

# **Actors in Collaboration**

**Sociotechnical Influence on Practice-Research Collaboration**

**Marisa Ponti**

Borås

Valfrid

2010

# Abstract

There has long been a concern about the research-practice gap within Library and Information Science (LIS). Several authors have highlighted the disconnection between the world of professional practice, interested in service and information system development, and the world of the academy, focused on the development of theory and the progress of the discipline. A virtual organization, such as a collaboratory, might support collaboration between LIS professionals and academics in research, potentially transforming the way research between these two groups is undertaken.

The purpose of this study was to examine how sociotechnical aspects of work organization influence the initiation, development, and conclusion of collaboration between LIS academics and professionals in distributed research projects. The study examined how three collaborative projects developed from the start to completion in two countries, Italy and another European country. The analysis aimed at deriving implications for the further development of theory on remote scientific collaboration.

The research design, data collection, and data analysis were informed by Actor-Network-Theory (ANT), in particular by Callon's model of translation of interests. Qualitative interviews and analysis of literary inscriptions formed the key sources of data for the three case studies. ANT was used to conceptualize collaboration as a process of negotiation of interests and construction of outcomes, which entailed the continuous engagement of people, artifacts, and practices.

The analysis of how and why collaborations between LIS academics and professionals initiated and developed revealed that the initial motivation to pursue collaboration has to do with the lack of economic and organizational resources on either or both sides, and with a genuine interest in a topic by both academics and professionals. The case studies in this study were decentralized and bottom-up projects in which LIS academics and professionals pursued collaborative research because they had a genuine interest in a given topic and not because they were mandated by their employers, or they hoped to be acknowledged and promoted by them on the basis of their participation in the project. Market conditions and/or institutional pressures did not exert much influence on the start and development of these collaborations, although one project was influenced by political considerations and funding conditions in healthcare.

In order to start collaboration, the analysis showed the importance of previous ties between information professionals and LIS academics. The networks individuals are embedded in influenced the formation of collaborative research projects by providing opportunities and resources needed to form ties. Through shared past experiences and personal relationships participants developed mutual trust and transactive knowledge about each other's knowledge, expertise, methods, working styles, available time and commitment. All these resources enabled people to start a collaboration without taking much risk initially, and were critical when economic and organizational resources

were scarce. An implication of this finding is that starting collaborations between previously unconnected individuals could be difficult.

On the question of what sociotechnical aspects influence how LIS academics and information professionals initiate, develop and conclude collaboration, and how these influence processes play out, this study found that lack of institutional resources and interest and presence of gift-culture seemed to have influenced the bottom-up process of mobilization of people and other resources characterizing the projects. Lack of institutional interest in the projects and cumbersome mechanisms to access funding drove participants to rely on resources “at hand” and to draw from previous contacts and available technological facilities. In the Italian projects, high transaction costs imposed by the university grant application process led people to volunteer to start and develop collaborations on a self-selected topic of shared interest. Transaction costs were thus reduced by deploying collaborations within self-managed contexts that required minimal individual transactions to carry out the project. Spurred by the lack of institutional commitment, the three projects shared some traits of commons-based peer-production. In fact, in all the three projects access to, and use of, resources were symmetrical and resources were shared, either freely or conditionally, and remained available to all the project participants at their discretion. In Italy, the presence of a “professor’s privilege” system enabled flexibility for individuals to greatly determine the creation and fate of their intellectual property and allowed to reward the contributions of all participants, which was important in projects with no external funding.

Self-interest was not the main driver of project participants, although the researcher had the opportunity to collect data for a publication and the professional enjoyed inexpensive help to study a practical problem. Rather gift-culture was an important aspect and people were mainly driven by intrinsic interests. Furthermore, the three projects were based on autonomous initiatives on self-selected topics of interest. This autonomy gave rise to decentralized project organizations that did not rely on formal structures of coordination. The dominance of a gift-culture supported this decentralization making external controls and extrinsic rewards unnecessary to manage the “tensions” between individual self-interest and willingness to contribute to a collaborative endeavor.

The patterns emerged from the findings of the three cases underpin the development of a sociotechnical framework aimed at providing a better understanding of remote collaboration between academia and non-profit organizations not only in LIS but also in other fields affected by the research-practice gap.

Language: English, with summary in Swedish

Keywords: Actor-Network Theory; Collaborative Work; Information Science; Practice-Research Gap; Socio-Technical Paradigm; Virtual Organization

# Acknowledgements

The American writer Dorothy Parker is quoted as saying, “I hate writing, but love having written”. Unintentionally, she said it best for all the doctoral students who go through the hardships of academic writing but find ultimately their excruciating work rewarded by the written manuscript. Writing this thesis has been both a painstaking and enjoyable experience long three years. During this time, I have received the support of many people that I want to acknowledge and thank with sincere gratitude and appreciation.

First and foremost, I would like to thank my main supervisor Prof. Diane Sonnenwald for her expert guidance and mentorship. She helped clarify my thinking when it was convoluted, and honed my research skills by forcing me to probe things and not take them for granted. I also would like to thank my co-supervisor Prof. Olof Forsgren for his encouragement.

The Swedish School of Library and Information Science, the Center for Collaborative Innovation, and Bengt Hjelmqvists Stipendium supported me financially. For three years, they gave me the privilege to focus on, and be committed to, this work. I hope that the final product shows this dedication. The Swedish School of Library and Information Science has also provided me with a good environment to study.

I am grateful to all my doctoral colleagues for their good comments at internal seminars. I am especially grateful to my close friend and good colleague Nasrine Olson. Her friendship has been a great source of strength for me when I felt down and discouraged. Our chats, were they about academic stuff or about silly things, have always cheered me up. We have shared joys and frustrations. I look forward to sharing many other experiences together in the future!

My gratitude goes also to Dr. Pirjo Elovaara for helping me clarify theoretical points at my final seminar, and to Dr. Lars Selden and Prof. Elena Maceviciute for their comments on the final draft of this work.

Along the road, I have met two inspiring scholars. One is Dr. Fabian Muniesa from the Centre de Sociologie de l'Innovation, who helped me clarify my way through some insidious paths of actor-network-theory. I treasure his suggestion to stay open, polite and, above all, empirical, in my work. The other one is Prof. David Heise from Indiana University, who encouraged me to pursue my combination of actor-network-theory and event-structure analysis and gave me generous and insightful comments on my analysis.

My empirical work owes a great deal to all my study participants who are too many to mention here. I make particular mention of my project gatekeepers Emanuela Casson, Claudio Gnoli, and Riccardo Ridi in Italy, and Carla (pseudonym) in the other European country, for granting me access to data, reading, and giving me feedback on my interpretation of their collaborations.

Last, but surely not least, I wish to thank Gunther for his love, support, and encouragement. He surely deserves a special prize for enduring patiently my numerous requests for fixing diagrams and text formatting, and for translating the summary in Swedish together with the valuable help of Anders and Karin Wallby.

Finally, consistent with my actor-network approach, let me thank two critical non-human actors: my computer and actor-network-theory. The former behaved for long enough to finish this work without major problems. The latter has been an intellectual battle but rewarding.

# Table of Contents

<b>Actors in Collaboration</b>	<b>i</b>
<b>Sociotechnical Influence on Practice-Research Collaboration</b>	<b>i</b>
<b>Marisa Ponti</b>	<b>i</b>
<b>Abstract</b>	<b>ii</b>
<b>Acknowledgements</b>	<b>iv</b>
<b>Table of Contents</b>	<b>vi</b>
<b>List of Tables</b>	<b>x</b>
<b>List of Figures</b>	<b>xi</b>
<b>1 Introduction</b>	<b>12</b>
1.1 Bridging the Practice-Research Gap	12
1.2 Research Questions and Objectives	14
1.3 Motivations for This Study	15
1.4 LIS and e-Research for the Humanities and Social Sciences	16
1.5 A LIS Collaboratory as Virtual Community	19
1.6 Potential Benefits of a LIS Collaboratory	20
1.7 The Challenges to Building a Successful Collaboratory	21
1.8 Organization of the Thesis	21
<b>2 Analytic Framework: Actor-Network Theory</b>	<b>23</b>
2.1 Outline of the Approach	23
2.2 Collaboration as a Local Network in a Larger Network	26
<b>3 Literature Review: Overview and Criteria for Selection</b>	<b>32</b>
3.1 Purpose of the Review and Thesis Statement	32
3.2 Approach to Reviewing the Literature	32
<b>Literature Review Part A: Definitions and Basic Premises</b>	<b>35</b>
3.3 Concepts and Theories Underlying Research Collaboration	35
3.4 The Organizational Environment for Research Collaboration	39
3.5 Defining a Collaboratory	40
3.6 Summary	44

<b>Literature Review Part B: The Influence of Sociotechnical Aspects of Work on</b>	
<b>Research Collaboration</b>	<b>45</b>
3.7 Findings	45
3.8 Discussion	54
3.9 Conclusion	57
<b>4 Research Design</b>	<b>58</b>
4.1 The Use of ANT as a Methodology	58
4.2 Choice of the Case Study Methodology	61
4.3 Case Selection	62
4.4 Data Collection and Analysis	64
4.5 Discussion of Reliability and Validity according to Lincoln and Guba's Criteria	75
4.6 Limitations of This Study	77
<b>The Analysis of the Three Collaborative Projects: Description and</b>	
<b>Explanation</b>	<b>79</b>
<b>5 Project One: Description of Semantic OPACs 1</b>	<b>83</b>
5.1 SemOP1 Overview - Introducing the Actors	83
5.2 Foundation Stage: The Creation of a Negotiation Space	85
5.3 Formulation and Sustainment of Collaboration	91
5.4 Conclusion of Collaboration: The Role of Project Inscriptions	104
<b>6 The Sociotechnical Influence of Events, Actors and Networks in SemOP1</b>	<b>106</b>
6.1 ESA: SemOP1 List of Events and the Ethno Diagram	106
6.2 Project Institutionalization: The Difficult Relationships between Local and Larger Networks	114
6.3 Common Ground: The Role of Previous Ties in the Creation of the Local Network	118
6.4 Changing Traditional Educational Practices and Making Use of CSCL	119
6.5 Nature of Work and Collocated and Remote Collaboration in the Local Network	121
6.6 Incentives, Rewards and Voluntary Participation	122
6.7 Summary	123

<b>7</b>	<b>Project Two: Description of Semantic OPACs 2</b>	<b>125</b>
7.1	SemOP2 Overview - Introducing the Actors	125
7.2	Foundation Stage: The Creation of a Negotiation Space	126
7.3	Formulation and Sustainment of Collaboration	127
7.4	Conclusion of Collaboration: The Role of Project Inscriptions to Sustain the Project	140
<b>8</b>	<b>The Sociotechnical Influence of Events, Actors and Networks in SemOP2</b>	<b>143</b>
8.1	ESA: SemOP2 List of Events and the Ethno Diagram	143
8.2	Project Institutionalization: The Difficult Relationships between Local and Larger Networks	148
8.3	Common Ground: The Role of Previous Ties in the Creation of SemOP2	148
8.4	Nature of Work and Remote Collaboration in the Local Network	149
8.5	Incentives, Rewards, and Voluntary Participation	153
8.6	Self-Organization and Coordination Mechanisms	157
8.7	Summary	159
<b>9</b>	<b>Project Three: Description of Impact of Library Services on Patient Care</b>	<b>161</b>
9.1	IMPPRO Overview - Introducing the Actors	161
9.2	Foundation Stage: Mobilizing the Larger Network to Create a Negotiation Space	165
9.3	Formulation and Sustainment of Collaboration	172
9.4	Conclusion of Collaboration: The Toolkit as a Developing Infrastructure for Mobilization	189
<b>10</b>	<b>The Sociotechnical Influence of Events, Actors and Networks in IMPPRO</b>	<b>192</b>
10.1	ESA: IMPPRO List of Events and the Ethno Diagram	192
10.2	Project Institutionalization: the Difficulty of Connecting Local and Larger Networks	198
10.3	Cooperation, Remote Work and Collocated Work in the Local Network	200
10.4	The Role of Previous Ties in Starting the Local Network	204
10.5	Incentives and Rewards	204
10.6	Use of ICT and Intellectual Property	206
10.7	Summary	208



<b>11 Sociotechnical Framework and Propositions</b>	<b>210</b>
11.1 Introduction	210
11.2 Extension of Olson et al.'s TORSC	210
11.3 Propositions of the Study	221
11.4 Conclusion: The Difficulties of Building a Prescriptive Model of Collaboration	224
<b>12 Implications and Conclusions</b>	<b>226</b>
12.1 Key Research Findings	226
12.2 Implications for Theory Development	228
12.3 Implications for Design: Values for a LIS Collaboratory	228
12.4 Conclusions about the Research Problem	231
12.5 Suggestions for Further Research	232
12.6 Final Remarks: Challenges Ahead and Sustainability	233
<b>Svensk Sammanfattning</b>	<b>236</b>
<b>References</b>	<b>240</b>
<b>Appendix 1 – Call for Volunteers for a Pilot Study</b>	<b>258</b>
<b>Appendix 2 – Protocol for Selection and Use of Literary Inscriptions</b>	<b>260</b>
<b>Appendix 3 – Details on Interview Participants</b>	<b>261</b>
<b>Appendix 4 – Interview Guide to Project Participants</b>	<b>263</b>
<b>Appendix 5 – Working Framework for Coding Interviews and Literary Inscriptions</b>	<b>266</b>
<b>Appendix 6 – The Event Frame</b>	<b>268</b>
<b>Appendix 7 – Summary of Studies Included in the Literature Review</b>	<b>269</b>

# List of Tables

<b>Table 2-1</b> Summary of key concepts in ANT (Adapted from Lamb, 2006; Walsham, 1997).....	25
<b>Table 3-1</b> Different levels of collaboration and distinction between inter- and intra-organizations (Katz & Martin, 1997, p. 10).....	38
<b>Table 3-2</b> Stages of research collaboration (Sonnenwald, 2007).....	39
<b>Table 3-3</b> Seven types of collaboratories (Bos et al., 2007).....	43
<b>Table 3-4</b> Sociotechnical aspects grouped according to Olson et al. (2008).....	46
<b>Table 4-1</b> Summary of interviews.....	66
<b>Table 4-2</b> Data analysis process in Step One.....	69
<b>Table 4-3</b> Interpretation of ESA Concepts in ANT Terms.....	73
<b>Table 5-1</b> Human actors.....	84
<b>Table 5-2</b> Nonhuman actors and their project roles.....	85
<b>Table 5-3</b> SemOP1 Timeline.....	85
<b>Table 5-4</b> Human actors' main interests.....	92
<b>Table 5-5</b> Nonhuman actors' main interests.....	94
<b>Table 6-1</b> List of events in SemOP1.....	107
<b>Table 7-1</b> Human actors.....	125
<b>Table 7-2</b> Nonhuman Actors.....	126
<b>Table 7-3</b> SemOP2 Timeline.....	126
<b>Table 7-4</b> Human actors' main interests.....	127
<b>Table 7-5</b> Nonhuman actors' main interests.....	128
<b>Table 8-1</b> List of events in SemOP2.....	144
<b>Table 8-2</b> Motivations of individual participants in SemOP1 and SemOP2.....	156
<b>Table 9-1</b> Human actors.....	162
<b>Table 9-2</b> Nonhuman actors.....	164
<b>Table 9-3</b> IMPPRO timeline.....	164
<b>Table 9-4</b> Potential benefits deriving from the provision of health library services.....	167
<b>Table 9-5</b> Human actors' main interests.....	172
<b>Table 9-6</b> Nonhuman actors' main interests.....	174
<b>Table 10-1</b> List of events in IMPPRO.....	193
<b>Table 11-1</b> Sociotechnical aspects influencing practice-research collaboration (based on Olson et al. (2008).....	212

# List of Figures

<b>Figure 4-1</b> Building an actor-network (Adapted from Callon, 1986a) .....	61
<b>Figure 5-1</b> SemOP1 as an actor-network .....	100
<b>Figure 6-1</b> Ethno diagram of SemOP1 .....	113
<b>Figure 7-1</b> SemOP2 as an actor-network .....	132
<b>Figure 8-1</b> Ethno diagram of SemOP2 .....	147
<b>Figure 9-1</b> Organizational relations .....	167
<b>Figure 9-2</b> IMPPRO as an actor-network .....	181
<b>Figure 10-1</b> Ethno diagram of IMPPRO .....	197
<b>Figure 11-1</b> Representation of proposition 1 .....	222
<b>Figure 11-2</b> Representation of proposition 2 .....	222
<b>Figure 11-3</b> Representation of proposition 3 .....	223
<b>Figure 11-4</b> Representation of proposition 4 .....	223

# 1 Introduction

This thesis develops a sociotechnical framework that can extend our understanding of the role of sociotechnical aspects of work organization in shaping how and why LIS academics and information professionals choose to collaborate in small-scale, distributed, no-grant-funded or small grant-funded collaborative research projects. This introductory chapter sets out the research rationale behind this study of the influence of sociotechnical aspects on practice-research collaboration in a social science, outlines the purpose and significance of this study, and provides a brief summary of the organization of this thesis.

## 1.1 Bridging the Practice-Research Gap

Library and Information Science (LIS) is a field in which a wide gap between information professionals and LIS academics seems to exist because knowledge sharing and collaboration between the two groups is limited. There has been a long tradition of concern in librarianship that much of the research emanating from academia lacks relevance for day-to-day professionals (Johnson, Williams, Wavell, & Baxter, 2004; Booth, 2003; Bates, 1999). LIS is not alone in suffering the disconnect between research and practice. Almost all the fields including professionals and academics lament the same problem (Rynes, Bartunek, & Daft, 2001). Examples of these fields include education (Ketter & Stoffel, 2008), leadership studies (Ospina, Godsoe, & Schall, 2001), and guidance research (Brown, Bimrose, & Hughes, 2005). In all these fields, professionals do not seem to make good use of the available research as they find that it is either divorced from their areas of concern, or that the presentation impairs understanding and application. At the same time, even when basic research could be applied, it can be difficult for professionals to translate the research into practice (Bates, 1999).

In the field of LIS, some research projects in Australia and the UK have examined the relationships between professionals and researchers. For example, Middleton (2005) noted that the gap between the two groups is contributed to by issues including:

- The motivators are different – researchers must increasingly work within the framework of grants-awarding procedures, which can be subject to political agendas that may not suit the concerns of professionals.
- Professionals often wish to see ‘research’ into operational areas such as staffing or the improvement of procedures and services, which essentially require the application of management procedures rather than the application of new knowledge.

- Many of the immediate problems of practice may be addressed through consultancy and project management work, which may draw upon expertise of researchers, on a consultancy rather than research agenda basis.

Other studies exist (e.g., McNichol & Dalton, 2004) that highlight the different research priorities and the different problems faced by information professionals and LIS academics and outline a research agenda driven by specific problems identified by librarians and library administrators (Buckland, 2003). However, similarly to what happens in other fields affected by the same disconnect (Ospina, Godsoe, & Schall, 2001), many information professionals have increasingly acknowledged the importance of bridging the gap between research and practice and many LIS researchers are equally concerned with producing work that influences practice (Johnson, Williams, Wavell & Baxter, 2004). Collaborations between academics and professionals can increase research productivity and quality, whereas professionals also benefit from a closer partnership and stronger link between theory and practice (Ospina et al., 2001, p. 3).

