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## Facilitating collaboration: exploring a socio-technical approach to the design of a collaboratory for Library and Information Science

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FACILITATING COLLABORATION:  
EXPLORING A SOCIO-TECHNICAL APPROACH TO  
THE DESIGN OF A COLLABORATORY FOR  
LIBRARY AND INFORMATION SCIENCE

MONICA LASSI

2014

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## ABSTRACT

The thesis explores the potential of one way of facilitating and stimulating collaboration in Library and Information Science (LIS), namely through a specific scientific collaboration activity: creating, sharing, using and reusing data collection instruments, such as interview guides, questionnaires and observation protocols. The research presented in the thesis has two study objects: 1) LIS as a discipline which does not have a strong tradition of collaboration; and 2) collaboratories as facilitators of collaboration. Thereby, the aim of the thesis is to explore how collaboration can be facilitated within the LIS community by means of an LIS collaboratory.

The thesis builds upon four studies, in which the design of a prototype collaboratory has a central role. The research process is thus also a design process. The thesis takes a socio-technical approach according to which technology affects the people using it, while people affect the technology by using it.

The four studies reported in the thesis can be read as a linear narrative, as each study builds on the previous one and contributes to the next one. Together the narrative of the four studies describes the process of starting by exploring social and contextual aspects of LIS, requirements and the actual design and development of a working collaboratory prototype, and finally how this prototype collaboratory was perceived by LIS professionals. The first two studies contribute to understanding the needs of an LIS collaboratory: for a general perspective, a review and a synthesis of literature related to design, adoption and use of collaboratories, and for a specialized perspective, an empirical study of perceptions of members of the LIS community concerning the potential of an LIS collaboratory. The findings of the two studies contribute to the design of an LIS collaboratory and the implementation of a working prototype collaboratory. Finally, an empirical study has been conducted to evaluate the prototype collaboratory.

Two theoretical models have contributed to the interpretation and analysis of the results of the four studies as a whole: the online community life-cycle model and the social actors model. The online community life-cycle model contributes with a perspective on designing the social aspects of a collaboratory, e.g. interaction between collaboratory actors. The social actors model focuses on understanding the potential collaboratory actors, in the context of the organizations they work in, and professional roles. Overall, the results show that an LIS collaboratory has potential to further LIS

research in two main aspects on which there was a very level of agreement among study participants: research quality and research process speed. An LIS collaboratory can lead to disciplinary advancements by facilitating the LIS community to build upon the work of others. Providing that the data collection instruments are of high quality, reusing data collection instruments can speed up the research process or save time that can be used on other tasks in the research process. While the benefits of an LIS collaboratory were focused on the greater good for LIS, the challenges reported were focused on the individuals' perspectives. Hence, a tension exists between the view of supporting the greater good and the challenges for the individual concerning sharing and reusing data collection instruments in an LIS collaboratory. The challenges for active involvement in an LIS collaboratory can be summarized as: concerns with quality assurance; a need to establish a reward system for an LIS collaboratory; and hesitancy about introducing a new way of working with data collection instruments in LIS.

The thesis emphasizes the implications for the LIS discipline if new ways of working with data collection instruments were to be introduced; the implications of addressing the needs of a diverse target audience; and the implications for further design iterations of an LIS collaboratory, including rewarding contributions, and ensuring quality content in a collaboratory.



# SVENSK SAMMANFATTNING

Denna avhandling undersöker hur vetenskapligt samarbete kan främjas inom biblioteks- och informationsvetenskap (B&I) med hjälp av ett kollaboratorium, en typ av informations- och kommunikationstekniskt verktyg för samarbete. Undersökningen har fokuserat på en särskild typ av vetenskapligt samarbete, nämligen att skapa, dela med sig av, använda och återavända datainsamlingsverktyg, såsom intervjuguider, observationsprotokoll och enkäter. Forskningen som presenteras i avhandlingen har två studieobjekt: 1) B&I som är en disciplin som inte har någon stark tradition av vetenskapligt samarbete, och 2) kollaboratorier som verktyg för att främja samarbete. Syftet är att undersöka hur samarbete kan möjliggöras inom B&I med hjälp av ett kollaboratorium. De potentiella aktörerna i ett B&I-kollaboratorium är studenter, forskare och yrkesverksamma inom B&I.

Avhandlingen bygger på fyra studier, för vilka ett B&I-kollaboratorium har en central roll. Därmed kan forskningsprocessen samtidigt ses som en designprocess. I avhandlingen har en socio-teknisk ansats tagits, som utgår ifrån synsättet att teknik och människor påverkar varandra, det vill säga att teknik påverkar de människor som använder den, och att människorna påverkar tekniken genom att använda den.

De fyra studier som ingår i avhandlingen kan läsas som ett linjärt narrativ, då varje studie byggde på de tidigare, och bidrog till nästföljande studier. Sammantaget beskrivs en process i tre faser som började med en kartläggning av samarbetsforskning, kollaboratorier och B&I, gick vidare till att undersöka designkrav och att designa och implementera en fungerande prototyp av ett kollaboratorium, och som avslutades med en utvärdering av hur prototypen upplevs av potentiella kollaboratorieaktörer. Den första fasen bestod av två studier: studie I var en genomgång och syntes av litteratur relaterat till design, adoption och användning av kollaboratorier bidrog med en förståelse för generella behov för kollaboratorier. Studie II var en empirisk studie som undersökte uppfattningarna bland aktörer verksamma inom B&I gällande potentialen för ett B&I-kollaboratorium. Resultaten från dessa två studier har bidragit till genomförandet av studie III, design av ett B&I-kollaboratorium och implementation av en prototyp av ett kollaboratorium. Slutligen, i studie IV gjordes en utvärdering av kollaboratorieprototypen var en väldefinierad grupp av potentiella aktörer, bibliotekarier, hade valts ut att utföra uppgifter i prototypen, vilket följdes

upp med intervjuer kring bland annat potentialen för ett B&I-kollaboratorium.

Två teoretiska modeller har bidragit till tolkning och analys av de fyra studierna som helhet: online community life-cycle-modellen samt social actors-modellen. Online community life-cycle-modellen bidrar med perspektiv på design av sociala aspekter av ett kollaboratorium, exempelvis främjande av interaction mellan kollaboratorieaktörer. Social actors-modellen fokuserar på förståelse av de potentiella kollaboratorieaktörerna, till exempel vilka typer av organisationer de arbetar i, och deras professionella roller. Sammantaget så visar resultaten att emedan fördelarna med ett B&I-kollaboratorium har en tyngdvikt på det allmännyttiga för disciplinen, så var majoriteten av utmaningar som rapporterades av individuell art. Detta visar på en spänning mellan synen på att å ena sidan bidra till det allmännyttiga, och å andra sidan riskera hinder för individuell karriärframgång. Ett B&I-kollaboratorium kan bidra till att främja forskningen genom att skapa möjligheter för B&I-aktörer att bygga på varandras arbeten. Förutsatt att datainsamlingsverktygen håller hög kvalitet, så kan återanvändning göra att forskningsprocessen går snabbare att genomföra, eller frigöra tid som kan användas till någon annan aktivitet i forskningsprocessen. Hinder för individer att vara aktiva i ett B&I-kollaboratorium kan sammanfattas som farhågor kring bristande kvalitet, farhågor kring nya sätt att arbeta med datainsamlingsverktyg i B&I, samt att den akademiska världen behöver utvidga de statusbyggande aktiviteterna (traditionellt bl.a. publicering och citeringar) till att inkludera aktiviteter relaterade till datainsamlingsverktyg.

Avhandlingen betonar implikationer för att introducera nya sätt att arbeta datainsamlingsverktyg inom B&I, implikationer för att uppfylla behov hos olika kollaboratorieaktörer, samt implikationer för vidareutveckling av ett B&I-kollaboratorium.

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Jag dedicerar min avhandling till  
alla kvinnliga klassresenärer –  
till de som banat väg för mig  
och till de som är på väg.

# 1. INTRODUCTION

Scientific collaboration is considered beneficial for the progress and quality of research as well as for developments in professional settings, according to both previous research and professional experience (e.g. Sonnenwald, 2007). Scientific collaboration can be described as researchers working together conducting activities such as collecting, analysing and sharing resources, interacting with collaborators, and coordinating work activities. Scientific collaboration also contributes to faster advancements when researchers contribute their time and expertise to solving problems (Finholt, 2002; Lassi & Sonnenwald, 2010; Olson et al., 2002; Sonnenwald, 2007). Scientific collaboration has been recognized and promoted by governments in order to develop or maintain the scientific excellence of nations, one of the motivations being to improve national economies (Berman & Brady, 2005; Pothén 2006).

Scientific collaboration is not as common in social science disciplines as in natural and technology disciplines (Cronin, 2005). The reason for that is that the characteristics of a discipline, for example the extent to which there is agreement about which topics to focus on and which methods to use, affect whether and how collaboration will be carried out (Birnholtz & Bietz, 2003; Finholt, 2002; Olson et al. 2002). Hence, what makes for successful collaboration in one discipline may not work for another discipline. Research on the characteristics, motivations and challenges for Library and Information Science (LIS) is sparse, and while LIS has similarities with other disciplines, some characteristics are specific and need to be considered in more detail, such as publication venues and types of publications that give status (Sonnenwald et al., 2009).

One way of strengthening scientific collaboration is to make use of collaboratories, i.e. online facilities for collaboration. These are tools for supporting collaboration across distances by providing access to instruments

for collecting and analysing data, for conducting experiments and for communicating. Collaboratories have been used extensively in the natural sciences since the early 1990s (see e.g. Finholt, 2002 for a review of collaboratories). Previous research has focused mainly on studying and analysing existing collaboratories to find what affects and stimulates collaboratory use. However, little attention has been given to the starting points – the initial design of a collaboratory. In other words, the research has had a more evaluative than formative focus. Further, development and use of collaboratories has tended to focus on natural science and technology disciplines, rather than on social sciences and humanities (Finholt, 2002). The focus of the thesis on the social science discipline LIS contributes to understanding social science collaboratories.

One specific activity of scientific collaboration is sharing resources, such as publications and data sets. While data sharing is considered to contribute to increased quality and effectiveness of science, it is difficult to do, in part for practical and ethical reasons (Borgman, 2007). Data collection instruments are artefacts pertaining to another part of the research process. Sharing data collection instruments do not involve as high stakes as sharing data sets. In LIS, research on sharing data collection instruments, such as interview guides, observation protocols and surveys, has not been reported. Rather, research in LIS has focused on collaboration between professionals and researchers (Ponti, 2010a), and on collaborative decision making for purchase of library management systems (Olson, 2010), while sharing resources from the perspective of scientific collaboration within the broader LIS community has not yet been studied.

Scientific collaboration, and collaboratories that support scientific collaboration traditionally assume researchers, and sometimes students, as the primary actors involved (Finholt, 2002; Sonnenwald, 2007). However, use of data collection instruments is not limited to academia; LIS professionals also conduct relevant activities, such as collecting and analysing data about use and users of library services. Research on collaboratories in LIS is thin: one study has focused on how library service managers perceive the potential of a collaboratory within the LIS field (Axelsson, Sonnenwald & Spante, 2006). Even so, the potential of groups other than researchers, such as students and professionals, to contribute to collaboratories is still unexplored. Therefore, the target audience of an LIS collaboratory, in this study, is expanded to include three groups: researchers, students and professionals. These are henceforth referred to as *potential collaboratory actors*, whereas the term *the LIS community* denotes the

LIS discipline and professionals in general. The term *LIS collaboratory* is used to denote a potential collaboratory for sharing data collection instruments in Library and Information Science, for students, researchers, and professionals. The term *prototype collaboratory* is used for the prototype designed and implemented as an example of how an LIS collaboratory could be designed.

To conclude, the thesis explores how scientific collaboration within the LIS community can be facilitated by sharing data collection instruments. The emphasis is on design of an LIS collaboratory with the target group academics (at different career and educational levels) as well as professionals.

## **1.1. AIM AND RESEARCH QUESTIONS**

The research on which the thesis builds has two study objects: 1) LIS as a discipline which does not have a strong tradition of collaboration; and 2) collaboratories as facilitators of collaboration. The aim of the thesis is to explore how collaboration can be facilitated within the LIS community by means of an LIS collaboratory.

This research has explored the potential of one way of facilitating and stimulating collaboration in LIS, namely through a specific scientific collaboration activity: creating, sharing, using and reusing data collection instruments such as interview guides, questionnaires and observation protocols. The target group for an LIS collaboratory is denoted as potential collaboratory actors, and includes, as stated, people who make use of LIS data collection instruments, hence LIS students, professionals and researchers. Three research questions have guided the research process to fulfil the aim. The first two research questions have an empirical focus:

- (1) What do members of the LIS community perceive to be benefits, facilitators and challenges for an LIS collaboratory?
- (2) What are the current attitudes towards and practices of creating, sharing, using and reusing data collection instruments of members of the LIS community?

The third research question focuses on interpreting the results, to create a broader understanding of the results of the first two research questions. Two theoretical models have been chosen for this purpose: the social actors



model and the online community life-cycle model. The social actors model stems from social informatics research and conceptualizes the people who use and are affected by information and communication technologies (ICTs), in the context of organizations, networks and other associations that may affect how and why people use ICTs (Lamb & Kling, 2003). In the thesis, collaboratories are viewed as ICTs that can support scientific collaboration (see Section 2.2). The social actors model aids in creating an understanding of how the members of the LIS community who participated in the studies – academia, industry and the public sector alike – work with respect to creating, sharing, using and reusing data collection instruments. The online community life-cycle model (Iriberry & Leroy, 2009) details what makes online communities successful (meaning adopted and used by the intended target group). In the thesis, the online community life-cycle model can shed light on the important social dimension of collaboratories (see Section 2.2 for background information on collaboratories), which can be used in the design of an LIS collaboratory. The models are presented in more detail in Chapter 3. The third research question was:

- (3) How can the social actors model and the online community life-cycle model contribute to understanding of the perceptions and practices related to data collection instruments and a potential LIS collaboratory?

The thesis is based on four studies, each focusing on a different aspect of collaboration and contributing to fulfilling the aim of the thesis. Central to all studies is the design of an LIS collaboratory, which is a tool for facilitating collaboration, thus the research process is also a design process. The studies together constitute a first iteration of a user-centred design process; the results can be used as feedback to a continued design process. The thesis takes a socio-technical approach according to which, in a simple way of explaining it, technology affects the people using it, and people affect the technology by using it (this is further discussed in Chapter 3). Therefore it is important to understand who the potential collaboratory members are; their activities concerning creating, sharing, using, and reusing data collection instruments; and what they perceive to be benefits and challenges of an LIS collaboratory.

The four studies can be read as a linear narrative, as each study builds on the previous one and contributes to the ones that follow. Together the narrative of the four studies describes the process of starting out in exploring the social and contextual aspects of LIS to find out about the potential collaboratory actors' needs; it then moves on to requirements and the actual

design and development of a working collaboratory prototype; and it finally concerns how this prototype collaboratory was perceived by LIS professionals. The first two studies contribute to understanding the needs of the potential collaboratory actors. The general perspective is given by a review and synthesis of literature related to the design, adoption and use of collaboratories, and a specialized perspective by an empirical study of LIS community members' perceptions of the potential of an LIS collaboratory. The findings from the two studies contributed to the design and implementation of a working prototype collaboratory building on the first two studies. Finally, an empirical study was conducted in order to evaluate the prototype collaboratory. The four studies and their corresponding papers are:

**Study I:** A synthesis of relevant literature, reported in Paper I: "Identifying factors that may impact the adoption and use of a social science collaboratory: a synthesis of previous research".

**Study II:** An empirical study investigating the perceived benefits, facilitators, and challenges of an LIS collaboratory, reported in Paper II: "Sharing data collection instruments: Perceptions of facilitators and challenges for a Library and Information Science collaboratory".

**Study III:** Design of a prototype collaboratory, reported in Paper III: "The socio-technical design of a Library and Information Science collaboratory".

**Study IV:** Evaluation of the prototype collaboratory designed in Study III, reported in Paper IV: "Evaluation of a prototype collaboratory for sharing data collection instruments in Library and Information Science".

Thus, the thesis will contribute to the body of research on scientific collaboration by focusing on a collaboratory for LIS by broadening the potential collaboratory members to include students, researchers and professionals; and by focusing on the distinct activities of creating, sharing, using and reusing data collection instruments.

The following chapter sets the scene in the sense that it gives an account of what scientific collaboration entails; what collaboratories are and how they can be used to facilitate and stimulate scientific collaboration; and LIS as a collaborative discipline.

# 2. SETTING THE SCENE

This chapter sets the scene for this research in light of the aim of the thesis to explore the potential of a collaboratory for facilitating collaboration in LIS. The chapter starts with a section giving an account of what scientific collaboration entails, focusing on the reasons why it is promoted for example by governments and funding agencies. Next, collaboratories as tools to support scientific collaboration are described. In the final section a characterization of LIS is given related to how scientific collaboration is conducted at present.

## 2.1. SCIENTIFIC COLLABORATION

Citations are seen as quality indicators in scientific publishing, both within and outside academia (i.e. as tools for governments to fund research) (Nelhans, 2013). Studies on the benefits of scientific collaboration show that researchers who collaborate tend to produce more publications, and that these publications have higher citation counts and are cited for longer periods of time than single-authored publications (see e.g. Beaver, 2001; Sonnenwald, 2007). By collaborating, researchers may learn from each other, share resources such as research instruments and data, and build on each other's results (Berman & Brady, 2005; Birnholtz & Bietz, 2003). Scientific collaboration has been standard practice within disciplines in the natural sciences, medicine and engineering, but is not as common in social science and humanities disciplines (Cronin, 2005). However, governments have encouraged scientific collaboration by developing infrastructure for collaboration across distances (e.g. American Council of Learned Societies, 2006; Berman & Brady, 2005; Pothen, 2006).

Scientific collaboration differs from collaboration in other settings, such as within and between organizations, in its high degree of uncertainty with

respect to whether a research goal will be achieved, and how to achieve the goal in the best possible way (Sonnenwald 2007). As stated, the thesis focuses on sharing and reusing data collection instruments, which can be seen as one type of collaboration. Sharing data collection instruments in a collaboratory means that anyone in the collaboratory can access and use shared data collection instruments. Thus, sharing data collection instruments possibly involves an even higher degree of uncertainty, as there are very limited ways of knowing who accesses, downloads and uses a data collection instrument.

Sharing resources is understood from a computer-supported cooperative work (CSCW) approach as an activity on a scale of how much work an individual can usually do before needing to interact with another individual in order to do one's work (Figure 1, Neale, Carroll & Rosson, 2004). The choice to present this model in this particular chapter, and not the theoretical framework, is motivated by the importance of giving an account of the starting points of the thesis early on. At the base of the pyramid are light-weight interactions that do not require much effort from the individuals. At the top of the pyramid is cooperation, which requires more communication and working together to complete tasks.

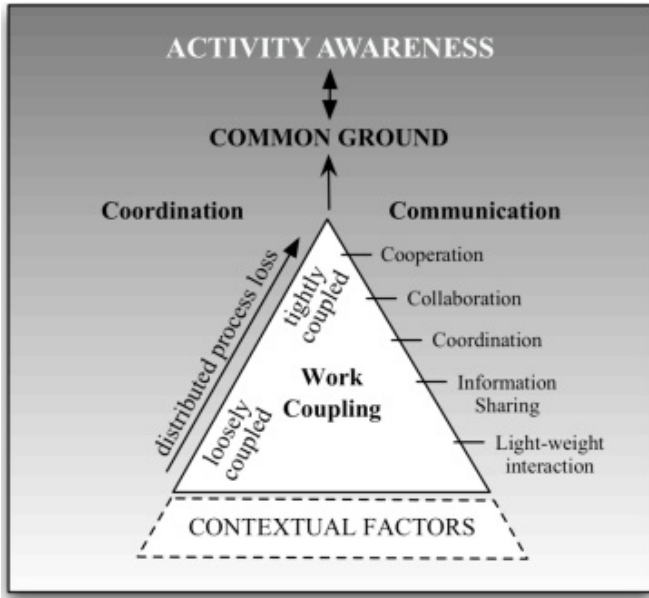


Figure 1 Activities related to work coupling. (Neale, Carroll & Rosson, 2004)<sup>1</sup>

The types of work coupling are, from the loosest to the most tightly coupled: (1) light-weight interactions – communication about work mixed with social talk; (2) information sharing – exchange of work-related information; (3) coordination – of activities and communication; (4) collaboration – working toward a common goal; and (5) cooperation – working more tightly together than in the previous step, and prioritizing common goals before individual goals (Neale, Carroll & Rosson, 2004).

It should be noted that Neale, Carroll and Rosson (2004) do not provide a precise definition of *information* in the concept of information sharing. In the thesis, the information sharing activity is understood as sharing *resources*, in particular data collection instruments, which can be seen as narrowing the definition of the concept. While information sharing is broadly and fuzzily defined in CSCW, the concept is often more specifically defined in LIS, e.g. delimiting information to documents or information about documents (Talja, 2002). It is deemed appropriate for the thesis to use the broad CSCW

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<sup>1</sup> Neale, D. C., Carroll, J. M., & Rosson, M. B. (2004). Evaluating computer-supported cooperative work: Models and frameworks. In Herbsleb, J. D. & Olson, G. M. (Eds.) *Proceedings of the 2004 ACM Conference on Computer-Supported Cooperative Work (CSCW'04)*. 6-10 November, 2004, Chicago, IL, USA: ACM. DOI <http://dx.doi.org/10.1145/1031607.1031626> © 2004 Association for Computing Machinery, Inc. Reprinted by permission.

definition of information sharing, so as to not limit what constitutes information, a document, or even a data collection instrument – it may in fact be up to the potential collaborative actors to come to an agreement about this, in the context of an LIS collaborative.

It should also be noted that this framework defines collaboration as an activity subordinate to cooperation. This is not commonly the case in scientific collaboration research, and reflects the viewpoints of computer-supported cooperative work (CSCW) and distributed work (and activity awareness) research on the one hand, and scientific collaboration research on the other. The intention here is to show how information sharing can be described as an activity on a spectrum of work coupling, and that one type of work coupling may spark a need for another type of work coupling. In the context of facilitating and stimulating scientific collaboration in LIS, information sharing activities may lead to collaborative projects.

Olson et al. (2008) suggest the following metrics for measuring the success of remote collaboration: a) effects on science, including changes to research practice and new ideas; b) effects on researchers' careers, including diversity and improved quality of life; c) effects on learning and science education, including distance-learning and student mentoring; d) inspiration to others, which could lead to new ICT tools and laboratories; e) effects on funding and public perception, including new and re-funding of laboratories; and f) effects on tool use, including tools being used and reused in other settings, and new people starting to use a tool.

Sharing and reuse of data collection instruments has not been given much attention compared to sharing raw data and data sets. In 2005 and 2006, in the *Journal of the American Society of Information Science and Technology (JASIS&T)*, data collection instruments were included in only 19,4% of the research articles. The number of included data collection instruments per issue ranges from zero to five. Thus, looking to journals to reuse or build on existing data collection instruments does not seem to be a viable solution. There are known difficulties related to motivating researchers to share data sets, for example practical and ethical aspects (Borgman, 2007). The ethical aspects are not an issue with data collection instruments, since no data about study participants are present in data collection instruments. However, some of the practical difficulties may be the same for data sets and data collection instruments. The next section describes how laboratories can be suggested to support scientific collaboration.

