scientific ideas evolve in groups of researchers; and gathering enough influence in the scientific community, they can assemble resources and build an infrastructure for a more institutionalized pursuit of the intellectual goals of the group. This development is one aspect of the general theory for the development of scientific and intellectual movements formulated by Frickel & Gross (2005). However, in e.g. fields with strong connections to professional practices, disciplines do not necessarily develop out of research areas or scholarly interest groups, but out of professions or schools for professional practices. LIS is one example, but there are others as well. One is management research, described by Whitley (1984) as a 'fragmented adhocracy', a field with a low level of coordination around a diffuse set of goals and a non-specialized terminology; but with strong connections to the practice in the business sector. The relation to the practice field was initially a reason for resistance when management studies tried to establish itself within academia, but have since managed to become a commonly accepted part of the university structure (Engwall & Gunnarsson, 1994). Another field with a similar background is the nursing sciences. The professionalization process and

the emergence of nursing schools begins in the second half of the 19th century (Andersson, 2002; Sundin; 2003), and developed as a field of research through-out the 20th century (Sundin, 2003).

Strongly related to academic disciplines with close relations to professional practices are also theories on professionalization, focusing on relations between occupational groups, theoretical knowledge and the possibility for practitioners to exclusively apply this knowledge in their profession (Sundin & Hedman, 2005). To a large extent, the establishment of LIS has been part of the process of the professionalization of librarianship. The founding of the Graduate Library School at Chicago University was funded by the Carnegie Corporation with the expressed intent to provide a theoretical foundation for librarians, much in the same way Johns Hopkins Medical School and Harvard Law School had contributed in raising the theoretical level of medical and legal training (Buckland, 1996). One issue in professionalization research is how some occupational groups – many of them, e.g. librarians and social workers, dominated by women – have not reached full professional status, instead being classified as semi-professionals (Etzioni, 1969; Evertsson, 2002; Witz, 1992).

Method and material

Since the project is analyzing LIS from several viewpoints, different methodologies have been chosen. A set of informetric methods and visualization techniques were used for mapping LIS research areas and to identify core topics within the field. Informetric methods have also been used to analyze changes in research orientations and how different subfields have developed; and on a smaller scale to analyze publication patterns at LIS schools and departments. For the second article, a close reading of Whitley's (2000) *The intellectual and social organization of the sciences* was performed to operationalize his theoretical framework for analyzing LIS, primarily by identifying topics and research questions; and testing them on a selection of LIS meta-studies. In the fourth article, a content analysis was performed on websites of five LIS institutions' to study the development of academic LIS research. As with the methods, a wide range of material was used. Institute of Scientific Information (ISI) databases; and to some extent the *Educational Resources Information Center* (*ERIC*) database provided most of the material for the informetric analyses. In the fourth article however, the main part of the empirical material, including the publication lists for the informetric analyses, were collected from web sites of the institution; while article two primarily is a literature study of science study literature and LIS meta-studies.

Using a combination of methods can be questioned, e.g. in terms of the comparability of different kinds of analyses performed on different kinds of materials. However, when studying the organization of different research areas and institutions, it becomes clear that one kind of methodology leaves out too much information about LIS. Given the nature of LIS, an all-encompassing view of the field requires a wide selection of data and methodologies (Åström, 2002; 2006; 2007).

One aspect of this is the use of data from the Institute of Scientific Information (ISI). The ISI data comes with a number of problems related to the selection of literature indexed in the databases. One is the exclusion of research material not being published in scientific journals. With the exception of some conference proceedings, most research published e.g. at websites, in books and book chapters is not indexed. This leaves a wide variety of research literature out of the ISI databases. This has strong implications on what kinds of analyses that are possible on most humanities oriented research fields in general, as well as on the perception of research areas included in LIS, according to analyses based on ISI material. The journal selection for the bibliometric analyses in article one and three was based on the *Journal Citation Reports* (*JCR*) ranking by the ISI. Although the method of selection can be discussed, a corresponding set of journals were identified as information science journals in a cluster analysis of citations in *SSCI* journals in the *JCR* (Leydesdorff, 2004).

The selection of material indexed is not the only problem. The selection of journals included in the ISI databases is predominantly in English, published in America or in the UK. The consequence of this is, when using the ISI databases for mapping research fields, there is a strong risk of enforcing an Anglo-American conceptualization of the field. Especially in a field like LIS, where there are big differences in research orientations of the journals, as well as how productive they are; there is a strong risk of a highly productive journal like the *JASIS&T* having a disproportional impact of the structures identified in the mapping of the field. These issues of selection and disproportionate influence of productive journals might explain the differences in results in the first and third article, where the library science oriented field identified in the first article might have still been visible in the third article had e.g. a normalization procedure or a weighted journal selection been applied in the third article. However, if any kind of dimension of impact is regarded as important when analyzing research areas, which of course is one main reason for using co-citation analyses when mapping fields of research, the ISI data is the only data available without constructing one's own database.