The creation of a virtual research organization where academics and professionals can work together in joint-research projects can be seen as one strategy to support the development of this closer partnership and stronger link. However, there seems to be, at least in LIS, a shortage of studies exploring the needs and challenges concerning the creation of such organization. While it has been acknowledged that information professionals should engage more closely with researchers – in every subject field and discipline – to contribute to the development and management of virtual research organizations (Voss & Procter, 2009), the potential for this type of organization to engage information professionals and LIS academics in collaborative research does not appear to have been investigated. The results of a pilot study conducted in Sweden by Axelsson, Sonnenwald, and Spante (2006), which involved ten information professionals working in a range of settings including a large city public library and a small town public library, suggest that there is a need for collaboration between LIS academics and information professionals and for a virtual research organization such as a collaboratory (Wulf, 1989) to facilitate on-demand, personalized knowledge sharing.

Collaboration between information professionals and LIS academics can help bridge this gap, especially through forms of research collaboration that value knowledge and experience of all the participants and aim to help them incorporate the outcomes of joint-work in their respective activities. In such a form of collaboration, information professionals and LIS academics could assess and establish the value and the effectiveness of collaboration. A LIS collaboratory may become a boundary object (Star & Griesemer, 1989; Wenger, 1998), aiming to couple different partners, types of knowledge, levels of knowledge (theory-practice), and to become a mutual point of reference (Chrisman, 1999) for social interactions and activities.

## 1.2 Research Questions and Objectives

The purpose of this study was twofold: (a) examine how sociotechnical aspects of work organization influence the initiation, sustainment, and conclusion of collaboration between LIS academics and information professionals in distributed research projects, and (b) derive implications for the further development of theory on remote scientific collaboration. To achieve these objectives, the following research questions were addressed:

1. How and why are collaborations between LIS academics and information professionals initiated and developed?
2. What sociotechnical aspects of work organization influence how LIS academics and information professionals initiate, develop and conclude collaboration, and how these influence processes play out?

In order to answer these questions I analyzed the processes of formulation, sustainment, and completion of collaboration in three small-scale, distributed research projects. I studied how collaborations formed and evolved over time, how sociotechnical aspects influenced these projects over time, and how this influence could be explained. In this study, the use of the term “sociotechnical” refers to Bijker’s (1995, p.12) conception of technology and society as heterogeneous “socio-technological ensembles” which mutually constitute each other.

When addressing the two questions, this research has focused on: (a) collaborations between a social science discipline (LIS) and a professional practice that is traditionally nonprofit/public, and (b) collaborations across geographical and institutional boundaries where ICT plays a role. The overall research objective was as follows:

**RO1** Based on empirical studies of past or present collaborative research, contribute to a better understanding of collaboration between academia and non-profit organizations, and further develop the theory on remote scientific collaboration.

The construction of sustainable collaboration between practice and academia is increasingly important to help focus and enrich academic research, and to enable the dissemination and sharing of research results with practice. Therefore, it is necessary to understand the processes through which collaboration is initiated and sustained. The qualitative study of collaborative projects between academics and professionals described in this proposal is theoretically based on actor-network theory (ANT), drawing on Callon’s (1986a) model of translation of interests. Instead of assuming collaboration as an “end product” and looking at sociotechnical influences on it, ANT suggests that the researcher changes the temporal point of departure and studies collaboration “in the making”, as a process of construction. This choice implies that the researcher follows the characters involved in the process and reconstructs the network of events, decisions, practices, technological artifacts, and institutions surrounding the construction of collaboration. I conducted this exploration through three cases of collaboration

between LIS professionals and academics in Italy and in another European country. I argue that this is a promising way to understand the influence of sociotechnical aspects of work organization on the making of collaboration, by uncovering how these aspects were concretely organized, how they interplayed with other elements, and how they effected and affected collaboration. An in-depth understanding of these aspects and how they can be modelled is needed to advance collaboration between practice and research and to carry it out in a collaboratory when participants are distributed.

### **1.3 Motivations for This Study**

The two research questions are important because more research is needed on collaboration between information professionals and academics and on the possibilities to develop a collaboratory in LIS. There is a lack of studies of practice-research collaboration and prospective collaboratories in LIS. In fact, very little research on and development of collaboratories in the social sciences has been done insofar. For example, Sonnenwald, Lassi, Olson, Ponti, and Axelsson (2009) noted that no papers on collaboratories in the social sciences were presented at the most recent largest international conferences in this area, the ACM Computer-Supported Cooperative Work Conference '08 and ACM Group Conference '07, which together had a total of 163 papers. There were only two papers on VREs and collaboration in social science professions: one concerning collaboration in non-profit homeless outreach centers and one concerning the use of technology for non-profit fundraising. There were also no papers focusing on collaboration between social science academics and professionals (Sonnenwald et al., 2009).

With respect to the first question, a close examination of collaborative projects between information professionals and LIS academics is necessary to provide accounts of how sociotechnical aspects influence the formation, sustainment, and completion of such projects. This in-depth discipline-based analysis can highlight the contextual- and project-specific circumstances in which collaborations form and develop. This analysis has seldom occurred in LIS and has taken place primarily in the sciences. Consequently, studies of the artifacts, the associated practices, and the contextual sociotechnical influences in the social sciences and the humanities often are based on comparisons to the sciences (Borgman, 2007). Given the predominant focus on collaboratories in the sciences, it is arguable whether existing collaboratories and theories are applicable to the social sciences, in particular to library and information science research and professional practice (Sonnenwald et al., 2009). Therefore, specific prospects and challenges for a LIS collaboratory may benefit from considering disciplinary, cultural, and professional differences because every collaborative project is a contingent sociotechnical process involving negotiations between people, artifacts and technologies, each bringing different interests to bear (Lin, Procter, Halfpenny, Voss, & Baird, 2007). The contingency and situatedness of collaboration resonates with the idea that collaboratories – as well as any other technology – do not diffuse across academic fields but are shaped and adapted in each specific field, based on dif-

ferent research practices and interactions between people and tools (Beaulieu & Wouters, 2009).

With respect to the second question, the design and uptake of a LIS collaboratory that prospective participants are willing to use entails understanding sociotechnical aspects including use of technologies, working styles, and previous collaborative experiences, all of which influence the success of collaboration. Because development and use of a collaboratory are mutually shaping processes, it is important to study how people practice research in specific subject fields, and see what technologies they use and how they use them, their working culture, and their incentives and constraints, to understand the implications for the design and uptake of a collaboratory (Voss & Procter, 2009).

At present, most efforts are concentrated on technological development, but future initiatives aimed at creating collaboratories must pay equal or greater attention to social issues (OSI, 2006). A better understanding of how these sociotechnical aspects influence readiness of LIS academics and information professionals to take-up and engage in computer-mediated collaboration can improve our ability to design and develop a beneficial collaboratory in a more cost-effective manner.

An additional reason to undertake this study is the potential to shed insights into the practice-research gap in other fields outside LIS, where professionals and academics are interested in exploring and trying new approaches to co-produce knowledge.

## **1.4 LIS and e-Research for the Humanities and Social Sciences**

Over the last two decades, there has been an increasing interest in Europe, in the USA and in Australia in developing a cyberinfrastructure, that is, advanced information and communication technologies (ICTs), including computer “grids”, clouds, semantic technologies and advanced teleconferencing systems, among others, to support innovative research practices in different subject fields (Voss & Procter, 2009). Cyberinfrastructure is one of the various terms used in the literature to capture the e-Science movement. Other terms include e-Science, e-Research, and e-Infrastructure, among the others (Meyer, Park, & Schroeder, 2009). The use of terms varies across countries. For example, cyberinfrastructure is used more in the United States and has been launched as an idea and source for funding by the National Science Foundation (NSF) in the 2003 report *Revolutionizing Science and Engineering through Cyberinfrastructure*, commonly referred to as “the Atkins report” (ACLS, 2006). In UK the OSI e-infrastructure Working Group (2007) produced a major report in which they use the term e-Infrastructure to refer mostly to the tangible network and advanced ICT tools to store, access and analyze digital data, and to support collaboration. In the Netherlands the e- does not stand for electronic but for enhancement of scholarly practices and knowledge creation (Wouters, 2004).



Although used interchangeably at times, all these terms are not neutral but carry implicit viewpoints on how research should be done and on the relation between technologies and research practices (Beaulieu & Wouters, 2009). In this study, I favor Beaulieu and Wouters' view of e-research as a practice of enhancing research using ICT, because the lack of emphasis on *e-* as electronic avoids the separation between the "social" and the "the technological". Avoiding this separation is important because a cyberinfrastructure is not confined to technology but is sociotechnical, as it includes "the layer of information, expertise, standards, policies, tools, and services that are shared broadly across communities of inquiry but developed for specific scholarly purposes" (American Council of Learned Societies (ACLS), 2006, p. 1). The report of the ACLS notes that this layer can provide a platform to empower specific communities of researchers to innovate and broaden participation to research.

This definition of the ACLS is pertinent for the purpose of this study, because it encompasses a heterogeneous combination of shared technologies, artifacts, expertise, and services to support scholarly communities and collaboration in every subject field, and not just a data-driven and computational view of research in those fields in which research is driven by large and technology-intensive research groups. The comprehensive character of the definition is relevant for LIS. Over the last twenty years, investments have been made to build digital libraries and develop standards and best practices that support data acquisition, storage, access, and preservation. However, now it is time to develop new forms of scholarship and collaborative partnerships in a social science as LIS, by using and adapting e-research tools, concepts, and ways of working (Wouters, 2004). Certainly when it comes to the adoption of e-research, LIS is not the only field in the humanities and social sciences that needs to move towards new ways of working. The humanities and social sciences need to bridge the increasing divide that separates them from science, technology, and medicine as to the use of e-research for new scholarly practices (Berman & Brady, 2005)<sup>1</sup>. "Big Science" has always been a form of distributed collaborative work (Bowker & Star, 2001), therefore scientists have been attentive to the potential of ICT to extend and develop their work. Most of the existing collaborative research environments and other e-research initiatives launched in the USA and Europe still concern large scale, inter-and intra-institutional, and inter-disciplinary collaborations in science and technology. By comparison, there are only few formal digital communities and collaboratories in the humanities and social sciences. This gap also reflects low levels of investments in the humanities and social sciences. Most of the funding frameworks and initiatives in the USA and Europe allocate their resources to support the development of a cyberinfrastructure in science, engineering, and medicine. For example, in the USA the Atkins

---

<sup>1</sup> In contrast to this position, Wouters (2004) stated that also in the humanities and social sciences many researchers have engaged in sophisticated forms of e-research using very advanced tools. He made several examples including archaeology and its use of Geographical Information Systems and expert systems, and linguistics with its experimental approaches that have lead to the transformation of the study of language and the creation of a research infrastructure.

report recommended annual investments of \$ 1 billion for such purpose (ACLS, 2006). Not much of this expenditure has gone to social sciences, though. In the U.K., it is estimated that 250 million pounds has been spent to fund e-science initiatives in natural sciences, while the social sciences and the humanities have received considerably less funding (Fry & Schroeder, 2009).

Collaborative research environments in science and technology are about projects whose magnitude of scale, scope and complexity of the problems addressed, number of resources engaged, and number of participants, require assembling people, funding, infrastructure, software, data, and so forth. Although the humanities and social sciences tend to work on much smaller projects and do not need generally the same large scale and expensive facilities, they would certainly benefit from learning how to do and sustain research in computer-mediated collaborative environments. In other words, they would benefit from thinking in terms of e-research rather than e-science, because, as the British Academy (2005) affirmed, “e-science is envisaged as more than larger scale e-based science” (p. 63). This way of thinking may have positive repercussions in terms of broadening opportunities for the humanities and social sciences. It may encourage the development of a generation of virtual research communities involving students, less advantaged researchers, professionals, and other groups excluded so far. Expanding the focus of collaboratories to promote inclusion is necessary to avoid that they become the exclusive virtual realms of elite-scientists working in traditional and highly ranked disciplines in which the use of technology seems to extend the status quo, and not to expand participation in science (Finholt & Olson, 1997). Furthermore, a new generation of collaboratories may contribute to “democratise science by making resources – instruments, dataset, facilities and tools – available to those who cannot afford their own investment but can benefit from a collective one” (Atkinson, 2006, para. 1).

E-research for the humanities and social sciences should promote not only access to, and preservation of, data collections but should also enhance collaboration across institutional and professional boundaries. There is the need to increase the participation of other stakeholders, especially non-profit organizations, to foster collaborations among professionals, and between professionals and researchers, because professionals play an important role in intellectual, educational, and economic development. With respect to LIS, Axelsson et al. (2006) reported figures from recent studies conducted in the USA showing that for every \$1.00 spent in public support of public libraries, there is return of \$6.54 in terms of gross national product and time and money saved. Thus, promotion of innovation and participation of libraries in new forms of collaboration with researchers should be seen of great scholarly and societal relevance. In LIS, professionals and researchers might gain from the use of ICT to support research collaboration even on a modest scale. The ACLS is right when they affirm that what matters is not just the collection of data, but also the social activities that occur around and integrate it (ACLS, 2006).

The road winds uphill for humanities and social sciences, however. Different scien-

tific paradigms and lack of collaborative scholarship are just few of the main challenges that humanities and social sciences need to face in order to partake of the promise of e-research. There is no doubt that these areas of knowledge, including LIS, must take the lead in taking forward discussion and development of e-research tools to ensure that their interests and specificity are taken into account.

## **1.5 A LIS Collaboratory as Virtual Community**

A LIS collaboratory may provide academics and professionals with the opportunity to bring their talents to the table and combine them in a synergistic fashion. Professionals bring specific experiential knowledge, resources, and connections, whereas researchers contribute with scientific knowledge. A collaboratory has the potential to ease the “translation” (Minna & Gazdar, 1996) of scientific knowledge into practical knowledge and applications. In a similar vein, collaboratories have the potential to expand participation in research projects (Arzberger & Finholt, 2002; Finholt, 2002; Allen-Meares, Hudgins, Engberg, & Lessnau, 2005) and engage professionals and academics in co-production, that is, joint research work that builds on the experiences of both of them without privileging one kind of experience over the other (Ospina et al., 2001). Ospina et al. argue that one outcome of co-production is practice-grounded research that is based on data coming directly from practice and generating results that can inform practice.

With respect to the LIS field, a collaboratory may fill a critical niche for small institutions (as LIS schools tend to be) and professionals who are generally not included in frontline research. It may provide them with the opportunity to choose and work together on significant research projects. This phenomenon refers to “peripherality hypothesis” (Sproull & Kiesler, 1991, p. 95), according to which technologies may produce benefits especially for those at a disadvantage. Information professionals who are least able to travel and/or to meet LIS academics can have the opportunity to establish contacts with them and gain from their work. In a non-elite collaboratory (Finholt & Olson, 1997; Finholt, 2002; Olson et al., 2008), LIS academics may have the opportunity to link to information professionals and treat them not as mere informants as in traditional forms of scholarships, but as colleagues who can bring knowledge, skills, capacities, and experiences to the process (Ospina et al., 2001; Nyden, Figert, Shibley, & Burrows, 1997; Cornwall & Jewkes, 1995). In this regard, a LIS collaboratory would be used differently than in “big” science; it would support co-production of research, or evolve into virtual locations where members of a community of practice can go to meet and collaborate with both familiar and new colleagues, not just access facilities and data (Arzberger & Finholt, 2002). Building a collaboratory to support an inter-institutional community may work towards achieving these goals because it can be a favorable locus for translating research (Minna & Gazdar, 1996), engaging in participatory research practices (Cornwall & Jewkes, 1995), fostering long-term relationships to support personal and organizational goals (Sonnenwald, 2003), and knowledge sharing (Brown & Duguid, 2001). Therefore a collaboratory might develop

to support a community of practice – or a constellation of communities (Wenger, 1998) – in which people cross boundaries to learn through sharing knowledge on a given topic, or to collaborate collectively on the development of artefacts.

## **1.6 Potential Benefits of a LIS Collaboratory**

Drawing from the literature on collaboratories (e.g., Wouters, 2004; Arzberger & Finholt 2002; Finholt, 2002; Finholt & Olson, 1997), a LIS collaboratory may be envisioned to impact the research and practice of library and information science as follows – some considerations from Swedish professionals and researchers also point in the same direction (SSLIS, 2007) :

### Collaborative research

- Promotes collaborative research among professionals, students and faculty.
- Generates new research ideas/questions, goals and partnerships.
- Promotes research and scholarship as a professional responsibility for librarians and information professionals.
- Fosters new ways of doing research and creating knowledge by using and adapting concepts and ways of working of e-research.

### Collaborative practice

- Responds to the emergent needs of individuals and communities by establishing new collaboration opportunities for library and information science practice.
- Helps faculty develop ideas and innovations that will improve practice and enhance public satisfaction with services and products.
- Creates knowledge repositories and/or social networks aimed at sharing experiences and research findings.

### Educational practice

- Provides research and service-learning opportunities for students.
- Improves and expands LIS curricula through a synthesis of scientific and practical knowledge.
- Organizes and provides access to stored data contributed by collaboratory members to provide new learning opportunities (e.g., publications, research data files).

## Social Networking

- Extends the contact network, provides opportunities for informal communication, and sustains relationships, including mentoring, among professionals and researchers to support long-term personal and organizational goals.

## 1.7 The Challenges to Building a Successful Collaboratory

The experiences from the first generation of collaboratories indicate that a number of sociotechnical aspects are critical to the success of a collaboratory. Two challenges have proved to be very difficult to solve. One is organizing and conducting activities in spatially remote locations, because people are used to doing things in collocation, and physical proximity facilitates interpersonal communication and the creation of common social spaces (Finholt, 2002). The other one is crossing institutional boundaries. Bos et al. (2007) argued that cross-institutional work is even more challenging than working at distance, because of organizational problems that cannot be easily solved.

Although suitable technologies and human-centered design can help create virtual settings in which people feel more comfortable, there are social and institutional barriers to the success of a collaboratory. However, as David (2005) pointed out rightly, effective technologies for e-research are likely to be the result of a nexus of interrelated social, legal, and technical changes. Unfortunately, technological progress has gone fast to produce advanced software and hardware to sustain scientific research, but social arrangements enabling organizations, groups, and individuals to collaborate better and in a more affordable manner have improved at a much slower rate (David). Especially large-scale projects in sciences and engineering in their early stage have overlooked social and institutional barriers (Hughes, 1998). David put the question in quite clear terms by contending that the complex demands for suitable institutional infrastructures have been downplayed, because they were deemed simpler to address than technological requirements, but indeed they may prove much harder to tackle.

As technological and sociotechnical aspects of collaboration are bound together, much closer attention must be directed to their nexus to create appropriate organizational foundations for the use of collaboratories. This concern calls for the use of an approach like ANT which helps understand how the social and the technological are linked together.