## 2.2. COLLABORATORIES AS TOOLS FOR SCIENTIFIC COLLABORATION

Scientific collaboration can be supported by information and communication technology (ICT) tools, e.g. collaborative writing tools; video conferencing tools; and laboratories which can facilitate activities such as collecting, analysing and storing data. The definition of a scientific laboratory that is said to be the original one is as *a laboratory without walls* (Wulf, 1989<sup>2</sup>, according to Finholt, 2002 and Sonnenwald, 2007). In the thesis, a richer definition of laboratories is employed:

A laboratory is a network-based facility and organizational entity that spans distance, supports rich and recurring human interaction oriented to a common research area, fosters contact between researchers who are both known and unknown to each other, and provides access to data sources, artifacts and tools required to accomplish research tasks. (Science of Laboratories, 2003, no pagination).

Other terms for this type of socio-technical phenomenon are cyberinfrastructure (Berman & Brady, 2005) and virtual research environments (Sonnenwald et al., 2009). They can also be described as socio-technical interaction networks (STINs) (Kling, 1999), which takes into consideration that the adoption and use of a laboratory is affected by the social values attached to it. Laboratories also have some similarities to institutional repositories, such as the Smithsonian/NASA Astrophysics Data System and the CERN Document Server. They also have commonalities with preprint archives, one of the first and most well-known being arXiv.org, all of them providing access to shared resources. What makes laboratories different from institutional repositories and preprint archives is the social feature which is intended to facilitate interaction, allowing people to coordinate and communicate about their activities. The interaction aspects of laboratories relate to online communities, which are ICTs that support interaction and user-generated content among community members (discussed further in Chapter 3).

Research on laboratories, particularly evaluations and reviews of factors affecting collaboration and laboratory use, is quite vast (e.g. Finholt, 2002;

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<sup>2</sup> Wulf, W. (1989, March). The national laboratory. In *Towards a national laboratory*. Unpublished report of a National Science Foundation invitational workshop, Rockefeller University, New York.

Lassi & Sonnenwald, 2010; Olson et al., 2002; Sonnenwald, 2007). Lessons learned from a review of collaboratories (Finholt, 2002) showed the importance of developing collaborative tools that are based on the same computing environment that the research community uses, and that collaboratories should be as “useful and invisible as possible” (Finholt, 2002, p. 81). Paper I (Lassi & Sonnenwald, 2010) is a literature review of literature on scientific collaboration, collaboratories and related fields, focusing on finding out which factors can be taken into consideration when designing an LIS collaboratory.

Collaboratories have been used extensively in the natural sciences since the early 1990s (see e.g. Finholt, 2002 for a review of collaboratories). Several collaboratories have failed due to developers simply copying a well-known successful collaboratory for high energy physics although the disciplinary and social characteristics did not match (Kling, McKim & King, 2003). For example the reward systems – the value connected to research activities including publication venues, or sharing data – differ between disciplines. Therefore, a collaboratory designed for the activities and reward system of one discipline might not support the activities and reward system of another discipline. Hence, the extents to which collaboratories are used, and are successful, depend on the disciplinary characteristics.

The term collaboratory traditionally suggests that collaboratory actors are predominantly researchers, and to some extent students. However, in the thesis the target group of an LIS collaboratory is defined more broadly, by including librarians and other LIS professionals. This includes, as stated, people who work with data collection instruments for studies relevant to LIS, irrespective of their organizational affiliations or professional roles. Thus, LIS professionals, for example librarians and information architects, are seen as potential collaboratory members.

Efforts to motivate LIS professionals to conduct research have been reported from around the world, based on the positive effects this can have on LIS research and on the LIS professions and organizations (e.g. Hall, 2010). It can be noted that the literature on this topic commonly uses the term *practitioners*, although the term *professionals* is used throughout the thesis. Explanations for the low level of research activities of LIS professionals include difficulties in finding the time to do research (Haddow & Klobas, 2004; Hall, 2010; McBain, Culshaw & Walkley Hall, 2013), difficulties in finding research funding, and the fact that the LIS professionals themselves do not believe that they have the competencies to conduct research (Hall, 2010; Klobas & Clyde, 2010). Regarding the perceptions of not having the



right competence, Hall (2010) points out that the professionals with LIS degrees from the UK learn research methods in their LIS programmes. This point is valid in countries other than the UK as well, for example in Sweden. Further, Hall (2010) argues that some of the work tasks conducted by LIS professionals are actually research tasks, for instance data collection.

In the USA, librarians can gain status as academic librarians by publishing in scholarly journals, unlike for example Australia, the UK and Ireland (McBain, Culshaw, & Walkley Hall, 2013). Therefore, there may be differences in the motivation for conducting research, depending on the career track chosen (Haddow & Klobas, 2004; McBain, Culshaw & Walkley Hall, 2013). Several articles discuss the need for practitioners to publish their research (e.g. Clapton, 2010; Shenton, 2008). This line of argument can be compared and contrasted to the review of research on LIS professionals' publications in LIS (Roberts, Madden & Corral, 2013), which suggests that LIS professionals do publish, and that depending on the unit of analysis, such as which fields, journals and conference proceedings are analysed, the proportion of publications authored by professionals ranges between 3.7% and 53%. The body of work on increasing collaboration between researchers and professionals, and incentives for professionals to publish in scholarly journals, can all be seen as pointing towards a need to further the involvement of LIS professionals in research.

As stated, research on collaboration and the potential of collaboratories for social sciences in general (Sawyer, Kaziunas & Østerlund, 2012) and LIS in particular is not vast, but has investigated several aspects (Sonnenwald et al., 2009), including how professionals collaborate, and how organizations affect collaboration styles (Ponti, 2010b); how professionals and researchers collaborate (Ponti, 2010a), collaborative decision making for purchase of library management systems (Olson, 2010), and how LIS professionals view the potential of a collaboratory (Axelsson, Sonnenwald & Spante, 2006). The study by Axelsson, Sonnenwald and Spante (2006) is of particular relevance for this research, as it investigated what library service managers perceived as important for a potential LIS collaboratory. Axelsson, Sonnenwald and Spante (2006) presented a slightly different definition of collaboratories to their study participants, using the term *forum*, whereas the studies in the thesis are based on presenting collaboratories as a *facility* (from the Science of Collaboratories definition (2003)), which supports the use of data collection instruments. The term forum has connotations to meetings and discussions, e.g. as "a public meeting place for open discussion" or "a medium (as a newspaper or online service) of open discussion or expression

of ideas”<sup>3</sup>. The term facility has more vague connotations to something unknown that can aid in conducting different kinds of activities, e.g. as “something (such as a building or large piece of equipment) that is built for a specific purpose” or “something that makes an action, operation, or activity easier”<sup>4</sup> – note the term *something* that is present in both variations of the definition. In light of the different definitions of collaboratory, the results of the study by Axelsson, Sonnenwald and Spante (2006) showed that the most prominent benefit suggested by the library service managers was to be able to connect with other LIS professionals in a network, which the authors name an “expert on demand” service (Axelsson, Sonnenwald & Spante, 2006, p. 10). The results also showed that the managers suggested some benefits of sharing and finding documents and other types of resources in a collaboratory, but that access to knowledge and people were their top priorities, as in having an arena for sharing and finding expertise.

The results of Ponti (2010a) and Axelsson, Sonnenwald and Spante (2006) can provide two points of comparison to the thesis. Apart from the terminology difference, the thesis and the work by Axelsson, Sonnenwald and Spante (2006) are different in that the thesis focuses on specific activities related to data collection instruments. Second, as the prospective collaboratory members are defined as researchers, students and LIS professionals, this means broadening the prospective members of a collaboratory from the traditional researchers, and from the library service managers studied in Axelsson, Sonnenwald and Spante’s (2006) study. Ponti (2010a) studied collaborative projects between LIS professionals and researchers, focusing on two of the groups of potential collaboratory members for the thesis. The primary study object of Ponti (2010a) was how and why collaborative projects are initiated and developed across the research practice gap, which could include a collaboratory as an ICT to facilitate collaboration, but not necessarily (Ponti, 2010a) (For a thorough review of literature on the research practice gap in LIS, divided into eleven distinctive gaps, including motivation and terminology gaps, see Harrow & Klobas, 2004). Ponti (2010a) found that incentives for initiating and developing collaboration were based mainly on intrinsic motivations, for example wanting to work with or enjoying working with others, and to a

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<sup>3</sup> Forum. (n.d.) The Merriam-Webster Unabridged Dictionary. <http://www.merriam-webster.com/dictionary/forum> [Accessed 2014-05-04]

<sup>4</sup> Facility (n.d.) The Merriam-Webster Unabridged Dictionary <http://www.merriam-webster.com/dictionary/facility> [Accessed 2014-05-04]

lesser degree self-interest motivations, such as recognition for contributions from a person's manager.

To sum up, we know what characterizes successful collaboratories and collaborations (predominately in the natural sciences and engineering); what library service managers see as potential for a collaboratory; and that intrinsic motivations matter more than extrinsic motivations for collaboration in LIS settings. However, what we have not known, until now, is the implications of including diverse groups of members in a potential collaboratory; the motivations of a broader group of members of the LIS community for contributing and being active in an LIS collaboratory; nor what an LIS collaboratory might look like. These issues are highlighted in the thesis. In the following section, the disciplinary characteristics of LIS are presented from the perspective of scientific collaboration to provide a description of LIS related to the characteristics of more collaborative disciplines.

### **2.3. LIBRARY AND INFORMATION SCIENCE AS A COLLABORATIVE DISCIPLINE**

Many of the successful scientific collaborations that we can learn from have been conducted in natural science disciplines and technology (Finholt, 2002). However, since scientific disciplines have different characteristics and ways of working, the tools and practices for successful collaboration in one discipline might not be optimal, relevant or even feasible for another discipline. Characteristics that may differ between disciplines include degree of mutual dependency (e.g. following the main paradigms concerning use of theories, and, citing the right researchers) and task uncertainty (e.g. the relevance of research topics and how to investigate them) (Whitley, 2000). Disciplines and research areas that display low task uncertainty and high mutual dependency, such as high-energy physics (Traweek, 1998) and AIDS research are more likely to be successful when it comes to information sharing and scientific collaboration (Birnholtz & Bietz, 2003). In contrast to many of these highly collaborative research fields, LIS is interdisciplinary and characterized as diverse with regard to research problems, epistemological, theoretical and methodological approaches. The purpose of this section is to describe the disciplinary characteristics of LIS that may affect scientific collaboration, and to look ahead towards potential increased collaboration within LIS.

LIS is a young discipline formed in the 1960s as a combination of the fields of library science, information science and communication (Estabrook, 2009). The literature describes the LIS discipline as multi- or interdisciplinary and containing several subfields, of which some are more closely related than others (Bates, 1999; Bawden & Robinson, 2012; Estabrook, 2009; White, 2003). There is no single agreed-upon definition of LIS, but common denominators among definitions concern management of recorded information, and the use and users of ICTs in which information is recorded.

The interdisciplinarity that is a major characteristic of LIS carries with it a plethora of different, and sometimes opposing, epistemological and methodological approaches to research, as well as research topics and study objects (Bates, 1999; Bawden & Robinson, 2012; Meho & Spurgin, 2005; White, 2003). For example, for some research, it is vital to define the concept of information (e.g. Buckland, 1991) whereas for other topics, perhaps more applied research, the concept of information can be taken for granted. Research areas close to the humanities might employ hermeneutic approaches; and research areas closer to computer science might employ mathematical approaches. The literature further describes a discipline that seems to be in a constant state of redefinition and tension. The interdisciplinary characteristics of LIS are also reflected by the diverse types of faculties that LIS departments are organized under in universities, including humanities, economics, social sciences, and technology. Researchers has long turned to publishing venues outside of LIS (Yerkey & Glogowski, 1990), and cite and are cited in publications from other disciplines, including computer science, management and general and internal medicine (Larivière, Sugimoto & Cronin, 2012). Based on the definition of interdisciplinarity that an author has published in LIS and in another discipline in a given year, LIS shows very high interdisciplinarity, particularly in 2010 (Larivière, Sugimoto & Cronin, 2012). Other disciplines in which LIS authors have published include sociology; language and linguistics; and political science and public administration (Larivière, Sugimoto & Cronin, 2012).

LIS education programmes often have a faculty set up to capture a broad spectrum of competencies related to the LIS field. In 2009, the proportion of faculties with LIS degrees in iSchools focusing on LIS varied between 39% and 76% of the total number of faculties, with degrees in humanities and computing degrees being other competencies in the majority among faculty members (Wiggins & Sawyer, 2012). A consequence of this is that the faculty members have disparate research interests and thus will not have

opportunities for collaboration with colleagues interested in the same research topics, as in larger departments with groups of researchers working on similar topics (Sonnenwald et al., 2009). Geographical distances between LIS departments are often long, and there may be only one LIS department in an entire country or state educating librarians and other LIS professionals. In countries where resources are particularly scarce, perhaps not having permanent Internet access or the resources to travel abroad to scientific conferences, a digital platform for sharing resources can make a difference in being part of the LIS community and research.

To alleviate the effects of small, geographically scattered LIS departments, networks and venues have been created. The iSchool movement was started as an association of LIS-related departments, with the goals of gathering people and sharing resources (Bawden & Robinson, 2012; iSchools, 2012; Wiggins & Sawyer, 2012). The DREaM project – Developing Research Excellence and Methods – included a network across the UK to connect researchers and professionals who may otherwise conduct their research in isolation from others in their fields (Hall, Kenna & Oppenheim, 2011). Other venues for sharing and discussing research include research conferences, such as Conceptions of LIS (CoLIS) and iConference, and conferences offered by professional organizations, for example the International Federation of Library Associations and Institutions (IFLA) and the Association for Information Science and Technology (ASIS&T), which changed its name from American Society for Information Science and Technology in 2013 to reflect its growing international membership (Sonnenwald, 2012). Another initiative, which focuses on publications, is E-prints in Library and Information Science (E-LIS), which is an international open access archive for LIS publications. Collaboration between LIS professionals and researchers was found by Ponti (2010a) to be initiated and sustained to alleviate lack of economic and organizational resources, as well as interests in the topic at hand for collaboration. Ponti's (2010a) research also showed the importance of personal networks for initiating collaborative projects. The social aspect that a collaboratory entails can function as a network to stimulate collaborations across organizations, topics, and nations. In order to support collaboration in a meaningful way, there is a need to understand what the facilitators and challenges are for collaboration in LIS.

Scientific collaboration as measured by co-authorship is not as common in LIS as in natural science disciplines. In 1999, the number of co-authors per article in LIS was lower than the number of co-authors per article in the

natural sciences was in 1955 (Cronin, 2005). By 2010, co-authorship had become the norm in LIS, and a pattern has emerged in which the average number of authors per publication has increased, and at the same time the number of papers per author has decreased (Larivière, Sugimoto & Cronin, 2012). Possible explanations given by the authors are the increased interdisciplinarity of LIS, as discussed above, and the fact that collaborators are acknowledged for their work on a research project even though they may not have contributed to writing the paper.

As stated, LIS's interdisciplinary nature is another challenge when trying to facilitate and stimulate scientific collaboration. Research is conducted on a multitude of topics, in a multitude of research areas, and applying a multitude of approaches. Further, LIS research includes diverse attitudes towards what research topics are relevant, and how they should be approached and researched. These are indications of a discipline displaying high task uncertainty, whereas disciplines with low task uncertainty typically are more likely to collaborate (Birnholtz & Bietz, 2003; Whitley, 2000). Adoption and use of an LIS collaboratory will be affected by these characteristics. Some research areas may become more represented than others, which may affect whether people find it worthwhile to share their resources and search for relevant resources. It also affects feeling welcome and accepted by other actors in the collaboratory.

Other characteristics of LIS suggest that stimulating collaboration is possible and beneficial. Attempts to bring the LIS community together on different arenas (e.g. university departments, conferences and publications, as well as cross-organizational collaborative projects) suggest that connecting and sharing resources is important to the LIS community. A LIS collaboratory can serve as an additional arena, complementing those mentioned above, for connecting LIS researchers and professionals around the particular activity of creating, using, reusing and sharing data collection instruments. These activities can assist in the replication and comparison of previous research results across different populations or datasets; reduce time spent designing, developing and testing data collection instruments; and facilitate the creation of new data collection instruments by reusing and modifying components of existing data collection instruments. With the diversity of research in LIS, the sharing of data collection instruments might potentially also act as a catalyst for collaboration across subfields, which could lead to new research problems as well as approaches to study and solve them. Previous research also suggests that there are interests and motivations for collaboration and contributing to collaboratories in LIS (Axelsson,

Sonnenwald & Spante, 2006; Ponti, 2010a; Ponti, 2010b). Apart from these LIS-intrinsic motivations, there are extrinsic motivation stemming from governments, funding agencies, and academic institutions that recommend or require data sharing and collaboration to receive funding.

To sum up, scientific collaboration occurs in LIS to a certain extent, although we do not know the perceptions of the LIS community regarding collaboratories and sharing and reuse of data collection instruments. This is investigated in the thesis, as an exploration of what members of the LIS community find to be the potential, challenges, and facilitators of an LIS collaboratory for stimulating and facilitating scientific collaboration. The next chapter describes the theoretical framework that will aid in understanding the problems investigated in the thesis.

# 3. THEORETICAL FRAMEWORK

As previous chapters have established, there is a need to understand potential collaboratory actors' practices of sharing and reusing data collection instruments to design a collaboratory that can facilitate and stimulate scientific collaboration. To meet this end, a holistic theoretical framework is presented in this chapter, consisting of three components which focus on 1) studying and designing ICTs; 2) designing for social actors; and 3) designing successful collaboratories respectively.

In the first section, the view and approach of the thesis to studying and designing ICTs is established. This is followed by a description of the theory of people as actors whose organizational and professional roles shape their relationships to ICTs. This will aid in creating an understanding of how LIS community members may be affected by introducing an LIS collaboratory for working with data collection instruments. The last section describes how online communities can be designed to ensure success, which entails designing an ICT that is of optimal use for the target audience. This will be used to understand how to design an LIS collaboratory that supports the relevant activities concerning data collection instruments, with specific emphasis on communication about the data collection instruments.

## 3.1. STUDYING AND DESIGNING ICTS

The social informatics approach to studying and designing ICTs was chosen to capture the aims of the thesis. Firstly, it does not separate social and technical aspects of designing ICTs (Kling, 1999). Secondly, it can be used in a normative fashion (Meyer, 2006), which suits the purposes of exploring how something that does not exist – here an LIS-collaboratory – can be proposed as facilitating collaboration. Further, the thesis assumes, in line with social informatics, the view of ICTs as tools for people to employ,



which means that ICTs do not have agency of their own, contrary to the view for example of actor-network theory (ANT) (Latour, 2005).

Traditional software design approaches have been criticized for separating the technical and human (traditionally called end-user) aspects of ICTs, and for attending to the human aspects by studying it *after* development and implementation instead of as a concurrent and vital part of the design process (Mens & Demeyer, 2008). ICTs for information sharing and collaboration which have been developed with little or no involvement of the intended users tend to be rejected or unsuccessful (Finholt, 2002; Preece, 2000). Another criticism of the traditional software design approaches concerns designing layered ICTs, where the bottom layers are made up of the technical aspects, and the social layer comes into play when people start using the ICT (Kling, McKim & King, 2003). A successful approach to creating usable systems that are adopted and used by the intended persons is to involve them in the design process. There are several approaches to understanding design and uptake of ICTs from a socio-technical point of view. Participatory socio-technical design (Mumford, 1983), in which the social and technical aspects are approached in parallel and are combined at a late stage in development. This type of design approach is criticized for separating the social and technical aspects of ICTs. Another relevant approach is social construction of technology (SCOT) which traditionally has a historical or summative perspective on technology, for example describing the development of the bicycle; however, SCOT predominately studies the past and not design at the time it occurs (Bijker, Hughes & Pinch, 1987; Clement & Halonen, 1998). Actor-network theory (ANT) is also used to map relationships between actors, including technology as one actor (Latour, 2005), similarly to the socio-technical interaction networks (STINs) concept of social informatics (Kling, 1999) (see Meyer, 2006 for a discussion on the relationships between STINs, ANT and SCOT); however, as stated, the view of the thesis is that ICTs do not have agency.

The people who will come in contact with ICTs are essential to socio-technical approaches. Traditionally, people who use ICTs have been termed users, for example in software engineering, human computer interaction and information systems research (Bannon, 1991; Beath & Orlikowski, 1994; Mens & Demeyer, 2008). Calling people users or end-users implies the traditional view that they are supposed to conduct predetermined tasks in the manner that the designers have determined; people are supposed to adapt to the ICT, rather than the other way around. However, people tend to be more creative than designers typically assume; ICTs can be used in ways

that are considered wrong by the designers, and find novel ways of working with ICTs that the designers did not intend, often called *human factors* in information systems and information retrieval research. The thesis does not subscribe to this rather outdated view of people as passive users and receivers of ICTs. Rather, the thesis is in agreement with design approaches in which people who are intended to use (or be affected by) an ICT can play an active part in the design process, from the start through implementation to evaluation, preferably in an iterative process. Many design approaches share this view, including participatory design, co-design (Albinsson, Lind & Forsgren, 2007), user-centred design (Abrams, Maloney-Krichmar & Preece, 2004) and interaction design (Sharp, Rogers & Preece, 2011). The theoretical approach adopted in the thesis implies that people not only *use* ICTs, they have an active role in *shaping* ICTs by conducting work in their organizations, which have different cultures and rules for interaction and use of ICTs (see e.g. Sawyer & Eschenfelder, 2002). This is captured by Lamb and Kling (2003): “information does not flow freely within and among organizations; it is pushed, pulled, created, packaged, and presented by people in one organization to members of other organizations” (Lamb & Kling, 2003, p. 215). Also, ICTs may affect different people (and other *stakeholders*, meaning others who are affected by an ICT, including organizations, departments, and clients of an organization to name just a few potential stakeholders) than the individuals who come in direct contact with them (Kling, Rosenbaum & Sawyer, 2005). Therein lies the difference between human and social factors: looking at individual end-users or a wider perspective of stakeholders, actor roles, organizations, and society.

In the following section, a model for understanding social actors is presented. The social actors model goes beyond the traditional individualistic views of ICT (end-)users, as discussed above, towards a conceptualization matching the complexity of people at work. In other words, the model makes visible the complex relationships between and among social actors, ICTs, organizations and professional networks. This aids in understanding the LIS community as collaborative actors in their professional and organizational contexts.

### **3.2. SOCIAL ACTORS – PEOPLE USING ICTS**

LIS community members work in various types of organizations (e.g. universities, university departments, libraries, industry), have a variety of job positions (students, researchers, librarians), live in different countries,

and have diverse native and working languages. As the target audience of an LIS collaboratory is so diverse, the motivations for using a collaboratory are bound to differ from the motivations found among actors in successful collaboratories in the natural science and technology fields, where the audience is not so diverse (see Paper I for a review of literature of lessons learned from collaboratories and motivations for scientific collaboration). It may also differ from successful collaboration in organizational settings (e.g. Goggins, Jahnke & Wulf, 2013; Orlikowski, 2002; Orlikowski & Baroudi, 1991). There is a need for an analytical tool that helps to understand this dynamic and complex group of potential collaboratory members. This tool can be the social actors model (Lamb & Kling, 2003).

As activities pertaining to data collection instruments of interest for this study can be assumed to mostly be carried out in educational and professional contexts, it is vital to understand how potential users – LIS students, professionals, and researchers – conduct these activities and interact with them. These activities can be described as information-sharing activities, in correspondence with the previously cited CSCW framework of work coupling by Neale, Carroll and Rosson (2004) (Section 2.1). The CSCW perspective on information sharing is ideal for the thesis, due to its close relationship to other types of collaboration (as types of work coupling), and because of the model's intrinsic relation to designing groupware in a wide array of settings (including within and between organizations, and in online communities).