Theoretical considerations

On a theoretical level, there are a number of issues that need further discussing: in terms of how issues have been analyzed and explained in earlier research, as well as how they are visible in library and information science. The main issues are of course how science, research fields and disciplines develop and organize socially and intellectually, how the social and intellectual aspects interact; and how contextual factors affect the development and organization of research. The theoretical backbone is an analytical framework developed by Whitley (2000), suggesting a variety of key organizational characteristics for analyzing and comparing research fields. However, to provide an alternative perspective, theories on a 'Mode 2' based science system developed by Gibbons *et al* (1994) will be used for analytical contrast. According to Whitley, research fields are analyzed as work organizations driven by access and allocution of resources, such as research funds, communication channels and scientific reputation. The social aspect is reflected in levels of 'mutual dependency', i.e. the extent to which scholars are dependent on co-workers in the field for access to resources. The intellectual issues are dealt with in terms of levels of 'task uncertainty', reflecting how well work techniques and problem statements are understood and can be ranked according to relevance for the field. By studying the interaction of the social and intel-

lectual dimensions, a typology of different kinds of research fields emerge (Whitley, 2000). The development of the sciences according to Gibbons *et al* (1994), has turned after the end of World War II, going from a discipline based 'Mode 1' research, to 'Mode 2'; characterized by research focusing on applicability of results in heterogeneous and trans-disciplinary organizations. 'Mode 2' research is organized around problems stated by commissioning authorities as well as by the scholars themselves, leading to a distribution of the power of determining competence and significance standards.

The institutional aspect is implicitly treated by Whitley in terms of e.g. access to resources. A more explicit discussion is found in Frickel and Gross (2005), in their attempts at defining a general theory of scientific and intellectual movements, where the access to key resources provided by structural conditions; and the access to 'micromobilization' contexts such as academic departments, are two main aspects in the development of scientific movements. However, while opposing research areas within a field is more or less an anomalous state, fueling the development of new research areas, according to Frickel & Gross; Whitley (2000) see the competition as merely one normal aspect of the internal life of scientific organizations. One could say that the struggle for power of definitions and so on in Whitley's view is primarily in relation to other fields, while for Frickel and Gross, the focus is on the relations between

different areas and groups within the field. Another point of view is represented by Gibbons *et al* (1994), focusing on cooperation instead of competition, seeing the diminishing role of the discipline based institution as part of a general scientific development.

Contextual effects, in terms of influences from other research fields and lay groups, can be analyzed through three factors: reputational autonomy, control over means of production and distribution; and structure of audiences. The reputational autonomy reflects the level of which a field controls the standards for assessing competence and performance, issues of importance e.g. for controlling work processes and the labor market within the field. The control over the means relates to the control over access to facilities, employment and communication channels, but also to the extent by which these are shared equally. The structure of audiences reflects both the variety of distinct audience groups; and the extent to which these groups are equivalent (Whitley, 2000). Contextual influence is primarily seen from a point of view within the field by Frickel and Gross (2005), focusing on how representatives in the field being analyzed become aware of alternative methods or theories, thus starting a process of developing new movements with the wider field. This is further emphasized by Gibbons *et al* (1994), identifying the contextual influences as part of the interdisciplinary development of the modern sciences.

However, there is also a set of other aspects, although related to the main issues, requiring further investigation in the case of LIS. One is the relation between LIS as discipline, research field and field of practice; and the dual origin of LIS. The research-practice dimension is partly covered by the contextual dimensions presented by Whitley (2000); and especially the relation to lay groups. The relation between research fields and disciplines is clearer in the discussions on scientific movements, emphasizing the need for employment and other structural conditions for the development and establishment of new research orientations; but also acknowledging how individualistic organizational cultures are more likely to be the fields where alternative scientific orientations emerge (Frickle & Gross, 2005).

The second aspect is the 'preoccupation' with meta-studies within LIS, where the motivation for doing them, as well as the way they are being done, needs further discussion. There is a close relation between identification of the field and the control over reputational autonomy, i.e. the level of autonomy to define core issues and work techniques, as well as the boundaries of the field (Åström, 2004; Whitley, 2000). Creating a framing around defining core concepts is a crucial feature for the development of scientific movements; and three important aspects of the process of creating a framework are: rhetorically constructing a collective identity, the historical origins and the relation to competitor movements

(Frickel & Gross, 2005). One aspect in various definitions of LIS is the notion of the field being interdisciplinary, again bringing up discussions on the concept by Klein (1990).

The third aspect relates to the competition LIS has been experiencing: in terms of disciplinary boundaries, definitions of the field and establishing a monopoly on dealing with certain research topics; but also in terms of access to resources and status in academia in general. The contextual dimensions identified by Whitley (2000) are important, however, primarily in terms of LIS relating to other research fields. The other side of the coin is issues on cooperation with other research fields, suggesting a level of interdisciplinarity in LIS research; a development reflecting the 'Mode 2' organization of research as suggested by Gibbons *et al* (1994). The concept of interdisciplinarity has been discussed by Klein (1990), and put in relation to similar concepts such as multidisciplinarity, using various levels of integration of e.g. methods as a yard-stick to determine whether scientific work can be considered truly interdisciplinary, or if it is the matter of a more additive process related to multidisciplinarity.

The final aspect is a discussion on where LIS is at now, taking into account the issues already raised here, but also introducing the element of scientific change and further development. This is done continuing using the analytical framework based on Whitley (2000), to some extent Frickel and Gross (2005); and the contrasting viewpoint of Gibbons *et al* (1994).

To further incorporate the element of the dynamics of scientific change, an elaboration of Whitley's ideas by Fuchs (1993) has been included. Building upon Whitley, Fuchs identifies three types of scientific change: fragmentation, specialization/cumulation and permanent discovery. In most social science fields, those labeled 'fragmented adhocracies' by Whitley, the diversity and uncertainty within the fields is reflected in how research specialties are self-contained, and innovations in one area do not necessarily have any impact on other specialties, leading to further fragmentation of research goals and procedures (Fuchs, 1993).