## 1.8 Organization of the Thesis

The remainder of this thesis is organized as follows. Chapter 2 lays out the conceptual framework that serves as theoretical basis and methodology for this study. Chapter 3 presents the findings of the review of literature on the sociotechnical aspects influenc-

ing research collaboration. Chapter 4 presents the research design and the method used to gather and analyse the data for the three case studies. Chapter 5, 6, and 7 describe each case in detail. Chapters 8, 9, and 10 describe the findings from the explanatory analysis of each case. Based on the patterns from the three cases, chapter 11 presents a sociotechnical framework aimed at contributing to a better understanding of collaboration between academia and non-profit organizations. Finally, chapter 12 concludes the work. The Appendices contain tables and other information related to the research methods and analytical techniques underlying this study.

## 2 Analytic Framework: Actor-Network Theory

The chapter outlines the main Actor-Network Theory (ANT) concepts and principles. ANT is not a stable and unified theory, because its originators have frequently revised elements of this approach over the years (Walsham, 1997). First, I introduced the concepts and principles that have remained relatively stable and can be considered “the core” of the approach (see Table 2-1 for a summary of these concepts). The peculiar vocabulary used by ANT is integral part of the framework and has been devised to avoid the distinction between human and nonhuman (Akrich, 1992). Then, I described how I used ANT to conceptualise collaboration as a heterogeneous actor-network held together by both humans and nonhuman actors, and to study the influence of socio-technical aspects of work organization on the initiation and development of collaboration. As to my knowledge, ANT does not seem to have been used much to study collaboration, as also other authors suggested (Hossain & Fazio, 2009).

### 2.1 Outline of the Approach

ANT is an approach started out by Bruno Latour, Michel Callon, and John Law in Science and Technology Studies (STS) to describe and explain the entanglement of the social and the technological (Callon, 1999). It is a material-semiotic approach in that it studies associations and connections which are not considered as either social or technical, but simultaneously social and technical (Latour, 1998).

The unit of analysis is *actor-network*, an ordered network of heterogeneous human and nonhuman actors, including people, organizations, things or animals. Hence, an actor-network is made of, and links together, both social and technological entities. ANT links the terms actor and network in order to avoid the dualism between agency and structure, which has been a main concern in sociology for a long time. Callon (2005, p. 4) affirmed that an actor is “made up [not only] of human bodies but also of prostheses, tools, equipment, technical devices, algorithms, etc.” Agency is not seen as a property of individuals nor of institutions, cultural values, or symbolic systems, but it is a property of hybrid networks composed of humans and nonhumans. I chose not to delve into the symmetrical notion of agency in ANT and the controversies it has spurred because it goes beyond the scope of this brief outline. However, even without embracing its radical principle of symmetry, ANT allows an extended notion of agency beyond human beings, which can enrich the representation and understanding of real settings (Kaptelinin & Nardi, 2007). Hence I found it valuable to think of things as delegates that speak for somebody else’s interests and act on his/her behalf, whereas leaving intentional agency to humans.

In ANT macrolevel phenomena are seen as hybrid networks that have become extensive and stabilized. Therefore, agency and network cannot be separated. In its effort

to overcome the long-standing separation between agent and structure, ANT considers *actor* and *network* as two faces of the same coin, two entities connected to one another in a circular way. As Latour (1998) put it, we do not study an individual as opposed to society, or an agent as opposed to structure, but we follow how a given entity becomes relevant through the numbers of connections (network) it builds up and how the same entity loses its importance when it loses these connections.

In ANT an *actor* is a semiotic concept, that is, an entity that can act and influence other entities – it is an actant – and it can be anything, because this “actantiality” does not presuppose human motivations or intentions (Latour, 1998). For this reason, *actor* is a hybrid category that includes both human beings and nonhumans, such as technological artifacts, and does not entail social asymmetries or hierarchies. The heterogeneity implied by the notion of actor allows to take into account the participation and influence of nonhuman actors, including artifacts and organisations. I argue that this aspect is important to describe and design a new sociotechnical system such as a collaboratory.

Actors differ from intermediaries because they transform these to create something else. For example, scientists transform texts, instruments, and grants into new texts (Callon, 1991). However, the difference between the two concepts is not ontological because actors can act as intermediaries and intermediaries can act as actors depending on the situations. Callon posited that only empirical data can help identify the two.

All the actors are stakeholders in ANT because they can affect and be affected by the activities of human and nonhuman entities. In this sense, the notion of actor resembles that of stakeholder in Vidgen and McMaster’s definition<sup>2</sup> (1996). Actors’ interests are seen as the driving force in every organization. They can either converge or conflict. The convergence of interests allows the network to stabilize and run smoothly. Hence, social order is an effect arising from a demonstrated agreement achieved by actors in a network. Order begins to break down and conflicts arise, when interests diverge and some actors leave the network, are removed from it, or pursue particular interests that clash with the goals of the network (Law, 1992). For example, the removal of telephones, banks, or the chair of the board may all result in significant break-downs in social order.

As ANT is concerned with the ways in which an actor-network achieves and sustains a stable order, it is interested in understanding how the interests of all the relevant actors in a network can converge. A *network* is a processual activity built and performed by the actors out of which it is constituted. Actors build and perform a network through a process of *translation*. Translation is a process of transformation, organization, re-location, or re-configuration of elements, by which actors try to overcome resistance and stabilize the network. Callon (1986a) identified four stages of

---

<sup>2</sup> Vidgen and McMaster (1996) define stakeholders as “as human and nonhuman organization unit that can affect as well as be affected by a human or nonhuman organization unit’s policy or policies” (p. 255).



translation in the creation of a network: problematization, interessement, enrollment and mobilization. During the stage of *problematization*, actors define a relevant problem and identify who the critical actors are; during *interessement*, the critical actors try to persuade others to invest in, or follow, their program; during *enrollment*, the critical actors bestow qualities and motivations to actors and establish roles, and during *mobilization*, enrolled actors seek to mobilize their constituencies to action.

Translation involves constant negotiations among human actors and delegates of nonhuman actors to establish a common set of definitions and meaning to allow dialogue and understanding of the phenomenon with which the network is concerned. The process of negotiation is marked by the identification of the *obligatory point of passage* which is an actor indispensable to the network, who acts as a gatekeeper through which all the other actors have to move (e.g., to accept a program).

The outcome of successful negotiations is an actor-network characterized by aligned interests. The degree of alignment is the degree of convergence of an actor-network. As a result of converging interests, stakeholders inscribe them into something durable (Law, 1992) – such as, for example, programs, specification documents, and physical artifacts – leading to technological and social outcomes (Callon, 1986; Law & Callon, 1992). Hence, translation presupposes a material in which it is inscribed. As Akrich (1992) pointed out, "a large part of the work of innovators is that of "*inscribing*" [their] vision (or prediction about) of the world in the technical content of the new object" (p. 208, emphasis in the original).

To conclude this brief outline of ANT concepts, I introduce the concept of *black-box*. A black-box is a simplified entity that is actor in its own right (Callon, Law, & Rip, 1986). Black-boxes are "sealed actor-networks" (Stalder, 1997) which have aligned their interests successfully and have inscribed the aligned interests in a stable association that can be questioned only at a heavy cost. In this sense, a successful collaborative can be seen as a black-box that has been "sealed" after a translation has succeeded in aligning the interests of all the involved actors.

**Table 2-1** Summary of key concepts in ANT (Adapted from Lamb, 2006; Walsham, 1997)

CONCEPT	DESCRIPTION
Actor (also called actant)	Hybrid category including both human beings and nonhuman entities, such as technological artifacts. These arrangements do not presuppose social asymmetries, hierarchies or cultures. An actor is anything that acts and transforms other entities.

CONCEPT	DESCRIPTION
Actor-network	Heterogeneous network of aligned interests, including, for example: individuals, organizations, technology, artifacts, documents, practices, and standards. Alignments of long and short networks account for institutional aspects of social structure.
Translation	Process by which actors' define and align their disparate interests. Actors translate interests into statements in line with a particular argument. In this process, allies for a particular argument are identified and enrolled in the network. Translation occurs through four "stages": (a) problematization; (b) interressement; (c) enrolment, and (d) mobilization.
Intermediary	Entity that transports effects, e.g., an idea, or an artifact, from one actor to another during a relatively stable transaction.
Obligatory point of passage (OPP)	Actor(s) acting as a gatekeeper to persuade the other actors enrolled in the network to move through them (e.g., to accept a program) and thus contribute to the durability of the network. Actors who are, or successfully define and control an OPP, become indispensable in the network and increase their power.
Delegates	Delegates are actors who 'stand in and speak for' particular viewpoints and interests that have been inscribed in them.
Inscriptions	Inscriptions are the actual translations of social practices into material forms. They are externalizations of stakeholders' thoughts and interests.
Irreversibility	The degree to which it is subsequently impossible to go back to a point where alternative possibilities exist, or where network elements can be reconfigured.
Immutable Mobile	Network elements with strong properties of irreversibility, and effects that transcend time and place, e.g., software standards.
Black Box	A simplified entity in the network. A black box is a network in its own right and often has properties of irreversibility.

## 2.2 Collaboration as a Local Network in a Larger Network

In his book *Science in Action*, Latour (1987) invited the readers to forget about prod-

ucts and to look at science “in the making”, as opposed to ready-made science. Instead of treating science as a black box and then examining the social influences on it, he asserted the usefulness of examining the process of making science before the box closes and becomes black. Following Latour, I used this temporal inversion in the choice of departure to study collaboration as a process of alignment of interests and to reconstruct the influence of sociotechnical aspects of work organization through their interplay with the ways in which LIS academics and information professionals initiate, develop, and conclude collaboration.

Because ANT links together both social and technological entities in an actor-network, it allows to view collaboration as a heterogeneous actor-network held together by both humans and nonhuman actors, e.g., people, practices, skills, artifacts, institutional arrangements, texts, and contracts. The interests of the actors must be aligned in order for the network to perform smoothly and accomplish a common goal. This network can work for a short or a long time, with weaker or stronger associations among the actors involved, and it has an obligatory point of passage. When a decision is made of starting a collaborative project, the actors work to enlist and stabilize organizational resources to build and sustain such a project. Consequently, the enrollment of actors for the accomplishment of collaboration is an important activity in its own right. This is why it is important to examine how collaboration has formed through persuasion and enrollment of actors.

Inspired by ANT, I framed a collaborative project as a *local network* developing from, and within, a larger context. Law and Callon (1992, p. 21) called this context *global network*<sup>3</sup> and defined it as a set of relations between actors and their neighbours (e.g., funding agencies, host institutions, research and professional associations), and between these neighbours. In this view, “context” is not a predetermined background in which collaboration occurs, but a set of structural relations that either enable or constrain actors’ activities by interplaying with them. The term *structural relations* may be seen incompatible with ANT’s rejection of the age-old separation between actor and structure. Delving deep into the sociological debate falls outside the scope of this work. Law and Bijker (1992) offered a way out of this highly controversial issue, arguing that “*both* [emphasis in the original] actors and structures are products, and they are created and sustained together” (p. 293). Therefore, both structures and actors may be seen as contingent sets of heterogeneous relations. Structures can be fragile or resistant, depending on actors’ intentions and the way in which they create and maintain relations.

The interplay between actors and their neighbours leads to the creation of what Law and Callon (1992) called a negotiation space, that is, a space where actors try to build a project (local network) by drawing the necessary resources from the outside context

---

<sup>3</sup> In this thesis, the term *larger network* is used instead of *global network* to avoid misunderstandings, given that there are no international or global aspects to the networks described in this study.

(larger network). Therefore, collaboration comes to be the space of juxtaposition of contextual and project-specific resources. This approach allows to bridge the gap between micro and macro levels of analysis because it takes into consideration both how actors' decisions and actions shape a project and how events external to the local network exert their influence.

Within the negotiation space, actors meet, create alliances, negotiate and align their interests, speak for themselves or on behalf of others, and fight against each other. Collaboration succeeds when a sufficient number of allies are enrolled and their interests are interpreted and aligned in such a way that they are willing to contribute to the stability of the network. If discrepancies and disagreements arise, collaboration struggles or fails. In fact, collaboration raises personal, political, and professional challenges, and puts at stake identities and interests of some of the actors. For this reason, these actors may develop conflicting views that lead them to pursue their own interests, or to appear to be collaborating but actually pursuing their own interests. Hence defining interests of potential participants is crucial to understand whether a new collaboration has chances to succeed.

Viewing collaboration as a sociotechnical network of allies negotiating their interests and contributing their own resources to shaping collaboration puts the responsibility of the success/failure of the process in the hands of the actors, each of whom can act differently. In this case, the success/failure of collaboration is an effect produced by the actions of every entity in the chain of actors involved in the network. The actors play a crucial role in shaping collaboration, not only by either contributing or not contributing to it, but through a progression of interpretations and negotiations of their own needs.

## **2.2.1 Understanding the Uptake of a Collaboratory as an Actor-Network**

As said in chapter 1, I welcomed the suggestion to think along the lines of *translation of e-research*, instead of diffusion of e-science (Beaulieu & Wouters, 2009). The concept of translation in ANT (transfer with transformation) challenges that of diffusion (Rogers, 2003), which implies transfer without transformation. In fact, ANT distances itself from the view that innovation and technologies are stable entities that are passed from person to person and then put into use. This view implies a separation between the “social” and the “the technological”, where technologies are seen as independent of the different people they are transferred between. On the contrary, ANT sees technologies as parts of an actor-network. Technologies are linked closely to human actors who have certain interests and roles. When technologies are transferred within and between actor-networks, they make sense in different ways, depending on the way they are translated by human actors and the ways they are used to sustain or challenge the network.

The concept of translation of e-research also involves a critique of e-science as a

model of research that is supposed to diffuse across academic fields (Beaulieu & Wouters, 2009). In contrast to this latter view, this study places emphasis on supporting a range of research practices. Therefore, to foster heterogeneity of models of research, it is necessary to understand local research practices, specific researchers concerns and the use of technologies and artifacts that may prove more helpful to enhance collaborative research between practice and academia in LIS.

Thinking in terms of translation, rather than diffusion, also calls into question the notion of user long dominant in Information System research<sup>4</sup> (Lamb & Kling, 2003). This notion connotes a decontextualised individual, who is supposed to know what s/he needs and wants, and who is able to exert discretion in the use of ICT. However, Lamb and Kling pointed out that a number of studies conducted in the field of computer supported co-operative work (CSCW) have argued that people do not see themselves as dealing primarily technologies; they see themselves as professionals who use technologies to do their work and interact with others (Lamb & Kling). The traditional notion of user fails to see people as stakeholders who can play different roles and change interests over time, while it sees technology as an entity that does not participate in the interactions with people to shape practices, structures and identities. ANT offers a way of viewing the uptake of a collaboratory as a process of translation in which both people and technologies can be stakeholders and mutually shape each other, and where what a collaboratory can mean as a practice is also subject to further transformation (Beaulieu & Wouters, 2009).

## **2.2.2 The Ontology of Sociotechnical Aspects and Epistemological Consequences**

This study examined the circumstances under which a certain concatenation of socio-technical aspects led to the initiation, sustainment, and conclusion of collaboration. Collaborations were seen as being held together by sociotechnical aspects of work organization<sup>5</sup>. In the same view, these sociotechnical aspects formed a set of structural relations that either enabled or constrained actors' decisions and activities. Treating sociotechnical aspects as structural means that they are more or less stable entities that shape – but are relatively unshaped by – the actions that take place on the stage (Law & Bijker, 1992). As Law and Bijker would assert, seeing these aspects as more or less stable entities does not imply to discard the belief in their ongoing, unfolding, temporal, and constructive nature. Saying that sociotechnical aspects are constructed means that their role is not fixed and predefined, but it does not imply that they do not exist.

---

<sup>4</sup> Obviously, ANT is not the only theoretical approach that can be used to call into question the rationalistic and decontextualized notion of user. Sociotechnical approaches such as Mumford's ETHICS approach, social-constructionist approaches, and institutionalist approaches can also help reconceptualize the user (Lamb & Kling, 2003).

<sup>5</sup> Drawing upon a term used by Bijker and other scholars, Shrum, Genuth, and Chompalov (2007, p. 20) stated that collaborations are "technoscientific", because the boundaries between equipment, practices, and inscriptions are indistinct.

Reducing them to social construction of meaning would deny their capacity of making resistance. ANT's position on realism has been a subject of controversy between those who criticized it for leading to an extreme form of constructivism and those who see a commitment to some sort of realism (Sismondo, 2004). I agree with the latter. I believe that the concept of "quasi object" (Latour, 1993) describes well the ontological nature of sociotechnical aspects in this study. As he puts it, quasi-objects are:

*much more social, much more fabricated, much more collective than the "hard" parts of nature, but they are in no way the arbitrary receptacles of a full-fledged society. On the other hand, they are much more real, nonhuman and objective than those shapeless screens on which society – for unknown reasons – needed to be "projected" (Latour, 1993, p. 55).*

Based on these premises, sociotechnical influence on collaboration is contingent and does not follow a necessary trajectory. Pivotal actions and unexpected events may create change in trajectories. Hence, enablements and constraints are not intrinsic to sociotechnical aspects but are the effect of their interplay with what actors do.

This position avoids treating the structural relations formed by sociotechnical aspects as a "predetermined context". As Latour (1996, p. 137) affirmed, in a given context the same project does or does not feel an impact. The same set of structural relations can bring about contrary effects. A "predetermined context" is an abstract notion devoid of real people and things. As he said, every context is composed of social and technological entities that do or do not decide to link their interests and ambitions to the fate of a project.

Taking collaboration "in the making" as a point of departure of this study helps avoid falling in the trap of a predetermined context. Instead of assuming a division between collaboration and context, the description of collaboration and its context occur simultaneously (Callon, 1991) by describing the making of collaboration through the network of actors' decisions and actions and their interplay with sociotechnical aspects. This relational epistemology holds promise for understanding the connections between sociotechnical aspects and the processes of formation and development of collaboration. To understand these connections, these processes must be unpacked, described and explained. Unpacking these processes means two things: (a) investigating which voices are represented, which intentions are realized, which interests are spoken for, and which patterns of action are embedded in; and (b) bringing back to surface the voices of the relevant stakeholders, both human and nonhuman. The voices of the stakeholders can emerge through the analysis of inscriptions – e.g. documents, artifacts, work routines, legal documents, prevailing norms and habits, and organizational arrangements and procedures – which materialize the translations of their interests, as well as through the analysis of interviews with the stakeholders. Particular attention needs to be paid to the actors that are "left out", in the sense that they are not repre-

sented by the voices speaking through the sociotechnical aspects under observation<sup>6</sup>. This sensitivity is necessary to avoid taking into consideration only the actors whose interests have been explicitly translated and whose status is higher, and downplaying or neglecting the interests of underprivileged stakeholders. Following Callon (1991), four aspects of inscriptions must be explored: (a) what it is inscribed; (b) who inscribes (which stakeholder(s)); (c) how it is inscribed, and (d) how powerful it is (what does it take to go against the inscription). This last point relates to the level of irreversibility of the translations of the interests inscribed. Some inscriptions “bind” the aligned actor-network, some others may provide some room for flexibility and change. Some inscriptions become actors and trigger the formation of new networks, whereas some others play an intermediary role.