As stated, the social actors model is employed in the thesis to create an understanding of the roles and contexts of prospective collaboratory actors, including academia, industry and the public sector. The conceptualization of social actors, i.e. forming an understanding of people's relationships with ICTs in their professional and organizational contexts, is based on four dimensions (expanded on below): affiliations, environments, interactions, and identities. The affiliations and environments dimensions have an organizational perspective, as they situate the social actors in their organizations, as well as in the industries and environments of those organizations. The interactions and identities dimensions focus on the individuals, as they put emphasis on relationships between and among social actors, as well as between social actors and ICTs that they use. (Lamb & Kling, 2003) Thus, the social actors model can shed light on a loosely connected community, which might conduct the loosely coupled activity (Neale, Carroll & Rosson, (2004) of sharing and reusing data collection instruments. The environment dimension of the social actors model,

presented next, characterizes the environments that social actors work in, from the perspective of their organizations and other affiliations.

The potential collaboratory actors belong to various types of organizations, in industry, academia, and the public sector. **The environments dimension** of the social actors model describes the environment of the organizations and networks in which a person works, including locations, associations and practices involved in conducting their work. ICTs can be used to support these practices and relationships, for example by supporting communication between social actors. Some communication practices may have more legitimacy than others. Organizations may use a particular ICT to show that they belong to a particular industry or research field (Lamb & Kling, 2003), e.g. by using a proprietary or free and open software. This dimension may determine whether an LIS collaboratory could be seen as a legitimate ICT to support practices and associations in various types of organizations including libraries and LIS university departments. The organizational entities that constitute the environment for a social actor are related in different ways. These relationships are the focus of the next dimension, affiliations.

**The affiliations dimension** describes relationships that an organization has to industry and networks via a social actor, for example to professional associations and networks. This dimension sheds light on an important view of ICT use and people using them: that the role of ICTs is to support relationships, and that ICTs cannot have a direct relationship with a social actor; thus an ICT is a means of communication between people. (Lamb & Kling, 2003) The affiliations dimension may determine how interaction and relationships between future actors could be supported by an LIS collaboratory. One way to understand their contexts, activities and needs in relation to an LIS collaboratory is to describe them as social worlds, meaning “collections of actors with shared understandings and shared institutionalized arrangements that convene, communicate, and coordinate behaviors on the basis of some shared interest” (Demerath, 2005, no pagination). People may belong to more than one social world, and people may interact in different ways in different social worlds (Mark & Poltrok, 2004). Meyer’s (2006) characterization of free/open source software (F/OSS) developers studied by Scacchi (2005) fits very well in characterizing the connections between the target audience of an LIS collaboratory: “the F/OSS developers are only loosely connected through a fragile web of alliances and communities” (Meyer, 2006, p. 42). Therein lies a challenge: trying to design for such a diverse group of people, whose common denominators are that

they work in LIS and are engaged in activities related to data collection instruments. As the affiliations dimension identifies the relationships between organizations and networks, the next dimension – interactions – characterizes the use of tools that social actors utilize to communicate with each other.

**The interactions dimension** characterizes which types of information and resources are used in interaction between social actors in different organizations. The social actors will communicate in legitimate ways, by using ICTs that are determined by the industry or discipline. (Lamb & Kling, 2003) Further, the social actors may communicate with each other in their organizational roles (Lamb & Kling, 2003), such as manager, human resources representative, or librarian in charge of acquisitions of digital media. The interactions dimension informs the thesis about how individuals in LIS interact in their roles as members of their organizations. This could be used to inform the design of an LIS collaboratory to encourage collaboratory actors to interact with other actors. The roles that social actors have in their organizations can be sustained by how social actors present themselves, which is the focus of the identities dimension discussed next.

Not only do potential collaboratory actors work in different types of organizations; they may have different roles in their organizations, for example administrator, professor, manager or librarian. A person may have various professional roles in an organization, which may create tensions when expectations and values differ between roles, perhaps on account of being an employee and a union representative in parallel. **The identities dimension** characterizes how social actors present themselves in the role of organizational members, on an individual and group level. These self-presentations include how people use ICTs to construct and emphasize identities that go beyond their roles in their organizations. (Lamb & Kling, 2003) For example, expert and novice identities are common in collaboratories and online communities (Paper I; Preece, 2000), which is shown by how new members in communities are guided into the community by experts or long-term members. The identities dimension may shed light on how LIS community members use ICTs in creation and reinforcement of identities apart from their organizational roles.

This section described theoretical models for understanding the professional and organizational contexts of social actors, i.e. the people who might use an LIS collaboratory for sharing and finding data collection instruments. The next section describes important social aspects of an LIS collaboratory,

focusing on how to support interaction between potential collaboratory actors.

### **3.3. DESIGNING FOR ONLINE COMMUNITIES**

An important part of a collaboratory is, as stated, a social feature that allows actors to communicate. This section focuses on how a social feature can be designed to encourage and facilitate communication among collaboratory actors by drawing on theories for instance from online communities and information systems research.

The theory of remote scientific collaboration (TORSC) framework (Olson et al., 2008) lists five sets of factors that are important for collaboratories to succeed: a) The nature of the work, which mainly has to do with tightly coupled work (compare with Neale, Carroll and Rosson's (2004) model of work coupling in Section 2.1) such as using laboratory equipment across distances and not so much about sharing and reusing others' resources; b) common ground, such as a common vocabulary and beliefs; c) collaboration readiness, including collaboration occurring already, goals being aligned within the research field, and actors trusting each other; d) management, planning, and decision-making running smoothly; and e) technology readiness, including the collaboration tools having the functionality needed and being easy to use.

The LIS collaboratory studied in the thesis is intended to support sharing and finding data collection instruments. These activities can be facilitated by a repository or an archive; however, by facilitating communication about data collection instruments, it can be expected that an LIS collaboratory creates added value for activities concerning data collection instruments. It would make it possible to ask and answer questions within the framework of a collaboratory, as opposed to using a data collection instrument found in a publication with no opportunities to ask what worked well and what needs to be considered for another person to use it. Therefore, this research emphasizes facilitating interaction between social actors, in line with the approaches to design described in Sections 3.1 and 3.2. Specifically, the online community life-cycle model (Iriberry & Leroy, 2009) will be used to frame the results of the empirical studies to emphasize the social aspects of the design of a collaboratory.

Online communities are also known for example as virtual communities and virtual community networks (Ellis, Oldridge & Vasconcelos, 2004). Preece (2000) defines online communities as “any virtual social space where people come together to get and give information or support, to learn, or to find company.” (Preece, 2000, p. 3) The word *virtual* in this definition has become replaced by *online* over the years, as researchers have started adopting the view that what happens online is as real as what happens face-to-face. In the thesis, the term online community is used. Hence, the term *virtual community*, used in Paper I, would be changed to *online* community if the paper was to be published today. A more theoretically rich definition of online communities is given by Lee and colleagues (2003, p. 51): “cyberspace(s) supported by computer-based information technology, centered upon communication and interaction of participants to generate member-driven content, resulting in a relationship being built”. This definition puts more emphasis on the ICTs which are employed to create spaces for interaction, than does Preece’s (2000) definition, and could very well be used to define collaboratories as well as online communities as it also has an element of user-generated content creation and sharing. In professional and organizational settings, collaborations can be described as communities of practice (Lave & Wenger, 1991), which in the thesis can be defined as “collaborative, informal networks that support professional practitioners in their efforts to develop shared understandings and engage in work-relevant knowledge building” (Hara, 2009, p. 3). Virtual communities of practice can hence be seen as ICT tools that support communities of practice.

The online community life-cycle model is based on the information systems life-cycle (ISLC) model (Ahituv & Neumann, 1990). The notion of an information system or online community having a life-cycle means that it has a life span after which it will be obsolete or perhaps replaced. This is thus a different view from the traditional approach to systems development that ends in deployment or maintenance (Mens & Demeyer, 2008). It can be noted though that the ISO/IEC/IEEE Standard for systems and software engineering - software life cycle processes (IEEE, 2008) was updated in its 2008 edition to include software disposal in the software life-cycle process. The ISLC model can be seen as serving as a link between online community infrastructure and software development methodology, which could be employed for designing complex architecture such as a collaboratory that focuses on data collection, processing and analysis in real time in a distributed environment, thus requiring more architectural solutions than an LIS collaboratory for sharing and reusing data collection instruments.

Whereas traditional software development processes are linear and end at the deployment stage, the ISLC model, and thus the online community life-cycle model, is seen as being an iterative process. This means that as an online community goes through different phases of design and use, new needs emerge that call for redesign. The five phases of the online community life-cycle, which are elaborated on below, are: inception, creation, growth, maturity and death/sustainability. Each phase has a set of success factors, which have been identified in Iriberry and Leroy's (2009) review of online community literature to have a positive effect on the adoption and long-term use of online communities. The success factors require a number of design features, incentives and ICT tools to be implemented.

The studies and design of a prototype collaboratory included in the thesis can be identified as being at the creation phase of the online community life-cycle, as a working prototype exists, and has been evaluated by potential collaboratory actors. Results from the studies can be framed by all phases of the online community life-cycle, even though the prototype collaboratory is at a particular phase. Each phase of the online community life-cycle is presented below, to show how they can frame the results of the studies and design of the prototype collaboratory and aid in understanding the process of designing an LIS collaboratory. The five phases of the online community life-cycle model are described below.

**The inception phase** of the online community life-cycle model is characterized by a vision of an online community, which is operationalized by determining the purpose of the community and who the target audiences are. Iriberry and Leroy (2009) found that having a clear purpose which is well-defined and expressed (e.g. as a trademark or tagline) is important, as is defining and expressing a target audience for the online community. These two fundamentals inform the design with respect to the needs that people have for interacting and sharing information (Iriberry & Leroy, 2009). For a collaboratory designed for the LIS community, having grasped the purpose and target audience can be reflected by supporting the research areas of LIS, as well as the academic cultures, vocabularies, and languages (Paper I). Other aspects that have been shown to be important include codes of conduct to regulate members' behaviours, and sources of funding, which could include hardware and software for hosting an LIS collaboratory, and salaries for developers (see Paper I for a discussion on development costs of collaboratories). The next phase of the online community life-cycle model, the creation phase, focuses on designing the interaction tools which members will use to communicate and share content.



**The creation phase** consists in determining the technology for the online community, which is aided by early community members. The focus in this phase is future members, which means that the creators should ensure that the interaction tools are usable, secure and perform optimally, for example that the technology can handle the numbers of members and contents intended for the online community (Iriberry & Leroy, 2009). This is ensured by employing a user-centred design approach to the development of the online community, which is defined as designing “with users in mind” (Iriberry & Leroy, 2009, p. 11:20). The term user-centred design could denote the entire design and implementation process, as discussed in Section 3.1., but in the context of the online community life-cycle model, it implies taking the needs of community members into account during the design. The expression of having users in mind further implies a view of design in which potential users may not be involved at all in the design process, which is not the case in the thesis (see Section 3.1. for a discussion on why the term user is not used in the thesis). During this phase, the focus is also on designing an interface that is easy to use, simple to understand, and intuitive to the members; and members being able to feel secure with privacy and anonymity issues for communities in which anonymity is important. As the creation phase comes to an end, the online community has a critical mass of members. At this point, the online community moves towards its growth phase.

**The growth phase** occurs when the online community has a set of members who are starting to define its culture, identity, and vocabulary. Member roles develop: some members become lurkers (who observe but do not contribute content), some are active posters, and others assume leader roles. The codes of conduct from the inception phase are developed into rules that fit the activities of the community. During this phase the focus is on attracting and integrating new members, building trust among members, supporting members’ interaction and sharing quality content (Iriberry & Leroy, 2009). Building trust in an LIS collaboratory means extending the typical ways of establishing trust in academia, including acknowledging and building on scholars’ work (Paper I) to a digital arena and including actors from other professional and organizational contexts. It is also important to ensure that actors regard as LIS collaboratory and its creators and affiliated organizations as trustworthy. Content quality concerns providing high-quality content, including how the content is organized, which could be particularly important for a collaboratory to be useful for finding data collection instruments. The next phase is related to the maturity of the online

community, as the fundamentals have been set in this and previous phases, i.e. building trust, content and means of interaction.

**The maturity phase** is characterized by building trust and strong ties among the community's members. As the online community grows in size (content and/or members), subgroups and more discussion topic categories may be developed. New members join, some members leave, and old members may take on more leadership roles. During this phase the focus is on managing membership, and supporting and organizing members' contributions. (Iriberry & Leroy, 2009) Recognition of contributions includes rewarding volunteers, for example with social recognition, and giving positive feedback to members who contribute content. Gift-giving as a means of recognition is discussed in Paper I, in the context of online communities and computer-supported cooperative work (CSCW) research. The maturity phase can help to understand the results by framing what members of the LIS community perceive to be important motivations for contributing their data collection instruments to an LIS collaboratory. The maturity phase is followed by either sustainability of the online community or stagnation in membership and content, which leads to its demise.

**The sustainability or death phase** is characterized by either sustainability of activities and members in an online community, or stagnation and decline (Iriberry & Leroy, 2009). Stagnation and decline are strongly related to poor participation: without a flow of new content and other community related activities, the community will stagnate. Shyness about public posting may inhibit members' willingness to share content. This can be handled by ensuring that success factors in the preceding phases are met, such as trust building and recognition of contributions. Willingness to share information is important to ensure that the community continuously gets new content. Finally, time limitations of the members may lead to a lack of new content, interaction and activities. Stagnation does not necessarily lead to the death of an online community; it can create a spark to further develop and redesign the online community according to the current situation. In such cases a new iteration of the phases occurs, which could for example entail checking that the codes of conduct reflect the current culture of sharing content.

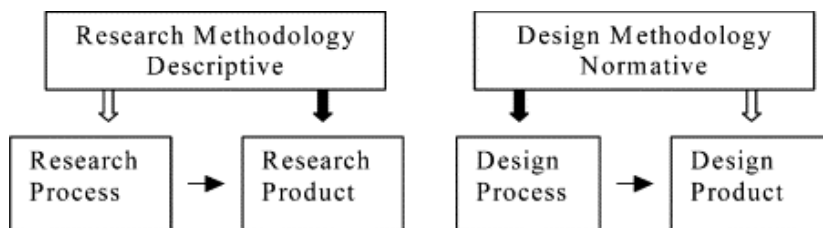
The following chapter details the research design, including getting to know lessons learned from previous collaboratories; what members of the LIS community perceive as benefits and challenges of a collaboratory for sharing and reusing data collection instruments; and designing and evaluating a prototype collaboratory.

# 4. RESEARCH DESIGN AND DESIGN PROCESS

This chapter describes the research design, which is simultaneously an account of the design process. The chapter starts out with a presentation of the research and design process as a whole. The holistic account is followed by four subsections that go into the detail of each phase and corresponding study. The first section describes the phase of approaching the understanding of needs among potential collaboratory actors, which involves analysing lessons learned from previous collaboratories and related research, and collecting data about LIS community members as potential collaboratory actors. This is followed by a section about the phase in which a working prototype collaboratory was designed and implemented, which is in turn followed by a section describing the phase in which evaluation of the prototype collaboratory took place. In the final section of this chapter, limitations of the methodological choices, and their implications, are discussed.

The combination of research project and design process in the thesis warrants discussion. Research activities and design activities may be so intertwined that they are difficult (and in some cases are seen as unnecessary) to separate from each other, according to designers (Love, 2002). In the context of the thesis, the specific activities making up the thesis are not labelled as either research or design, instead utilizing its narrative to describe the research design and design process. Kroes (2002) argues that there is a twofold difference between design methodology and research methodology (seen in Figure 2). The methodologies differ in their orientation, research methodology being product oriented, i.e. theories and explanations, and design methodology being process oriented. The other differing characteristic concerns their stance; research methodology having a descriptive stance, focusing on descriptions and justifications of the

outcomes, and design methodology having a normative stance, focusing on improving design practices. Even though Kroes (2002) finds these differences in the two methodological approaches, the author stresses that there is a strong connection between the design process and its outcome. The thesis shares this view, operationalized in this chapter as descriptions of the four research studies divided into three phases of a design process.



**Figure 2 Research methodology and design methodology compared<sup>5</sup>**

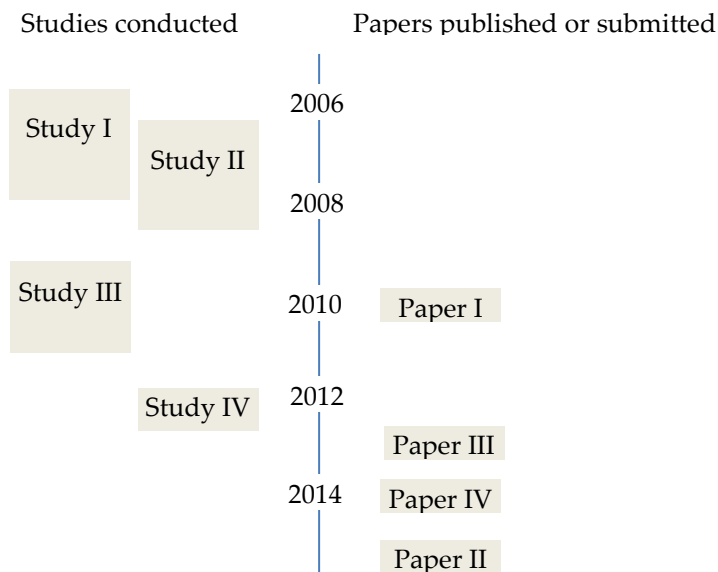
As described in Chapter 3, a socio-technical approach guides the investigations of the research questions posed in the thesis. This is manifested by a holistic view of design which does not separate social and technical aspects influencing the design of the prototype collaboratory. Using the interaction design vocabulary (Sharp, Rogers & Preece, 2011), an interaction design project involves four activities: a) establishing requirements, b) developing alternatives, c) prototyping, and d) evaluating. These activities are all included in this research project, which is presented in this chapter as three phases rather than four: understanding needs, designing a prototype collaboratory (which included developing alternatives), and evaluating a prototype collaboratory. The research design can be seen as a first iteration in an iterative design process, in which every phase leads to modifications of the design. In the context of the thesis, the findings from the different studies are presented in Papers I-IV and in Chapter 6, Results. The findings can be seen as feedback to the design, to inform a potential future iteration of the design process. Such suggestions are discussed in Sections 7.3 and 8.1.

The chronological relationships of the studies are presented as a timeline in Figure 3. The first phase of the research design – understanding needs - included a literature review of research related to collaboratories and motivations for participating in collaboratories (Study I), and an empirical study in which LIS students, professionals and researchers were interviewed

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<sup>5</sup> Reprinted from *Design Studies*, 23/3, Kroes, P., Design methodology and the nature of technical artefacts, pp 287-302, 2002, with permission from Elsevier.

about their practices and attitudes towards sharing and reusing data collection instruments and about their perceptions of the benefits and challenges of introducing a collaboratory to the LIS community (Study II). The literature review informed the empirical study by providing a research context and by identifying some of the themes for the interview guide. The second phase – designing a prototype collaboratory – was informed by the findings of the previous phase, including design requirements of an LIS collaboratory, which were transformed into design requirements for a working prototype collaboratory (Study III). The literature review contributed with a broad view of motivations for participating in collaboratories and sharing resources as well as lessons learned from collaboratories in other disciplines and research areas. The empirical study contributed by adding LIS community members’ attitudes, motivations and practices of sharing resources and actively participating in an LIS collaboratory. During the third phase – evaluating the prototype collaboratory – the working prototype collaboratory was evaluated by asking LIS professionals to conduct predetermined tasks in the prototype collaboratory, which was followed by interviews investigating perceptions of the prototype collaboratory and the idea of an LIS collaboratory (Study IV).



**Figure 3** Timeline of the studies and papers in the thesis. Note that Paper II is included in the thesis as a manuscript.

All three phases of the research process have been conducted as collaborations. The contribution of the author of the thesis to each study, and details about each paper, are provided below.

**Understanding needs phase: Literature review**

Author's contributions	Collected, reviewed and synthesized literature. Wrote paper.
Paper	Paper I: Lassi, M. & Sonnenwald, D. H. (2010). Identifying factors that may impact the adoption and use of a social science collaboratory: a synthesis of previous research. <i>Information Research</i> , 15(3) colis710.

**Understanding needs phase: Empirical study**

Author's contributions	Developed interview guide Identified and recruited study participants, scheduled interview sessions, conducted interviews Transcribed interviews, translated data in Swedish into English Analysed interviews, developed design features
Paper	Wrote paper. Paper II: Lassi, M. & Limberg, L. (manuscript). Sharing data collection instruments: Perceptions of facilitators and challenges for a Library and Information Science collaboratory.

**Designing prototype collaboratory phase**

Author's contributions	Reviewed alternatives and chose ICT for implementation of prototype collaboratory. Developed use cases. Transformed design features into design requirements Implemented design requirements
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Paper	<p>Wrote paper.</p> <p>Paper III: Lassi, M. &amp; Sonnenwald, D.H. (2013). The socio-technical design of a Library and Information Science collaboratory. <i>Information Research</i>, 18(2) paper 576.</p>
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### Evaluating prototype collaboratory phase

Author's contributions	<p>Developed task descriptions, observation protocol, interview guide</p> <p>Study participant selection</p> <p>Analysed evaluation and interview data</p> <p>Wrote paper</p>
Paper	<p>Paper IV: Lassi, M. &amp; Emanuelsson, H. (submitted). Evaluation of a prototype collaboratory for sharing data collection instruments in Library and Information Science. Manuscript submitted for peer review.</p>

The research design and methods employed in each research phase are described in the subsequent sections of this chapter. The chapter concludes with a discussion of the limitations of the research design and methodological choices.

## 4.1. PHASE ONE: UNDERSTANDING NEEDS

The first phase of the research process concerned understanding the needs of actors of an LIS collaboratory for sharing data collection instruments. Understanding the needs consisted of two studies. The first study was a literature review surveying factors influencing the adoption and use of scientific collaboratories. The second study consisted of an empirical study in which LIS students, professionals and researchers were interviewed about their current practices and attitudes toward sharing and reusing data collection instruments in an LIS collaboratory. The studies are presented in the subsequent sections. For more detailed descriptions of the research design and methods used in each paper, see Paper I for the literature review and Paper II for the interview study.

### **4.1.1. LITERATURE REVIEW**

The aim of the study was to review the scientific literature on collaboratories and related areas, to identify factors that may impact the design, adoption and use of a collaboratory. The literature selection followed a snowball approach, by which reference lists of included publications were searched for relevant publications. This process started from a set of publications identified as central among other things to collaboratories (Finholt, 2002), scholarly communication (Cronin, 2005) and scientific collaboration (Borgman, 2007; Sonnenwald, 2007). As new aspects of relevance to the review were introduced, searches in databases were conducted to identify key publications to start reviewing from a snowball approach. This method led to a breadth in the topics covered in the review, although there is a clear limitation to the results due to taking a less systematic approach than determining keywords and conducting database searches in a structured way. Another consequence of the snowball approach was that relevant literature on collaboratories in the humanities is regrettably absent from the synthesis, for example Humanities, Arts, Science and Technology Alliance and Collaboratory (HASTAC) and Nineteenth-century Scholarship Online (NINES).

The literature identified for the review was selected from the research areas of scientific collaboration, scholarly communication, scientific collaboratories, scientific disciplines, invisible colleges and virtual communities in science. Literature on the topics was found in several disciplines, for example in LIS, computer science, CSCW, communication, computer-mediated communication, psychology, sociology and social studies of science. Monographs and national reports on collaboratories were also included in the review. The majority of the literature was published between 1999 and 2007, with some items having been published in the 1960s and 1970s. Full details about the included literature can be found in Paper I. In the next section, the empirical study of the understanding needs phase is presented.