Summary of the articles

Article I. Visualizing LIS concept spaces through keyword and citation based maps and clusters

The aim of the first study is twofold: to compare different methods of indexing to see what influence the indexing have on informetric analyses; and to analyze the implications of varying journal selections when studying LIS. The background of the first aim is a discussion on the usability of keywords for mapping research fields where keywords have not been able to gain any wide acceptance for the purpose of research field mapping, while the keywords and the structures they create have the advantage of being directly understandable by people not familiar with the author names in a map based on co-citation analyses. The second aim comes out of an observation on previous analyses on LIS, where the library science orientation within LIS has not been visible; and when studying the journal selection in those previous studies, the journals analyzed have to a large extent been oriented towards information science.

The study was based on 1135 records from nine journals – four information science journals, five oriented towards library science – selected on the basis of their ranking in the *Journal Citation Reports*. Records published 1998-2000 were downloaded from the *Web of Science: Social Science Citation Index*; and the descriptors from the DX-field in the *Edu-*

cational Resources Information Centre Database (*ERIC*) were added. The records were processed and three sets of analyses were made, using the *Bibexcel* software. The three analyses were a co-citation analysis, a co-occurrence of keywords analysis and one merged co-occurrence of citations and keywords analysis. The resulting co-occurrence matrices were visualized using the *MDS Alscal* multi-dimensional scaling algorithm; and the structures of the map were also enhanced, using a clustering routine. The maps and clusters were compared in terms of how authors and keywords relate to each other and find different positions on and in between the maps; and on the third map, also how authors and keywords correspond.

The results showed the same basic structures in all three maps. There were four recognizable areas: systems and user oriented information retrieval (IR), bibliometrics and library science. However, in the citation based map, the clustering routine made a division between systems and user oriented IR and bibliometrics (with library science as a part of user oriented IR); while in the keyword and combined analyses, the division was made between IR, bibliometrics and library science. When merging the cited authors and keywords in the analysis, they formed corresponding relations both in the maps and in the clusters. It has already been mentioned, but the analyses also show that in comparison with earlier

analyses of LIS, an alternate journal selection makes the library science orientation of LIS visible.

Apart from the results per se and the methodological conclusions the paper brings forward, there are also some further conclusions to be made about the nature of LIS. One is how differing journal selections bring varying results: not only in terms of which documents or authors becomes visible, but the visibility of whole research areas within LIS are depending on the selection. This emphasizes the heterogeneity of LIS and its communication system, but also, how the journal selection in the ISI databases can enforce a particular view on a research field like LIS. If no methods for normalization are used to limit the effects of highly productive journals, and without making an active selection of journals: the view on LIS emerging out of quantitative analyses of ISI indexed journals gets heavily influenced by an Anglo-American view on LIS.

Another conclusion is based on what is not in the analysis. Although LIS has an abstract service, the *Library and Information Science Abstracts* (*LISA*), the keyword analyses are based on descriptors from the education oriented *ERIC* database. The reason is that the descriptors from *LISA* were hard to use due to inconsistencies and errors in the indexing. Two explanations for this are: the inclusion of practice oriented trade journals and information oriented magazines, making indexing terms that can handle different material necessary; and also, the heterogeneity of the

field, with research areas using varying vocabularies to disseminate re-
search.

**Article II. Library and information science in context. Theoretical con-
siderations on the development of scientific fields, and their relations to
professional contexts**

The purpose of the paper is to discuss how theories of social and intellec-
tual development of scientific fields can be used for analyzing LIS; and
especially its relationships to other research areas and the library and
information field of practice. From a science studies perspective, these
issues relates to questions about applied sciences and applications ori-
ented research; and also to how useful dichotomies, developed in science
studies under the influence of Thomas Kuhn, are for analyzing the or-
ganization of scientific research. Methodologically, the paper is a litera-
ture study: of the theoretical framework developed by Whitley (2000);
and of a selection of LIS meta-studies. To operationalize the framework,
a set of aspects for analyzing LIS are identified and tested on the meta-
studies. Scientific fields are described in the article as reputational work
organizations, where degrees of task uncertainty and mutual dependency
control the coordination and direction of the fields through allocation of
rewards. Through the concepts of reputational autonomy, control over
resources and structure of audiences, four aspects of scientific work were

identified as a basis for empirical analyses of LIS: definitions of the field, institutional structure, research work and communication structures.

Preliminary analyses suggests that LIS is a field with a high level of task uncertainty and a low degree of mutual dependency, reflecting the heterogeneity of LIS with its diversity of research areas, methods and theories. However, there is a large mutual dependency between LIS research and the field of practice, where the field of professional practice is a significant part of the audience structure and to some extent also influencing the control of resources, limiting the reputational autonomy of the research field. In the context of academia, LIS is dependent on other fields of research in terms of e.g. methodology and theoretical aspects, but is still relatively isolated, having a limited impact on other fields of research.

The article shows how contextual factors, such as professional practices and lay groups can influence, not only the formulation of research questions and the means for answering them, but also by providing influential audiences, controlling financial resources and so on. This has obvious drawbacks if the field wants to have autonomous control over how research within the field is organized, performed and assessed. It also has a strong impact on the possibilities of the field to determine its borders in relation to other disciplines and how easy it is for 'outsiders' to contribute to the intellectual goals of the research field; issues that becomes highly

relevant for a field finding competition from other fields approaching similar topics. However, at the same time, one of the main *raisons d'être* of LIS are practice based problems of access and management of information, making the performance of applications of research results an important criterion for assessment.