---

<sup>6</sup> ANT has been criticized for emphasizing “the princes”, such as leaders, heroes, great innovators and so on (Callon, Law, & Rip, 1986). As Sismondo (2004) noted, such emphasis may highlight the contribution and the perspectives of these figures and overlook the work done by other less privileged or lower status actors and ignore the reasons that prevent them from participating or from having their perspectives unheard. However, although ANT may encourage to follow the positions of the princes, ANT does not restrain the analyst, who can choose to follow any perspective or multiple perspectives (Sismondo, 2004). What ANT suggests is that the analyst should not assume a priori which actors exert power and which ones are powerless (Latour, Mauguin, & Teil, 1992).

# 3 Literature Review: Overview and Criteria for Selection

## 3.1 Purpose of the Review and Thesis Statement

This chapter provides a selective review of peer-reviewed literature on interorganizational research collaboration<sup>7</sup>, with the aim of giving the reader an understanding of the sociotechnical aspects of work organization that encourage or constrain the initiation and development of this type of collaboration. Some sociotechnical aspects that sit at the heart of successful/unsuccessful collaborations are seen embedded in local work contexts. The study of these aspects is crucial for two reasons. First, when people start collaboration, they do so within an already existing structure of practices and policies that characterizes their organization, and within a structure of purposes sustained by their organization. Second, collaboration is not necessarily natural and straightforward but demanding on participants, who incur costs in terms of time, money, and personal and professional challenges. I undertook the review to achieve the following goals:

- Find out what current research identifies as the main sociotechnical aspects of work organization influencing research collaboration, especially within academia and between academia and nonprofit community organizations.
- Identify the research designs and their main implications for future research, when empirical work was conducted to study actual or prospective laboratories.

This chapter is divided into two main parts. Part A includes an examination of basic premises and definitions of research collaboration and laboratory. Part B describes the key findings of the review and concludes by outlining some issues relevant for this study.

## 3.2 Approach to Reviewing the Literature

The boundaries of this review are restricted to sociotechnical aspects of work organization that influence the initiation, sustainment, and conclusion of collaboration. Hence a thorough review of political, economic and legal aspects, including rules and regulations of funding agencies, laws regulating contracts, privacy, and intellectual property laws has not been included. Although these environmental features are crucial both at the foundational stage and for the development of collaboration, and a systematic approach cannot avoid directing attention to them, they are only touched tangentially in Part A to avoid making the review overly extended and complex, espe-

---

<sup>7</sup> In this work, research collaboration and scientific collaboration are used interchangeably.



cially in an international study like this one.

The literature on research collaboration is diverse and voluminous, thus any review of this topic needs to be selective and set some limitations. When addressing the two questions, I focused my attention on inter-institutional collaboration: (a) within university, and in university – public sector/nonprofit settings; and (b) across geographic distances where information and communication technology (ICT) plays a role. My primary interest was in the development of inter-institutional collaboration between a social science discipline (LIS) and a professional practice that is traditionally non-profit/public.

There seems to be a dearth of studies regarding this type of inter-institutional collaboration in social sciences. Corley, Boardman, and Bozeman (2006) noted that most of the current literature on inter-institutional collaboration concerns collaborations involving private firms or public agencies (e.g., state-level agencies). On the contrary, there is an extensive literature on university-industry collaboration that has taken many forms, including research corporations, research joint ventures (Hagedoorn, Link, & Vonortas, 2000), technology transfers, and transfers of knowledge through licensing agreements and research joint ventures, among others (Miczka & Größler, 2005). These modes of collaboration have occurred primarily to produce technological advancements in science-based and technology-intensive industries such as telecommunications and computer services, advanced materials, and biotechnology. In many countries, public policies have facilitated these modes of collaboration through the development of legal frameworks, the creation of technology transfer offices inside universities, mobility of researchers to industry, and large cooperative R&D programmes (Fontana, Geuna, & Matt, 2003). In most university-industry collaborations the emphasis has been on commercialization of results and increase of business competitiveness. Chompalov, Genuth, and Shrum (2002, p. 750) also noted that organizational frameworks such as the “Mode 2” research and the “Triple Helix” model operate on a macrolevel of analysis with a focus on innovation, technology transfer and enhancement of economic applicability of scientific research. The focus of this study is much narrower.

For these reasons, this strand of research does not seem to throw much light on the development of practice-research collaboration in a field like LIS where traditionally professional practice is no profit/public. Thus research collaboration within academia and in university–community settings provided the bulk of the contributions to this review and the most pertinent insights for my research, although some work on collaboration between university and industry proved valuable as well<sup>8</sup>.

---

<sup>8</sup> The approach taken by many studies on university-industry collaboration is distant from that chosen in this study. According to Belkhdja and Landry (2007, p. 322), who studied the drivers of collaboration between the university, industry and government in Canada, most previous empirical studies on the subject lack a strong theoretical foundation and present several problems. The two authors state that these studies show methodological weaknesses in

I sourced literature, including empirical and conceptual papers, mainly from the areas of collaborative work environments and virtual research environments, with incursions into other disciplines such as information systems, research policy, and social science disciplines concerned with the design and management of knowledge communities and social networks. As for the LIS field, a vast literature – both academic and professional<sup>9</sup> – exists on various forms of inter-institutional collaboration, including interlibrary consortia (e.g., Shachaf, 2003), federating systems, and information communities bringing together disparate kinds of information for a community (Lougee, 2002), and twinning relationships (Kesselman, 2004). Indeed, libraries and information professionals participate in a broad array of organizations at all levels of practice (Webster, 2006). However, there is an apparent lack of documented cases of collaboratories and/or research collaborations involving information professionals and LIS academics. Lougee (2002) seems to confirm this lack of examples when she argued for the potential of libraries to develop collaboratories, searching for increasingly effective ways to widen access to content and to serve target user communities better. Hence, the examination of collaboratories in other domains is expected to be beneficial to the development of a LIS collaboratory.

Thirty-seven papers are included in this review (see Appendix 7 for an overview of the studies included). Given the qualitative nature of the majority of the included empirical studies, this integrative review is presented in a traditional narrative form.

---

that they used non-representative samples, poor response rates and reliance on inferentially weak analytical strategies. Furthermore, these studies were designed to determine the attitudes of researchers towards collaboration and do not take into account the aspects that influence the attitude toward non collaboration.

<sup>9</sup>For example, *Library Trends* (Winter 2006, vol. 54, no. 3) has considered issues of library cooperation and resource sharing through networks. IFLA (The International Federation of Library Associations and Institutions) also publishes professional papers describing collaboration among LIS professionals. A good example is Daugaard (2003).

# Literature Review Part A: Definitions and Basic Premises

## 3.3 Concepts and Theories Underlying Research Collaboration

### 3.3.1 Defining Research Collaboration

“Collaboration” is a contentious word. Laymen use the term to mean simply working together to pursue a common goal, but in the social sciences collaboration is not a univocal concept. There is, in fact, significant disagreement on the meaning of the term across research fields, depending on the different conceptions and values underlying its definition, as well as on the domains of application. Collaboration is the classical term that does not “carve nature closer to the joints” as Aristotle would say (Rosenberg, 1995, p. 16). Therefore, every generalization that employs the word “collaboration” is riddled with exceptions, because there is no standard definition that can account for very specific examples of what we may call collaboration.

The terms “research collaboration” and “scientific collaboration” are also so commonly used that it seems like their meaning is fairly understood. Katz and Martin (1997) pointed out that there is a tendency to take for granted the meaning of these words and to think of collaboration as a single phenomenon, irrespective of the type of collaborators (e.g., individuals, groups, nations, etc.) and the setting in which it occurs. In this work, research collaboration is defined as a social process, taking place in a social context, in which researchers interact to share meaning, develop understanding, and perform tasks to achieve a mutually-shared superordinate goal, which generally produces knowledge (Sonnenwald, 2007). This definition highlights a conception of collaboration as a process of participation in epistemic communities (Knorr-Cetina, 1999), which has been well documented in many empirical works in science and technology studies (e.g., Collins & Pinch, 1982; Latour, 1987, 1988). In these epistemic communities, scientists engage in collective activities of knowledge construction, consisting of interaction, discussion, exchange of ideas and conflicting views, and generate concrete outcomes, such as publications and patents. Besides being a social process, research collaboration is also a social product which is embodied in papers, patents, and other collective forms of knowledge.

Pursuing shared goals is another feature of the definition. Sonnenwald (2007, p. 645) defined the goal of research collaboration as “superordinate”, to draw attention to its being higher in rank than researchers' individual goals. In fact, working collaboratively does not mean to abandon individual goals, which may or may not be closely aligned with the superordinate goal.

Another issue concerns who should be considered collaborators, whether only those who collaborate substantially and regularly, or also those who collaborate sporadically or on limited pieces of work. Setting boundaries to make a clear distinction is challenging, as Katz and Martin (1997) concluded despite their attempt to create a list of putative criteria for such identification. The boundaries of research collaboration are fuzzy, they noted. They are subject to negotiations and vary across settings, field, country, and over time.

### **3.3.2 Beliefs about Knowledge and Collaboration**

Different views of knowing underlie different beliefs and values about collaboration and the role that technology plays in the process. In this section, I argue for a perspective that is consistent with the following: (a) a distributed and collaborative approach to knowing, instead of an individualist/rationalist approach; and (b) a view of technology not as a “mind tool” but as an inextricably related part of collaboration and knowing.

Lipponen (2002) outlined two views of collaboration, one being a special form of interaction, and the other being a process of participation in a knowledge-building community. These views imply two different perspectives on knowing and learning: one which tends to emphasize individual knowing and the other one which tends to emphasize group knowing. The former is associated with a cognitive view and the latter is associated with a situative/socio-historic view.

The first perspective refers to an individualist/rationalist view that treats knowing as organization of information in cognitive structures and processes. Cognition takes place inside the human mind independently of the activity, context, and culture in which it occurs. Traditions of cognitive science research, including constructivism (originally developed by Piaget) and information processing (e.g., Newell & Simon, 1972) have emphasized conceptual understanding and development of individual cognitive abilities, such as problem solving and reasoning, and have neglected the influence of material and social conditions on cognition. This perspective fits a “mind tool” view of technology (Dennett, 1996), according to which humans use technology to extend and enhance their cognitive capabilities. Tools and artefacts are external resources that humans use to process, store, retrieve, and display information, knowledge, and meaning. They act as peripheral devices that augment brain abilities, and allow people to transfer mental efforts onto the environment and reduce cognitive load (Dennett, 1996). In this rationalist view, collaboration is seen as a form of interaction between two or more people, in which technology is external and plays an instrumental role.

Cognitive sciences and the “mind tool” view do not help bridge the discontinuity between the human and the machine: cognition happens “inside the individual head”, and technology does not participate in the shaping of this process. Other theories have contributed to the understanding of the interweaving processes that comprise knowing, technology, and environment. In learning sciences, a situative/socio-historic perspec-

tive views knowing not as occurring primarily “inside” people’s heads, but as distributed in the world among people, the tools and artefacts they use, and the communities and practices in which they participate (e.g., Brown, Collins, & Duguid, 1989; Brown & Duguid, 1991; Lave & Wenger, 1991). By bringing together people, the artefact of technology, and the environment, this view makes it possible to see how these elements are influencing and are being influenced by each other in a dialectical and not deterministic relation. A distributed approach to cognition helps account for the social and material resources which people use to share information, learn and build knowledge. It brings back to light the objects they use in these processes, including data sources, artefacts and tools (Hutchins, 1995). This perspective tends to emphasize a form of knowing that involves the whole collaborating system, of which people, tools, and artifacts are all agents, and goes beyond the narrow conception of “mind tool”. In this perspective, collaboration is properly seen as a distribution of knowledge, just as the very idea of knowledge depends on social relations with others. Indeed, no one individual knows everything about a given discipline, or has all the expertise in a given area, and the technical knowledge involved in doing research work is also typically distributed across a range of actors (Shapin, 1995).

### **3.3.3 Motivation for Research Collaboration**

A number of reasons contribute to develop collaborative relations. These reasons vary depending on the field, the setting of collaboration and on the circumstances. Since World War II, research policies have constantly pushed toward research requiring multiple and often different knowledge rather than intradisciplinary research led by one investigator (Traweek, 1988). In physical and life sciences, collaboration and pooling resources have become a necessity, because the costs of experimental instrumentation have been increasing exponentially making it impossible for funding agencies to allocate financial resources to each individual research team (Sonnenwald, 2007; Katz & Martin, 1997). In addition to research policy and increasing costs, other aspects have contributed to expand collaboration, including decreased costs of travel and information and communication technology (ICT), together with increased availability and easy access (Katz & Martin, 1997); the need for interaction with other scientists to produce knowledge; the increasing specialization required to address the complexity of projects and experiments, and the growing importance of interdisciplinary fields (Sonnenwald, 2007; Katz & Martin, 1997); and the need for solving compelling and urgent problems in a timely manner, e.g. in medical research (Sonnenwald, 2007).

Varied and complex are also the reasons that drive firms to seek collaboration with universities. Drawing from the literature on university-industry collaboration, Lee (2000, p. 113) lists a number of reasons considered to be personally important to faculty members and firms when entering collaborations. For academics, reasons to collaborate include, among others, supplementing funds for their own research, testing the practical application of their research, gaining knowledge about practical problems useful for teaching and creating student internships and job placement opportunities.

For firms, reasons include, among others, solution of specific technical or design problem, improvement of product quality, access to new research via seminars and workshops and recruitment of university graduates.

### 3.3.4 Types of Collaboration

Research collaboration can be characterized in terms of the disciplines involved, the geographical setting, and the organizational and community focus (Sonnenwald, 2007). Collaboration can involve participants at different levels, from the micro-level of individuals (e.g., dyads, triads), to the meso-level of department/institutions, and the macro-level of countries (Sonnenwald, 2007). Table 3-1 summarizes the definitions of each form of collaboration in terms of its setting.

**Table 3-1** Different levels of collaboration and distinction between inter- and intra-organizations (Katz & Martin, 1997, p. 10)

SETTING	INTRA	INTER
Individual	--	Between individuals
Group	Between individuals in the same work group	Between groups (e.g., in the same department)
Department	Between individuals or groups in the same department	Between departments (in the same organization)
Institution	Between individuals or departments in the same organization	Between organizations
Sector	Between organizations in the same sector	Between organizations in different sectors
Nation	Between organizations in the same country	Between organizations in different countries

The need to make an analytic distinction between individual and organization varies according to the purpose of a study. However, in this work I chose not to make the distinction between the two dimensions because they are dependent. Creating a dualism between the two levels runs the risk of configuring organizations as structures with a capacity to collaborate of their own. Instead, it is important to establish a link connecting the two levels, to make visible the individual in the organizational and vice versa. Collaboration is not a process engaging either individuals or groups disembodied from their organizations, or organizations devoid of individuals. A collaborator always operates in a set of organizational and material circumstances that contribute to shaping the process and its outcome.

While these forms of collaboration encompass the full continuum of relationships – from informal, one-to-one interactions to formal, complex and structured arrangements – it can be difficult to determine when a less formal relation ends and a formal collaboration between organizations or groups starts (Katz & Martin, 1997). All these different forms of collaboration can range from collocated and organizationally embedded within the same organization, to geographically distributed across organizations and countries.

In terms of disciplines involved, research collaboration can take different forms, depending on whether participants work within the same discipline or use knowledge from different disciplines, with or without the intent of integrating such knowledge (Sonnenwald, 2007). The organizational focus also varies, as it ranges from collaboration within academia to variously arranged collaborations engaging companies, universities and non-profit organizations to share resources in pursuit of a common goal (Sonnenwald, 2007).

### 3.3.5 Stages of Research Collaboration

Research collaboration is a complex process that requires intentional knowledge and information sharing and joint responsibility for accomplishing the common goals. It often occurs within long-term relationships between participants and follows a developmental trajectory that evolves over time. Drawing on previous identification of stages of the scientific process, Sonnenwald (2007) described the different objectives and levels of organizational structure characterizing each stage (Table 3-2):

**Table 3-2** Stages of research collaboration (Sonnenwald, 2007)

FOUNDATION STAGE	FORMULATION STAGE	SUSTAINMENT STAGE	CONCLUSION STAGE
Examine aspects that are required to initiate a collaboration or that prohibit collaboration from being initiated	Decide and plan collaboration. Articulate and share goals with the stakeholders	Set up organizational structure and management practices	Results may or may not emerge. Funding and other resources can come to an end

## 3.4 The Organizational Environment for Research Collaboration

An array of interrelated political, economic, and legal aspects that characterizes both the external environment and the organizational structures influences the possibilities of institutions to initiate and sustain research collaboration. The emphasis on the tech-

nological development of a cyberinfrastructure for research has overlooked the crucial importance of those aspects. As a result, the progress in constructing social, legal, and organizational arrangements that facilitate collaboration has not kept pace with advances in engineering, leading to many inefficiencies in managing complex inter-institutional collaborations and in solving the difficulties that often appear in those settings (David, 2005). According to David, critical environmental and organizational dimensions include:

- Policies and regulations of funding agencies, which reflect political and economic pressures.
- Rules and administrative procedures of research institutions to regulate formal relationships with their staff (faculty, researchers, and technical staff, in the case of universities). These rules usually refer to external legal systems, including statutes governing contracts, privacy, and intellectual property.
- Informal and epistemic community norms which members of research and professional groups acknowledge and perhaps adhere to.

### 3.5 Defining a Collaboratory

Scientific collaboration has long occurred in traditional laboratories. In these shared physical settings, scientists can easily get access to one another and find conditions for sharing tacit knowledge that is necessary to do their work (Finholt & Olson, 1997). The evolution of networking technologies throughout the seventies and eighties has underpinned the formation of collaboratories, mostly in the USA (Finholt & Olson, 1997), making it much easier for scientists to participate in dispersed scientific collaboration. William Wulf (1989), who was director of the Directorate for Computer and Information Science and Engineering for the National Science Foundation, coined the metaphoric term “collaboratory”<sup>10</sup> to refer to a:

*center without walls, in which the nation’s researchers can perform their research without regard to geographical location – interacting with colleagues, accessing instrumentation, sharing the data and computational resources, [and] accessing information in digital libraries (Wulf, p. 19).*

For Wulf, a collaboratory aimed at doing what a laboratory does, that is, providing access to scarce and expensive resources, such as the unique instruments used in physics, and supporting interaction with colleagues, without the temporal or geographical constraints of physical locations, thanks to improved technological capabilities. Changes over the last two decades in the nature of the research work and in Information and Communication Technology (ICT) suggest an opportunity to update and

---

<sup>10</sup> Voss and Procter (2009) treat the term collaboratory as being synonymous with the concept of virtual research environment (VRE) that is prevalent in Europe.



elaborate the initial notion (Arzberger & Finholt, 2002). A more recent definition comes from the Science of Collaboratories (SOC), which defines a scientific collaboratory<sup>11</sup> as 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, artefacts and tools required to accomplish research tasks (SOC, 2003, online).*

Two aspects must be highlighted in this notion. First, a collaboratory is seen as a heterogeneous sociotechnical system comprising a number of interwoven elements, including people, hardware, software, techniques, and information structures (Kling, 1999). A collaboratory would not be possible without the participation of all these elements. Second, a collaboratory is about distribution in every sense of the word: distribution of people, artifacts and information (Bowker & Star, 2001). Collaboration is no longer ascribed to people alone but to their interactions with artifacts and information.