### **4.1.2. EMPIRICAL STUDY**

The first empirical study consisted of interviews with LIS community members and built on two focus areas: how LIS students, professionals and researchers create, share and reuse data collection instruments; and their perceptions of benefits and challenges of a collaboratory for sharing data collection instruments relevant within LIS. At this stage the idea of



expanding the selection of the target audience of an LIS collaboratory from the traditional audience (i.e. researchers and to some extent students) to include LIS professionals became an important aspect of the research design (see Section 2.2 for the reasoning behind this choice).

The study participant selection was based on two dimensions: educational level or professional role (e.g. student, professor, librarian); and experience or expertise of different LIS data collection instruments (questionnaires, interviews, or experiments) This participant selection strategy facilitated collecting data regarding many different experiences and professional roles, while keeping the study relatively small; the data collection consisted of 16 semi-structured interviews which were conducted between November 2006 and February 2008. The recruitment of study participants followed a purposeful sampling approach (Robson, 2002), and the study participants were six researchers, two Ph.D. students, four LIS professionals, and four master students. The study participants were based in Asia, Australia, Europe, and North America. Out of the 16 study participants, 13 had experience of using questionnaires to collect data, 12 had experience of conducting interviews, and 7 had experience of conducting quasi experiments and experiments.

Eight of the 16 interviews were conducted at conferences. From a list of conference attendees, searches for publications of potential study participants were conducted, to ensure the purposeful sampling of both data collection instrument experiences and career levels. Requests for interviews (see Appendix 1a for the English version and Appendix 1b for an example of an interview request in Swedish) were sent out beforehand, and the interviews were conducted at the ASIS&T Annual meeting in Austin, TX in November 2006, and the CoLIS conference in Borås, Sweden in August 2007. Since not all groups of study participants were at the conferences, eight of the 16 interviews were conducted at other locations and on dates other than during the conferences. These eight study participants were found through the snowball effect, asking study participants if they knew of anyone with a particular data collection instrument experience and educational or career level who could be a potential study participant. To complete the data collection, interviews were conducted up until February 2008. The study participants were: two Ph.D. students, two master students, three LIS professionals and one researcher.

The ethical conduct of the study is in accordance with the Swedish Research Council's guidelines for the humanities and social sciences (Vetenskapsrådet, 2002), as well as the American Psychological Association

(2002). The identities of the study participants will be kept strictly confidential, as will any information that could reveal their identities. In connection to the interviews, the study participants read and signed an informed consent form. The consent form (Appendix 2 (the English language consent form was used for all interviews)) included information about the research project; contact information to the interviewer and supervisor; and the study participants' right to discontinue the interview at any time.

Data were collected through semi-structured interviews. The interview guide (see Appendix 3a for the English version, and Appendix 3b for the Swedish version) was developed in parallel with the literature review process and builds on the findings from the literature review regarding relevant themes and questions: the study participants' current practices of sharing data collection instruments and of using existing data collection instruments; the participants' perceptions of benefits and challenges of using existing data collection instruments and of sharing data collection instruments with others; and the study participants' perceptions of advantages and disadvantages of constructing new versus using existing instruments.

The first three interviews, conducted in November 2006, were conducted as pilot interviews. Some of the questions of the pilot interview guide were specified more closely in the final interview guide, to create the possibility of a step by step account of the study participants' experiences of choosing and using a data collection instrument (see the example below). In the pilot interview guide, this question was intended to ask the study participants about a case when they had chosen a data collection instrument to use in a research study. It contained these elements:

Can you think of a time when you have been in the process of choosing a data collection instruments for your research. You have already decided on what type of instrument to use, so now it's time to choose a particular one or create one. Did you develop a new one or choose one that already existed?

If someone else's – how did you find it? If you chose one that already existed, was it one of your own or someone else's?

Would you have preferred some other way of finding the instrument?

In the final interview guide, the question was posed as two separate cases: one focusing on having used someone else's data collection instrument, and one focusing on having constructed a data collection instrument. The first case contained these elements:

If you think of the last time, or a time that comes into mind, when you have used someone else's data collection instrument for a research project...

How did you find the instrument?

Do you have any thoughts on how that process could have been made more efficient (easier/better) for you?

The second case contained these elements:

If you think of the last time, or a time that comes into mind, when you have constructed your own data collection instrument for a research project...

What motivated you to use the instrument?

What kind of information would you want to have about it beforehand?

The changes between the pilot interview guide and the final interview guide were deemed to be in sufficient alignment to treat all interviews in the same way during the data analysis. Depending on the study design, research object and claims that can be made from the data analysis, there may be issues with this approach. In this case the differences in the interview guides were deemed not to interfere with developing the design features or the implementation of the prototype collaboratory since the data served as the basis for a design of an LIS collaboratory, and the study participant selection included members of the LIS community whose experiences of creating, sharing, using and reusing data collection instruments varied extensively, meaning that not all study participants could reply to questions regarding having used someone else's data collection instrument.

13 interviews were conducted face-to-face, and 3 by telephone, all of them audio-recorded. Interviews were conducted in English (9 interviews) and Swedish (7 interviews). The shortest interview lasted 18 minutes, the longest lasted 69 minutes, giving an average of 38 minutes per interview. In total there are 10 hours 11 minutes of audio-recorded interview data. The interviews were transcribed following written language conventions and

were taken at face value, meaning that the study participants' utterances constituted the unit of analysis, thus not going into a deeper level of data analysis of how, for example, the tone of voice or facial expressions were related to the study participants' utterances.

Data analysis was based on the typical steps for qualitative research described by Miles and Huberman (1994) and Robson (2002), employing three concurrent activities: data reduction (including coding and memoing); data display (using card sorting and tables); and summarizing the themes that emerged from the data. The data reduction activities started with an initial coding, employing codes derived from the themes of the interview guide, while being open to finding new codes and modifying the initial codes. This process was conducted using the computer-assisted qualitative data analysis software ATLAS.ti, version 5. The final coding scheme consisted of 13 codes (Appendix 4), e.g. UsingExistingBenefits, UsingExistingProblems, UsingExistingSelecting, SharingBenefits, and SharingProblems Then memos were created and read, in order to explore if any additional themes would emerge, and to look for connections in the data that had not shown up during the coding.

The data display activities included looking for relationships between the themes. In particular, the data were sorted according to different themes in order to find connections among the data that could be transformed into design features for an LIS collaboratory (see Figure 4 for an example of this data display activity focusing on the theme "Career incentives of submitting data collection instruments to collaboratory").

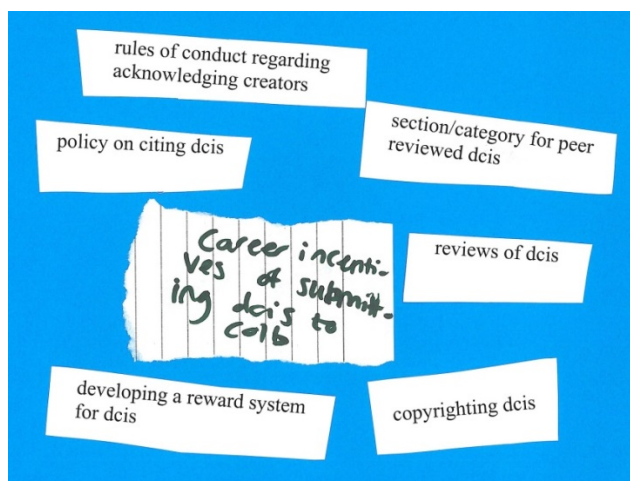


Figure 4. Data display using card sorting with colour coding.

The themes and the data related to each theme were then used to create a table detailing the design features for an LIS collaboratory (Table 1). The themes include reward system, social network and version control. The design features were listed under each theme in no particular order and unfiltered regarding whether they could be implemented in a prototype collaboratory in a short-term or long-term perspective.

Dynamic content – to get people to visit and submit	Searching/ browsing	Critiques and reviews	Modifications – version control
My data collection set – previously downloaded	Search algorithm like Google’s PageRank	Constructive critiques of data collection instruments	Modification links between data collection instruments
New trends section	Good browsing capabilities	Constructive critiques down to the question level	Back-links to components of data collection instruments that’ve been used to create a new one
Latest comments section	Support for different languages and character sets	Reviews of data collection instruments	Feature: create new data collection instruments from existing ones
Recommended instruments (similar to Amazon)		Validated data collection instruments section	Guidelines for modifications of data collection instruments and acknowledgement of original instrument

**Table 1. Excerpt of design features based on the interview data.**

The results from the literature review, including lessons learned from previous collaboratories, were then included in the table of design features. Hence, previous research synthesizing factors that may impact the design, adoption and use of a collaboratory were related to data on the study participants’ practices concerning data collection instruments, and their perceptions of benefits, facilitators and challenges of an LIS collaboratory.

The summarizing activities concerned writing summaries of the themes emerging from the data, and relations found between the themes. These summaries guided the writing of the paper reporting the first empirical study (Paper II).

The results of this phase of the research process informed the next phase: designing a prototype collaboratory. At this point, the results, i.e. design features, were unfiltered in the sense that they were not customized for a prototype collaboratory. Determining which design features would be relevant for the design of a prototype collaboratory was an activity undertaken in the next phase, designing prototype collaboratory, described in the next section.

## **4.2. PHASE TWO: DESIGNING A PROTOTYPE COLLABORATORY**

This phase of the research process concerned designing and implementing a prototype collaboratory using the design features identified during the understanding needs phase, specifically the review and synthesis of literature and the empirical study of LIS community members.

A prototype is a manifestation of a design that can facilitate interaction between the prototype and prospective users, used in order to get an idea of what is working well and what needs to be modified (Sharp, Rogers & Preece, 2011). The prototype collaboratory implemented during this phase is a high-fidelity prototype, according to a typology of Sharp, Rogers & Preece (2011), as it is closer to the end-product design than to a low-fidelity pen-and-paper representation of a prototype.

During this phase, the design features were specified into design requirements and implemented into a working prototype. A design feature is defined as a “distinguishing characteristic of a system item (includes both functional and nonfunctional attributes such as performance and reusability” (IEEE, 2008, p. 10). A design requirement is defined as “Documentation of the essential requirements (functions, performance, design constraints, and attributes) of the software and its external interfaces” (IEEE, 2008, p. 10). Hence, design requirements can be derived from design features and provide more detail regarding the design of an ICT. At the beginning of this phase, the design features were unfiltered, meaning that any design feature was considered viable for an LIS collaboratory, regardless of whether they could be implemented in a prototype collaboratory or not. For example, one design feature concerned an LIS collaboratory having an editorial board; another design feature involved allowing actors to comment and pose questions about data collection instruments. Even though these

examples are of a different character, the latter being more technically straightforward than the former to implement, these design features were treated in the same way, thus keeping an open mind about the design to avoid limiting the alternatives of tools for implementing the design at an early stage.

To facilitate the process of transforming the design features for an LIS collaboratory into specified design requirements for a prototype collaboratory, use cases were employed. Use cases are scenarios for human-system interaction that are technology independent and therefore do not limit the choices of ICT tools in which a design is later implemented (see e.g. Cockburn, 2001 for an in-depth review of use cases and their applications, and Paper III for a literature review of use cases related to the design of the prototype collaboratory). The use cases were analytically derived (see e.g. Carroll & Rosson, 1992, for an account of scenario-based design) by creating narratives of the activities that people should be able to conduct in the prototype collaboratory. Hence, use cases focus on people's activities in relation to an ICT, or put differently: the interaction between people and the ICT being designed. The use cases were helpful in the process of specifying what design requirements were important to implement in the prototype collaboratory by pointing out important interactions between actors and the ICT in order to support the actors to achieve the intended activities. The activities that the use cases captured during this phase were: joining the collaboratory and creating a research profile; sharing a data collection instrument; finding a data collection instrument; posting a comment or question about a data collection instrument; creating a new version of a data collection instrument; volunteering to become a reviewer; and providing a recommendation letter for a collaboratory member. All of these use cases are reported on in Paper III.

Below is an excerpt of the use case *sharing a data collection instrument*, showing first the formal parts of a use case, which provide guidance for the narratives. The formal parts include what is the goal of the activity; who the actor is; any preconditions that should be fulfilled in order for the use case to take effect; success and failure conditions; a trigger that initiates the activity; and any notes that are not covered by the other formal parts.

**Goal:** To submit a data collection instrument to the collaboratory by uploading a data collection instrument and creating a page for annotating the data collection instrument.

**Actor:** a collaboratory member.

**Precondition:** the actor is logged on to the collaboratory.

**Success condition:** the actor has shared and annotated their data collection instrument.

**Failure condition:** the actor has not successfully shared and annotated their data collection instrument.

**Trigger:** the actor wants to share their data collection instrument in the collaboratory.

**Notes:** only data collection instruments owned by the actor may be shared in the collaboratory, with the exception of having permission from the creator of the data collection instrument.

Following the formal aspects is the narrative of the same use case, i.e. *sharing a data collection instrument* (Paper III), presented in four steps (the last step being divided into sub-steps to allow for alternative ways of going about the activity).

**Step 1)** The actor is presented with the option to share a data collection instrument directly after logging in to the collaboratory and chooses to go forward with this option.

**Step 2)** The actor annotates the data collection instrument by applying metadata.

**Step 3)** The actor provides intellectual property information for future use of the data collection instrument.

**Step 4)** The actor makes the data collection instrument available.

**Step 4a)** The actor makes the data collection instrument available in the collaboratory.

**Step 4b)** The actor makes the data collection instrument available at an external source.

Note that the person performing the activity in the use case is an *actor*, connecting this design method to the socio-technical design approach and the view of the thesis of persons using ICTs as active as opposed to being a passive user, as discussed in Chapter 3. All use cases were constructed for a general prototype collaboratory actor, thus they were not adapted for any particular groups of actors such as students or LIS professionals. The findings from the understanding needs phase suggested that the needs and motivations for using an LIS collaboratory were different depending on professional roles and data collection instrument expertise; creating specific use cases would strengthen the design in a future study.



The design requirements of the prototype collaboratory, stemming from the use cases and detailing the design features, guided the process of exploring options for an ICT tool for implementing the prototype. The process was based on the premises that a tool would be able to work as a repository for storing data collection instruments, and that it would support interaction among collaboratory actors. Based on these premises, the top alternative was to use a wiki, and the second alternative was to use a content management system (CMS). While a CMS would allow for excellent management and presentation of content, interaction features are often lacking or not flexible enough for the design requirements of a prototype collaboratory. A wiki, however, allows for both content management and social interaction, and so alternatives for wikis were investigated further. Free and proprietary wiki tools were investigated and compared to the design requirements of the prototype collaboratory, including MindTouch and Wikia. One of the resources used in the decision-making process was the extensive Wikipedia entry Comparison of wiki software (2005), which included features such as Extensibility and User-customizable interface. In the end the MediaWiki software, on which Wikipedia runs, was chosen because of its flexibility in the implementation of the design requirements, compared to the other alternatives. MediaWiki has a large community of developers who continuously create new ways of adjusting it for different needs and purposes. A major caveat with MediaWiki was that it did not offer a stable WYSIWYG (What You See Is What You Get) interface. This meant that users would have to contribute content using wiki-markup, instead of a text editor. Despite this caveat, the benefits were deemed to overcome the weaknesses that MediaWiki entailed, and the prototype collaboratory was implemented in MediaWiki. From a social actors perspective, MediaWiki builds on the efforts of actors who contribute in different ways to the sustainability and development of the software. It also offers the same capabilities for the actors of any wiki developed in the software. Hence, the choice is supported by the social actors model, as well as the online community life-cycle model in the flexibility in developing a wiki especially designed for the actors' needs.

In order to fully customize the implementation of the prototype collaboratory to the design requirements, MediaWiki's standard installation needed to be complemented by extensions, which work as plug-ins and are developed by the MediaWiki community. Alternatives for customization were researched and entered into the table of design features developed during the understanding needs phase (see Table 2). The most stable extensions among the alternatives were always chosen in order to meet the

design requirements at the same time as providing a stable prototype collaboratory.

Dynamic content, get revisits & submissions	Searching/ browsing	Info about dcis	Controlled vocabulary (functionality)
My data collection set – previously downloaded	Search algorithm like Google’s PageRank <a href="#">Google SiteSearch p 19</a>	Rich information about dcis	Use terminology of research methods textbooks in creating controlled vocabulary
New trends section <a href="#">Created and maintained by editors</a>	Good browsing capabilities	Creator’s description and comments of dci <a href="#">On the dci page</a>	Facetted classification scheme: a facet for type of instrument
Latest comments section <a href="#">TopTenPages p 43</a> <a href="#">CurrentPages p. 10</a> <a href="#">DynamicPageList p 12</a>	Support for different languages and character sets <a href="#">MultiLanguageManager p 27</a>	Creator’s reflections upon a dcis <a href="#">On the dci page</a>	Vocabulary terms to represent subjects of instruments
Top rated dcis feature <a href="#">TopTenPages p 43</a> <a href="#">DynamicPageList p 12</a>		Links to personal profiles of the creator and users of a dci <a href="#">UserPageStyles p 45</a>	Term relations, e.g. hierarchical

**Table 2. Excerpt from table of design features with alternatives for implementation in MediaWiki.**

The built-in features of MediaWiki, combined with the user-created extensions, were utilized to implement a fully operational prototype collaboratory (see Figure 5 for a screen shot of its main page, and Paper III for more screen shots connecting the use cases to the implementation). The configuration settings of MediaWiki that are stored on the server can be seen in Appendix 5. A great deal of the configuration has been done through the web interface, e.g. pre-population of the content of new wiki pages. Examples of these types of configurations can be found in an archived version of the prototype collaboratory serving as a snap shot from April 2014. The archive version is available through a link from <http://hdl.handle.net/2320/13583>. Note that information about Study IV that could make it possible to identify study participants, e.g. their profile names, has been redacted from the archive version. Most of the design features have been implemented, except features that were not supported in MediaWiki,

such as creating and distributing surveys by combining questions from existing ones, and editorial board or review committee.

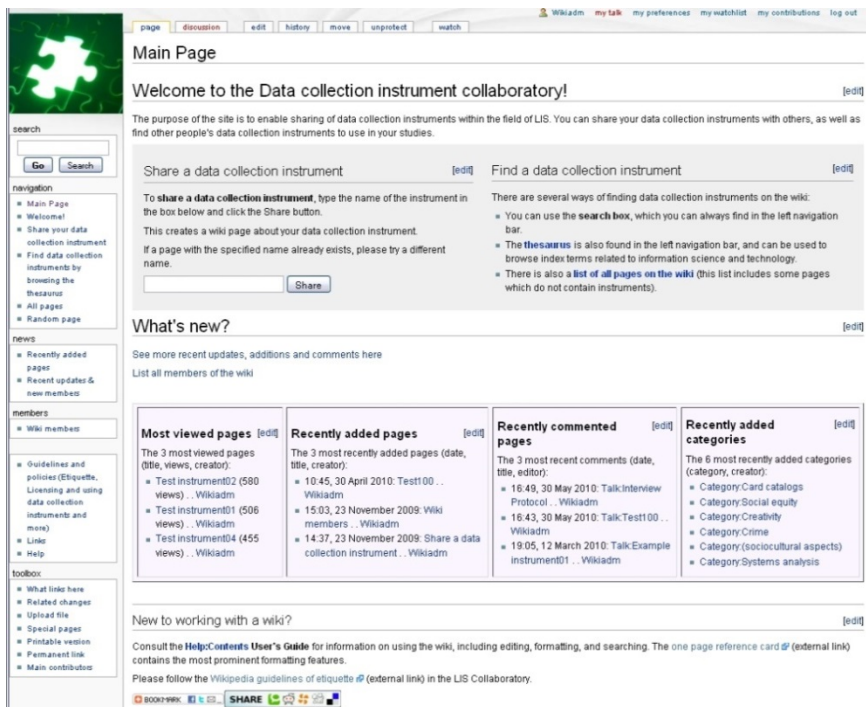


Figure 5 Main page of the prototype collaboratory

When a working prototype collaboratory was in existence, the next phase concerned an evaluation in which study participants conducted activities in the prototype collaboratory based on the use cases, to provide feedback on the design. This phase of the research design is described in the next section.

## 4.3. PHASE THREE: EVALUATING A PROTOTYPE COLLABORATORY

A working prototype collaboratory was developed in the previous phase. In this final phase of the research process, the prototype collaboratory was evaluated to provide feedback on the design and the preceding phases of the design process. The approach to design taken in the thesis (as discussed in Section 3.1), is based on an iterative design process in which different phases of the process provide feedback and suggestions for redesign. This approach

is different from a linear design process which is traditionally considered finished when the last phase, e.g. evaluation or deployment of an ICT, is completed. The description of this research ends with this final evaluation phase, which might give the impression that a linear design approach has been taken. To alleviate the potential impression of a linear design, a section of the thesis (Section 8.1, Future research) is dedicated to discussing ideas for future research which can inform iterations of the design process.

The evaluation consisted of two parts, described in more detail in Paper IV and in the master thesis by Emanuelsson (2013). In the first part, study participants conducted think-aloud sessions, meaning that they conducted predetermined tasks in the prototype collaboratory while talking out loud about what they were doing (see Appendix 6a for the English translation and 6b for Swedish version). This enabled capturing spontaneous reactions about a prototype's functionality and interface. The think aloud sessions were screen-captured, audio-recorded, and notes were taken in an observation protocol (see Appendix 7a for the English translation and 7b for Swedish version). Second, right after the think-aloud session, a follow-up interview was conducted, which included questions about the study participants' experiences during their interaction with the prototype collaboratory, and about their perceptions of the benefits and challenges of an LIS collaboratory (see Appendix 8a for the English translation and 8b for Swedish version). The interviews facilitated expanding on topics that arose during the think-aloud sessions and a more general discussion on a potential LIS collaboratory.

The first empirical study (Paper II) aimed at capturing a wide array of experiences and educational and career levels, whereas the evaluation study focused solely on librarians, more specifically five hospital librarians (Paper IV). This shift of focus in study participant selection, from a broad to a narrowly defined group, is motivated by the need to learn more about the professional and organizational contexts of librarians, since professions other than researchers are typically not included in collaboratories aimed at research (see Section 2.2). Moreover, the evaluation study provided an opportunity to focus more on the results of Study II concerning LIS professionals' attitudes towards creating, sharing, using and reusing data collection instruments, and the potential of an LIS collaboratory. Further, the study participants were selected because of their experiences of working with collaborative tools; this could provide an updated account of how people worked with collaborative tools 2013, compared to the Paper II data, collected between 2006 and 2008. Recruiting Swedish-speaking study

participants allowed for exploration of the reactions of actors whose everyday working language is not the same as the prototype collaboratory (English).

The evaluation study had two aims: first, to understand how a group of librarians perceived the interaction with the prototype collaboratory as they were performing predetermined tasks; and second, to gain insights about the librarians' perceptions of the functionality of the prototype collaboratory and of the general potential of an LIS collaboratory. The two aims correspond to 1) functionality – whether the ICT tool supports the activities that people are supposed to perform, and 2) the human-system interaction – whether the ICT tool is easy to use (see e.g. Redish & Dumas, 1999 and Sharp, Rogers & Preece, 2011).

At the beginning of each data collection session, the study participants were informed about the study, including the session they were about to take part in. They read and signed an informed consent form (see Appendix 9a for the English translation and 9b for Swedish version) which was constructed in accordance with the CODEX guidelines for research developed by the Swedish Research Council, including information about the aim of the study, contact information to the investigators, the confidentiality of the study participants, and their right to at any time discontinue their participation in the study (CODEX, n.d.). During the think-aloud sessions, the study participants conducted three tasks in the prototype collaboratory while talking out loud about what they were experiencing and thinking while conducting the tasks. The tasks were derived from the use cases developed during the stage of designing a prototype collaboratory and were: becoming a member of the prototype collaboratory; sharing a data collection instrument in the prototype collaboratory; and finding a data collection instrument in the prototype collaboratory and posting a comment about it. The use cases developed in the design phase were analytically derived and evaluated, meaning that they had not been empirically tested. As the tasks of the evaluation were based on the use cases, and as the tasks served the purposes for the think-aloud sessions, this is seen as verification that the analytical design method was adequate. The interviews were audio-recorded and transcribed following spoken language norms.