Article III. Changes in the LIS research front: Time-sliced co-citation analyses of LIS journal articles, 1990-2004

The third article returns to the intellectual organization of LIS as reflected in informetric mapping, this time on a larger scale and with the focus on how the research front has developed over the last fifteen years. A set of analyses were performed on 13,605 research articles published in all general LIS research journals 1990-2004. The first analysis was an unrestricted co-citation analysis on the whole document set to determine the research base, followed by a co-citation analysis, again of the whole set, but this time restricted by the use of a citations among documents (CAD) methodology: limiting the analysis to cited records within the document set. The reason for the second analysis was to provide a context of research areas during the 15 years the analysis spans over. The three following analyses were time-sliced, CAD restricted co-citation analyses, covering the periods 1990-94, 1995-99, 2000-04. Time-slicing means a further restriction on the material being analyzed: these analyses are lim-

ited to only include citing and cited documents within a specific period of the whole time span. The purpose of these studies is to analyze changes in the research front, investigating the development of highly influential research areas during these particular periods.

The results show a structure that is stable and in line with previous analyses, making a basic distinction between informetric research on one side, and information retrieval and seeking on the other. A noteworthy difference in relation to earlier studies is how the information retrieval and information needs and uses fields gradually have been merging to an ISR field throughout the 1990's. Another gradual development over the three time periods analyzed is how the IR and informetric research have been forming stronger ties to each other, sharing methodologies and empirical material, as well as interests in issues such as visualization.

The traditional way of identifying research fronts in informetric terms is by 'bibliographic coupling' analyses. In this article, a time sliced CAD co-citation analysis was chosen instead, to introduce an element of impact of research as well as how current it is. One consequence of this is a delay in determining current research fronts: while bibliographic coupling allows clustering of literature being published right now, the co-citation analysis requires some time to pass for the literature in the front to be able to amass citations. Other consequences are: a drastic reduction of possible clusters using the co-citation analysis instead of the biblio-

graphic coupling; and the use of time sliced analyses with discrete time periods reduce the impact of literature published at the end of each time period.

After investigating the intellectual organization of LIS, one question still remains: where can LIS go from here? The field has been around at least since the 1920's, but is still relatively small, with large variations in terms of impact and recognition. Many research topics of interest to LIS are also being studied by other disciplines: organization and retrieval of information is being analyzed by computer scientists, knowledge organization is studied by scholars in psychology and information management is an important theme in management research. So how can LIS meet up to this competition? Tradition is strong in LIS, not only do the basic structure remain more or less the same. Considering changes in information technology during the last decades; and the shifts in research orientation in LIS since the end of the 1990's, it might be surprising to discover how intact the research base is, compared to analyses made ten or twenty years ago. Algorithm oriented IR is still the single largest area in the research base, containing literature published at least fifteen years ago; and with two text books from 1979 and 1983 at the very top of the ranked list of cited documents. On the other hand, the integration of the IR and IS areas, as well as IR and informetrics, follow a general trend of develop-

ment, both in society and technology, towards integration and convergence between e.g. systems as well as businesses.

Article IV. Becoming a Discipline: The institutionalization of library and information science in the Nordic countries

This article builds on the theoretical framework developed by Whitley (2000), and the empirical indicators identified by Åström (2004). The purpose is to analyze the social aspects of the development of LIS, focusing on the institutionalization of academic LIS research, with the Nordic countries as an example. An important aspect is how e.g. the professional practice and wider scientific community have influenced the development of academic LIS; but also the role of different academic settings of the different schools and departments where they are situated.

The article makes a distinction between institutions that are independent, located at university colleges and at universities; and among the university affiliated departments, between institutions at different faculties. The article focuses on institutions in the mainland Nordic countries, where five departments were selected for analysis on the basis of academic affiliation. Information about the institutions were collected, primarily from their websites, and analyzed in terms of organizational origin and setting, how research is organized and communicated; and the extent of external academic and professional connections.

The results show an academic landscape covering a wide variety of research areas within LIS; and big differences in terms of how departments are organized. These differences include e.g. academic affiliation, internal structure and how research work is organized. At an engineering oriented faculty we find a mid-sized LIS department within a faculty with related disciplines. Research is coordinated by focusing on a few research topics; and to a large extent co-authored and published in international peer review journals. Research is being performed in LIS areas with relatively high levels of standardization of work processes and standardized terminology and evaluation criteria; and research projects are primarily evaluated in relation to the LIS field in general. At the unit located at a humanities faculty, we find a small organization sharing departmental structure with related fields of study. However, at the same university there is also another information science department, including different computer science areas and communications studies, but not LIS. There is no apparent coordination of research efforts. Faculty members pursue a variety of individual projects in different research areas; and the most common means of communicating research is book chapters in the domestic language. Since departmental structure is shared with other disciplines; and research is being performed in areas with relatively low levels of formalization, assessment of research tasks and criteria for distributing resources is mainly performed at the local level. At the social science

faculty we find a department where the situation is somewhere in-between the aforementioned units; and at the independent and the university college affiliated schools, we find common traits with both the humanities and engineering units, depending on which department at the school we are studying.

Many of the organizational features observed at the institution located at a humanities faculty, could be explained by it being a small and fairly new institution. However, when looking at the results of the analysis of all institutions – and the department at the schools – there is a tendency towards correspondence in terms of shared organizational features between topically similar units; and coherent variation in-between institutions at different faculties, supporting the connection between faculty/topic orientation and social organization.

Discussion

Origin and development of LIS

When analyzing the development of LIS, two sets of characteristics appear as central: LIS being a field of research, a discipline and a field of professional practice; and the dual origin of LIS, developing from a field of practice; and, out of other research fields.