Most existing collaboratories have been concerned with large scale, inter- and intra-institutional, and interdisciplinary collaborations in physical and life sciences (Finholt & Olson, 1997; Finholt, 2002; Arzberger & Finholt, 2002). In comparison, as noted in section 1.4., there has been less development of collaboratories in the social sciences and humanities, due to limited funding opportunities, less need for expensive and unique scientific instrumentation, and different behavior and attitude to collaboration. For example, collaborations tend to be more uncommon in the humanities than in physical and life sciences probably because the level of epistemic development is lower in the former than in the latter where there is a higher degree of consensus on what the relevant questions are and how to conduct the empirical work (Melin, 2000). Nevertheless, the SOC<sup>12</sup> has identified a few collaboratories in the humanities and social sciences, including COLLATE (a collaboratory supporting research on historic European films) (Thiel et al., 2004); Inquiry Page (a community in inquiry-based education available at [http://inquiry.illinois.edu/us/inquiry\\_page.php](http://inquiry.illinois.edu/us/inquiry_page.php)), and Distributed Knowledge Research Collaborative (a consortium of individuals and groups dedicated to study how knowledge is produced, shared, negotiated and co-constructed within distributed communities; the project is available at [http://spider.adlnet.gov/index.cfm?RID=WEB\\_OT\\_1001247](http://spider.adlnet.gov/index.cfm?RID=WEB_OT_1001247)). Other recently developed collaboratories include “Global Hubs for Global History (economic history) (Dormans, 2009), and the UK National Guidance Research Forum Website (guidance research and practice) (Brown, Bimrose, & Hughes, 2005).

---

<sup>11</sup> This definition is restricted to academic collaboratories (Bos et al., 2007).

<sup>12</sup> A comprehensive and up-to-date list of collaboratories identified by the Science of Collaboratories is available at <http://scienceofcollaboratories.org/Resources/colisting.php>.

### 3.5.1 Characteristics and Types of Collaboratories

The term ‘collaboratory’ is a hybrid of collaboration and laboratory. The flexible meaning of the parent words makes the meaning of collaboratory open to negotiation and change as well (Lunsford & Bruce, 2001). Both collaboration and laboratory – the latter being no longer confined to restrictive dictionary definitions<sup>13</sup> – are more usefully understood as evolving processes and places, rather than static settings, through which participants constantly negotiate the objects of their activities.

Like laboratories, collaboratories are social organizations that provide for the diffusion and preservation of knowledge created from collaboration (Finholt & Olson, 1997). In addition, they can support networking and collegiality that may have a socially levelling effect and lower the barriers to dialogue. According to Lunsford and Bruce (2001), a collaboratory differs from other sociotechnical systems because of these characteristics:

- Shared inquiry. Not only do participants share common goals but also a set of problems that they all consider to be significant and worth the effort to work on.
- Intentionality. Participants feel involved in a mutual project. A collaboratory then becomes a generative space where people feel that they earn as much as they give from taking part in the exchange. There is a tipping point, which brings about the critical mass awareness that is necessary to turn the joint work into a collaboratory.
- Active participation and contribution. Participants actively contribute to joint activities and engage in constant negotiation of the objects of their projects.
- Access to shared resources. Participants can use tools, documents, and information provided by the collaboratory.
- Technologies. Technologies used in collaboratories vary depending on the research field, nature of tasks, purposes, and goals. They range from rare equipment such as observatories, space satellites, or enormous shared databases used in space physics, to ordinary technologies including electronic mail, file transfer software, online community websites, video conferencing, transcription software, and database software.
- Boundary crossings. Collaboratories always cross some kinds of boundaries that can be geographical, time, institutional and disciplinary.

---

<sup>13</sup> For example, the Oxford English Dictionary (2nd Ed.) defines a laboratory as “a building set apart for conducting practical investigations in natural sciences, originally and especially in chemistry, and for the elaboration or manufacture of chemical, mechanical and like products”.

Over 70 collaboratories responding to the SOC project's definition have been launched since 1992, mostly in the USA (SOC, 2003, online). Most of the collaboratories included in their study relate to academic collaborations in engineering, physics and natural sciences, and do not include projects involving corporate, government, and non-profit organizations.

Collaboratories can take different forms, depending on their main type of resource (instrument, data, or knowledge) and activity (aggregating resources across distance or co-creating knowledge across distance). The SOC's database groups collaboratories into seven categories, based on the main function, as follows:

**Table 3-3** Seven types of collaboratories (Bos et al., 2007)

TYPE	FUNCTION	EXAMPLE
Shared Instrument	Increased access to equipment (e.g., large telescopes)	Keck Observatory in Hawaii
Community Data System	Information resource created and maintained by a distributed community	Protein Databank (PDB)
Open Community Contribution System	Open project aggregating the efforts of many contributors toward a common research problem	Open Mind Project
Virtual Community of Practice	Network of individuals sharing a research area and communicating online	Ocean.US
Virtual Learning Community	Learning and knowledge building	Ecological Circuitry Collaboratory (ECC)
Distributed Research Center	Distance-based research center	Inflammation and the Host Response to Injury
Community Infrastructure Project	Develop infrastructure to further work in a domain	GriPhyN (Grid Physics Network)

The SOC drew attention to the major difficulties of managing and sustaining Virtual Learning Communities and Virtual Communities of Practice over other types of collaboratories, because sharing and constructing knowledge across distance is more problematic than sharing and aggregating data and instruments (Bos et al., 2007).

### **3.6 Summary**

This section has provided a basic understanding of the notions of research collaboration and collaboratory, and the theoretical values underpinning their definitions. Special emphasis has been placed on the distributed and heterogeneous characters of these entities. People and things are mixed together and extend each other's abilities across time, space, institutions, and disciplines. The heterogeneity of research collaboration and collaboratories also stands with respect to the purposes of the target user community, as well as the goals and interests of individual participants.

# Literature Review Part B: The Influence of Sociotechnical Aspects of Work on Research Collaboration

Research collaboration is a set of relations following a developmental trajectory – from members gaining entry, to sustaining and recognizing benefits of working together, etc. For this reason, it is important to understand how sociotechnical aspects (such as incentives, norms, and organizational relations) influence this trajectory, and see if they constitute strengths or potential challenges and threats to collaboration. Birnholtz (2004) identified two main groups of aspects from the literature on scientific collaboration: field-level aspects and work-level aspects. Field-level aspects characterize a discipline in terms of scientific competition among researchers, level of integration, models of research (Birnholtz, 2004), research agenda (Allen-Meares et al., 2005), mutual dependence to develop ideas (Dreher, Everett, Hartwig, & University of Iowa Nursing Collaboratory, 2001; Fuchs, 1992), and need to share resources and material demands (Fuchs, 1992). Work-level aspects characterize the collaborating groups in terms of working culture, coupling of work, and common ground (Birnholtz, 2004). The research reviewed herein concentrates on work-level aspects.

## 3.7 Findings

Eleven sociotechnical aspects emerged from the review. As described in chapter 2, the division between social and technical is arbitrary in ANT. Hence, the identified aspects are seen as heterogeneous, because they are neither contextual properties nor mere social constructions of meaning<sup>14</sup>, but are “constituted in networks of heterogeneous material arrangements” (Law, 1991, p. 16).

The identified aspects are grouped together in Table 3-4, according to the categories identified by Olson et al. (2008) in their working towards an initial theory of remote scientific collaboration (TORSC). Drawing from the data collected for the SOC project (SOC, 2003), and from literature on computer-mediated communication, organizational behavior, management information systems, and science and technology studies, Olson et al. have clustered a broad set of success measures into five key factors. These factors were first described in Olson and Olson (2000), with the exception of the management issues. They affect collocated collaborations but appear to be critical to distributed projects as well.

---

<sup>14</sup> See section 2.2.2 for the articulation of the ontology of sociotechnical aspects in this study.

**Table 3-4** Sociotechnical aspects grouped according to Olson et al. (2008)

NATURE OF WORK	COMMON GROUND	COLLABORATION READINESS	MANAGEMENT STYLE AND LEADERSHIP	TECHNOLOGY READINESS
Nature of work	Common ground	Incentives and rewards	Management structures	Integrated use of ICT
	History of collaboration between individuals/organizations	Current work practices		
	Tacit knowledge and transactive knowledge	Shared collaborative culture		
		Collaboration goals and the need to collaborate		
		Mutual trust		

### 3.7.1 Nature of Work

The concept of coupling of work refers to the amount and frequency of communication needed to complete a task (Olson & Olson, 2000; Birnholtz, 2004), and to the possibility of a task being broken down into small components (Olson & Olson, 2000). Tightly coupled work is non-routine, can be ambiguous, and requires greater interdependence (Chompalov et al., 2002). The communication necessary to perform this kind of work can be complex and needs frequent and prompt feedback and rich information. On the contrary, a loosely coupled work has fewer dependencies, is more routine, and tasks and procedures are clear. As a result, less amount and frequency of communication are needed to complete the task. Working at distance makes it difficult to do tightly coupled work, since ambiguity cannot be handled well due, among the other things, to the loss of nonverbal cues (Olson & Olson, 2000; Kraut, Fussell, Brennan, & Siegel, 2002; Birnholtz, 2004; Sonderegger, 2009). Barrett, Cappleman, Shoib, and Walsham (2004) also reached similar conclusions after examining the failure of virtual communities for brokers in the London insurance market. They concluded that virtual interactions can be seen as inadequate for complex, political or trust-based communication.

### **3.7.2 Common Ground**

Successful interactions between collaborators are often assumed to require a certain amount of ‘common ground’, that is, mutual knowledge, beliefs, and assumptions that all collaborators share (Clark, 1996). Whereas successful distributed collaboration should not imply neglecting differences, silencing disagreement, and privileging consensus-based interpretations of community (Cleal, Andersen, & Albrechtsen, 2004), it has been observed that communication is more effective when people share a common ground (Olson & Olson, 2000). However, establishing and maintaining common ground among different collaborators – with different expertise, subject domain knowledge, work practices, professional values, special vocabularies, etc. – is challenging, even more so in distributed settings, where people lack contextual behavioral cues and the richness of co-location, as Olson and Olson conclude, after conducting multiyear field and laboratory investigations of collocated and remote synchronous group collaborations.

Other studies reach similar conclusions. For example, in her study of thirteen geographically distributed teams, Crampton (2001) identified five types of communication problems arising from the teams’ use of technology to accommodate for the lack of physical proximity: failure to communicate and retain contextual information, unevenly distributed information, difficulty to communicate and understand the salience of information, differences in speed of access to information, and difficulty in interpreting the meaning of silence.

Distance mattered also for the thirty-one researchers interviewed by Sonderegger (2009) in 17 Indian R&D centers all engaged in some forms of international distributed collaboration. The results of her investigation show that computer-mediated communication hindered common understanding of a research problem.

A way to avoid these difficulties might be to start a new remote collaborative project with already established contacts that include friends made in university, in previous educational and professional networks, or through previous collaborative projects. Working with previously established ties can facilitate the process of communication and knowledge exchange in a virtual environment, because people already have a common ground based on a common repertoire of previous experiences and interactions (Sonderegger, 2009). Also Thune (2007) confirmed the importance of previously established ties in starting collaboration in her study of collaborative R&D projects in two academic fields. However, Thune did not say whether the settings of collaborations she examined were collocated or dispersed, thus we do not know the role played by technology in these projects.

### **History of Collaboration among Individuals/Organizations**

When starting a new collaboration, research shows that prospective collaborators need to have a genuinely positive stance on it and be willing to work together. In other words, they need to be ready to collaborate (Sonnenwald & Pierce, 2000; Olson & OL-

son, 2000; Finholt, 2002). Empirical evidence suggests that a crucial component of such readiness is history of collaboration among individuals and/or organizations, both in academia, university–community, and university–industry settings. Previous experience of collaboration, for example in the form of past joint publications, collaborative grants and other collaborative activities, makes the potential collaborative partners more willing to commit to collaboration and enables them to trust the process (Olson & Olson, 2000; Mattessich, Murray-Close, & Monsey, 2001; Olson, Teasley, Bietz, & Cogburn, 2002; Allen-Meares et al., 2005; D’Este & Patel, 2007; Sonderegger, 2009). Mattessich et al. argued that, other conditions being equal, collaborative efforts are most likely to succeed when organizations have a positive history of collaboration. People who have already worked together have established work practices, are familiar with the respective cultures and norms, and know better what to expect from each other. Indeed, they have established personal compatibility, which is crucial to sustain shared projects (Hara, Solomon, Kim, & Sonnenwald, 2003).

A lengthy history of collaboration through informal and individualized relationships between professionals and academics was reported as an important aspect in the successful development of collaboration between the University of Iowa (UI) Hospitals and Clinics Department of Nursing Services and Patient Care and the College of Nursing (Dreher et al., 2001). Space physicists also had a long tradition of collaboration before they started to use the Internet to support their long-distance interactions (Olson & Olson, 2000). A baseline assessment of the prospects and challenges of two new collaborative opportunities for international research on HIV/AIDS suggested a high degree of collaboration readiness, given that scientists were already involved in ongoing collaborations (Olson, Teasley, Bietz, & Cogburn, 2002). This suggestion is confirmed by the results of a six-year study of collaboration networks from two scientific bibliographic databases, which show a strong correlation between probability of collaboration and number of previous collaborations and number of previous collaborators (Newman, 2001).

### **Tacit Knowledge and Transactive Knowledge**

Long-distance collaboration hinders communication of tacit knowledge that is situated and context-dependent (Sonderegger, 2009). A multimethod analysis of knowledge processes in distributed research teams (Kanfer et al., 2000) shows a conflict between the way in which groups create knowledge more efficiently and the assumptions underpinning the design of technologies to support these knowledge creation processes. Kanfer et al. explained that the conflict rests in the fact that people tend to create knowledge more efficiently in and through interpersonal face-to-face interactions, whereas technologies are designed to support knowledge construction in a distributed manner, and to make knowledge mobile outside those face-to-face interactions. Similar to tacit knowledge, sharing of transactive knowledge is also hampered in dispersed settings (Bos et al., 2007), because it is stored in the group that generated it. Transactive knowledge is knowledge that is available or possible because of transactions



among people (Wegner, 1986). Members of an organization form a transactive memory about each other's knowledge, expertise, methods, working styles, available time, and commitment (Haythornthwaite, Lunsford, Bowker, & Bruce, 2006). Furthermore, members also learn who does what tasks and who has responsibilities (Brandon & Hollingshead, 1999).

### **3.7.3 Collaboration Readiness**

#### **Incentives and Rewards**

An appropriate system of rewards and incentives is necessary to develop a positive attitude towards knowledge sharing and collaboration and make people feel that collaboration is in their interest (Olson & Olson, 2000; Arzberger & Finholt, 2002; Hara et al., 2003; Barrett et al., 2004; Corley et al., 2006). For example, Dreher et al. (2001) reported the experience of collaboration between the UI Hospitals and Clinics Department of Nursing Services and Patient Care and the UI College of Nursing. The goal of the collaboration was to use good ideas that often remain undeveloped to create nursing products and services that respond to the health care needs of patients, families, and communities. The collaborative partners anticipated that many of these products and services could generate revenues that would help strengthen practice, better meet the needs of their clients, and provide incentives and other opportunities for both nursing faculty and staff.

Monetary rewards are not seen as the only ones to stimulate people to contribute. In the case of four Community Data Systems, for example, incentives included possibility of publication in peer-reviewed journals, desire to do well on a rating system and goodwill incentives (Bos, Olson, & Olson, 2006). Markus, Manville, & Agres (2000) also drew attention to the significant role of altruistic motives. In their study based on a secondary analysis of the literature on the open-source phenomenon, Markus et al. (2000) showed that what motivates people to participate in open-source projects is not primarily the prospect of future economic advantages but sharing social values, such as commitment to the purpose, gaining reputation, and altruism. Open source development can be seen as a way of creating public good. This conclusion is similar to Wasko & Faraj's findings (2000) in a study of participation in three virtual communities of practice. Their results indicate that people participated primarily out of community interest, generalized reciprocity, and prosocial behavior. In this respect, the results are consistent with the argument that broadening outcomes of collaboration to meet significant social goals is another form of intrinsic motivation (Corley et al., 2006; Sonnenwald, 2003). A good example in this sense is the creation of a university–community–retail collaboration to promote community education on universal design, which made the partners feel empowered by the possibility of using universal design to provide better accommodation for seniors (Price, Zavotka, & Teaford, 2004).

The management of an institutional system of incentives and rewards is a very deli-

cate aspect, because it is linked to expectations and norms of behavior existing in a workplace and to issues of local evaluation and control (Owen-Smith, 2001).

### **Current Work Practices**

Collaboration – especially when it occurs across distance – must be worth the effort. People must perceive it as bringing benefits over their current work practices and as complementary or compatible with existing institutional policies and norms (Sonnenwald, 2003; 2007). In one of the few studies of prospective users, which was part of a larger study focusing on the design and evaluation of a new scientific collaboratory, Sonnenwald (2003) interviewed 17 scientists to find out their expectations regarding this form of organization. The results show that scientists expected both organizational and personal benefits. The former included travel savings and granting wider access to specialized scientific resources. The latter included support for their long-term plans, and facilitation of the management of the scientific process, especially with respect to team building and increasing opportunities for interactions.

It is interesting to note that none of the participants in Sonnenwald's study thought that the collaboratory would provide the same opportunities for informal and opportunistic interaction as physical proximity. An interpretation of this expectation can be that people may see the prospect of a collaboratory as disruptive of long-established individual and organizational practices that exploit features of their collocated social and physical settings (Finholt & Olson, 1997; Finholt, 2002). As Finholt (2002) noted, these practices are tied to a group's social network and local circumstances and tend to evolve into a "common space". Co-construction of knowledge is also rooted in local epistemic assumptions, norms, and beliefs, and embedded in professional practices. For example, people who are collocated and have worked together for a long time can achieve mutual understanding in informal face-to-face interactions and do not need to communicate information that is tacitly shared (Sonderegger, 2009).

Shifting from these local practices and routines to larger long-distance collaborations supported by technology places new cognitive and social demands on people to restructure their work lives, and can make knowledge sharing over distance very problematic (Finholt & Olson, 1997; Finholt, 2002; Bos et al., 2007). To overcome the problems raised by working at distance, new social and organizational practices can be necessary. For example, after conducting a one-year qualitative study of the transition from collocated to multi-site meetings using videoconferencing in large group collaboration, Sonnenwald, Solomon, Hara, Bolliger, and Cox (2003) found that facilitation of participants during videoconferences, use of visual aids to compensate for technological constraints and participant etiquette made the use of videoconferencing more effective. However, while recognizing the usefulness of new practices to overcome difficulties raised by virtual working, not all such resistance can be assumed to be negative, because it may reflect the view that technology is seen as inappropriate for certain tasks involving delicate trust-based interactions, e.g., negotiation and agreement of insurance business between underwriters and brokers (Barrett et al., 2004).