Data analysis of the think-aloud sessions and follow-up interviews followed a cutting and sorting method (Ryan & Nernard, 2003). Transcripts were read in their entirety, while important quotes were marked and preliminary notes taken. The themes from the interview guide were used as a first coding scheme, e.g. Cost of participation, and more codes were expected to emerge

from the data. As new themes emerged from the data they were added to the list of themes (see Appendix 10a for the English translation and 10b for the Swedish version). Throughout the data analysis, factors which could indicate a high cost of participation were prioritized, to provide feedback which could be used in an iteration of the design process to improve the design of the prototype collaboratory. Some of the major codes were assigned sub-codes that would capture a more specific theme, such as major code “Cost of participation”, sub code “Difficult to work with wiki markup”. The data were also analysed across the themes, to look for similarities and differences, and to see if any themes would benefit from being merged or divided into more themes. This section concluded the research design and research process of the thesis; the next section discusses the limitations of the research design and the methods used.

#### **4.4. LIMITATIONS**

The purpose of this section is to describe the limitations of the research design and methods used in the studies, in relation to how the results can be interpreted. In short, the limitations are threefold: the time span of the studies; the small numbers of study participants in the empirical studies; and the types of data collection instruments focused on in the first empirical study. The motivations and implications of the research, along with how some of the implications have been alleviated, are discussed below.

The data collection for the first interview study was conducted between 2006 and 2008, which means that it is possible that the study participants’ perceptions and practices might have changed if the study was to be conducted today. For example, social media were not as pervasive then as they were in 2013, and collaborative tools had become more commonplace, e.g. collaborative writing tools and online conferencing tools. To lessen this caveat, the evaluation study focused on study participants who were used to sharing and using information in digital environments. Future studies can take into account questions about the current practices and the experiences of collaboratories more extensively.

Both empirical studies were small-scale regarding the number of study participants: the first empirical study included 16 study participants and the evaluation of the prototype collaboratory five. The small-scale studies were motivated by the research approach adopted in the thesis, aimed primarily at designing, developing and evaluating a prototype collaboratory. The aim

of the first empirical study was to get a broad understanding of the perceptions and practices of LIS students, professionals and researchers with different experiences of LIS methods concerning sharing data collection instruments. Striving for large sets of data would have required more time for data collection, processing and analysis, which would have led to less time for the time-consuming prototype collaboratory design process. The small numbers of study participants mean that the data do not allow for generalizations. Hence, it is not possible to draw any conclusions about the LIS community as a whole based on either of the empirical studies. The numbers and selection of study participants, however, constitute a purposeful sampling for the overall research approach of the thesis.

The different selection criteria for the study participants in the two empirical studies, although purposefully crafted, could be regarded as skewed, as the first empirical study had a broad and diverse group of study participants, whereas the evaluation study focused on LIS professionals. The results of the evaluation study should therefore be interpreted based on this premise. It should be noted, however, that from a design perspective, focusing on a particular sub-group of the main target group naturally occurs in design processes. A target group analysis may result in the creation of several personas, which synthesize and represent typical actors, including information about their skills, attitudes, interests and other characteristics (Sharp, Rogers & Preece, 2011). Thus, from a research perspective it should be noted that the study participant selection of the two empirical studies are not in alignment, although from a design perspective this constitutes a typical part of the design process.

Early on in the research process, a delimitation of the types of data collection instruments to focus on for an LIS collaboratory was made, a delimitation based on which types of data collection instruments could be stored in a collaboratory. Therefore, when recruiting study participants for the interviews to understand the needs of LIS community members, and also when presenting the idea of an LIS collaboratory for sharing data collection instruments to the study participants, the examples of data collection instruments they were presented with included questionnaires, interview protocols and logging software. As a result of making this delimitation, some research methods commonly used in LIS have been left unexplored in this research. Future research might broaden the scope of epistemological, theoretical and methodological approaches to develop further understanding of the perceptions of benefits and challenges of sharing data collection instruments in an LIS collaboratory.

# 5. SUMMARY OF PAPERS

This chapter provides a summary of the papers included in the thesis. Relating to the three phases of the research design, papers I and II investigated the needs of an LIS collaboratory. Paper I presents factors that affect adoption and use of collaboratories in general, stemming from previous research on scientific collaboration, collaboratories and other research fields. Paper II presents the results of a study about factors that may affect the design, adoption and use of a collaboratory specifically for LIS. The designing a prototype collaboratory phase of the research design is presented in Paper III, which describes the design process for a prototype collaboratory for LIS, building on the results from Papers I and II. Finally, the evaluating prototype collaboratory phase is reported in Paper IV, which presents an empirical study in which the working prototype collaboratory was evaluated involving LIS professionals.

## **5.1. PAPER I: IDENTIFYING FACTORS THAT MAY IMPACT THE ADOPTION AND USE OF A COLLABORATORY WITHIN LIS: A SYNTHESIS OF PREVIOUS RESEARCH**

Lassi, M. & Sonnenwald, D. (2010). Identifying factors that may impact the adoption and use of a social science collaboratory: a synthesis of previous research. *Information Research*, 15(3) colis710.

The paper reports on a review of research literature related to collaboratories, focusing in particular on identifying factors that may affect the design, adoption and use of collaboratories, to provide a basis for designing a collaboratory for sharing data collection instruments in LIS. The



choices of literature was not, however, specifically directed at LIS or social sciences, but instead provided a general perspective, on which an empirical study of needs and practices of LIS community members could be built.

The aim of the study was to review and synthesize relevant research to identify factors that impact the design, adoption and use of a collaboratory, particularly with regard to a social science discipline such as LIS.

A review and synthesis of literature in the following research areas was carried out: scientific collaboration, scholarly communication, scientific collaboratories, scientific disciplines, invisible colleges and virtual communities. Using a snowball approach to literature collection, the process started from a set of publications identified as central to topics such as collaboratories, scientific collaboration and scholarly communication. The literature was found in disciplines such as LIS, computer science, CSCW, communication, computer-mediated communication, psychology, sociology and social studies of science.

Six types of factors that appear to impact the design, adoption and use of a collaboratory emerged from the synthesis. The factors were sorted according to their level of focus (on individuals or groups) and aspects of science (progress, social or economic) (Table 3). The identified factors were: career factors that impact a researcher's career advancements; personal factors concerning aspects of doing science which affect researchers on a personal level other than their career; cost of participation factors, focusing on whether the benefits of being active actors in a collaboratory outweigh the costs for the individuals; disciplinary and scientific advancement factors focusing on furthering science and disciplines in general, such as the development of new methodology within a discipline; community factors that affect the community of researchers; and cost of developing and sustaining factors for developing and sustaining a collaboratory for a community or discipline.

<i>Level of focus</i>	<b>Aspects of science</b>		
	<b>Progress</b>	<b>Social</b>	<b>Economic</b>
<i>Individual</i>	Career	Personal	Cost of participation
<i>Group</i>	Disciplinary and scientific advancement	Community	Cost to develop and sustain

**Table 3. Six types of factors that impact the adoption and use of a collaboratory.**

The findings informed the design of the empirical study, as the broad perspective on related research of the literature review informed the investigation of a specific discipline – the practices and perceptions of creating, reusing and sharing data collection instruments among LIS students, professionals and researchers.

## **5.2. PAPER II: SHARING DATA COLLECTION INSTRUMENTS: PERCEPTIONS OF FACILITATORS AND CHALLENGES FOR A LIBRARY AND INFORMATION SCIENCE COLLABORATORY**

Lassi, M. & Limberg, L. (manuscript). Sharing data collection instruments: Perceptions of facilitators and challenges for a Library and Information Science collaboratory.

The paper reports on an empirical study of the needs, barriers and design requirements for a collaboratory for sharing data collection instruments in LIS. The aim of the study was to explore LIS students', researchers', and professionals' 1) current practices of creating, sharing, using and reusing data collection instruments, and 2) perceptions of benefits, facilitators and challenges for a collaboratory for sharing data collection instruments in LIS.

The empirical data of the study were collected through interviews with LIS community members regarding their practices and attitudes concerning creating, reusing and sharing data collection instruments, and their perceptions of the benefits and challenges of an LIS collaboratory.

An empirical study was conducted, which consisted of semi-structured interviews with sixteen members of the LIS community. The study participants were recruited to capture a broad picture of the LIS community, according to two dimensions: their professional and educational positions, and their experiences or expertise in using questionnaires, interviews, and (quasi-)experiments. The interview guide was based on the findings presented in Paper I, the literature review of research related to collaboratories and scientific collaboration, with additional questions focusing on the practices of the study participants. This last element, the additional questions, was added to learn more about the professional and organizational contexts of the study participants who were not working in academia, i.e. librarians and information architects.

In all, the findings indicate that while people express the view that an LIS collaboratory would be beneficial on a community and disciplinary level, the benefits for the individuals may not be sufficient incentive to make them become active collaboratory actors. The most prominent facilitators and benefits for the adoption and use of an LIS collaboratory discussed by the study participants were: building upon previous work can lead to higher quality data collection instruments; using the same data collection instrument can facilitate comparing results across studies; and the fact that people would feel flattered if someone wanted to use their data collection instruments. The most notable challenges discussed by the study participants were: that the uniqueness of their research would make it difficult to use anyone else's data collection instrument; that they would need rich meta-data to determine its potential for their study; that modifications to a data collection instrument could lower its quality; and that sharing resources is not in the LIS culture. While some of the benefits and challenges discussed by the study participants were discussed by all or the majority of the professional and educational positions (such as the benefits of building upon previous research), other themes were discussed predominantly by one profession. The LIS professionals' perceptions differed from the other groups, including whether they would have time to actively use a collaboratory, and whether the quality of their data collection instruments would be good enough to be interesting for other collaboratory actors. This may not be so surprising, considering that their professional and organizational contexts differ from the ones prominently researched in relation to scientific collaboration (typically academia). It can be noted that the issue of quality raised by the professionals was not included in the interview guide, but rather something that the study participants suggested without a specified inquiry from the interviewer.

### **5.3. PAPER III: THE SOCIO-TECHNICAL DESIGN OF A LIBRARY AND INFORMATION SCIENCE COLLABORATORY**

Lassi, M. & Sonnenwald, D.H. (2013). The socio-technical design of a Library and Information Science collaboratory. *Information Research*, 18(2) paper 576.

The paper reports on the design of a prototype collaboratory for sharing data collection instruments in LIS. The design was based on the findings of Papers I and II (see summaries of Papers I and II respectively).

The aim of the paper was to present the design of a prototype collaboratory for sharing data collection instruments in LIS. The design was based on findings from the literature review and the first empirical study, in the form of design features of a collaboratory. The design features were transformed into design requirements, i.e. more concrete and implementable requirements for what is needed in designing a working prototype collaboratory.

Use cases – scenarios of human-system interaction – were developed based on the findings presented in Papers I and II to guide the design of the prototype collaboratory. The use cases were: joining the collaboratory and creating a research profile; sharing a data collection instrument (see example below); finding a data collection instrument; posting a comment or question about a data collection instrument; creating a new version of a data collection instrument; volunteering to become a reviewer; and providing a recommendation letter for a collaboratory member. The design requirements were implemented in the wiki software MediaWiki, which was the most flexible software alternatives and could capture the most design requirements.

## **5.4. PAPER IV: EVALUATION OF A PROTOTYPE COLLABORATORY FOR SHARING DATA COLLECTION INSTRUMENTS IN LIBRARY AND INFORMATION SCIENCE**

Lassi, M. & Emanuelsson, H. (submitted). *Evaluation of a prototype collaboratory for sharing data collection instruments in Library and Information Science*. Manuscript submitted for review.

This paper reports on an empirical study in which the prototype collaboratory design (reported in Paper III) was evaluated. The aims of the evaluation were: to understand how a group of librarians perceived the prototype collaboratory as they were performing predetermined tasks; and to gain insights about the librarians' perceptions of the potential of a collaboratory for sharing data collection instruments in LIS.

The study consisted of think-aloud sessions with five hospital librarians who conducted predetermined tasks in the prototype collaboratory while talking out loud about what they were doing and experiencing. This was followed

by semi-structured interviews which included questions about the study participants' experiences during their think-aloud sessions, and questions about their perceptions of the benefits and challenges of an LIS collaboratory.

The study results indicate that although the study participants expressed some difficulties working with the interface, all of them were confident that they could learn to use the prototype collaboratory after a brief introduction period. The study participants reported high cost of participation concerning some of the prototype collaboratory concepts; the wiki-markup; and the working language being different from what they are used to (the librarians are Swedish, and the collaboratory language is English). Further, the librarians expressed positive attitudes towards sharing data collection instruments as well as commenting in the prototype collaboratory. However, the study participants stressed that they would predominantly use a future LIS collaboratory to help others, including library patrons, to find data collection instruments.

# 6. SYNTHESIS OF RESULTS

In this chapter, synthesized results of the four studies are presented, focusing primarily on the empirical studies (Study II and IV) on which empirical data answers to the two research questions of the thesis are based:

- (1) What do members of the LIS community perceive to be benefits, facilitators and challenges for an LIS collaboratory?
- (2) What are the current attitudes towards and practices of creating, sharing, using and reusing data collection instruments of members of the LIS community?

The third research question, which has a theoretical focus on understanding the results of the empirical studies, is discussed in Chapter 7. The first section of this chapter reports on results from the understanding needs phase of the research process, while the second section focuses on results from the evaluating prototype collaboratory phase.

Overall, the results show that an LIS collaboratory has potential for furthering LIS research in two main aspects of which there was very high agreement among study participants: research quality and research process speed. An LIS collaboratory can lead to disciplinary advancements by facilitating building upon others' work within the LIS community. Provided that the data collection instruments are of high quality, reusing data collection instruments can speed up the research process or save time that can be used on other tasks in the research process. While the benefits of an LIS collaboratory focused on the greater good for LIS, the challenges reported focused on the individuals' perspectives. Hence, a tension exists between the view of supporting the greater good and the challenges for the individual concerning sharing and reusing data collection instruments in an LIS collaboratory. The challenges for active involvement in an LIS collaboratory can be summarized as concerns with quality assurance; a need for establishing a reward system for an LIS collaboratory; and hesitancies

about introducing a new way of working with data collection instruments in LIS. The relation between benefits and challenges can be synthesized as: “An LIS collaboratory would be great for LIS as a discipline, but I am not sure I want to actively contribute”. The reasons for this tension are further discussed in the following sections.

## **6.1. UNDERSTANDING NEEDS PHASE**

The understanding needs phase consisted of a synthesis of literature (Study I, reported in Paper I) and an empirical study in which LIS community members were interviewed to focus specifically on the needs of an LIS collaboratory (Study II, reported in Paper II). The general view among the study participants interviewed in Study II was, as stated earlier, that an LIS collaboratory can contribute to furthering the LIS discipline and have benefits on a disciplinary level, while most challenges reported were on an individual level. The study participants’ career and educational levels have been synthesized in this chapter, compared to the accounts of research methods and results in Paper II. For example, the group *junior researchers* and *professors* from Paper II have been combined into the larger group *researchers* in the following sections. The following sections synthesize these empirical results more in-depth, structured as follows: the purpose of an LIS collaboratory; ensuring quality content; and rewards for contributing to LIS collaboratory.

### **6.1.1. THE PURPOSE OF AN LIS COLLABORATORY**

As described earlier, scientific collaboration is less common in LIS than in other disciplines, particularly in the natural sciences. One possible explanation for this is that LIS is multifaceted regarding research problems, study objects, approaches to study research problems, theories and methods. In investigating this empirically, both the interviews in Study II and the follow-up interviews in Study IV included questions on the study participants’ perceptions of an LIS collaboratory and activities related to data collection instruments.

The vast majority of study participants in both studies expressed the view that LIS can benefit from a collaboratory, something which was most commonly motivated by the possibility of furthering LIS research. The study participants specified how LIS can be further developed by suggesting that high-quality data collection instruments could be made available; by saving

time during the research process by using others' data collection instruments; and by facilitating learning of LIS methodology. These results all confirm previous research on collaboratories in other disciplines (Paper I; Finholt, 2002; Sonnenwald, 2007). Apart from providing opportunities for students to learn from researchers, the study participants also suggested that an LIS collaboratory can be useful for researchers from other disciplines who might have an interest in LIS research to learn about, and later on contribute to, LIS research.

In the interview study, many of the researchers suggested that an LIS collaboratory can be used for teaching LIS research methodology, and can be a resource for students to find data collection instruments for their thesis work. The students also discussed the potential of learning from others in an LIS collaboratory, suggesting that they would feel more secure conducting their thesis work if they could use data collection instruments created by renowned researchers when possible. In contrast, a majority of the students reported having created their own data collection instruments for their master thesis, some of them even stating that they thought it would be unacceptable or plagiarism to use a data collection instrument created and used by someone else.

The results revealed that actors may take on more roles than anticipated based on previous research. The study participant selection process was based on categories of career and education levels which had emerged from previous research. However, the study participants described the potential of an LIS collaboratory from several different roles that they could have in relation to a collaboratory, and that their use would depend on their role and work at hand. For example, all researchers identified challenges with sharing and reusing data collection instruments, whereas the researchers were entirely positive to how an LIS collaboratory could be helpful in their roles as teachers. Note that the interview guide for Study II did not include questions about different roles; instead, the study participants brought this up without a trigger from the interviewer. This result was surprising in relation to previous research on collaboratories, which focused to a great extent on research activities conducted by senior researchers, junior researchers and sometimes Ph.D. students. It is a less surprising result in view of the fact that both research and teaching are often part of research positions in LIS. Hence, this result shows the importance of getting to know the community for which a collaboratory is developed. Among the LIS professionals, the tension consisted of, on the one hand, wanting to contribute to the discipline but, on the other hand, not being confident that



the quality of their data collection instruments would be good enough to share in an LIS collaboratory. The results show that it is important to alleviate the challenges that are reported on the individual level to ensure a critical mass of actors contributing to an LIS collaboratory.

The LIS professionals as actors in an LIS collaboratory add a new dimension to this research, compared to previous research. Not surprising, the potential benefits and challenges of an LIS collaboratory differed compared to study participants active in academia. While the LIS professionals in both the study of understanding needs and the evaluation agreed with the general motivations concerning the advancement of the discipline, a majority focused on purposes related to using others' data collection instruments and helping others find relevant data collection instruments. The following section focuses on needs for assuring the quality of data collection instruments in an LIS collaboratory.

### **6.1.2. CONCERNS WITH THE QUALITY OF SHARED DATA COLLECTION INSTRUMENTS**

One of the major benefits of an LIS collaboratory suggested by the study participants is the possibility of reproducing studies and building on others' research. Also, the importance of ensuring the quality of data collection instruments shared in an LIS collaboratory was stressed during many interviews in Study II. Therefore, ways of ensuring data collection instrument quality are important to address in the prototype collaboratory design.

One aspect of quality issues expressed by study participants concerned the fact that errors in a data collection instrument would be reproduced if used in future studies building on that data collection instrument. This is addressed in the prototype collaboratory design by urging actors to provide as much metadata as possible when sharing a data collection instrument, for example stating the purpose and study population of the study in which the data collection instrument has been used; links to publications; and additional comments about using the data collection instrument that cannot be found in publications and other resources. Many study participants stressed the need for rich information about data collection instruments, which they explained would ensure being able to make informed decisions about whether to use a data collection instrument or not. Similarly, many study participants suggested interaction possibilities between actors, so that they can ask questions, make comments, and discuss data collection

instruments. During the evaluation phase, a suggestion was given about adding a discussion forum allowing for discussions that do not pertain to one specific data collection instrument, as was the case in the prototype collaboratory at the time of evaluation.

Another concern that study participants raised was the risk of having their name connected to a modified version of their data collection instrument that may be of lesser quality than their original one. This could reflect badly on the creator of the original data collection instrument, affecting their reputation in the LIS community, an issue related to the career factors identified in the synthesis of previous research (Study I). Version control of data collection instruments is addressed in two ways in the prototype collaboratory. The code of conduct specifies how to handle data collection instrument attribution and version control. Also, backlinks to the original version of the data collection instrument are required when sharing a modified version of a data collection instrument created by someone else.

The risk of data collection instruments being used incorrectly, rendering erroneous results of research, was also discussed by interview study participants in Study II. A researcher expressed worries concerning the consequences of including LIS professionals as a target group of a collaboratory for sharing data collection instruments. The reason being that data collection instruments might be used erroneously. The researcher explained that LIS professionals possibly belong to: “a very naïve methodological population ... who may not have had a research lesson in their life. So in that case, that instrument has to be pretty bulletproof ... you're sort of handing an instrument to someone who doesn't know what they're doing - that better be a pretty good instrument”. Results from the evaluation of the prototype collaboratory (Study IV) complements the researcher's discussion, as the study participants found some of the research terminology difficult to grasp when describing the questionnaire that they were sharing.

The worry expressed by the researcher was confirmed by LIS professionals, in both empirical studies, as LIS professionals expressed a concern that their data collection instruments might not measure up to the data collection instruments created by researchers. A university librarian elaborated: “I think there's an anxiety at libraries... you are not there to do research /.../ it's almost as if there is an arena between sort of proper research and sort of research on the side, some sort of amateur research”. The prototype collaboratory includes a discussion page for each data collection instrument and a messaging system, so that actors can choose the communication type

they prefer. Communication about data collection instruments that may be of general interest to other collaboratory actors is preferably conducted on the data collection instrument's discussion page, so that other actors can join in, and learn from, the discussions. The prototype collaboratory also contains a peer review section to which collaboratory actors can submit their data collection instruments for review by experts. Apart from providing a quality review, the peer review section can also be used to filter out data collection instruments that have undergone review when searching for relevant data collection instruments to use.

### **6.1.3. REWARDS FOR CONTRIBUTING TO LIS COLLABORATORY**

Rewarding actors who share data collection instruments is deemed important, particularly by study participants with long careers in research. The study participants suggested that receiving rewards for contributions may stimulate sharing and alleviate some of the downsides of sharing their resources. As expressed by a professor: "if people felt that participation in this boosted their careers, boosted their visibility, boosted their recognition, then they would want to be a part of it". Researchers stand out regarding rewards for contributing their data collection instruments in an LIS collaboratory, which may possibly be explained by their experiences of the requirements for career advancement in academia. Master students and LIS professionals almost unanimously had opposite views about requiring rewards, stating for example that it would be sufficient reward that someone found their data collection instruments valuable to use in further studies.

Major caveats of sharing data collection instruments discussed by the researchers pertained to the competitive aspects of research, for example that other researchers may get ahead by using someone else's data collection instrument to get published before the creator of the data collection instrument. The researchers also expressed concern about not getting credit when someone else used their data collection instrument to publish a paper, and that the academic reward system typically does not reward or recognize the value of sharing data collection instruments.

Some of the most experienced researchers stated that the risk of someone using a data collection instrument without crediting the creator is an actual part of academia that researchers face in many phases of research projects, a risk that is not connected solely to collaboratory context. A researcher expanded on the view of academia as a utopia in which ethics can be taken

for granted, though they should not be, pointing out the ambivalence related to sharing resources: “if you make it too public there is a risk of plagiarism, and yet at the same time, without people using your work you don't exist. It's a fine balance that you want acknowledgement... I wouldn't want someone to take and then not acknowledge”. Another researcher who discussed this issue stressed that even though the possibility of not getting credit could be a risk when sharing in an LIS collaboratory, it would be worth the risk as sharing could further LIS research.