The practice related origin of LIS can be traced back to the 19th century if not further, with the development of general rules for classification and cataloguing, as well as attempts at formalizing library praxis and routines. The disciplinary establishment of the Graduate Library School in the 1920's was motivated by an ambition to create a theoretical foundation for the library profession. LIS developing out of other fields is reflected in e.g. IR research coming out of the computer sciences; and to some extent as a support function to science research in the 1940's and -50's. The research field origin is also reflected in a majority of the 'founding fathers' of information science having a background in other disciplines. Identifying the historical origin is a main aspect of creating a framework around core concepts for a scientific movement (Frickel & Gross, 2005), but for LIS, the origin is dual, with large variations in terms of how the origin has affected the development of the field.

'Normally', research areas develop into disciplines with e.g. departments and the right to issue university degrees, by creating infrastructures and amassing sufficient resources and credibility (Frickel & Gross, 2005). In LIS however, we can see one line of development where research areas have developed, to be incorporated into disciplinary LIS. But we can also see a disciplinary development out of the field of practice through library schools, then trying to establish research activities. This development is not in any way unique, the engineering sciences went through a similar process in the late 19th century; and medical and juridical sciences went through a similar process in the early 20th century. The engineering sciences were quick to establish close connections to other research fields; and the medical and juridical sciences were also established as academic research fields relatively fast. LIS has been much slower in establishing itself within the academic community; and the development and varying orientation has been dependent on local academic environments.

There might be several reasons for this. As opposed to e.g. medicine, the primary research object and underlying practice of library science was certain types of institutions, of which one of the main types was associated with a caring and fostering role; and with a work force largely consisting of women (Hildenbrandt, 1996; Wiegan, 1999). In addition to that, the variety of different kinds of libraries, varying widely depending on where they are and what purpose they serve, make it even harder to see

possible generalizations to be made. There are also parallels between the development of LIS and the professionalization process of the library occupation, with problems reaching a full professional status, for instance due to a lack of knowledge claims unique to LIS scholars as well as practitioners (Etzioni, 1969; Witz, 1992). However, applications oriented research and strong connections to non-academic fields are major traits in the post-1945 sciences, even in the fields traditionally considered 'pure' sciences (Gibbons *et al*, 1993). Still, many LIS areas have been experiencing differences establishing themselves in academia, especially at institutions affiliated with humanities oriented faculties, while some, primarily information science oriented, research areas originating out of other research fields have been finding it easier to receive attention in the academic world. One reason might be the multidisciplinary nature of LIS, where relations to other fields of research as well as the field of practice makes it hard to establish a set of competencies monopolized by the LIS scholars (Sundin & Hedman, 2005).

The close relation to the field of practice is apparent in many ways: in terms of research objects and in assessment of the relevance of research problems, in funding research and as an audience. The practice field also has an impact on the terminology within the field, which is reflected in e.g. how Åström (2002) chose descriptors from the *ERIC* database instead of *LISA*. The level of formalization of terminology is an important

aspect of reputational autonomy. A common sense vocabulary tends to increase the level of ambiguity, making large variations in terms of interpretation of results more likely, increasing the 'risk' of external influences and pressure (Whitley, 2000). The terminology issue also has implications on the extent of how work techniques and problem statements can be clearly understood and ranked according to relevance for the intellectual goals of the field. The less specialized terminology, the harder it becomes to make an unambiguous assessment of research problems and results, which in Whitley's (2000) terms indicates a high level of task uncertainty. In an area like informetrics, the level of formalization of terminology, methodology and so on is higher, making a formal assessment and ranking of research proposals and studies easier, thus decreasing the level of task uncertainty. In general, the level of task uncertainty seems to vary with the extent to which research areas have developed out of other research fields, disciplinary LIS or the field of practice.

Disciplinary development of the field is very diverse, with LIS institutions at all kinds of university faculties, as well as at university colleges and institutions being independent organizations. The varying organizational affiliation within academia for LIS in general suggests a position where the local situation might be more important for access to resources than position within the field, something Whitley (2000) would describe as a low level of mutual dependency. There are large variations in this as

well, though. Whereas there are institutions where local conditions are the main factor for deciding who gets access to resources, there are also many institutions where access to resources is determined by how well e.g. a research proposal is coordinated with the intellectual goals of the field in general, implying a higher degree of mutual dependency. However, while mutual dependency increases in relation to the field in general, the room for alternative research procedures is reduced; whereas in fields or institutions with low mutual dependency and high levels of task uncertainty, the organizational culture tends to be more individualistic and the opportunities of producing innovative research increases (Frickel & Gross, 2005; Whitley, 2000).

Meta-studies

One feature of LIS, of which this thesis is also a part, is a long term interest in meta-studies. According to Frickel and Gross (2005), the rhetorical construction of a collective identity is an important part of identifying core concepts and framing the development of a research area. However, the nature of LIS has been discussed through decades, to an extent where meta-studies can be considered a LIS research genre, if not a research area on its own. There are around 700 definitions of information science, which is characteristic for the conceptual chaos Schrader (1983) identified when studying these. The studies of LIS have been done for a num-

ber of reasons, and from a variety of viewpoints: to define what LIS is or should be, for purposes of self-understanding or to establish boundaries in relation to other fields; to investigate the intellectual content in terms of research areas or to identify core activities in the field.