## **Shared Collaborative Culture**

A working culture that values knowledge sharing and learning from sources internal and external to the organization is another important component of readiness to collaborate (Olson & Olson, 2000; Barrett et al., 2004). However, this culture is more valuable when people share the values of a collaborative effort, rather than simply accepting collaborative work practices (Karsten, 1999). When sharing the values of collaboration, people feel ownership of both the way the group works and the outcomes of the work. A salient example is the open-source movement, in which a precondition is a large “community of practice” with a strong shared culture of technical professionalism (Markus et al., 2000). Markus et al. described the shared culture of open source as a gift culture, in comparison to an exchange culture. In academic environments, shared collaborative culture can mean the tendency to collectively interpret findings and a willingness to report tentative findings (Birnholtz, 2004, 2005). In stark contrast, some biomedical research areas are reported not to be “collaboration ready”, because in this biomedical research individual scientists and laboratories tended to be very competitive and work hard to be the first to achieve some breakthrough (Olson, Teasley, Bietz, & Cogburn, 2002).

## **Collaboration Goals and the Need to Collaborate**

People must feel the need to collaborate (Karsten, 1999) and must have clear goals that expound the reasons for collaboration (Olson, Teasley, Bietz, & Cogburn, 2002; Barrett et al., 2004). Collaboration, in fact, is a demanding process; participants incur costs in terms of time, effort, opportunity costs, reputation risks, and money. Hence, collaboration goals need to be clearly articulated and shared (Sonnenwald, 2007; Allen-Meares et al., 2005) to lead to tangible and positive outcomes that influence the way people feel about collaborating. Clear and attainable goals are also linked to the ways in which collaboration will be organized and how the success of collaboration will be measured (Corley et al., 2006). While scientific and university–community collaboration goals include building knowledge, doing basic research, sharing resources, interacting with the community, and developing solutions to improve societal conditions, interorganizational collaboration typically aims at developing new products or services.

## **Mutual Trust**

People need to trust each other to work effectively at distance (do quality work and on time), or they have to setup contracts to ensure that the work is done (Olson, Olson, & Venolia, 2009). Trust is defined as the “condition in which one exhibits behavior that makes one vulnerable to someone else” (Zand, 1972). This form of personal trust is

necessary for collaborators to be willing to expose themselves to criticism when they share their ideas, and to feel that everybody is doing their part and will be rewarded if collaboration is successful (Sonderegger, 2009).

Technology to support remote collaboration is seen inadequate to support the establishment of trust, especially when people have never met each other before. Research by Zheng, Veinott, Bos, Olson, & Olson (2002) reported that remote teams are less effective and reliable than face-to-face teams, based on the observation simply stated as “trust needs touch”. When meeting face-to-face is not possible, using a text-chat and seeing pictures can be beneficial to the development of trust, because these activities allow to share social and personal information. Based on the findings of an experimental study with two-hundred undergraduate and graduate students, Zheng et al. suggested that “having a static presentation of the kinds of social information that is exchanged normally in a getting acquainted session is no better than having nothing” (Discussion para.).

Trust has been long viewed as a precondition of research collaboration, but Shrum, Chompalov, and Genuth (2001, p. 685) claimed that this view does not distinguish between what they called “foundational” types of trust that are necessary for any social activity, and more complex types of trust that are needed for scientific collaboration. Their results of a qualitative analysis of 53 collaborations in physics and related sciences challenged the importance of trust for successful research collaboration and found no evidence of a relation between trust and performance, and of greater trust in projects formed through pre-existing relationships than those without such ties. Indeed, they contended that efficient collaboration depends on a distribution of work “in ways that are not conducive to building trust among those without some prior history” (p. 682), and argued for the greater significance of the relationships among people involved (researchers, engineers, research groups, etc.).

### **3.7.4 Technology Readiness**

#### **Integrated Use of ICT**

The availability of tools to support collaboration does not guarantee per se that collaboration will occur. A number of qualitative empirical studies of the use of technology in collaborative work show that the successful use of collaborative technology, as well as the ease and readiness with which it is adopted, depends on its fit with people’s patterns of everyday activities, and/or their willingness to change work practices to adapt them to technology, and on the existence of a culture of sharing and collaboration (Allen-Meares et al., 2005; Ruhleder, Jordan, & Elmes, 1996; Olson & Olson, 2000).

It is unsure, however, whether the use of collaborative technologies leads to increased collaboration (Karsten, 1999). Karsten called attention to two circumstances: one is that there may not be a direct relationship between the need to collaborate and

actual collaboration, because of external or institutional stakeholders exerting pressures towards collaboration; the other is that it is unclear how collaborative technology can support the many forms that collaboration can assume. Situations<sup>15</sup> – people, activities, work arrangements - can be very different and the way technology suits one may not be the same in another one. Depending on the circumstances, technology can potentially strengthen boundaries between different groups and create electronic fences (Barrett et al., 2004).

### **3.7.5 Management Style and Leadership**

#### **Formal Management Structures and Organizational Policies**

Organizing and conducting activities in spatially remote locations is a main challenge, because people are used to doing things in co-location. Physical proximity facilitates interpersonal communication and the creation of common social spaces (Finholt, 2002; Olson & Olson, 2000). As dispersed organizations increase the costs of coordination and communication to accomplish a project (Cummings & Kiesler, 2005), many studies of Computer Supported Cooperative Work (CSCW) have examined whether collaboration can gain from the use of formal mechanisms of communication and coordination.

Within this unsettled debate, Cleal et al. (2004) identified two contrasting positions. On the one hand, a rationalist-informed position contends that the complexity of coordination and communication in dispersed settings can be reduced by setting up formal management structures. On the other hand, a situated view emphasizes that organizational order is always precarious and people achieve coordination and mutual understanding by themselves through social interactions. Different insights into the relationship between formal management structures and successful inter-institutional collaboration can be provided by studies in research policy. For example, Corley et al. (2006) suggested that formal management structures are needed when the level of epistemic development in a domain is low. Although aware of the limitations of their work based only on two case studies, the authors speculated that when there is a high level of epistemic development in a domain – people work in similar areas, share epistemic norms and analytical tools – bottom-up collaboration is more likely to emerge and be successful. In contrast, when the level of epistemic domain is underdeveloped, more formal policies need to be in place to enhance common work, thus top-down collaboration is more likely to emerge. These findings are consistent with those of Chompalov et al. (2002) who studied research collaboration in physics, a domain with a high degree of epistemic development, and found that greater interdependence was associated to decentralization of responsibilities and less hierarchy and formalization. However, Corley et al.'s (2006) findings must be interpreted with caution because, in

---

<sup>15</sup> Karsten suggested that rather than looking at the situation at any one point, a more fruitful way is to look at ICT use as an evolving process (p. 234).

addition to the level of epistemic development, other characteristics of work, including group size, distance, task interdependence, and scientific competition, can be associated with greater coordination problems (Walsh & Maloney, 2007) and the adoption of either a bottom-up or a more top-down management approach. Based on the findings of a survey of 230 scientists in four fields, Walsh and Maloney suggested that larger collaborations – and especially remote collaborations – are more likely to report coordination problems. Corley et al. (2006) did not make explicit whether the settings of collaborations were collocated or dispersed, thus we do not know what role technology played in the relation between epistemic domain and organizational structure of collaboration.

### **3.8 Discussion**

This literature review describes the key findings from selected studies on inter-institutional research collaboration and laboratories. The difficulty of keeping pace with the scattered literature addressing sociotechnical aspects of collaborative work is known (Sonnenwald, 2007). Given the importance of scientific collaboration, its actualizations in a range of academic and practical domains, and its implications at many levels, from practice to policy, pertinent papers are spread in different journals. It is necessary to monitor a large number and broad spectrum of sources. The result of this fragmented and decentralized literature base is that researchers are not always aware of important papers published in other disciplines and journals (Sonnenwald, 2007).

The examination of this scattered literature reveals significant semantic and ontological differences. Authors across disciplines use the same terminology to mean different things or different terms to denote the same meaning. For example, the use of the word “collaboratory” in the literature on scientific laboratories always includes a discussion on the role of technology and non-collocation. However, this is not always the case in the literature on collaboration published in other disciplines.

Different meanings in the use of the word collaboratory also seem to reflect different conceptions of what constitutes the fabric of laboratories. While the studies in social informatics and social studies of science treat a collaboratory as a sociotechnical system, studies in other fields tend to disentangle the human component from technology. Unlike the former groups of studies, the latter apparently focus on collaboration that is either collocated or in physical contact and do not make explicit the role of technology or non-co-location in the process. In doing so, they draw a boundary that separates the social and the technological. A further issue emerging from these studies is whether the processes they describe would be different in computer-mediated forms of collaboration.

#### **3.8.1 What We Can Learn from the Literature Review**

Five main points related to the sociotechnical aspects examined in this review are of interest. First, distance still matters and makes complex, political, or trust-based com-

munication very difficult to manage. Difficulties increase in high-context environments (Hall, 1976), in which little explicit information is available for newcomers to set the context of the project, and people who are already “contextualized” expect others to understand what they think and do not feel the need to be specific. Failure to take the nature of work into account may result in serious impediment to coordination and development of collaboration. Therefore, at the onset of a collaborative project, it is necessary to understand what activities entail and what participants are expected to do in order to make good use of ICT. Activities characterized by tacit shared information and long-term relationships require particular caution with the use of technology.

Second, time also matters. In fact, collaborative projects spanning relatively short time frames make complex, political or trust-based communication very difficult to manage because participants who are unknown to one another take longer time to familiarize and develop trust, given the lack of contextual behavioral cues, rapid feedback, and previously established ties. In work settings characterized by proximate and long-established relationships, the use of technology to support knowledge sharing and social bonding should be carefully balanced with face-to-face communication, especially in critical phases of a collaborative project as the beginning. It seems wise to introduce technologies in small steps and use face-to-face communication to repair disagreements and re-secure relationships.

Third, because prior ties and collaboration experiences deeply influence one’s current and future experience of collaboration, the design for collaborative environments should afford participants who are unknown to one another to gather, intercommunicate and build relationships. Only through communication can participants with different nationality, disciplinary background, expertise, and work history come to develop like interests and goals. Sensitivity to the background of participants requires careful dialogue which balances direct and explicit information sharing and rational argumentation with tolerance for ambiguities, emotional exchange, and time for building relationships and mutual trust. As for the previous point, technology should be used cautiously and blended with dialogue in the context of face-to-face communication.

Fourth, an appropriate system of incentives must be in place but its existence is not necessary per se to ensure a positive attitude to collaboration. Being linked to expectations and norms of behavior existing in a workplace and to issues of local evaluation and control, how utmost the system of rewards is managed is of the utmost importance. The effectiveness of a system of incentives depends on how readily and unambiguously mechanisms to verify achievements are in place and deployed. However, discretionary power of managers to provide rewards can weaken effectiveness of incentives so that collaborators no longer feel motivated to respond to them. In such a case, to restore the credibility of the system, the managers need to negotiate their discretionality and accountability.

Fifth, and finally, any design of collaborative research environment is likely to embody the conflicting interests of multiple stakeholders and this conflict is likely to

emerge in the course of collaboration. Accordingly, during the design process, further reflection may be warranted on sociotechnical issues, so any proposal made for a social aspect should always be weighed against technological considerations and vice versa (McMaster, Vidgen, & Wastell, 1997). A process of consultation with human stakeholders with legitimate interests in the development of a collaborative research environment is necessary to let them voice their needs and visions. This consultation entails assessing the suitability of a collaborative research environment as a sociotechnical system to fulfil the needs of stakeholders. During this phase, a dialogue should be established in which sociotechnical aspects influencing collaboration are not examined separately, as they belonged to two different realms, but are assessed in their interrelation and against critical technological and social issues that people would like to be settled. Consulting the stakeholders allows to integrate their visions and apprehension of ongoing experience in strategy formation and planning of collaborative environments. This way, the stockholders can play a crucial role in shaping collaboration not only by either contributing or not to it, but also through a more open process of interpretations and negotiations of their own interests.

### **3.8.2 Limitations of the Reviewed Literature for the Present Study**

Looking at the scientific domains concerned by the studies of collaboration included in this review, they mostly relate to engineering, physics, and life sciences. The definitions themselves of research collaboration and collaboratory stem from the experience of research occurring in those domains. The extensibility to other disciplines of tools and methods developed elsewhere has not been tested much (OSI, 2006), but it seems unlikely that technologies and services originating within a discipline can be “transferred” to others (Beaulieu & Wouters, 2009). Thinking along the lines of translation of e-research, as noted in section 2.2.1, my claim is that a collaboratory is interpreted and used differently across disciplines, and that the social and technical relations that constitute it also unfold in different ways. Furthermore, owing to the fact that collaboratories are still at a relatively early stage of development, it is not clear yet whether we can elaborate generic models for research conducted in collaboratories, or whether each discipline will have its own specific set of tools, processes and working methods (OSI, 2006). Hence, it is necessary to investigate realizations of collaborations in social sciences to account for contextual and disciplinary differences that will influence the adoption and use of collaboratories.

This literature review enumerated and described a number of sociotechnical aspects that need to be taken into account to attract potential collaborators and encourage actual collaborators to continue to engage in the process. However, I argue that what remains unclear in most studies is the nature of the relations between these sociotechnical aspects and collaboration. For this reason, as described in the previous chapter, the approach used in this study aimed at describing the making of collaboration through the network of actors’ decisions and actions and their interplay with



sociotechnical aspects. This relational epistemology holds promise for understanding the connections between sociotechnical aspects and the processes of formation, development, and completion of collaboration. Understanding this nexus of interrelations in specific settings and the way in which these interrelations evolve over time can provide a better sense of causality, and offer a roadmap for how to implement actions that predictably lead to successful collaboration.

### **3.9 Conclusion**

To sum up, there is a substantial body of research literature on the sociotechnical aspects encouraging or hindering inter-institutional research collaboration in academia and academia/nonprofit organizations. However, most of the articles addressed the enablers/barriers of successful collaboration, but did not examine the processes of formation, development, and completion of collaboration. Furthermore, there seems to be little research work that is theoretically based, at least in an explicit way. An in-depth study examining such processes in detail can shed light on the relations between sociotechnical aspects of work and who starts and develops collaboration and why, as well as on the nature of the collaborative process. Generating this understanding is also relevant for shaping up organizational processes that help the uptake and sustainability of a virtual organization supporting collaboration between LIS academics and information professionals.

With this reasoning in mind, I conducted three in-depth case studies of research collaboration in LIS drawing on ANT. ANT was used as a framework to link together social and technological entities in the processes of construction of collaboration. Following this perspective, the sociotechnical aspects influencing collaboration were analysed in their interaction with the actors involved. My goal was to provide an account with a satisfactory level of precision of how collaboration unfolded over a period of time. In my view, this was a promising way to analyze the nature of work, the existence of previous ties, the role of incentives, and the other aspects identified by this literature review, to uncover how they were concretely organized and held together, and to understand how they influenced collaboration.

## 4 Research Design

### 4.1 The Use of ANT as a Methodology

ANT is both an analytic framework and a methodology (Latour, 1998, 2005). This means that it can be used both as a lens to see the world and as a set of practices, or tools, to describe the heterogeneity of actors and how they interact in networks (Latour, 1998; Law, 1997). Using ANT as a methodology implies the adoption of some important and interrelated principles (Callon, 1986a). The first principle is agnosticism, which implies abandoning any a priori assumptions of the nature of networks, their causal conditions, or the accuracy of actors' accounts. The second principle is generalised symmetry, which requires the analyst not to privilege humans in his/her account, but to employ a single register to analyze human and nonhuman actors. As mentioned in section 2.1, this extreme symmetrical treatment of humans and nonhumans has raised considerable controversy. Walsham's (1996) position in the debate was particularly useful for this empirical work. Although rejecting ANT extreme principle of symmetry, he deems valuable to think of things as actors, and to consider which interests they inscribe, represent, and speak for. In his opinion, this is different from assuming a symmetric position for people and things, but still constitutes a useful analytical device (p. 476).

The third principle is free association, which advocates abandoning the distinction between natural and social phenomena and the idea that the two are separated by a clear boundary. These three principles require the researcher to adopt the following approaches to the phenomena of study: learn to be articulated, follow the actors, and examine inscriptions. These approaches are in line with the ethnomethodological roots of ANT and are discussed below.

#### 4.1.1 Learn To Be Articulated

ANT does not propose that the researcher's duty is to record bare facts through accurate and unbiased statements in order to pursue universal truths. Latour (2004, 2005) has argued that facts (from the Latin *facere*, meaning "to make") are constructed and not objectively given. To escape the subject-world trap and produce interesting and insightful accounts of phenomena, Latour (2004) contends that we need to learn to be articulated, which, as he phrases it, means "learning to be affected by differences" (p. 210). For Latour, being articulated means to record and understand the many differences and contrasts that may characterize the objects of study, and avoid a deductive way of thinking that moulds reality to fit one's theoretical understanding. Each actor can be articulated in a number of ways. Let us use the example of collaborative culture: it can facilitate knowledge sharing when the value of sharing information is clear to each participant, but there is often, at the same time, the unspoken fear that one loses power by sharing knowledge. Collaborative culture thus is not an unproblematic

matter of fact but a matter of concern (Latour, 2005, p. 114). Interests, issues, ideas, and intentions lead to multiple translations of collaborative culture. Therefore, dealing with sociotechnical aspects of work as matters of concern, and not as matters of fact, means that I treat them not as they were forces exerting linear causality, but as actors whose influence is mediated and translated by other actors.

### **4.1.2 Follow the Actors**

To maximize the opportunities for objects of study to be understood in their multiple activities, researchers need to “follow the actors”, both human and nonhuman, in their translations (Callon, 1986b; Callon & Latour, 1981). Therefore, researchers need to examine closely how actors interact, negotiate, form, contest, and break alliances. In the case of human actors, it means to let them talk, give them the opportunity to use their own categories, let them ask questions and question researchers' aims. In the case of nonhuman actors, it means to understand who constructed them and how, who they speak for, and what interests and practices they embed. The account generated by following the actors is not a report that reproduces the world “as it is” and leads to generalizations that are invariant or context-free, but is a rich and fine grained account describing what actors articulate. ANT affords an in-depth analysis of the relations and negotiations through which collaboration is constructed.

ANT does not provide hard and fast rules to “operationalise” the described principles and the approaches. Nor does it offer a set of clear rules to guide researchers through the research process (Law, 1992). How researchers try to uncover and define which networks exist in a given setting, how actors translate their ideas and interests, and which forms these translations take depend on the specific situation under study. At the outset of a study, Law (1992) suggests that it is a good idea not to assume too much about the phenomena of investigating. There needs to be a starting point, but where to start is up to the researcher. In this study, a concern was to apply data analysis techniques that would be consistent with the goals of ANT, in that their underpinnings would not conflict with this framework. ANT does not prescribe one data analysis technique, but methods must be chosen that allow the identification and description of the full range of associations among the actors involved in a project.