In line with the traditional reward system, suggestions from the interviews in Study II about rewards for contributing to an LIS collaboratory include that data collection instruments could be copyrighted, that data collection instruments (and data sets) could be cited the same way publications are cited, and that creators could request co-authorship of publications based on use of their data collection instrument.

These challenges of sharing data collection instruments relate mostly to the individual's career advancement, characterized as career factors in the literature review (Paper I). Many of the positive reactions to the idea of an LIS collaboratory relate to the collective, characterized as disciplinary and scientific advancement factors in the literature review (Paper I). In the prototype collaboratory, rewards for contributions include determining one's preference of attribution when sharing a data collection instrument, for example copyright or a Creative Commons license, being mentioned in the acknowledgement section of a publication, or having right of co-authorship of a publication. Also, the design of the prototype collaboratory include an editorial board which can provide recommendation letters to actors who have been active in the collaboratory by sharing, commenting, and reviewing.

Apart from the aspects of rewards discussed above, a majority of the study participants, across all job categories, stated that they would feel flattered if anyone had interest in using their data collection instruments. During the interviews, some of the senior researchers spoke very positively about feeling flattered when they had been contacted by people who asked them to get access to and use their data collection instruments. Study participants who did not have experience of sharing data collection instruments, and thus were talking about a scenario, also stated that they would feel flattered if someone used their data collection instrument. The flattery aspect is addressed in the prototype collaboratory by providing lists on the main page displaying top downloads, most commented, and new data collection instruments.

This section on rewards for contributing to an LIS collaboratory concludes the synthesis of results from the understanding needs phase. The following section focuses on synthesizing the results of the prototype collaboratory evaluation.

## **6.2. EVALUATING A PROTOTYPE COLLABORATORY PHASE**

The evaluating prototype collaboratory phase consisted of an empirical study which was conducted to evaluate the prototype collaboratory design (Study IV, reported in Paper IV). The study had two aims: to evaluate the prototype collaboratory, and to explore the potential of an LIS collaboratory. The latter of these aims connects this study to the empirical study of the understanding needs phase. The study participants were five hospital librarians who are used to sharing and using information in digital environments on a daily basis.

The evaluation of the prototype collaboratory (Study IV) showed that it consisted of the appropriate features, measured by how well the study participants performed their tasks, their utterances during the tasks, and the follow-up interviews. The study participants were successful in conducting their tasks using the prototype collaboratory, though the wiki markup constituted a challenge for the study participants when sharing a data collection instrument, as they did not have previous experience of wiki markup. Other challenges for the study participants were that some of the suggested metadata keywords were research terminology that they were uncertain of how to use, and that they were not used to creating content in English, the language of the prototype collaboratory.

Regarding the potential, benefits and challenges of an LIS collaboratory, the discrepancy between the greater good and the individual's perspectives were present in this study, just as in Study II. On the one hand, the study participants were positive to the potential of an LIS collaboratory, suggesting that it could contribute to the advancement of the discipline. On the other hand, they suggested that they would use an LIS collaboratory to aid patrons to a much higher degree than for finding and sharing data collection instruments for themselves.

### **6.2.1. MEDIAWIKI AS PROTOTYPE COLLABORATORY PLATFORM**

During the prototype collaboratory design phase, a review of software for implementing the prototype collaboratory resulted in choosing the MediaWiki software. MediaWiki offers high flexibility in creating a design that fits the purposes of an LIS collaboratory and the needs of potential collaboratory actors (see Paper III for details). For example, through use of *extensions* to the MediaWiki software, information about the most downloaded data collection instruments and most commented data collection instruments can be displayed on the main page.

Apart from the vast opportunities for flexibility, another advantage of MediaWiki is that it offers a well-known and familiar interface for Wikipedia users. This could possibly make it easier to use for the study participants in the evaluation study than having to learn a completely new interface for a wiki. While the study participants were familiar with Wikipedia, none of them had experience of adding content to wikis. One of the tasks of the think aloud sessions consisted of sharing a data collection instrument to the prototype collaboratory, which required the study participants to use wiki markup to format text, links etcetera. Even though some of the study participants had experiences with HTML coding and using web publishing tools, all of them found it difficult to work with wiki markup. None of the study participants were particularly discouraged due to their first experience of adding content to the prototype collaboratory; they were in agreement that they would get over the learning curve (the time and effort required to learn a new ICT tool) quickly and then be able to provide content without hassles.

### **6.2.2. ENGLISH AS PROTOTYPE COLLABORATORY LANGUAGE**

The prototype collaboratory language is English, to reflect the idea of a globally accessible LIS collaboratory. The global perspective was important in the recruitment of study participant for the interviews in Study II, and the study participants resided in countries in Asia, Australia, Europe, and North America. In the prototype collaboratory evaluation study, the study participants were narrowed down to librarians working in Sweden. The study participants were asked to share and describe a questionnaire formulated in Swedish to the prototype collaboratory, and to provide

information among other things about the creator, the purpose of the study, and publications based on the questionnaire. The study participants did not receive any instructions about which language to use, so the choice was entirely up to them. Three of five study participants chose to describe the questionnaire in Swedish, and the remaining two chose English.

One of the three study participants who chose to provide information in Swedish reflected upon the language choice: “if I did a Swedish survey, I’d want Swedish communication. But if I were a researcher, I think I’d have a different focus. Like [the creators of the questionnaire they submitted to the prototype collaboratory] probably want to share in Sweden where we have the same type of users and the same requirements and needs first and foremost. Then, if someone wants to publish or move forward, that’s a completely different issue.”

While all of the study participants read English texts and work with English language ICT tools and databases regularly, they stated that there was a big leap from reading to producing English content themselves, especially since there was a translation task involved. The difficulties encountered in producing content in English were explained by a study participant: “I work with English all the time. But... I read English, I don’t write English”.

In the next chapter, the results are discussed using the social actors model, the online community life-cycle model, and related research, to understand the results from multiple perspectives.

# 7. DISCUSSION

The aim of this research was to explore the benefits, facilitators, and challenges of an LIS collaboratory as a way to facilitate collaboration within the LIS community. The prototype collaboratory designed and evaluated is part of the research and design process, as well as the results, and is a way to explore how collaboration can be facilitated in an interdisciplinary social science discipline. The results thereby contribute to the body of research on collaboratories and scientific collaboration by investigating collaboration among a diverse target audience, i.e. LIS students, professionals and researchers.

This research can be said to bridge the socio-technical gap (Ackerman, 2002) which causes “the great divide between what we know we must support socially and what we can support technically” (Ackerman, 2002, p. 180). This has been accomplished by getting to know potential LIS collaboratory actors with respect to their current practices and perceptions of new ways of working with data collection instruments; and by designing and implementing a prototype collaboratory based on previous research and empirical data specifically about members of the LIS community.

The results of the four studies show that the design of a collaboratory needs to capture the practices of the LIS community concerning creating, sharing, using, and reusing data collection instruments. Across the empirical studies, it is evident that there are benefits to sharing and reusing data collection instruments, particularly for furthering the quality and speed of LIS research. However, there is a gap between the common good for the discipline and the perceived benefits for individuals. For an LIS collaboratory of the type suggested in the thesis to be adopted and used by the LIS community, the benefits for the individuals need to be higher than the costs of use, including time, effort, risks of competition and the learning curve for getting to know a new tool.



To connect to the aim of the thesis, i.e. to explore how collaboration can be facilitated in LIS, the following sections discuss the results of the four studies in light of their implications for facilitating collaboration in LIS. The discussions are carried out in three sections. First there is a discussion on the implications for the LIS discipline when new ways of working with data collection instruments would need to be introduced. Second, the implications of addressing needs of a diverse target audience are discussed. Third, the design of an LIS collaboratory is discussed, including perspectives on creating versus supporting communities; rewarding contributions; and ensuring quality content in a collaboratory.

## **7.1. IMPLICATIONS FOR THE DISCIPLINE**

From the start of this research, an important – and valid – question has been present: Does the research involve designing something for a discipline that does not want it? The short answer is theoretically, yes, but empirically no.

Theoretically, attempting to facilitate and stimulate collaboration via an LIS collaboratory is a bad idea and will probably fail, because of the disciplinary characteristics of LIS including its interdisciplinarity, and because LIS does not have a highly collaborative culture as a starting point. As stated in Chapter 2, the low mutual dependence and high task uncertainty (Whitley, 2000) of LIS militates against scientific collaboration on a grand scale. Further arguments against a successful collaboratory in LIS stem from the theory of remote scientific collaboration (TORSC) framework (Olson et al., 2008). In particular, the success factor relevant for the thesis is collaboration readiness. Collaboration readiness brings up some of the disciplinary characteristics described by Whitley (2000), such as a naturally collaborative culture, but Olson and colleagues (2008) also list the fact that participants in a collaboratory trust each other and “have their best interests at heart” (Olson et al., 2008, p. 80). Having other actors’ interests at heart represents the particulars of the TORSC framework, namely that to a large extent it builds on research on major collaborative initiatives, such as national infrastructures. Therefore, the literature review conducted during the understanding needs phase of the research project (Paper I) fulfilled an important role in bringing in perspectives from fields other than research on scientific collaboration and collaboratories. Although LIS as a whole does not display the typical characteristics of a successfully collaborative discipline, some research areas may display these characteristics and be more amenable to collaboration. These research areas display a high mutual dependence and low task uncertainty, such as information retrieval.

In favour of the potential of facilitating and stimulating collaboration in LIS in the TORSC framework (Olson et al., 2008) is the fact that in initiatives such as an LIS collaboratory focused on data collection instruments active participation would come from individual actors themselves, and not be motivated by external factors such as actors' organizations or funding agencies.

Empirically, the results suggest that an LIS collaboratory and the central activities of sharing and reusing data collection instruments would be welcome, particularly for supporting the discipline and for supporting learning of LIS research methodology. It should be noted though, that a positive attitude from a community is not enough to ensure adoption and use of a collaboratory to facilitate collaboration (Finholt, 2002). Designing to support the work practices of the target group is therefore vital (Finholt, 2002; Olson et al., 2008). However, the starting point of this research project has not been to support existing collaboration, but rather to explore if an LIS collaboratory can be a trigger and facilitate and stimulate new collaboration. In this perspective, new ways of working would need to be developed, including changes to the academic reward system to accommodate research resources such as data collection instruments and data sets.

With a view to developing and supporting new ways of working with research resources, i.e. sharing and reusing, the results indicate a complex relationship between researchers wanting to support LIS, and wanting to control how one's resources are used and career direction. Also, researchers expressed hesitancy over sharing and reusing data collection instruments within a collaboratory setting, while they expressed many positive aspects of using an LIS collaboratory in their teaching. A possible consequence of this tension between their roles as researchers and teachers is that students may learn that sharing and reusing is only important during their education and not in a professional or academic position. Thus, if researchers are not actively supporting sharing and reusing resources, they communicate to their peers and students that these activities are not worthwhile doing for their research. Of course, such activities cannot and should not be imposed on actors, but it is still a scenario and a consequence worth considering.

A feasible way of initiating new ways of working more collaboratively in LIS could be to start in an educational setting. For one, teachers showed positive attitudes towards teaching students about LIS methodology by using an LIS collaboratory to find and share data collection instruments. Also, students showed positive attitudes towards finding data collection instruments that they could use in their masters' and Ph.D. thesis work. By supporting

students in using an LIS collaboratory in course work and thesis work, they may bring these practices into their professional settings, identification through learning that sharing and reusing resources are customary activities in LIS. It would also contribute to giving legitimacy to using an LIS collaboratory to share and find data collection instruments, which connects to the environments dimension of the social actors model (Section 3.2). It is also in line with the TORSC framework (Section 3.3) of creating successful collaboration facilities, in particular in view of the importance of technology readiness, which in this case corresponds to setting the groundwork for agreement in the LIS community about which platform to use for sharing data collection instruments.

Another implication of the results for the LIS discipline is related to the academic reward system. The results show that the current lack of academic rewards for sharing data collection instruments are seen as discouraging by the interviewed researchers. This is a confirmation of the findings of the literature review of the understanding needs phase (Paper I), which further suggested that broadening the academic reward system to include other rewards than publication and citation counts may take time to achieve. The challenges of getting researchers to share data sets have similarly been discussed (Borgman, 2007). Researchers are also being forced to share their data even though they may find it problematic, as funding agencies, governments and scholarly journals require them to share their data. These extrinsic incentives to share may potentially create a habit of sharing resources which could benefit disciplines in the long run, even though the idea of an LIS collaboratory builds on voluntary sharing based mostly on intrinsic motivations.

## **7.2. IMPLICATIONS OF A DIVERSE TARGET AUDIENCE**

The starting point of this section is the third research question “How can the social actors model and the online community life-cycle model contribute to the understanding of the perceptions and practices related to data collection instruments and a potential LIS collaboratory?”, focusing in particular on the social actors model (Section 3.2).

As stated, and as supported by the findings of the empirical studies, the target audience for an LIS collaboratory is diverse concerning professional roles and types of organizations. Because of the diverse target group, it is even more important to understand the current practices of the LIS

community, to accommodate actors who have different roles in different types of organizations. The aim of the social actors model corresponds very well to these needs, as discussed in Section 3.2. However, the data from the empirical studies turned out to be too complex to provide a stringent conceptualization of the potential collaborative actors. In view of the broadly defined target group, it added more dimensions to an already complex research aim. To clarify, the dimensions causing the complexity include the diverse target group (including different educational and professional roles in academia and other types of organizations); including many LIS research methods (represented by study participants with experiences of at least interview guides, questionnaires or experiments); and the global perspective on LIS (including study participants from four continents, which could mean differences in national culture, native and working languages). In all, this makes up a very complex data set which does not allow a neat fit into theoretical categories. From a design perspective, it is vital that an LIS collaboratory supports the culture, languages and communication styles of the actors (as found and discussed in Paper I). Therefore, a discussion of the findings in relation to the social actors model is carried out in this section.

It is clear that different groups see different facilitators, challenges and benefits of an LIS collaboratory. A pattern that emerged from the data is that a particular actor may have different motivations depending on their professional role. This became evident with researchers who, as stated, saw many challenges with sharing, but who saw many and only benefits of using an LIS collaboratory for teaching their students about LIS methods. Also, librarians saw different benefits of using an LIS collaboratory for helping others than for themselves. Librarians also stressed that they would need to ask their managers for time to use an LIS collaboratory, as it would not be part of their typical work tasks, which is in line with previous research on professionals' motivations for conducting or not conducting research (Haddow & Klobas, 2004; Hall, 2010; McBain, Culshaw & Walkley Hall, 2013). This was not an issue with any other group of study participants.

Including LIS professionals as collaborative actors was a novel approach according to the literature review (Paper I). The results showed that there are many differences in the type of work, the professional roles and organizational contexts of LIS professionals and academics. LIS professionals reported that their organizations stipulate how actors should work in more detail than actors in academia; are not as used to creating research content and sharing it; and are worried that the quality of their data

collection instruments may not be good enough compared to researchers' resources. These results are in line with the results of Axelsson, Spante and Sonnenwald's (2006) study of library managers' perceptions of an LIS collaboratory (Section 2.2) which showed that managers of small libraries were unsure if they had anything to offer larger libraries, and that managers of public libraries stated the same hesitations in relation to research libraries.

This tension between researchers and LIS professionals, and the difficulties that the hospital librarians had in describing some aspects of the survey in the evaluation study can be seen in light of the importance of common ground found in the literature review of the understanding needs phase (Paper I). It also relates to the identities dimension of the social actors model (Section 3.2), in that actors in a community may have different identities, including expert and novice in LIS research methods. If these identities are clarified in an LIS collaboratory, it may provide a context for actors and for the data collection instruments they share – information that can help other actors to determine whether a data collection instrument is suitable for a study or not. Forming identities in an LIS collaboratory could occur during the growth phase according to the online community life-cycle model (Section 3.3), when a set of actors continuously use the LIS collaboratory. So, despite challenges, it may still be worthwhile to include LIS professionals in an LIS collaboratory, with the right support for contributions, e.g. peer review to get quality suggestions, and actors providing rich information about data collection instruments to help others who may want to use it to determine its quality.

The different uses of an LIS collaboratory for librarians became evident in the follow-up interviews with the hospital librarians who had conducted tasks in the prototype collaboratory (Study IV). The hospital librarians saw the primary purpose of an LIS collaboratory as a tool for aiding patrons, to a much higher degree than using it for their own work. This result was not evident in the interviews in the first empirical study (Study II), the reasons being at least twofold. First, the study participants in Study II were recruited on the basis of their experiences with conducting studies using different types of data collection instruments. Secondly, the interview guide in Study II focused mostly on practices of creating, sharing, and reusing data collection instruments. Study IV, on the other hand, focused on the study participants' views and thoughts about the collaboratory prototype. The study participants were recruited on the basis of them having experiences of using collaborative technology, and not their experiences of creating, using and sharing data collection instruments. Comparing the results of the

studies creates a bigger picture regarding the purposes and potential uses of an LIS collaboratory from the LIS professionals' perspective. The study participants in Study IV also suggested the following purposes for an LIS collaboratory: to help other collaboratory actors, to interact with collaboratory actors, and for rewarding actors' activities by offering feedback on data collection instruments shared by actors, which corresponds to the results of a "gift-culture" culture (Ponti, 2010a) and discussions on reciprocity in online communities (Paper I). These results are a contribution to research on collaboratories, as the new group of professionals has been added to the target audience of a collaboratory.

A challenge for librarians in both empirical studies was to find time and be allowed to use a collaboratory by their managers. This was exclusively discussed by librarians, and not by any other LIS professionals or career or educational level. In the TORSC framework, Olson and colleagues (2008) suggest that having time to conduct collaborative work is important to scientists. The difference between the TORSC framework and the results of this research project may be explained by the difference in TORSC's focus on tightly coupled activities, versus this project's focus on sharing and reusing data collection instruments which is a loosely coupled activity.

To connect to the findings (Chapter 6), the relation between benefits and challenges for an LIS collaboratory was synthesized as: "A LIS collaboratory would be great for LIS as a discipline, but I am not sure I want to actively contribute". This statement reflects the socio-technical approach to actors discussed in Chapter 3.1; one way for people to affect ICTs is to not use them, or to be clear about what needs to be in place for them to consider adding another ICT to their work.

### **7.3. IMPLICATIONS FOR AN LIS COLLABORATORY DESIGN**

This section and its subsection discuss the findings in relation to the research question "How can the social actors model and the online community life-cycle model contribute to the understanding of the perceptions and practices related to data collection instruments and a potential LIS collaboratory?", particularly focusing on the online community life-cycle model (Section 3.3).

Overall, the findings of the four studies support the user-centred approach to designing an LIS collaboratory prototype, as does the TORSC framework (Olson et al., 2008) and the online community life-cycle model (Iriberry &

Leroy, 2009). The findings indicate that it is important for an LIS collaboratory to thoroughly ensure quality data collection instruments, and that contributions to an LIS collaboratory should be rewarded. The rewards differ among career and educational levels, and it is therefore necessary to cater to the needs of different roles of the target group to ensure broad adoption and use within the LIS community.

Technology readiness within the theory of remote scientific collaboration (TORSC) framework means that a collaboratory provides the functionality needed by the target audience, is easy to use, and provides benefits to the actors (Olson et al., 2008). Similarly, in Paper I, ease of use and as little effort as possible were found to be important for adoption and use of collaboratories, as time is scarce in research. The evaluation of the prototype collaboratory showed that the functionalities of the design fit the tasks carried out during the evaluation. However, the prototype collaboratory was not easy to use in one vital aspect, namely the requirement to use wiki markup to add descriptions about data collection instruments. While the study participants ensured that they would learn how to use wiki markup, it may be a demonstration of good will, more than the prototype collaboratory's actual ease of use. While this particular result has to do with the software chosen for the prototype collaboratory, and not with a particular prototype collaboratory design feature, it can be seen as an example of the success factor technological readiness within the TORSC framework. It also relates to lessons learned from previous collaboratories which have shown that even though the community for which a collaboratory is design is positive towards its adoption and use, it may fail because the technology does not fit the community (Finholt, 2002). Another possible, and probably complementary, explanation for the study participants' positive attitude towards learning to use wiki markup to master the prototype collaboratory has to do with the vast number of ICT tools people are used to encountering and learning to master in their professional roles (c.f. Söderström, 2010).

While ease of use and the right functionality are important factors for success, another factor is whether a new ICT tool gives enough value for the actors for the efforts and extra complexity added to their work. Stress and other psychological issues have increased dramatically since 1998, which Söderström (2010) explains as being due to an increasingly unhealthy digital work environment. This problem is said to be caused by a mismatch between what and how ICTs allow us to conduct work tasks, and what we need support with from ICTs to conduct our work tasks (Söderström, 2010).

Only one of the study participants across both empirical studies brought up the issue of yet-another-system to learn and master. However, it is a vital issue to consider whether an LIS collaboratory would potentially add to an unhealthy digital work environment. This aspect was also discussed by Axelsson, Sonnenwald and Spante (2006, p. 9), asking: “Is it possible to design a collaboratory which will not be a burden to its users, especially when most potential users seem to be overloaded with information already?”. From this it follows that an LIS collaboratory should be designed so that it fulfils what is needed from the design to prevent it from causing stress to the target audience. Another solution would be to use an existing established service for sharing and finding data collection instruments, such as a social networking site for researchers (e.g. ResearchGate), or a service for storing information about research projects (e.g. euroCRIS – Current Research Information System). Thus, while there seems to be potential for an LIS collaboratory (though based on the limited number of combined study participants in the empirical studies), it is vital that it supports people’s work, and does not interfere or require unreasonable amounts of time and effort that they could be used for other things.

The current prototype collaboratory development is at the creation stage according to the online community life-cycle model (Iriberry & Leroy, 2009), having gone through the growth phase determining goal and target audience, and a first iteration of a user-centred design process. To investigate the subsequent phases, i.e. growth, maturity, and sustainability/death, it is necessary to introduce the prototype collaboratory to actors on a larger scale. Doing that makes it possible to study how the actors shape the interactions and activities related to data collection instruments by using the collaboratory, and in the long-term perspective study whether the practices involving data collection instruments change.

### **7.3.1. CREATING VERSUS SUPPORTING COMMUNITIES**

Designing a tool for such a diverse target audience as the LIS community as a whole can be difficult, and, according to some research, not advisable. According to communities of practice research, as synthesized by Hara (2009), virtual communities of practice cannot, or at least should not, be pushed on a target audience. Rather, communities of practice should emerge and not be designed. Hara also points out that reviews of community of practice literature “generally should not be artificially designed” (Hara, 2009, p. 5). This means that this research project goes against research on how to design for successful adoption and use in this respect.



The motivation for choosing a diverse target audience nevertheless is to provide a facility for the *activities* concerning creating, sharing, using and reusing data collection instruments. Thus, the common denominator among LIS collaboratory actors is not who they *are*, i.e. their professional roles, but what they *do*. In this way, the idea of an LIS collaboratory is more related to online communities, in which actors gather around a topic or an activity. This relates to free/open source software development communities, which can be seen as semi-professional as they border on leisure activities but actors are using skills that are typically considered professional. From the perspective of online communities, creating a community can thereby be motivated.