The multitude of definitions, as well as the varying research orientations and institutional structures, gives an impression, not only of a research field with a weak self-understanding; but also, a field with a vague identity. Even in terms of the name of the field, there is no general consensus. An increasing amount of schools and departments have chosen to focus on 'information science' or 'information studies', while LIS is primarily used in non-Anglo-American research systems. There is, however, also a discussion on whether library science and information science are one joint discipline or two different ones. The issue of defining the field is a central aspect of the ability to control the identification of the field and the characterization of the domain, relating to the level of reputational autonomy; and when the identification of the field is weak, it is also a strong indicator on a field with a low level of mutual dependency. A low level of reputational autonomy increases the risk of 'intrusion', both in terms of 'outsiders' making significant contributions to the field; and of other fields taking over research areas from the field in question (Åström, 2004; Whitley, 2000). One of the more extreme examples on these issues is the forming of an information science department at Upp-

sala University, Sweden, of which an already existing LIS unit did not become a part.

A central aspect of the definition of the field is the relation between library science and information science: are they – as e.g. Saracevic (1999) claim – two related, however separate fields; or is library science a R&D activity within information science (Ingwersen, 1992). Using the Whitley model for analyzing research fields would support Saracevic' position; and LIS could be broken down into at least two distinct research fields given the distinct organizational variations. There are of course other aspects, joining the library and the information research fields together. One is historical traditions, both in terms of a long relationship between information science and library science; and also how libraries have been the central institution for providing access to information on a professional basis. Another is the current tendencies towards an integration of research areas such as OPAC research and IR; and knowledge organization and informetrics.

The fragmented nature of LIS is further exemplified when looking at the various views on what LIS should do, how it should be done and why. The *raison d'être* of LIS is to a large extent centered around the basic idea of making relevant information available, a motivation for doing LIS research which is supported by most, but not by all. Some would suggest that the primary reason for doing LIS is just to gain a general understand-

ing on information related phenomena. There are also many opinions on how LIS research should be performed, and on what basis. One of the major reasons for doing meta-studies is to define where LIS should be heading. There are a number of texts suggesting different epistemological, theoretical and methodological perspectives as a programmatic basis for LIS research. One of the most influential research orientations in LIS since the late 1970's has been the 'cognitive viewpoint' (e.g. Belkin, 1990; Ingwersen, 1996), where the basis of the analysis is found in the individual information user. Although the 'cognitive viewpoint' has developed into incorporating contextual aspects – as well as trying to integrate cognitive IR research with information seeking research (Ingwersen & Järvelin, 2005) – the individualistic core of the 'cognitive viewpoint' has been criticized by e.g. Frohmann (1992) for not sufficiently taking social aspects into account.

An alternative viewpoint is Hjørland's (2002; Hjørland & Albrechtsen, 1995), domain analytical perspective, suggesting the field of interest – or the domain – as the point of origin for analyzing information related processes. However, Whether LIS would benefit from reaching consensus on how to do research; and if it at all is possible; is a matter of discussion. There are trends pointing towards a homogenization of the field, at least in terms of certain areas; and the field would certainly become less fragmented. But for as long as we hang on to the notion of a unified LIS

field, we will have a vast amount of different research areas requiring different modes of interpretation and analysis. And for as long as the field is closely connected to the field of practice – and to an applications oriented *raison d'être* – there will be a need for analyzing a plethora of social, cultural, organizational and information related processes.

There is also a wide variation in how the different meta-studies have been performed, to some extent also being the reason for variations in the perception of the field. The clearest example might be the co-citation analyses performed to describe the intellectual structure of LIS (e.g. Åström, 2002; Åström, 2007; Persson, 1994; White & Griffith, 1981; White & McCain, 1998). Depending on methodological issues, as well as selection criteria and sources of empirical material, the results vary. Whether the analysis is done on a document or a journal level determines if e.g. medical informatics is included in LIS (Åström, 2007); and with variations in the journal selection, library science becomes visible in some analyses (Åström, 2002). Also, the use of ISI data enforces an American view on the perceived intellectual structure of LIS. The bias in the selection of journals indexed in the ISI databases is one issue here, but there is also the question on how to approach fields publishing in varying forms of media. When gathering the material and doing the analyses of LIS publishing in the Nordic countries (Åström, 2006), humanities oriented LIS research became visible in a way impossible when

using ISI data, regardless of weighted selections of journals or normalizing procedures for limiting the impact of productive journals. Similar effects have also been found in studies on e.g. XML research published either in ISI-covered journals or on the World Wide Web (Zhao, 2003).

As mentioned earlier, Frickel and Gross (2005) perceive the construction of a collective identity as a crucial part of framing the development of a field; and Whitley (2000) links the definition of the field to the level of reputational autonomy. The definition of the field depends on a wide variety of factors, such as e.g. methodological or epistemological positions, but also how the field is analyzed. Even when applying methods acknowledged as reliable ways of analyzing the intellectual structures of research fields, the result is still depending on a number of issues. This reflects an inability to reach a consensus on the nature and identity of the field, raising questions on how able the field is to define itself in relation to other research fields.

Competition (and cooperation)

The establishment of LIS boundaries in relation to other fields of research is the third aspect of Frickel and Gross' (2005) framing of the development of research fields. In LIS, this has become increasingly important, due to a raised level of competition from other disciplines dealing with information related topics. However, considering the problems of reach-

ing consensus on the definition of LIS, the question is to what extent LIS is able to maintain its boundaries? One aspect relates to acceptance and status in the wider academic community, of importance for disciplinary establishment; but also, to be able to compete with other fields for research grants from research councils. At the Finnish academy for instance, there is a work committee for administering LIS research applications, while at the Swedish Research Council, there is no such infrastructure. Instead, research grants have to be applied for from committees oriented towards other fields of research. Another aspect is the risk of research topics and areas being 'abducted' by other fields of research. In an analysis of LIS research specialties, 'import of ideas' was identified as a specialty (White & McCain, 1998); and there is a significant amount of authors from other fields contributing to LIS journals, whereas the number of articles in non-LIS journals referring to LIS research are few (Cronin & Pearson, 1990). Both competition for grants and other fields contributing to LIS research reflects problems of maintaining a monopoly on LIS competencies, as well as boundaries towards other research fields.