### **4.1.3 Examine Inscriptions**

Collaboration can be seen connected to material forms of representation, for example literary inscriptions or texts, and technical artifacts. These forms are historically and socially situated so that one can speak of inscriptions (Latour, 1990) as representations being inscribed into a certain practice of collaboration, which, in turn, can be described through the inscriptions pertinent to that specific practice. The metaphor of the “inscription” points to the idea that the processes of collaboration can be seen as being “written” and “read” (e.g., Martin & Veel, 1998). Collecting relevant inscriptions provides the opportunity to map and examine multiple social aspects, since they inscribe social practices and decisions and speak for the values and interests of the actors in-

volved at points in time. Inscriptions can be described by analysing four aspects (Callon, 1991): what it is inscribed; who inscribes (which stakeholders); how it is inscribed; and how powerful it is (what it takes to go against the inscription). Documenting past or present collaborations through a trail of inscriptions can show us the influence of the actors' work contexts, with their structures of knowledge and interests. Aspects influencing collaboration can be detected and studied through the analysis of inscriptions, that is, material representations produced in the course of the project. Such objects can move from the background to the fore to make visible social interactions: who and what acted in a given situation, who and what else was present but did not act, why, and so on. Therefore, it is possible to use inscriptions to account for the specific context in which collaboration originates and develops.

The three described approaches lead to the choice of a methodology that preserves the wholeness of the phenomenon under investigation, allows an in-depth analysis, and lets emerge the multiple perspectives of the actors involved. These aspects are salient characteristics of case studies.

#### **4.1.4 ANT as a Methodology for Describing**

In this study, ANT was used to describe “what was” as opposed to suggest how and why actors behaved the way they did. I am aware that the choice of distinguishing description from explanation does not follow Latour’s (1991, 1993, 1998, 2005) belief that description and explanation cannot be separated<sup>16</sup>. In ANT, a good explanation is not different from a meaningful description, because using ANT allows to describe causes and effects, things provoking other things, and this is what good explanations are made of.

In conducting data analysis, I followed instead ANT’s avoidance of explanations that try to find the “explanatory” outside the empirical account (e.g., “external forces”). The “explanatory thing” must be something that is included in the data (Latour, 1999a). Therefore, I followed the actors and learned from them not only what they did but also how and why they did it, trying not to impose on them a preestablished view of their world and their activities. In conducting case studies, I followed the characters involved in the construction of collaboration and I attempted to reconstruct the network of events, decisions, physical artifacts, and organizations interplaying with the process of construction.

Adapted from Callon (1986a), the diagram below outlines the strategies to build a network and displays the path I followed throughout the collection and analysis of data.

---

<sup>16</sup> See also section 4.4.4 for more articulation of the stance about description and explanation adopted in this study.

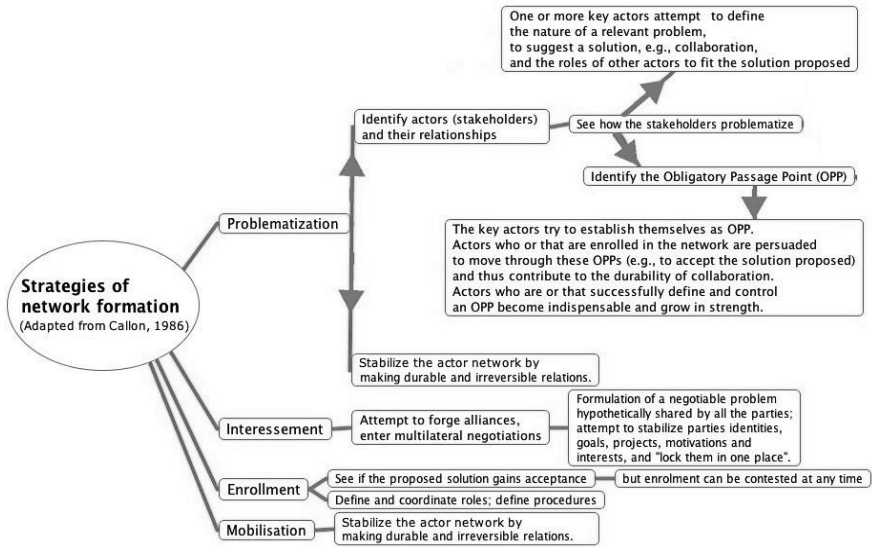


Figure 4-1 Building an actor-network (Adapted from Callon, 1986a)

## 4.2 Choice of the Case Study Methodology

### 4.2.1 Case Studies

Leonard-Barton (1990) defined a case study as:

*A history of a past or current phenomenon, drawn from multiple sources of evidence. It can include data from direct observation and systematic interviewing as well as from public and private archives. In fact, any fact relevant to the stream of events describing the phenomenon is a potential datum in a case study, since context is important (p. 249).*

This research is based on three qualitative case studies in two countries: Italy and another European country that cannot be identified for privacy reasons. It is comparative because it aims to follow how collaborative projects involving actors from academia and practice have developed from the start to their completion in two national contexts. Two case studies were retrospective and one was real-time.

### 4.2.2 Reasons for Choosing the Case Study Methodology

The case study methodology was chosen for three reasons. First, this study focused mostly on “how” questions about small-scale, distributed projects between academics and professionals in LIS. Given that these types of collaborations have not been thor-

oughly researched yet, a case study was a logical methodology to use.

Second, case studies have been used in a large number of studies using ANT (e.g., Callon, 1986a, 1986b; Monteiro & Hanseth, 1995; Akrich, 1992; Law & Callon, 1992; Stanforth, 2007; Walsham, 1997). The essence of ANT studies that investigate socio-technical phenomena is to follow the creation and maintenance of actor-networks. This longitudinal process examines the ways in which actors negotiate the creation of networks and new actors emerge from them. ANT-informed case studies usually illustrate detailed ethnographic or historical studies conducted in naturalistic settings, in order to account for the ways in which people adopt and use technology, or the ways in which heterogeneous actors interact and negotiate their interests to pursue their goals. The emphasis on phenomena in their real settings and naturalistic inquiry held promise for this study, because collaborations were performed in rich contexts including material circumstances, work practices, social ties, and bodies of knowledge. These complex ecological circumstances require a method that attempts to generate a holistic understanding of the processes of formation, development, and sustainment of collaboration.

Third, case studies are likely to contribute to theory development (Eisenhardt, 1989). Although Eisenhardt refers to multiple and iterative cases driven by a priori testable hypotheses and to the development of theory generalizable across settings, she also appreciates the ability of this methodology to build novel and empirically valid theory. The latter is relevant for this research, which aims to generate rich details and further theoretical understanding of research collaboration between academia and practice.

### **4.3 Case Selection**

Case selection involved considering country selection, recruitment of collaborative projects and negotiation of access, and protection of human participant. Each is outlined in detail in the following sections.

#### **4.3.1 Country Selection**

A cross-country study can help gain greater awareness and better understanding of collaboration between information professionals and LIS academics in different national contexts. To conduct a cross-country comparison, initially I sought cases in three countries, Italy, Sweden, and another European country. This choice reflected both practical and purposive reasons. The main practical reason was linguistic and cultural. In fact, it was necessary for me to choose countries whose language and culture I understood, or in which it was possible to use English as a lingua franca in the interactions with study participants if the local language was a barrier. This constraint reduced the options.

The purposive reason refers to the need to study cases in countries where projects that include both academics and professionals occur. For example, countries in which

there are LIS departments or schools and where academic staff is conducting collaborative research. In this respect, Sweden and the other European country were both good options. The Italian context of library and information science within academia is different from the other two countries. In Italy, only three departments are formally named as LIS by the Ministry of University and Research, while a larger number of higher degree programs in the field are offered by departments in the humanities. In Italy, the separation between academia and practice is not very sharp, and the ties between the two realms have been close and recurrent, but for consultancy and teaching rather than for doing research together (Claudio Gnoli, personal communication, June 19, 2007).

Selecting Italy, Sweden, and the other European country as countries from which to recruit cases could provide the opportunity to compare contrasting cases of collaboration occurring in rather different institutional settings (e.g., academic practices, traditions, value systems, and language).

### **4.3.2 Recruitment of Collaborative Projects and Negotiation of Access**

Gaining access to cases was a sequential process. As a first step, in summer 2007 I circulated a letter to recruit volunteers for a pilot study (see Appendix 1). To find suitable cases in Sweden and the other European country, I used professional mailing lists and emailed few selected contacts among academics and professionals. In Italy, I sought out the persons, both academics and professionals, who I thought of as being best informed about the phenomenon under study. This meant that I selected few people among the most active representatives of the Italian community in LIS and emailed them. One of them was an ideal prime contact because he was involved in one of the included projects. It can be argued that the Italian case studies were liable to self-selection bias, given that the group of people being studied had a form of control over whether to participate. For example, people who have strong opinions or substantial knowledge may be more willing to spend time talking during an interview than those who do not.

In the letter, I explained the purpose of the pilot study and what volunteers were expected to do. I also explained that, for my research purposes, the projects had to meet the following basic criteria:

- Involve LIS academics and information professionals.
- Not involve training/teaching or consultancy.
- Be about joint-research activities, or other activities in which the parties were involved to solve a significant problem together.

These criteria were a form of purposive sampling (Silverman, 2005) employed to gain access to cases relevant to my research questions and objective. The mailing lists

and email contacts yielded two retrospective cases, one in Italy and one in the other European country. A third real-time case was added when the Italian project was resumed in November 2007. No suitable cases were found in Sweden. This low number of found cases may suggest that collaborative projects between academia and practice are not common in LIS, with teaching/training and consultancy projects being more frequent.

The three cases involved small-scale and distributed collaborative projects:

- Retrospective: Semantic OPACs (SemOP1), 2003-2006, 21 participants.
- Real-time: Semantic OPACs (SemOP2), 2007-2008, 17 participants.
- Retrospective: Impact Study of Library Services on Patient Care (IMPPRO), June 2004 – July 2006, 10 participants.

The case studies are described in full details in Chapters 5, 7, and 9.

### **4.3.3 Protection of Human Participants**

In each case study, I followed the rules and guidelines for research in the social sciences and the humanities set forth by the Swedish Research council [*Forskningsvetiska principer inom humanistisk-samhällsvetenskaplig forskning - Humanistisk-samhällsvetenskapliga forskningsrådet* (Humanistisk-samhällsvetenskapliga forskningsrådet, 2002)]. In particular, project members participating in interviews were informed about the project goals, their role in the project, and how the collected data would be used. An informed consent form outlining participants' rights and researcher's obligations was given to each participant before data collection was initiated. If they agreed to participate in the study, participants signed a copy of the consent form, and were given a copy for their own use. Interviews and audio-recording of interviews had to be approved by interviewees. Permission to collect literary inscriptions was sought first from each project leader or coordinator. The project leaders acted as gatekeepers and gave permission on behalf of the entire project team, which made the process of obtaining approval more efficient. While the project leaders were the main source of literary inscriptions, individual project members could also contribute them.

When reporting data analysis results, any information that could be traced to a specific individual, group, or case was made anonymous, unless the project leader agreed otherwise, as in the Italian cases, in which both the coordinators and the participants agreed to participate with their real names.

## **4.4 Data Collection and Analysis**

Data sources included literary inscriptions (texts) and interviews. Silverman (2005) suggests that the use of multiple techniques should be informed by the theoretical per-



spective chosen and should include techniques and data generating accounts of phenomena from within that perspective. Making a theoretically-based choice of data collection techniques is important to avoid aggregating sets of data from different sources in the misleading attempt to provide a complete and truthful picture of reality (Silverman). As the choice of ANT requires to follow the actors and to examine inscriptions, interviews and analysis of texts were the elective choice, because they have been used in most studies informed by this theoretical perspective. Details regarding these techniques are provided below.

Data analysis was conducted in three main steps: descriptive analysis within cases; use of event-structure analysis for search of associations among sociotechnical aspects; and search for cross-case patterns.

#### **4.4.1 Data**

##### **Literary Inscriptions**

I collected all texts related to the three projects that were either freely available on the Internet or in other public domain resources, or were given to me by the project leaders and other group members. The purpose of collecting as much material as possible was to constrain subsequent research narratives, following the example of forensic scientists and anthropologists who collect as much evidence as possible to constrain their conclusions about the responsibilities of a crime (Roth, 2005). Therefore, I collected both all the available texts produced during the projects, and other texts related to the context of the projects. My search yielded a total of 44 texts for the three projects, plus several messages distributed through the Italian projects' mailing lists over 13 months. Texts included journal papers, project reports, web materials, PowerPoint slides, minutes of meetings, and potentially interesting reports, annual reports and workplans produced by external institutions. Not only did these texts represent the outcomes of collaborative work, but also conditions, events, and activities influencing collaboration.

ANT does not provide guidance as to how to decide which inscriptions to include in the analysis, therefore researchers must address this issue locally. In my study, I followed Hammersley and Atkinson (1995) who suggest questions to be asked during the selection and use of documents in ethnographic analysis (e.g., who produced the document? for what purposes? on what occasions? with what outcomes? what is recorded? what is omitted?). These questions helped understand better the nature of the information, interests, and perspectives provided in a specific inscription. A literary inscription is in fact the product of social interactions and cannot be considered as a neutral nor transparent representation. A guide to select and use inscriptions in this study is in Appendix 2. I analyzed texts before starting the interviews to explore the projects beforehand and generate relevant questions to ask and topics to be covered, as well as to optimize the interviewee's time.

## Interviews

I conducted 31 semi-structured interviews with 28 study participants in the three projects (see Table 4-1 for details). Interviewees included senior and junior information professionals from various institutions across the respective countries, LIS academics and LIS graduate students (see Appendix 3 for more details on the interview participants). Six were male and 18 female. The majority had a master’s degree in areas related to information studies.

**Table 4-1** Summary of interviews

PROJECT	POPULATION	SEMI-STRUCTURED INTERVIEWS
SemOP1 (retrospective), 21 project participants	LIS academic: N = 1 Information professionals: N = 7 LIS graduate students: N = 13	LIS academic: N = 1 Information Professionals: N = 3 LIS Master’s students: N = 4 Invited participants who did not respond and/or declined : N = 2
SemOP2 (real-time), 18 participants	LIS academic: N = 1 Information professionals: N = 17 Drop-out information professionals: N = 5	LIS academic: N = 2 Information Professionals: N = 14 Drop-out information professionals: N = 1 Invited participants who did not respond and/or declined : N = 5
IMPPRO (retrospective), 10 participants	LIS academics: N = 3 Information professionals: N = 7	LIS academics: N = 2 Information Professionals: N = 4 Invited participants who did not respond and/or declined: N = 3

All the participants in IMPPRO and SemOP2 were invited for an interview. Invitations were sent by email, explaining the purpose of the research and the goals of the interview. When people asked for a copy of the interview guide beforehand, I sent it to them. Most of the interviews took place on the phone, because participants were distributed across two countries. After an interview, when needed, follow-up emails were used to clarify points, or to ask questions that were not asked previously. In a few cases, participants also volunteered or requested to read the interview transcriptions and suggested changes/additions.

In the case of SemOP1, I was unable to gain access to all members, in particular to the graduate students. As four years have passed since the completion of their Master’s

program, I was unable to find all their contact details. Of the 13 student in SemOP1, I was able to interview four. Although a higher number of interviews would have generated a more comprehensive view of the students' perspective, it must be noted that the class was a relatively homogeneous population with narrow objectives. The small group of students shared a common experience and a number of characteristics (e.g., previous educational background, region of origin, age range, and degree of knowledge about subject indexing). Given this particular cultural setting, it can be assumed that even four individuals can give information that can provide insights into the degree to which this information can be extended to the rest of the class (Guest, Bunce, & Johnson, 2006)<sup>17</sup>.

### ***Interviewing and Interview Processing***

The interview guide was organized around Callon's stages of translation and socio-technical influences, and, as mentioned earlier, it was developed for each case after the analysis of the available texts. The guide enabled the collection of specific evidence related to activities of actors and networks, inscription techniques, and translation processes. I refined the guide throughout the interviewing process, making changes to match the different actors and the different projects.

During the interviews, I asked people about activities, circumstances, events, and goals of collaboration projects. I also elicited participants to talk about challenges and difficulties faced, and satisfactory and dissatisfactory aspects. All interviews were audio recorded. Interviews lasted an average of 40 minutes, with a range of 21 minutes to one hour and 20 minutes, depending upon the extent of the interviewee's participation in the project, and his or her time constraints. In fact, I was asked by the project leader to restrict the length of interviews with information professionals in IMPPRO due to their busy schedules. Interview guides were developed in the local languages of study participants and interviewing occurred in those languages as well.

The interview guide (See Appendix 4) contained a core list of questions and helped to ensure that all the important topics were covered during each interview. At the same time, the semi-structured interview guide allowed for shifts in topics driven by the interviewee, and this yielded further important information.

Interviews were transcribed by either a professional transcriber or myself. A smooth verbatim transcription was used, that is exact transcription minus fillers (every "um", "er", "you know" and other conversational fillers), with some editing to improve fluency.

---

<sup>17</sup> While arguing against assuming that a small number of interviews (six to twelve) can always be enough to achieve a desired research objective, Guest, Bunce, and Johnson (2006, p. 75) affirmed that "with respect to instrument content, the more widely distributed a particular experience or domain of knowledge, the fewer the number of participants required to provide an understanding of the phenomenon of interest" (p. 75).

## **Translation**

Data from the three projects are in the participants' local language, one of which is Italian. The presentation of the analyses in a second language becomes an important issue for any researcher who hopes that readers understand and make sense of data from foreign participants (González y González & Lincoln, 2006). Given the importance that context had during the unfolding of the data, I chose to analyze data in the local language and to translate the results, giving readers the option of reading data excerpts in the original language of the data along with the "presentation" language (González y González & Lincoln, 2006).

I translated interviews myself (Temple & Young, 2004). Italian is my mother tongue and English is my second language that I know at a fair level of proficiency. A translator does not work as a simple "reproducer" of a text from a source language into a target language, just trying to find word equivalence. In a number of cases, interviews contain fragmented expressions that cannot be translated "as they are", but need to be "reconstructed", which means that they need to be turned into coherent sentences (for example, by adding or removing words in order to ensure that the meaning gets communicated) in the original language before being translated. Therefore, my approach to translation did not mean seeking word-equivalence, but finding the expressions that were closest in contextual meaning to the original text.

### **4.4.2 Data Analysis**

As noted earlier, ANT does not provide guidance as to how to conduct data analysis. Researchers must address this difficulty practically and locally in each empirical study. In this work, I interleaved data collection and data analysis. I started data analysis as soon as I gathered the first set of data. Furthermore, I did the analysis in an iterative fashion. That is to say, what I learned from the data gathered from one document and interview helped me learn what to watch for in other documents, or ask during subsequent interviews. The process was generally inductive, but ANT concepts and the findings from the literature review were used as sensitizing devices.