A potential problem with adopting an online community approach to designing an LIS collaboratory is the focus that online communities have on designing for a sense of belonging (e.g. Iriberry & Leroy, 2009; Preece, 2000; as well as Paper I). A collaboratory for activities involving sharing data collection instruments that focuses too much on a sense of belonging may create a mismatch between what actors expect – a facility used in a (semi-) professional context – and an online community that may require actors to become active actors who are expected to continuously contribute in order to be accepted actors in the community. So, looking at the LIS collaboratory design process from a community of practice approach, the choice of designing for a target audience who does not typically communicate or collaborate may be criticized. However, the professional setting of the communities of practice definition by Hara (2009) is in agreement with the findings of the studies concerning different professional roles and organizations. Shifting the lens to an online community approach, an LIS collaboratory could be designed for a target audience that typically does not yet communicate or collaborate. However, the focus on creating a sense of belonging by contributing enough may demand too much of actors who wish to share or find data collection instruments sporadically.

For a future LIS collaboratory, developers could leave it to the actors to determine who the target groups are; as members come and go during an online community's life cycle (Iriberry & Leroy, 2009) there may be new directions concerning the purpose and the target audience of an online community.

### 7.3.2. REWARDING CONTRIBUTIONS

The empirical studies show the importance of rewarding actors for sharing data collection instruments and contributing to an LIS collaboratory. These rewards are of two types: collaboratory specific (rewards for being active in the collaboratory), and discipline specific (the academic reward system in LIS). Thus, rewards need to be considered for the particular ICT design, and for the discipline. The activities concerning collaboratory involvement include being active by interacting with other actors and commenting on shared data collection instruments, contributing data collection instruments, and reviewing data collection instruments for a peer review section. The disciplinary specific rewards concern rewards that can be helpful for career advancements, similarly to publications and citations being rewards for academic achievements. In this section, the ICT, or collaboratory specific aspects are discussed, while Section 7.1 has discussed the disciplinary implications of new ways of working.

As discussed in Section 7.2, this research involves a diverse target audience. With diverse professional roles come diverse rewards for contributing to a collaboratory. In order for a collaboratory to be useful and attractive to broad groups of actors, investigating and implementing rewards need to be further taken into account in future iterations of the design process. The online community life-cycle model (Iriberry & Leroy, 2009) emphasizes rewarding contributions and volunteering; in their review of online community research Iriberry and Leroy (2009) found that rewarding contributions and giving recognition to active actors increase the content created by online community actors. The literature review (Paper I) mainly focused on rewards connected to research and career advancement, but also included that designing for a sense of belonging to a community can lead to use of a collaboratory over time. This includes reciprocal actions, such as gift-giving, making new actors feel welcome, and volunteering to handle administrative activities.

As most of the results of the empirical studies focused on disciplinary and career advancement rewards, it is not possible to draw any conclusion regarding the rewards for collaboratory activities. A speculation, however, is that if the academic career advancement aspects are not important to an actor, the rewards of the collaboratory become more important. In other words, for actors who are not mainly interested in citation and publication metrics, the motivations for active involvement given by the community of peers in the collaboratory may be important motivations. On the other hand,

initiatives combining traditional academic rewards with online community rewards have been introduced, specifically the RG Score system used by the social network site ResearchGate (ResearchGate Digital Team, 2012). The RG Score is made up of all types of contributions that a researcher makes to the network, including publications, data, followers, and number of questions posed and answered. This creates a holistic metric for the actors' activities and contributions, meaning that the higher the score, the more status the actor has. So, novel types of rewards and recognitions, in combination with traditional ones might be a way to include a broad and diverse target audience.

### **7.3.3. ENSURING QUALITY DATA COLLECTION INSTRUMENTS**

Research on scientific collaboration (e.g. Olson et al., 2008; Paper I) stresses the importance of trust for remote collaboration to work. For an LIS collaboratory, the most important aspect of trust seems to concern the quality of the data collection instruments. The empirical studies suggest that there are several aspects of quality concerns of data collection instruments, including that errors might be reproduced and that data collection instruments are used erroneously.

Scientific collaboration research that investigate large-scale, perhaps nationwide or global, research infrastructures put little focus on providing quality resources, whereas economic, social and technical aspects are more prominent (e.g. Olson et al., 2008; Sonnenwald, 2007). Therefore, this research project contributes to the body of research on a smaller scale of collaborative efforts, as the focus is on sharing a particular type of resource. To provide further contrast, Ponti's (2010a) study of research-practice collaborative projects may be characterized as small-scale collaborative projects, in which a set of people collaborate during a limited time. This research project therefore lands somewhere in between these two, and may perhaps be characterized as a mid-scale or mid-range collaborative effort. In this capacity, the research can contribute with perspectives on quality of resources for scientific collaboration research irrespective of the scale of the object of study.

# 8. CONCLUSIONS

The aim of the thesis was to explore how collaboration can be facilitated within the LIS community by means of an LIS collaboratory. This was studied through activities relating to data collection instruments – creating, sharing, using and reusing data collection instruments – and the design of a prototype collaboratory for sharing and finding data collection instruments.

From a theoretical standpoint, the characteristics of LIS speak against increased scientific collaboration, the interdisciplinarity being a major challenge as there are multiple takes on what to do research on, and how. However, the empirical data show that the study participants are positive towards more sharing and reuse of data collection instruments, and towards a collaboratory for handling these activities.

The first two research questions, which had an empirical focus, are synthesized below. This is followed by a discussion on the third, theoretically focused research question, tying them together. The first two research questions were:

- (1) What do members of the LIS community perceive to be benefits, facilitators, and challenges for an LIS collaboratory?
- (2) What are the current attitudes towards and practices of creating, sharing, using and reusing data collection instruments of members of the LIS community?

The empirical data corresponding to these two questions are closely related, as the attitudes and practices of creating, sharing, using and reusing data collection instruments is thought to be carried out in an LIS collaboratory.

The opportunities to contribute to the greater good of LIS constitute a major benefit for scientific collaboration found in the data. The perceived challenges were more focused on individuals, and more diverse, which can

be seen as a reflection of the diversity of the target group LIS students, professionals and researchers. For an LIS collaboratory to be successful, the benefits for the individual actors need to be higher than the drawbacks. Most facilitators suggested concern rewards for sharing, in the context of a collaboratory community as well as incorporating sharing and reuse of data collection instruments in the academic reward systems. It is also clear that the benefits, facilitators and challenges differ between professional roles and organizational contexts. Study participants active in academia focused on traditional scholarly rewards, such as citations, and ways of alleviating competitive elements of sharing resources. Whereas students and LIS professionals generally expressed that they would not need any academic rewards, LIS professionals, on the other hand, stressed that they would need time to use a collaboratory, which needs to be mandated by their managers.

The third, theoretically focused, research question was:

- (3) How can the social actors model and the online community life-cycle model contribute to the understanding of the perceptions and practices related to data collection instruments and a potential LIS collaboratory?

The empirical material turned out to be too complex to categorize neatly into the dimensions of the social actors model. The complexity can be explained by the study participants belonging to different professional roles and different types of organizations, as well as different subfields of LIS, and working in different countries. This creates a very broad and diverse data set that provides many new questions to investigate further, whereas it does not allow for generalizations about the LIS community.

The online community life-cycle model has contributed with a design framework focused on the social interaction among actors in a collaboratory. The research presented in the thesis can be described as being at the creation stage according of the online community life-cycle model, as determining the goal and target audience has been conducted. A next step in a design process would be to introduce the prototype collaboratory to potential actors, and see how it evolves when actors share, find, and reuse data collection instruments. Within the framework of a user-centered design process, the research can be seen as having gone through a first iteration that can give information for further design efforts.

The theoretical models, seen together, verify the difficulties when dealing with a too complex target group for design. The online community life-cycle

model stresses the need for a clearly defined target group, and the social actors model can aid in characterizing different roles in the LIS community to direct design efforts at particular roles of the target group.

An LIS collaboratory would introduce new ways of working with data collection instruments in LIS. One way of introducing such new ways is to incorporate sharing and reusing data collection instruments in LIS education. Students may critique data collection instruments in research methods courses, or build on existing data collection instruments in their thesis work. Possibly, actors who are used to sharing and reusing data collection instruments in an educational setting would continue these practices in their professional roles, whether it is as LIS professionals or researchers. The findings of the first empirical study indicate that students were very positive towards sharing and reusing data collection instruments, but that there were some uncertainties among them whether it was allowed to use existing data collection instruments. Although researchers stressed the challenges of sharing and reusing, in their role as teachers they were very positive towards using an LIS collaboratory in LIS education. Hence, two of the identified roles in an LIS collaboratory would benefit from this suggestion, and could contribute to new ways of working in a long-term perspective. This would contribute to legitimacy both for an LIS collaboratory and for reusing and sharing data collection instruments, in accordance with the environments dimension of the social actors model (Section 3.2).

The results suggest new ways of working and conducting research across distances and in doing so other types of collaboration could be facilitated. The results may also be applicable to other disciplines that have characteristics in common with LIS, including being of relatively young age, interdisciplinary, small in size, and having limited research funding. Disciplines that use data collection instruments similar to those used in LIS could also benefit from these results, to initiate and facilitate sharing. The thesis can also expand the notion of the typical collaboratory actors, from only researchers to other professions who work with research related activities. The next section elaborates on the questions raised during this research, formulated as suggestions for future research.

## 8.1. FUTURE RESEARCH

The studies and the synthesis of the results have given rise to questions that could be pursued in further research. They include the diversity of the LIS community, the prototype collaboratory usability; and the thesis's topic related to research on big data. Each of these questions is discussed in this section.

The target group for an LIS collaboratory is more diverse than what was captured in the empirical studies. Considering that a potential LIS collaboratory would be globally accessible, it is relevant to point to the fact that important aspects have not been investigated in the studies. LIS papers written by authors from high-income nations and Northern Europe are more likely to be cited, and papers written by authors from East Asia, Southeast Asia and Southern Europe are less likely to be cited (Sin, 2011). In the literature review (Study I), the focus on publications in English is evident when looking at the reference list. The first empirical study provided wider perspectives, as the study participants were working in several different countries on four continents. In the second empirical study, the group of Swedish study participants were confronted with an English language prototype collaboratory, which caused some challenges in completing the tasks. To stress a globally accessible and usable collaboratory, it is important to further explore the different circumstances and contexts of the LIS community on a global scale. This could be seen as an attempt to bridge "geographies of invisible colleges" as described above concerning the likeliness of papers to be cited depending on the nations of the authors (see Sin, 2011, p. 1780). Another aspect of the diversities has to do with the organizational contexts and professional roles of actors working in LIS. The prototype collaboratory can be designed and evaluated further to capture the needs of particular, specific roles of the target group, e.g. students on undergraduate levels; school librarians, or experts in research methods. Using the same data collection instruments and data analysis instruments across studies focusing on different roles of the target group can build a data set that we can learn more about the LIS community from if shared in a collaboratory.

Implementing a more intuitive WYSIWYG (What You See Is What You Get) interface for interacting with the prototype collaboratory would affect the usability. Consequently, further evaluation could focus more on the prototype collaboratory interface. Another solution would be to try out other software that offers a more suitable interface both for reading and

submitting data. Also, a longitudinal perspective on this research is possible, observing what happens when the prototype collaboratory is freely available. This allows for evaluations, modifications and further design based on naturalistic usage data.

During the process of writing the thesis, visions of the opportunities for doing research on big data sets have developed, particularly in the last couple of years. All the opportunities inherent in these huge data sets also come with challenges that need to be taken into account and handled, e.g. which questions to ask, which analysis tools to use, and metadata management. The issues and proposed solutions, and lessons learned from sharing and reusing big data would be interesting to compare and contrast to the thesis's focus on data collection instruments. Finally, there is value in comparing the findings in this research on collaboratories in other social science disciplines, and research areas that are interdisciplinary in nature.



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## APPENDIX 1A. ENGLISH REQUEST FOR INTERVIEW, STUDY II

Dear [Name]

My name is Monica Lassi, and I am a PhD student at the Swedish School of Library and Information Science (SSLIS) in Borås, Sweden. My advisors are Diane Sonnenwald, who is also at SSLIS, and Jussi Karlgren at the Swedish Institute of Computer Science (SICS).

The topic of my dissertation concerns developing a socio-technical design of a collaboratory for data collection instruments used in LIS. I am studying the current practices of LIS research, such as how LIS researchers choose and evaluate data collection instruments for their research. I also intend to explore what would motivate researchers to share their data collection instruments within a collaboratory/repository for other researchers to use. Interviewing you would be a very valuable contribution to my dissertation, considering your experience and expertise in LIS research.

Would you have time for an interview [at suggested time and place, in most cases a conference]? The interview will take approximately 30 to 60 minutes. Any day during the [conference] works for me, as does before or after the conference, in case you plan to spend a few extra days in [city]

Please let me know me if you agree to an interview, via and we can decide on a specific day and time when the conference starts in [month]

Best regards, Monica Lassi

[Original contact information omitted in the thesis]

## **APPENDIX 1B. SWEDISH REQUEST FOR INTERVIEW, EXAMPLE, STUDY II**

Hej!

Jag är doktorand på BHS, och inom ramen för mitt avhandlingsprojekt så intervjuar jag bibliotekarier och B&I-forskare och -studenter angående användning av verktyg för insamling av data. Jag har fått tips om att du [details about person's experience of LIS data collection instrument(s) omitted in the thesis], och undrar om du skulle kunna tänka dig att träffa mig för en intervju om dina erfarenheter.

En intervju tar 30-60 minuter och rör hur man använder datainsamlingsverktyg; om man brukar använda redan existerande eller föredrar att skapa nya; hur man ser på att dela med sig av verktyg man skapat själv m.m.

Hälsningar Monica Lassi

## APPENDIX 2. CONSENT FORM, STUDY II

This study is part of a research project leading to a dissertation, titled “A collaboratory for Library and Information Science data collection instruments : A socio-technical design”. The purpose of the study is to find out which socio-technical factors that could affect the adoption and use of a collaboratory for data collection instruments used within Library and Information Science (LIS). Important topics of the study concerns how LIS researchers and information professionals find and use data collection instruments, and which potential benefits and challenges of sharing data collection instruments that can be seen.

The dissertation project is performed at the Swedish School of Library and Information Science at Göteborg University and University College of Borås, Sweden. My primary supervisor is Professor Diane Sonnenwald at the Swedish School of Library and Information Science. My secondary supervisor is assistant professor Jussi Karlgren at the Swedish Institute of Computer Science.

As a participant, you will be interviewed during 30 to 60 minutes. The interview will be taped, transcribed and analyzed by Monica Lassi.

Thank you for your willingness to participate in this study. Your participation is very much appreciated. I would like to assure you that as a participant you have the following rights:

- Your participation in this study is entirely voluntary.
- The taped interview and the transcript of the interview will be kept strictly confidential.
- Excerpts of the data may be made part of research reports/papers and presentations but under no circumstances will your name or identifying characteristics be included in the reports and presentations.

If you have additional questions about the study, you may contact:

[Original contact information omitted in the thesis]

Please sign and date this form to show that you have read it, or that I have read it to you. You will receive a copy for your records.

Thank you very much.

\_\_\_\_\_

\_\_\_\_\_

Participant

Date

Research investigator

Date

Please print your name: \_\_\_\_\_

# APPENDIX 3A. ENGLISH INTERVIEW GUIDE, STUDY II

Interview guide for the dissertation project “A collaboratory for Library and Information Science data collection instruments: A socio-technical design”,  
Monica Lassi

## Introduction

- Thank you for agreeing to the interview
- Short information about the project
- Contact information

## Background questions

- Could you tell me a bit about the kind of research you do, in particular which kinds of data collection instruments you use in your research?
- How do other people classify your research area? What terms would they use?
- Would you classify it the same way? What terms would you use?

## Constructing new, vs. using existing, instruments

- How do you decide on whether to use an existing instrument instead of creating a new one?
- What benefits do you see with using already existing instruments?
- What problems/challenges do you see with using already existing instruments?
- (*Would you say that you usually construct your own instruments or use already existing?*)

## Sharing instruments

- What benefits do you see with sharing your instruments with other LIS researchers? (*with people you do not know in person*)
- What problems/challenges do you see with sharing your instruments with other LIS researchers?

- How do you think those problems can be counterbalanced?  
(*counteracted/work-arounds/solutions/advantages that could balance out the problems*)
- Are there any sub-disciplines of LIS that you think could have particular benefits or problems with sharing?

### **A case**

- If you think of the last time, or a time that comes into mind, when you have used someone else's data collection instrument for a research project...
  - How did you find the instrument?
  - Do you have any thoughts on how that process could have been made more efficient (*easier/better*) for you?
- If you think of the last time, or a time that comes into mind, when you have constructed your own data collection instrument for a research project...
  - What motivated you to use the instrument?
  - What kind of information would you want to have about it beforehand?

### **Searching for instruments**

- Do you think that there are any particular controlled vocabularies (*or classification systems*) of LIS that could be used to describe the different methodologies and data collection instruments of LIS?
- Would you consider a folksonomy as an alternative or complement to a controlled vocabulary? (*which lets the members tag their own and other people's instruments, together creating a vocabulary*)

### **Conclusion**

- Do you have any questions for me?
- Thank you very much!

# APPENDIX 3B. SWEDISH INTERVIEW GUIDE, STUDY II

## Introduktion

- tack för att du ställer upp på denna intervju
- kort information om projektet
- kontaktinformation

## Bakgrundsfrågor

- kan du berätta för mig om den typ av forskning/undersökningar som du brukar göra, speciellt hur du har använt eller brukar använda datainsamlingsverktyg?
- Hur tror du att andra skulle klassificera din forskning/dina undersökningar? vilka termer skulle de använda?
- Skulle du klassificera din forskning på samma sätt? vilka termer skulle du använda?

## Att konstruera vs. att använda redan existerande verktyg

- Hur går du till väga för att bestämma dig för om du ska använda ett redan existerande verktyg eller att skapa ett nytt verktyg?
- Vilka fördelar ser du med att använda ett redan existerande verktyg?
- Vilka problem/utmaningar ser du med att använda redan existerande verktyg?
- *(skulle du säga att du oftast skapar egna verktyg eller använder redan existerande?)*

## Dela med sig av verktyg

- vilka fördelar ser du med att dela med dig av dina instrument till andra forskare, studenter och bibliotekarier? *(med människor du inte känner)*
- vilka problem/utmaningar ser du med att dela med dig av dina verktyg till andra?
  - o Vad tror du kan uppväga de problemen?

- Är det några speciella fält inom B&I som du tror kan ha speciella fördelar eller problem med att dela med sig av insamlingsverktyg?

### **Ett exempel**

- Om du tänker på den senaste gången, eller en gång du kommer att tänka på, när du har använt någon annans datainsamlingsverktyg för en undersökning...
  - o Hur hittade du verktyget?
  - o Har du några funderingar kring hur processen skulle ha kunnat göras mer effektiv för dig?
- Om du tänker på den senaste gången, eller en gång du kommer att tänka på, när du har konstruerat ett datainsamlingsverktyg för en undersökning...
  - o Vad motiverade dig att använda verktyget?
  - o Vilken typ av information skulle du velat ha om verktyget i förhand?

### **Söka verktyg**

- Tror du att det finns något särskilt kontrollerat vokabulär för B&I som skulle passa bra för att beskriva olika metoder och datainsamlingsverktyg inom B&I?
- Skulle du kunna tänka dig en folksonomi som ett alternativ eller komplement till ett kontrollerat vokabulär? (*vilken låter medlemmar tagga/klassificera sina egna och andras insamlingsverktyg, så att man skapar en vokabulär tillsammans*)

### **Till sist**

- Har du några frågor som du vill ställa till mig?
- Tack så mycket!



## APPENDIX 4. CODING SCHEME, STUDY II

Code name	Usage
CaseCreatedNew	The study participant describes an instance of having created a new data collection instrument.
CaseUsedExisting	The study participant describes an instance of having used an existing data collection instrument.
CreatingBenefits	Benefits of creating new data collection instruments.
CreatingProblems	Problems with creating new data collection instruments.
LIS	Utterances relating to the LIS discipline.
Requirements Collaboratory	Utterances that are directly related to design requirements of a LIS collaboratory, e.g. using a search feature.
SharingBenefits	Benefits of sharing data collection instruments.
SharingProblems	Problems with sharing data collection instruments.
UsingExisting Benefits	Benefits of using existing data collection instruments.
UsingExisting Problems	Problems with of using existing data collection instruments.
UsingExisting Selecting	How the study participant goes (or would go) about selecting an existing data collection instrument.
Vocabulary	Utterances relating to LIS vocabulary, e.g. use of thesauri or tagging features.