The most obvious example on outside competition is how LIS research issues have gained interest from other fields on research. The relationship between the computer sciences and LIS goes back to the origin of both disciplines. However, whereas the computer sciences have gained momentum along with the development of the 'information society', LIS

has to an increasing degree become less interested in systems and algorithm development issues. One, perhaps somewhat harsh, interpretation of the LIS scholars increasingly steering away from systems oriented IR, as reflected in Åström (2007) is out of necessity. When the computer scientists becomes better at systems and algorithm issues than the LIS scholars, the LIS scholars turn the focus to human and user aspects of information systems instead. Meanwhile, e.g. psychology has taken an increasing interest in issues on representation and organization of knowledge; and management studies scholars and LIS authors are equal contributors to information management literature. LIS seems to have a hard time monopolizing research issues and having any substantial impact on academia in general, something also reflected in the problems of reaching a full professional status for librarians (Sundin & Hedman, 2005).

There is another side of the coin as well: the merging of different information related disciplines into one organizational unit or 'information schools' can be seen in many academic systems. Two random examples are the I-school at The University of Washington and The Faculty of Information Sciences at University of Tampere, whereas there is also the antithesis of this development at Uppsala University in Sweden, and the aforementioned information science department leaving out the LIS unit at the university. At these 'compound' institutions, we find LIS together with e.g. various computer science areas such as human computer inter-

action, computer oriented mathematics, information systems; and also with e.g. media and communication studies. However, LIS at Uppsala University can also be seen as part of the same development, although seeking allies on another basis, joining forces with archival studies and museology. There are also many other types of more or less formalized ways of cooperation between scholars from LIS and other fields, not the least depending on varying organizational affiliations of LIS institutions at different universities.

The cooperation and competition can be seen from two points of views. One is the obvious strategy of strengthening the position, institutionally by forming larger units; and as a field of research, by cooperating with other fields that are more established in the academic community. Furthermore, there is also the fruitfulness of interdisciplinary efforts; and the tendencies towards a relative dissolving of traditional research areas (Gibbons *et al*, 1994). It can, however, be discussed to what extent LIS is interdisciplinary. There are a many different research areas in LIS, but with a few exceptions, the amount of actual cooperation and interchange of ideas can be questioned. Since the level of interaction between different LIS areas is relatively low, a correct classification of LIS would probably be multidisciplinary rather than interdisciplinary (Klein, 1990). The other point of view is based on Whitley's framework; and emphasizes the competitive aspect rather than the cooperation, where the relation be-

tween LIS and other fields of research is characterized by weak boundaries and low levels of reputational autonomy.

LIS: now and onwards

In the light of the discussions on the origin and development of LIS, it's 'preoccupation' with self-understanding and relation to other disciplines; questions on the current status and future of LIS emerge. In Vakkari *et al* (1993), Nordic LIS of the 1980's was described as a field with weak ties to academia and a scattered departmental structure; and although some improvements have been made, many of the characteristics from 25 years ago still remains. In 1974, a weak theoretical development in LIS was the motivation for formulating the 'fundamental equation of information science' (Brookes, 1974); and almost 30 years later, the problem is still here (Hjørland, 2000; Pettigrew & McKechnie, 2001).

In general, the field can be described as fragmented, with a vast variety of research areas, research orientations and so on; and a widely heterogeneous disciplinary and institutional structure. In Fuchs discussion on scientific changes, he claims that fields, in Whitley's terminology described as 'fragmented adhocracies', will see a continuing fragmentation process because of the organization of the field (Fuchs, 1993). Describing LIS, together with most other social sciences, as a 'fragmented adhocracy' is not a problem, at least for as long as we agree on Whitley's

categorization of different kinds of fields; and we maintain the notion of LIS as one field of research. However, when studying the development of LIS over the last fifteen years, it becomes clear that there are processes of homogenization and integration going on. IR is moving closer to both information seeking research and informetrics; and there are also stronger relations between informetrics and knowledge organization. Although we have not been able to populate the interior of LIS as identified by White and McCain (1998), we might at least have located 'our Uluru'. These are also the LIS fields where specialized and formalized terminologies and work processes has developed the most; and the informetric area is one of few LIS research orientation receiving any wider attention in the academic field as a whole.

Still, there are also many research areas and institutions that are small and in more or less problematic positions. There are for instance many institutions, where the LIS discipline has developed out of e.g. masters programs, struggling to establish themselves in terms of research and institutional development, at the local university as well as in academia. Since they have not developed out of specific research areas; they hire faculty members with varying research orientations for educational purposes. One result is scholars free to formulate research problems without strong connections to the local research environment, more or less integrated with the field in general.