## APPENDIX 5. MEDIAWIKI SETTINGS, STUDY III

```
<?php

# This file was automatically generated by the MediaWiki
installer.
# If you make manual changes, please keep track in case
you need to
# recreate them later.
#
# See includes/DefaultSettings.php for all configurable
settings
# and their default values, but don't forget to make
changes in _this_
# file, not there.
#
# Further documentation for configuration settings may
be found at:
#
http://www.mediawiki.org/wiki/Manual:Configuration\_settings

# If you customize your file layout, set $IP to the
directory that contains
# the other MediaWiki files. It will be used as a base
to locate files.
if( defined( 'MW_INSTALL_PATH' ) ) {
    $IP = MW_INSTALL_PATH;
} else {
    $IP = dirname( __FILE__ );
}

$path = array( $IP, "$IP/includes", "$IP/languages" );
set_include_path( implode( PATH_SEPARATOR, $path ) .
PATH_SEPARATOR . get_include_path() );

require_once( "$IP/includes/DefaultSettings.php" );

# If PHP's memory limit is very low, some operations may
fail.
ini_set( 'memory_limit', '20M' );

if ( $wgCommandLineMode ) {
    if ( isset( $_SERVER ) && array_key_exists(
'REQUEST_METHOD', $_SERVER ) ) {
        die( "This script must be run from the
command line\n" );
    }
}
```

```

}

## Uncomment this to disable output compression
# $wgDisableOutputCompression = true;

$wgSitename          = "LIS Collaboratory";

#----- No robot -----
$wgDefaultRobotPolicy = 'noindex,nofollow';

#----- Logo -----
$wgStylePath    = "/skins/";
$wgLogo         =
"{ $wgStylePath }/common/images/logo.jpg";

#----- UseCategoryBrowser at bottom of each page -----
$wgUseCategoryBrowser = true;

## The URL base path to the directory containing the
wiki;
## defaults for all runtime URL paths are based off of
this.
## For more information on customizing the URLs please
see:
## http://www.mediawiki.org/wiki/Manual:Short_URL
$wgScriptPath      = "";
$wgScriptExtension = ".php";

## UPO means: this is also a user preference option

$wgEnableEmail      = true;
$wgEnableUserEmail  = false; # UPO

$wgEmergencyContact = "monica.lassi@hb.se";
$wgPasswordSender   = "monica.lassi@hb.se";

$wgEnotifUserTalk = false; # UPO
$wgEnotifWatchlist = false; # UPO
$wgEmailAuthentication = false;
#ShowUpdatedMarker requires EmailAuthen=true:
#$wgShowUpdatedMarker = true;

## Database settings
$wgDBtype          = "mysql";
$wgDBserver        = "localhost";
$wgDBname          = "wikidb";
$wgDBuser          = "wikiuser";
$wgDBpassword      = [omitted in thesis];

```

```

# MySQL specific settings
$wgDBprefix          = "";

# MySQL table options to use during installation or
update
$wgDBTableOptions    = "ENGINE=InnoDB, DEFAULT
CHARSET=binary";

# Experimental charset support for MySQL 4.1/5.0.
$wgDBmysql5 = true;

## Shared memory settings
$wgMainCacheType = CACHE_NONE;
$wgMemCachedServers = array();

## To enable image uploads, make sure the 'images'
directory
## is writable, then set this to true:
$wgEnableUploads      = true;
# $wgUseImageMagick = true;
# $wgImageMagickConvertCommand = "/usr/bin/convert";

## If you use ImageMagick (or any other shell command)
on a
## Linux server, this will need to be set to the name of
an
## available UTF-8 locale
$wgShellLocale = "en_US.utf8";

## If you want to use image uploads under safe mode,
## create the directories images/archive, images/thumb
and
## images/temp, and make them all writable. Then
uncomment
## this, if it's not already uncommented:
# $wgHashedUploadDirectory = false;

## If you have the appropriate support software
installed
## you can enable inline LaTeX equations:
$wgUseTeX              = false;

$wgLocalInterwiki      = strtolower( $wgSitename );

$wgLanguageCode = "en";

$wgSecretKey =
"79c3360435f16f07eb872f2fad470d7dc3bcf7cc99bc630447b9002
b7ab90741";

```

```

## Default skin: you can change the default skin. Use
the internal symbolic
## names, ie 'standard', 'nostalgia', 'cologneblue',
'monobook':
$wgDefaultSkin = 'monobook';

## For attaching licensing metadata to pages, and
displaying an
## appropriate copyright notice / icon. GNU Free
Documentation
## License and Creative Commons licenses are supported
so far.
# $wgEnableCreativeCommonsRdf = true;
$wgRightsPage = ""; # Set to the title of a wiki page
that describes your license/copyright
$wgRightsUrl = "";
$wgRightsText = "";
$wgRightsIcon = "";
# $wgRightsCode = ""; # MediaWiki comment: Not yet used

$wgDiff3 = "/usr/bin/diff3";

# When you make changes to this configuration file, this
will make
# sure that cached pages are cleared.
$wgCacheEpoch = max( $wgCacheEpoch, gmdate( 'YmdHis',
@filemtime( __FILE__ ) ) );

#-----
#----- File types -----
#-----
$wgFileExtensions = array('ps', 'svg', 'txt', 'pdf',
'doc', 'docx', 'xls', 'png', 'gif', 'jpg', 'jpeg');

#-----
#----- Extra Namespaces Instruments + -----
#----- SocialProfile etc -----
#-----

#----- Instruments namespaces-----
# Instruments are currently in the Main namespace. I
think it might be difficult to understand
# the namespace concept for people who are not used to
MediaWiki and that it might make it more difficult to
use the wiki.
#define("Instrument",100);
#define("Instrument_talk",101);
#$wgExtraNamespaces[100] = "Instrument";

```

```

#$wgExtraNamespaces[101] = "Instrument_talk";

#----- SocialProfile nameSpaces -----
/*define("SocialProfile",110);
define("SocialProfile_talk",111);
$wgExtraNamespaces[110] = "SocialProfile";
$wgExtraNamespaces[111] = "SocialProfile_talk";
*/

#----- Protect namespaces-----
#$wgNamespaceProtection[100] = Array("editfoo");    ???
What goes in the array??
$wgNamespacesWithSubpages[100] = true;
$wgGroupPermissions['*']['Instrument'] = false;
$wgGroupPermissions['sysop']['Instrument'] = true;

#----- Users -----
$wgAllowRealName = true;
$wgDisableAnonTalk = true;
$wgInvalidUsernameCharacters = true; #MediaWiki says it
might not be totally stable
$wgNewUserLog = true;

#----- Searching -----
$wgEnableMWSuggest = true;

#-----
#----- Extensions -----
#-----

#----- Contributors - is this necessary -----
----- when i've got DynamicPageList? -----
require_once("extensions/Contributors/Contributors.php")
;

#----- GoogleSiteSearch -----
#If a page doesn't exist, there's no link from the
search result to Create new page. So I went back to
original search function
#require_once("extensions/GoogleSiteSearch/GoogleSiteSea
rch.php");

#----- TagAsCategory-----
require_once("extensions/TagAsCategory/TagAsCategory.php
");

#----- DynamicPageList -----
require_once("extensions/DynamicPageList/DynamicPageList
2.php");

```

```

#----- Create Box -----
require_once("extensions/CreateBox/CreateBox.php");

#----- SocialProfile -----
require_once("extensions/SocialProfile/SocialProfile.php");
$wgUserProfileDisplay['friends'] = true;
$wgUserProfileDisplay['foes'] = false;
$wgUserBoard = true;
$wgUserProfileDisplay['board'] = true;
$wgUserProfileDisplay['stats'] = true; # keep this or
not?: "To enable per-user statistics that show up on the
profile pages"
$wgUploadAvatarInRecentChanges = false;
$wgUpdateProfileInRecentChanges = true;

#----- NewUserMessage-----
include("extensions/NewUserMessage/NewUserMessage.php");
require_once("extensions/DiscussionThreading/DiscussionThreading.php");

#----- Category Tree -----
$wgUseAjax = true;
require_once("extensions/CategoryTree/CategoryTree.php");
;
$wgCategoryTreeMaxDepth = array(CT_MODE_PAGES => 7,
CT_MODE_ALL => 7, CT_MODE_CATEGORIES => 7);

#----- UsageStatistics -----
#fick lite krångel efter installation - kolla upp!!
Problem: edit About Collaboratory Prototype: save --> en
helt vit sida laddas. Edit av andra sidor har dock
funkat...
#require_once("extensions/UsageStatistics/SpecialUserStats.php");
#$wgUserStatsGoogleCharts = 1;

#----- ShareThis -----
#Activate closer to launch - or switch to AddThis.
#require_once('extensions/ShareThis/ShareThis.php');
#$wgShowShareThisSidebar = true;

#-----
----- User permissions etc -----
#-----
# Keep at bottom of file

# Pages anonymous user may see as an array, e.g.:

```

```

# array ( "Main Page", "Wikipedia:Help");
# Special:Userlogin and Special:Resetpass are always
whitelisted.
# NOTE: This will only work if
$wgGroupPermissions['*']['read']
# is false -- see below. Otherwise, ALL pages are
accessible,
# regardless of this setting.
# Also note that this will only protect _pages in the
wiki_.
# Uploaded files will remain readable. Make your upload
# directory name unguessable, or use .htaccess to
protect it.

$wgWhitelistRead = false;

/**
 * Should editors be required to have a validated e-mail
 * address before being allowed to edit?
 */
$wgEmailConfirmToEdit=false;

// Most extra permission abilities go to this group
$wgGroupPermissions['sysop']['block'] = true;
$wgGroupPermissions['sysop']['createaccount'] = true;
$wgGroupPermissions['sysop']['delete'] = true;
$wgGroupPermissions['sysop']['bigdelete'] = true;
// can be separately configured for pages with >
$wgDeleteRevisionsLimit revs
$wgGroupPermissions['sysop']['deletedhistory'] = true;
// can view deleted history entries, but not see or
restore the text
$wgGroupPermissions['sysop']['undelete'] = true;
$wgGroupPermissions['sysop']['editinterface'] = true;
$wgGroupPermissions['sysop']['editusercssjs'] = true;
$wgGroupPermissions['sysop']['import'] = true;
$wgGroupPermissions['sysop']['importupload'] = true;
$wgGroupPermissions['sysop']['move'] = true;
$wgGroupPermissions['sysop']['move-subpages'] = true;
$wgGroupPermissions['sysop']['move-rootuserpages'] =
true;
$wgGroupPermissions['sysop']['patrol'] = true;
$wgGroupPermissions['sysop']['autopatrol'] = true;
$wgGroupPermissions['sysop']['protect'] = true;
$wgGroupPermissions['sysop']['proxyunbannable'] = true;
$wgGroupPermissions['sysop']['rollback'] = true;
$wgGroupPermissions['sysop']['trackback'] = true;
$wgGroupPermissions['sysop']['upload'] = true;
$wgGroupPermissions['sysop']['reupload'] = true;

```



```

$wgGroupPermissions['sysop']['reupload-shared'] = true;
$wgGroupPermissions['sysop']['unwatchedpages'] = true;
$wgGroupPermissions['sysop']['autoconfirmed'] = true;
$wgGroupPermissions['sysop']['upload_by_url'] = true;
$wgGroupPermissions['sysop']['ipblock-exempt'] = true;
$wgGroupPermissions['sysop']['blockemail'] = true;
$wgGroupPermissions['sysop']['markbotedits'] = true;
$wgGroupPermissions['sysop']['apihighlimits'] = true;
$wgGroupPermissions['sysop']['browsearchive'] = true;
$wgGroupPermissions['sysop']['noratelimit'] = true;
$wgGroupPermissions['sysop']['movefile'] = true;
#$wgGroupPermissions['sysop']['mergehistory'] = true;
$wgGroupPermissions['sysop']['createaccount'] = true;
$wgGroupPermissions['sysop']['edit'] = true;
$wgGroupPermissions['sysop']['read'] = true;
$wgGroupPermissions['sysop']['createpage'] = true;
$wgGroupPermissions['sysop']['createtalk'] = true;
$wgGroupPermissions['sysop']['minoredit'] = true;
$wgGroupPermissions['sysop']['userrights'] = true;

/**
 * Permission keys given to users in each group.
 * All users are implicitly in the '*' group including
anonymous visitors;
 * logged-in users are all implicitly in the 'user'
group. These will be
 * combined with the permissions of all groups that a
given user is listed
 * in in the user_groups table.
 *
 * Functionality to make pages inaccessible has not been
extensively tested
 * for security. Use at your own risk!
 * * This replaces wgWhitelistAccount and
wgWhitelistEdit
 */
// Implicit group for all visitors
$wgGroupPermissions['*']['createaccount'] = true;
$wgGroupPermissions['*']['edit'] = true;
$wgGroupPermissions['*']['read'] = true;
$wgGroupPermissions['*']['createpage'] = true;
$wgGroupPermissions['*']['createtalk'] = true;
$wgGroupPermissions['*']['minoredit'] = true;
$wgShowIPinHeader = false; #hide user tools for
anonymous (IP) visitors:

# logged-in users
$wgGroupPermissions['user']['move'] = true;
$wgGroupPermissions['user']['move-subpages'] = true;

```

```
$wgGroupPermissions['user']['move-rootuserpages'] =
true; // can move root userpages
//$wgGroupPermissions['user']['movefile']          = true;
    // Disabled for now due to possible bugs and
security concerns
$wgGroupPermissions['user']['read']                = true;
$wgGroupPermissions['user']['edit']                = true;
$wgGroupPermissions['user']['createpage']          = true;
$wgGroupPermissions['user']['createtalk']          = true;
$wgGroupPermissions['user']['writeapi']            = true;
$wgGroupPermissions['user']['upload']              = true;
$wgGroupPermissions['user']['reupload']            = true;
$wgGroupPermissions['user']['reupload-shared']     = true;
$wgGroupPermissions['user']['minoredit']           = true;
$wgGroupPermissions['user']['purge']               = true;

#----- Detailed debugging info-----
$wgShowExceptionDetails = true
```

## APPENDIX 6A. ENGLISH TASK DESCRIPTIONS, STUDY IV

### Task 1

- Your task is to create an account to make you a member of the collaboratory.
- When your account has been created you will get a confirmation and a message from the collaboratory.
- The task is completed when you have read the message.

### Task 2

- Your task is to find an interview protocol in the collaboratory.
- When you have found the interview protocol: make a comment about it in the collaboratory, e.g. a question, a compliment, or that you wish to use it in your own study.
- The task is completed when your comment has been saved in the collaboratory.

### Task 3

- Your task is to share a survey created for [the name of the organization omitted in the thesis].
- Start by reading the survey.
- Then share the survey in the collaboratory and input the information about the survey that you deem relevant.
- The URL that you can use to link to the survey is [URL omitted in the thesis].
- The task is completed when the information you have shared has been saved in the collaboratory.

# APPENDIX 6B. SWEDISH TASK DESCRIPTIONS, STUDY IV

## Arbetsuppgift 1

- Din uppgift är att skapa ett konto som gör dig till medlem i kollaboratoriet.
- När ditt konto har skapats får du en bekräftelse på detta, samt ett meddelande i kollaboratoriet.
- Uppgiften är avslutad när du har läst meddelandet.

## Arbetsuppgift 2

- Din uppgift är att leta upp ett intervjuprotokoll (*interview protocol*) i kollaboratoriet.
- När du hittat protokollet ska du lägga in en kommentar om det i kollaboratoriet, t.ex. en fråga, en komplimang, eller att du önskar att använda dig av protokollet i en egen studie.
- Uppgiften är avslutad när din kommentar har sparats i kollaboratoriet.

## Arbetsuppgift 3

- Din uppgift är att dela med dig av en enkät gjord på uppdrag av [the name of the organization omitted in the thesis].
- Börja med att läsa igenom enkäten.
- Dela sedan med dig av enkäten i kollaboratoriet och lägg in den information om enkäten som du bedömer som relevant.
- Den URL som kan läggas in som länk till enkäten är [URL omitted in the thesis]
- Uppgiften är avslutad när informationen du lagt in har sparats i kollaboratoriet.

# APPENDIX 7A. ENGLISH OBSERVATION PROTOCOL, STUDY IV

Observation protocol for task 1

Based on use case 1: Joining the Collaboratory and Creating a Collaboratory Profile.

Step 2b in the use case, *The actor fills in additional information*, is not included in the task, and has been removed in the observation protocol.

P1 = study participant, I = investigator

Note that quotes may not be word-for-word, but freely taken during the think aloud session as aids for the follow-up interview.

<i>Step 1) The actor accesses the collaboratory's home page and is met by a notification that they need to become a member to access and use the collaboratory.</i>
[Space for notes]
<i>Step 2) The actor chooses to become a member and creates a member profile.</i>
<i>Step 2a) The actor fills in the required information.</i>
[Space for notes]
<i>Step 3) The actor is notified that they have successfully joined the collaboratory.</i>
[Space for notes]

## APPENDIX 7B. SWEDISH OBSERVATION PROTOCOL, STUDY IV

Observationsblankett arbetsuppgift 1

Baserad på use case 1 Joining the Collaboratory and Creating a Collaboratory Profile

Steg 2b i use caset, The actor fills in additional information, ingår inte i arbetsuppgiften, varför detta steg tagits bort i observationsblanketten.

D1 = deltagaren, S = studieledaren

Notera att citat inte nödvändigtvis är ordagrant återgivna, utan spontant nedtecknade i samband med tänka-högt som stöd inför den uppföljande intervjun.

<i>Step 1) The actor accesses the collaboratory's home page and is met by a notification that they need to become a member to access and use the collaboratory.</i>
[Utrymme för anteckningar]
<i>Step 2) The actor chooses to become a member and creates a member profile.</i>
<i>Step 2a) The actor fills in the required information.</i>
[Utrymme för anteckningar]
<i>Step 3) The actor is notified that they have successfully joined the collaboratory.</i>
[Utrymme för anteckningar]

## APPENDIX 8A. ENGLISH INTERVIEW GUIDE, STUDY IV

### Question 1

- The idea of the collaboratory is that students, researchers and professionals in Library and Information Science can share and use other people's surveys, interview guides etc. What is your view of this idea?
- What is your view of this idea from the perspective of your work as a librarian?

### Question 2

- The collaboratory has an international focus, and consequently the language of the content is in English. What do you think about the content being in English?
- (If negative response, ask: 'How much would the English matter for your decision to become a member of a future collaboratory or not?' In that case it could be relevant to ask question 8 too, though I would rather pose that one last.)

### Question 3

- In the second task you were asked to comment on an interview guide that somebody else had shared in the prototype. What do you think about the possibility of commenting and discussing each other's work in the collaboratory?

### Question 4

- In the final task that you conducted, when you shared a survey in the prototype, you got to a page where you could provide metadata about the survey, from who had created it, to finally providing a link to the survey. Is there any metadata that you find unnecessary? Why?
- Is there any metadata that you think is important to provide that was missing?

### Question 5

- Is there any feature that you did not encounter in the prototype that you think could be useful in a future collaboratory?

### Question 6

- What is your opinion on the feature that allows you to connect different types of intellectual property rights to data collection instruments that you share in the collaborative?
- Do you think you would use such a feature? Why/Why not?

#### Question 7

- Do you think it is important that contributors to the collaborative, who share their data collection instruments and opinions, get some sort of acknowledgement or reward for their efforts? Why/Why not? (If they answer yes, ask: 'What do you think could constitute such acknowledgements or rewards?')

#### Question 8

- Would you consider joining the collaborative if it became real? Why/Why not? (If not: 'Is there anything that could make you reconsider' (might be better design, language, demands from employer etc.)



## APPENDIX 8B. SWEDISH INTERVIEW GUIDE, STUDY IV

### Fråga 1

- Grundidén bakom kollaboratoriet är att studenter, forskare och yrkesverksamma inom biblioteks- och informationsvetenskap ska kunna dela med sig av och ta del av andras enkäter, intervjuguides m.m. Hur ser du på den grundidén?
- Hur ser du på grundidén utifrån ditt arbete som bibliotekarie?

### Fråga 2

- Kollaboratoriet har en internationell inriktning varför texten i prototypen är på engelska. Hur tänker du kring att texten är på engelska?
- (Om "negativ" respons, fråga "Hur stor betydelse har engelskan för om du skulle gå med i ett framtida kollaboratorium eller inte?". I så fall kan vara lämpligt att ta fråga 8 också, även om jag helst vill ställa den sist. )

### Fråga 3

- I den andra arbetsuppgiften fick du lägga in en kommentar kring en intervjuguide som någon annan lagt in i prototypen. Hur ser du på att man öppet kan kommentera och diskutera varandras arbeten i kollaboratoriet?

### Fråga 4

- I den sista arbetsuppgiften som du genomförde när du lade in en enkät i prototypen så kom du in på en sida där du fick lägga in metadata om enkäten, allt från vem som hade skapat den till att slutligen lägga in en länk till själva enkäten. Är det någon av dessa metadatauppgifter du tycker är onödig? Varför?
- Finns det någon metadatauppgift du tycker att man borde kunna fylla i som saknas?

### Fråga 5

- Finns det någon funktion som du inte stött på i prototypen som du tänker skulle vara värdefull att ha med i ett kommande kollaboratorium?

### Fråga 6

- Vad tycker du om funktionen att man kan koppla olika former av skydd av intellektuell äganderätt till datainsamlingsverktyg som man lägger in i kollaboratoriet?
- Tror du att du själv skulle använda dig av en sådan funktion? Varför/Varför inte?
- Tror du att bibliotekarier i allmänhet skulle använda sig av en sådan funktion? Varför/Varför inte?

### Fråga 7

- Tycker du att det är viktigt att den som bidrar till kollaboratoriet genom att dela med sig av sina datainsamlingsverktyg och synpunkter får någon form av erkännande eller belöning för det? Varför? Om varför: Vad skulle ett sådant erkännande eller belöning kunna bestå av? Varför inte?

### Fråga 8

- Skulle du kunna tänka dig att gå med i kollaboratoriet om det blev verklighet? Varför? varför inte? Om varför inte: Finns det något som skulle kunna få dig att ändra inställning?  
*(Här kan det handla om bättre design, språk, krav från arbetsgivare m.m.)*

# APPENDIX 9A. ENGLISH CONSENT FORM, STUDY IV

Informed consent for participation in a study evaluating a prototype for a collaboratory for Library and Information Science.

## **What is the research project about?**

At the Swedish School of Library and Information Science, Monica Lassi is conducting a research project about the potential of a digital platform, a so called collaboratory, where researchers, students and librarians/information specialists can share and exchange experiences about data collection instruments, i.e. surveys, interview guides, logging software etc. A web based prototype has been designed, as a draft for a potential collaboratory. As part of Haidi Emanuelsson's master thesis project, an evaluation of the prototype will be conducted in collaboration with Monica Lassi and under the supervision of professor Elena Maceviciute.

## **What are my tasks as participant in the study?**

As a participant in the study you will:

1. Fill in a form about your practices of using different types of web based services.
2. Conduct some predetermined tasks in the prototype as you talk aloud about your thoughts about it. This will be audio recorded and screen captured.
3. Be interviewed. This will be audio recorded.

The total time for the study will be maximum two hours.

## **What are my rights as a participant?**

Participation in the study is voluntary. Even if you have started participating, you can at any time stop your participation.

The collected data will be handled and archived to ensure that your personal information is not available to others. What you say and do in the study will be anonymized in the report and any future texts, so that neither your identity nor your place of work will be connected to the texts.

## **Questions about the study**

If you have further questions about the study, please contact:

[Original contact information omitted in the thesis]

With my signature I confirm that I have read the information about the study given above, and that I consent to participate.

Participant's signature      Date                      Investigator's signature      Date

Thank you for your participation! It is valuable for the continued development of the laboratory.

# APPENDIX 9B. SWEDISH CONSENT FORM, STUDY IV

Informerat samtycke till deltagande i studie om utvärdering av prototypen för ett kollaboratorium inom biblioteks- och informationsvetenskap

## Vad omfattar forskningsprojektet?

Vid Bibliotekshögskolan i Borås bedriver Monica Lassi ett forskningsprojekt om förutsättningarna för en digital plattform, ett så kallat kollaboratorium, där forskare, studenter och bibliotekarier/informationsspecialister kan dela med sig av och utbyta erfarenheter kring verktyg för att samla in data, d.v.s. enkäter, intervjuguider, mjukvara för loggning av webbdatabaser m.m. En webbaserad prototyp som är ett utkast till ett tänkt kollaboratorium har tagits fram. Inom ramen för Haidi Emanuelssons masteruppsats kommer en utvärdering av prototypen att göras i samverkan med Monica Lassi och under handledning av professor Elena Maceviciute.

## Vilka uppgifter har jag som deltagare i studien?

Som deltagare i studien kommer du att:

1. Fylla i en enkät om din vana att använda olika typer av webbaserade tjänster.
2. Genomföra vissa på förhand bestämda arbetsuppgifter i prototypen samtidigt som du berättar högt om vilka tankar du har. Ljudinspelning och inspelning av datorskärmen kommer att ske.
3. Bli intervjuad. Ljudinspelning kommer att ske.

Den totala tiden för studien kommer att ta maximalt två timmar.

## Vilka är mina rättigheter som deltagare?

Deltagande i studien är frivilligt. Även om du påbörjar studien kan du när som helst avbryta din medverkan.

Det insamlade materialet kommer att hanteras och bevaras på ett sådant sätt att dina personliga uppgifter inte sprids vidare. Det du säger och gör i studien kommer att avidentifieras i kommande rapport, och övriga eventuella texter, så att varken din person eller arbetsplats kommer att kunna kopplas till texterna.

## Frågor om studien

Vid ytterligare frågor om studien kan du kontakta:

[Original contact information omitted in the thesis]

Med min underskrift bekräftar jag att jag tagit del av ovanstående informationen om studien och att jag samtycker till att delta.

Deltagarens  
underskrift

Datum

Studieledarens  
underskrift

Datum

Tack för din medverkan! Den är betydelsefull för laboratoriets fortsatta utveckling.

## **APPENDIX 10A. ENGLISH ANALYSIS THEMES, STUDY IV**

You get to know a system by using it

English as a challenge

Jargon as a challenge

Trying to log in before having created an account

The metadata page is confusing to go into

No information from the system regarding why comments are not saved

Lots of information

Location of link to the survey

Location of the new comment feature

Different needs and conditions for different target groups

Mixing languages as a challenge

Difficult mark-up language on the metadata page

Difficulty knowing what is required for different headings on the metadata page

## **APPENDIX 10B. SWEDISH ANALYSIS THEMES, STUDY IV**

Använder man ett system så lär man sig det

Engelska som hinder

Fackspråk som hinder

Försök till inloggning innan skapat ett konto

Förvirrande att komma in på metadatasidan

Inget besked från systemet om varför kommentarer inte sparas

Mycket information

Placering av länk till enkäten

Placering av funktionen för ny kommentar (new)

Skilda förutsättningar för målgrupperna

Språkblandning som hinder

Svårjobbat markupspråk på metadatasidan

Svårt att veta vad som efterfrågas under olika rubriktexter på metadatasidan