The tendencies towards integration in some areas, together with increased efforts towards cooperation with other research fields, are joined by signs of an increased acceptance of LIS within academia. In institutional terms, this is a development primarily taking place in a few strong research environments, while there are also many institutions with a more or less established disciplinary structure, but showing little result in terms of research. One strategy would be to focus on strong research areas and environments, which might further strengthen LIS position in the academic world. This would leave other research areas and institutions to either form alliances on their own – e.g. with archival studies and museology – or in a worst case scenario, follow the path of the library schools at e.g. Columbia University and Chicago University: the first university affiliated library school and the first graduate library school, both of which are now gone. One strategy to increase research activities in the Nordic countries is the establishment of the Nordic Research School in Library and Information Science (NoRSLIS), gathering 15 institutions in the Nordic and Baltic countries to establish a research community and take advantage of the competencies gathered at the different – many of them small – institutions.

However, another aspect of the current and future identity is related to the strong connections between LIS and the field of practice. There are many aspects influencing the practice not covered by core areas such as

IR and informetrics. The needs of the field of practice are a strong argument for maintaining a diverse and multidisciplinary LIS. A less fragmented LIS field might stand a better chance of further acceptance in academia, but on the other hand risk a weaker relationship to the field of practice, one of the main audiences for LIS research and an important part of the discipline's *raison d'être*.

On the other hand, the practice field is also going through changes, both in terms of new areas of practice and new roles for libraries and librarians. This affects what kind of training is needed from library and information institutions; and also, what kind of research is needed to provide the theoretical background for teaching and practice. One example is university libraries increasingly becoming involved in science policy processes, increasing the demand for librarians with knowledge of informetric methods. The demands from the practice field have changed in other ways as well, also in relation to changes in the practice itself, where the need of technological skills have decreased, while pedagogic skills and the ability to analyze different user contexts have increased significantly.

The social and intellectual development and organization of LIS – Concluding remarks

The heterogeneous nature of LIS should be well established by now, both in terms of research areas and organizational settings. LIS is also facing challenges as societal change and competition from other disciplines. The social structure is signified by institutional affiliations ranging from totally independent schools to departments and units at a variety of university faculties, with wide variations in terms of e.g. size and level of establishment in the local environment. The intellectual structure shows the same patterns, with large differences in terms of both research orientation and how the identity of LIS is perceived.

Whitley (2000) would describe LIS as a 'fragmented adhocracy': a field with high levels of task uncertainty and low mutual dependence, where research is weakly coordinated, providing plenty of opportunities for pursuing personal research agendas. Because of the vagueness and lack of consensus, results can contribute to the intellectual goals of the field in an unspecific way, further emphasized by the lack of standardization and consensus on standards for evaluating research. The communication system also has a low level of standardization and specialization. These features make the field open to influences and contributions from 'outsiders' in research and fields of practices. This is further emphasized

when looking at the development from a professionalization theory perspective: a field with these features will have a hard time claiming a strong monopoly on any sort of knowledge claims. These are all characteristics matching LIS; and if Fuchs' (1993) theory of scientific change would be correct, LIS would be heading for a further fragmentization.

There are, however, signs of an increased integration of LIS research areas; where scholars are also becoming more dependent on coordinating their own research agendas with the intellectual goals of the field, while language and work processes are being increasingly formalized and specialized; a development contradicting Fuchs' theories on research development. There is of course the question whether it is a matter of one LIS field or at least two; and there are several LIS research areas where this development is not taking place.

The relation between LIS and the wider academic community has also been characterized by an increasing cooperation: in terms of establishing information schools, interdisciplinary efforts and so on. The most significant characteristic, however, is competition, and most notably, the 'abduction' of LIS research issues by other disciplines, and in some events, even parts of the disciplinary name. Both these lines of development reflect a low level of reputational autonomy and control over the definition of the field and its identity. Autonomy and identity issues are also visible in the close relation to the field of practice, where the professional prac-

tice have a direct impact on research, e.g. by contributions to the research literature, by being an important audience group and by providing research funds. Another important aspect is how LIS satisfy the needs of the practice field by providing a theoretical backbone and the development of practices and services; and by providing the academic training of the practitioners.

However, issues of integration and the relation to other research fields do not necessarily have to be view in terms of autonomy and level of fragmentation. Another point of view is theories on the development of a 'Mode 2' research, emphasizing interdisciplinary work with strong features of applicability and contacts outside academia (Gibbons, 1994). From this point of view, the development of LIS is sharing most of the features of the general development of the sciences since 1945; raising the question whether problems of establishing LIS in academia are related to inertia in the academic system, or if it still is a matter of a fragmented field with a vague identity and a low level of autonomy.

This thesis has been an attempt at discussing the social and intellectual organization and development of Library and Information Science, how it relates to its wider context of academia and the field of practice; and with a focus on dynamics between the LIS area as a discipline, as a field of research and as a field of practice; and with a dual origin in both the practice field and other research fields. Further inquiries have also been made

into different LIS meta-studies and the increasing competition from other fields; leading up to a question on the current state and future of the field. There is of course much more to be done. In terms of LIS, the institution-alization can be analyzed in a much broader sense, comparing institutions around the world instead of focusing on the Nordic countries; and in terms of the intellectual organization of the field, there is still the matter of the vast amounts of research being left out in the ISI-based informetric analyses.

The last issue relates to a wider question on how to do quantitative analyses on research fields with varying ways of publishing results. Methods for analyzing websites have been developed in webometrics, increasing the possibility of mapping intellectual structures through re-search published on the web; and also, comparing literature published in scientific journals and on websites (e.g. Zhao, 2003). But research litera-ture published in books and book chapters is still to a large extent out of reach for informetric analyses. The question on dynamic relationships between disciplines, research fields and practice fields is also something that can be analyzed further, not the least to discuss why some disciplines developing out of fields of practice have such a hard time establishing themselves in general academia, while some do not?

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