### **4.4.3 Step One: Analysis within Individual Cases**

This step involved the development of detailed case descriptions, coding of data, and writing of topic memos. Analysis started with a thorough reading of texts and interview transcripts, to identify actors, networks, and stages of translation within each case. When adopting an interpretive approach, it is a dilemma to "manage" the quantity of empirical material that results from a qualitative case study without imposing categorization routines that effectively discount much of the data before it can be assessed as part of an integral whole. Coding data into strict categories that have been subjectively assigned by the researcher is contrary to the ethos of ANT where we learn from the actors - and from them alone. To solve the dilemma, I made a compromise with ANT and used a rough descriptive framework (see Appendix 5), – a sort of “re-

ording frame” – based on Callon’s stages of translation, and the sociotechnical aspects that emerged from the literature review. I used this framework to describe, understand, and reconstruct how the different actors had joined their efforts to achieve a common goal, and whether the alliances they achieved were successful and sustainable.

Using this framework, I unpacked assumptions, entities, and events; I widened the network described by texts, by extending it to other networks and bringing them in; I created connections, followed unsuspecting paths, and examined effects. I did not simply inspect data to label interesting points, but analyzed them in a systematic matter through an iterative process. I made comparisons between text segments and across participants, to discern conceptual similarities and differences, and to discover patterns. I interconnected text segments and codes, to produce relations or cross-settings of categories. I travelled back and forth between each piece of data and an emerging narrative describing the construction of collaboration in each project. In fact, I developed a narrative to unify events into a single story. In doing so, I could find out which sociotechnical aspects suggested by the literature were grounded in evidence and which new aspects emerged. My understanding of collaboration in each project emerged through a constant interplay between my act of writing and what I read in texts and interviews transcriptions. Writing was part of "getting close to the data", because constructing a plot through written text and the use of data sources and memos helped illuminate important patterns that could go unnoticed (Seltzer & Rose, 2006). The data analysis process is outlined in Table 4-2.

**Table 4-2** Data analysis process in Step One

PROCEDURE	PURPOSE
Transcription of interviews	Recording interview data in Word.
Reading of texts and transcriptions	Achieving a sense of the whole, and selecting smaller data sets to work on.
Limiting the data sets	Selecting parts of texts and transcriptions.
Creating tables in Word and entering segments from texts and transcriptions	Creating a simple database for categorizing data and writing memos.

PROCEDURE	PURPOSE
Segmenting narratives into relevant and meaningful units according to attribute code and aspect code.	Thorough reading of sentence-by-sentence and word-by-word to identify themes. Use of the attribute code and the aspect code in the descriptive framework to mark events or activities that are meaningful for charting translation in the setting under study.  Writing memos.
Using Table's functions in Word for sorting data by attribute code and aspect code. Gathering groups of statements in the sequence which will allow translation phases to be described.	Highlighting how the translation process and the social aspects of work are associated.
Constant comparison of the statements.	Making comparisons across entries and participants to identify conceptual similarities and patterns.  Interconnection of text segments and codes to produce relations or cross-settings of categories.
Consolidating data and memos in a narrative into a coherent argument.	Developing a narrative to unify events into a single story. Identifying actors, networks, translation processes, and sociotechnical aspects.

With respect to interview responses, consistent with the ANT perspective, I did not treat them as giving direct access to interviewees' experience, but as narratives that they constructed actively. As Knapik (2006) put it nicely, I "did not presume to be analyzing some purported original interactions that participants referenced in their accounts to evaluate them. Instead, my focus was on reports of their experience and how they interpreted these" (p. 3). I experienced the interviews as conversations, in which meaning was produced through negotiation between study participants and myself (Dortins, 2002). Participants employed a wide variety of ways of speaking, related to their cultural situations and perception of the interview space (Dortins), from the shy participant who felt anxious during the interview and would prefer to write, to the caring person who wanted to be helpful.

#### **4.4.4 Step Two: Use of Event-Structure Analysis**

The analysis conducted during Step One was aimed at constructing the narrative of each collaborative project. The main goal of the narratives was to use the data to re-

construct the events involving the actors in each collaborative project. Therefore, I organized the data into a sequential order, and I structured the content into a coherent story. Griffin (1993) defined a narrative as:

*an analytic construct that unify a number of past or contemporaneous actions and happenings, which might otherwise have been viewed as discrete or disparate, into a coherent relational whole that gives meaning to and explains each of its elements and is, at the same time, constituted by them (p. 1096).*

Griffin implied the inevitably interpretive character of narratives by adding that they are orchestrated from beginning to end by the narrator who uses the data to construct a particular sequence of actions for a particular purpose. Latour (1991) seems to assert a similar view, when he posits that temporality of events of sociotechnical paths must be constructed.

In their existing form, the narratives of the three cases were the material for the second step of analysis and did not help construct a causal interpretation. There are two types of approaches to explanatory causation: nomothetic and idiographic (Schutt, 1996). Nomothetic explanations are concerned with gathering as many examples as possible of the occurrence of a given variable, and then searching for the common patterns that might reveal the general circumstances under which the variable occurs. This type of explanation does not fit the research design of this study. Therefore, I adopted an idiographic approach, which focused on three cases to examine how a series of concrete events resulted in particular outcomes at a particular time and place.

The narratives of the three cases organize the data and support understanding of how events unfold and relate to each other. Therefore, in contrast to Latour's (1991, 1998, 2005) belief that description and explanation cannot be separated, I followed Griffin's argument (1993) that narratives have a sort of internal explanatory logic, but their explanatory weakness lies on the reliance on temporal order of, and relations among, events. To harness their explanatory power, narratives need to be transformed through a process of abstraction and generalization of events, to make inferences based on the analysis of sequence of events replicable and not just dependant on the researcher's idiosyncratic intuition (Griffin, 1993). In particular, Griffin suggested that it is crucial to ask and respond to factual and counterfactual questions. Counterfactual questions examine what would have happened concretely if a different concrete circumstance had occurred. If the absence or modification of a concrete circumstance had changed the course of an event, the circumstance is deemed essential to the particular configuration as it actually happened, and a cause of what happened. The process of asking counterfactual questions resembles Latour's insight that social research can be understood as a form of detective work (Austrin & Farnsworth, 2005), aimed at tracing and unravelling unsuspected elements and practices that constitute networks. Latour (1991) used the counterfactual method in his sociology of the door-closer.

In section 2.2., I described my approach to the study of the interplay between socio-

technical aspects of work and actors' decisions and actions in the processes of formation, development, and completion of collaboration. My goal was to examine the connections between these processes and the influencing aspects. To understand these connections, I needed to unpack the narratives of the three cases, and respond to factual and counterfactual questions about sequences of events. Possible counterfactual questions included, for example, What is *theoretically* expected to follow from this counterfactual action or condition? How can *comparable* and *analogous* events help us understand this particular counterfactual condition? How do these kinds of actors *typically* respond to these actions? What has been the consistent *pattern* of action of this actor? (Griffin, 1993, p. 1103; emphases in original).

To facilitate this questioning process, I used a technique for narrative analysis called event structure analysis (ESA). ESA is a qualitative method for analyzing and understanding the logical structure of events through which human activities unfold (Heise & Durig, 1997), and has been used mainly to analyze historical processes, individual motivational processes, and organizational change (Hager, 1998). Although ESA is informed by ideas from cognitive science (that is, human actions are governed by subjective representations of reality, which implies a fracture between subjective and context), it can be used as a method of analysis in combination with ANT by attempting to trace the “logic” that actors have followed in their translations. Neither are ESA’s logical underpinnings in theory of production system a constraint, because one does not need to accept production system logic to structure narrative sequence with ESA, as virtually any process theory can be tested (Griffin, 1993).

### **Understanding Translation of Interests through Series of Events**

In ESA, the unit of analysis is an *event*, which – in ANT terms – can be conceptualized as a network, in which an actor is associated to another one by an action performed under certain circumstances. Events deal with processes (Heise & Durig, 1997), therefore Heise and Durig say that the analysis of events focuses on the processes and transactions that form an organization. This assumption fit my ANT-informed study of collaboration, because my interest was to examine how actors translated their interests to start a collaborative project and to make it work. This constant process of alignment of interests takes place in a number of relations among the actors involved in collaboration. Analyzing this process of translation can be daunting, because many actors can be involved, and even when a relatively small number of actors form a network, their associations develop into a dense web of relationships. My approach to understanding this complex tangle of relationships involved an analysis of translation as a social process. ESA helps view each translation phase as a sequential series of events. An event is a process, and dealing with events means dealing with happenings that are significant in understanding the translation phase. As a network is also a process, in which actors are associated to one another by what they do to each other, an event can be conceptualized as a network of actors involved in translation.

Table 4-3 shows my interpretation of the main ESA concepts in ANT terms. Events



may be causally linked to each other, and parallel series of events may occur simultaneously. Some events may be critical turning points in the process of translation. Some events lead to multiple streams of events, and events may converge on a significant event. I assumed that an analysis of the events embedded in problematization, interestment, enrollment, and mobilization can lead to a better understanding of the translation of interests that occurred throughout the course of collaboration. In fact, collaboration is a set of relations following a contingent development path – from members gaining entry, to sustaining and recognizing benefits of working together, etc. Therefore, creating a diagram of how these events are linked to each other should provide insights into how interests have been translated. The sociotechnical context in which collaboration occurs is not seen as an external static background but as co-constitutive of the events. An explanation of its influence relies on the unfolding interconnections among events, to investigate why something happened in the translation process and how actors understood those events.

**Table 4-3** Interpretation of ESA Concepts in ANT Terms

ESA	ANT
Social Change	Translation: Social process of construction of a social order through transformation of one order into another
Constituted by events = transactions among people and entities involved in happenings	Constituted by events as networks = associations of actors (human and nonhuman) involved in happenings
Event as a happening in which people use means to transform people and/or things from one condition to another	Event as a network = a basic step in translation, in which actors use resources to transform people and things from one order to another
An event consists of functional linkages between people and entities involved in a happening	A network consists of functional linkages among actors involved in a happening
These functional linkages influence the interrelations between events	These functional linkages influence the interrelations between events and eventually the process of translation.
Translation as a sequence of events:	

ESA	ANT
Each phase (problematization, intersement, etc.) = chain of events Analysis of each phase = analysis of the logical interrelations between events, and of the functional linkages between actors and instruments involved in each event	

ESA consists of two main types of analysis: one is compositional analysis, which helps describe how events in a narrative associate people, things, and actions; the other one is linkage analysis, which helps identify the type of linkages between events (e.g., prerequisite, implication, historical causation, etc.). Before beginning linkage analysis, events must be coded according to the Event Frame. The Event Frame is an analytical technique for texts and consists of eight categories to describe events (for more detail, see Appendix 6). Some adaptations of the definitions of the elements of the frame had to be made to accommodate the principle of symmetry in ANT, but this should not be seen as a major theoretical problem because the Event Frame is considered as a flexible tool for interpretive and constructivist work<sup>18</sup> (Heise & Durig, 1997).

To conduct the linkage analysis, I used Ethno, a software designed for this type of analysis (Heise & Durig, 1997). Each of the three narratives was analyzed individually, inputting the events from each narrative chronologically into the computer program. In listing the events, I focused on each process of translation and built a record of events that contributed causally or influenced the stages of foundation, formulation, sustainment, and conclusion of collaboration within each process. Each process comprises a set of relevant events. I judged their relevance based on the knowledge and understanding of the project gained through the first phase of analysis, during which I tried to make sense of what happened. As the stage unfolded, each new event was added to the set of translation events. To conduct the linkage analysis, for each event entered ETHNO asked me a series of yes/no questions about whether a temporal antecedent was necessary for a subsequent event. After all the events were entered, ETHNO produced a diagram that represents the causal connections among the sequences of events. It should be noted that ETHNO does not produce the causal connections that make up diagrams. It can only probe the analyst for deductions about the causality between events. Thus, the program depends on the analyst having the knowledge about the relations between events, to make the decisions that will produce the diagram of causal connections.

---

<sup>18</sup> I argue that the Event Frame is compatible with the ethos of ANT. I see some parallelism between this approach and the sociotechnical graph suggested by Latour, Mauguin, and Teil (1992). For example, both the Event Frame and the sociotechnical graph are inspired by sociological and linguistic traditions. And also in Latour, Mauguin, and Teil, phenomena of interest are identified through sentences in their syntagmatic dimension, which means the combination of components in a meaningful syntactic-semantic relation.

#### **4.4.5 Step Three: Development of a Sociotechnical Framework**

This step involved the search for patterns of influential sociotechnical aspects across the three cases. These patterns are supposed to highlight similar findings across the three cases concerning particular sociotechnical configurations and the activities connected to those configurations. There are characteristics in the examined projects that may be relevant or interesting for thinking about collaboration in other fields affected by the research-practice gap. During the analysis of data within the three individual cases, I related findings to previous work but it was necessary to make clearer the relevance of these findings to new settings or across settings, to enhance the generalizability of conclusions drawn from the cases and also provide a resource for other academics and professionals to design virtual research organizations.

### **4.5 Discussion of Reliability and Validity according to Lincoln and Guba's Criteria**

I used Lincoln and Guba's (1985) notion of trustworthiness to assess reliability and validity of my work. Trustworthiness is made of four criteria: credibility, transferability, dependability, and confirmability. This set of criteria draws on Lincoln and Guba's model of naturalistic inquiry.

#### **4.5.1 Credibility**

To establish the "believability" of the qualitative research results, Lincoln and Guba (1985) argued that the data should speak to the findings and researchers should provide a "rich and thick description" (Geertz, 1973) of the setting, subjects, procedures, interactions, etc., so that the boundaries and characteristics of the study are made clear. Lincoln and Guba also stated the importance of using procedures that increase the probability that the findings will be considered credible. In this study, credibility was established through the construction of rich accounts of collaborative work provided by multiple data sources, including literary inscriptions and interviews. The analysis of inscriptions and interviews was a process of reconstruction, because it rested upon recollection of circumstances on behalf of both the researcher and the study participants. However, inscriptions, especially in the form of texts, stabilize work to some degree and make it observable to the participants and to the researchers as well. Therefore, they are also central to the process of gaining credibility. In fact, they carry work to other people and organizations, and present it in such a way that its meaning and relevance become clearer (Callon, 1986a).

#### **4.5.2 Transferability**

For Lincoln and Guba (1985), transferability implies generalizability of the findings of a study to other settings. Concerning generalizability of the findings from the examined three cases, I addressed the issue developing patterns which highlighted

regularities across the cases, and their relation to similar findings in previous research. In so doing, I attempted to generalize both to other settings and to theory (Yin, 1994). This means that I intended to contribute to the development of theory of collaboration through building generalizations inductively from evidence of particular specific activities, and through maintaining the theory's accountability to that evidence. In this case, what matters for the transferability of the findings is the quality of the theoretical inferences that are made out of the data (Bryman, 2004).

### **4.5.3 Dependability**

To assess the degree of dependability, Lincoln and Guba (1985) suggested that we look for accurate and adequate documentation of changes, unexpected occurrences, and the like, in the phenomena being studied. This study occurred in natural settings, so it was not designed to focus on control and to keep things constant like in experimental conditions. Suchman (1987) said that social researchers have only one advantage over natural researchers, which is to keep “a record of action and its circumstances, independent of their analysis” (p. 113). Storing evidence in a data management system provides the opportunity for repeated inspections by other observers and, to some extent, “avoids the reliance on unexplicated resources that characterizes traditional ethnography” (Suchman, p. 113). Providing a “confirmability audit” (Lincoln & Guba, 1985) consisting of original data, analysis notes, construction and synthesis products, and other materials produced in the course of the study constitutes a valuable resource for external observers who want to inspect and assess my research process. This audit addresses the issue of whether independent observers would generate the same understanding of the phenomena of study, or would develop the same constructs in similar settings (Le Compte & Goetz, 1982). Thus, providing records of the research steps taken from the start of this study to the development and reporting of findings is critical to show readers the procedures used in this research, to ensure that methods are reliable and the conclusions valid<sup>19</sup>. However, I agree with Hammersley (2004) that an audit trail cannot be the only resource to draw upon. The reason for it, as he argued, is that qualitative research is not founded “on data whose meaning and validity are given” (p. 291), but on the researcher interpreting data, exercising subjective judgment, and making claims about the meaning of data. Therefore, the dependability of my study should be assessed not only against a complete account of the research process, but for the cogency of the claims in the light of the evidence (Hammersley, 2004).

### **4.5.4 Confirmability**

This concept is analogous to the concept of objectivity in quantitative research and is closely connected to the notion of dependability. Lincoln and Guba (1985) suggested that evidence of objectivity can be established either by their more traditional notions

---

<sup>19</sup> These records are not made available in this thesis but can be provided on request.

of credibility, or by providing some evidence of lack of the researcher's own bias. This criterion is certainly the most critical to handle in an ANT perspective for two reasons. First, as I said earlier, ANT does not believe that the scientist's duty is to record bare facts through accurate and unbiased statements in order to uncover universal laws. Whereas a positivist stance aims at making accurate statements of facts, supposed to be "out there", ANT argues that researchers cannot attempt to achieve fidelity and reproduction of reality, simply because they cannot avoid interpreting – and constructing – the phenomena they study (Latour, 2004). For ANT, when researchers move from data collection and analysis to published results and claims, they go through a chain of translation of inscriptions. For example, they can translate data into maps and graphs and later into other inscriptions, such as a summary, a commentary, or a paper. Besides, they do not act directly on the phenomena of study, but use value-laden procedures and technological mediation to perform these translations. Second, in ANT researchers are not expected to be detached from their studies to avoid "contaminating" them with their values. The idea of objectivity as knowing without a knower is extraneous to this approach (Latour, 2004).

My take on confirmability and the ways it can be handled in this study is indebted to Suchman (1987). When she discussed the inevitable uncertain relation between the account of a situated action and the observations and inferences on which the account is based, she admitted that there can be discrepancies between the two. To find out if a description matches observation and inferences, we must have, she says, two things: (a) the comparison of our interpretations with those of our subjects, and (b) a record that is not contingent on either (p. 112). In this study, the former recommendation was met by having several study participants comment and confirm the findings. In addition, to improve the reliability of the connections that were produced using ETHNO, each narrative and its event structure were analysed separately by my advisor, who compared sequences and pointed out inconsistencies in my initial analysis.

The latter recommendation was met by keeping raw data in my audit trail.

## **4.6 Limitations of This Study**

The present study has two important limitations that need to be taken into account when considering the results and their contributions.

Firstly, this study, as any other, relied on the necessarily partial character of the used data sources (Silverman, 2005). In all the three cases, I had to use documentary sources and interviews to construct an account of how collaboration occurred. In fact, in all the three projects, participants were distributed and ubiquitous, and these aspects raise challenges for a researcher who wants to observe naturally occurring interactions. Even if all the three cases would have been ongoing, I could have not observed the actual work of participants. Therefore, I had to rely on accounts of interactions from study participants. In so doing, I did not presume that these accounts are "objective" descriptions of original interactions, but participants' constructions. A number of as-

pects may have influenced, consciously or unconsciously, these constructions, including how people felt that situations were to be described, the desire to present themselves in a particular light, the reluctance to reveal some type of information, and the type of questions I asked. Additionally, in one case, interviewees were asked to recall events as far back as four years since the project took place.

With regard to texts, they are unobtrusive, stable, and can be reviewed repeatedly, but their use can be biased both through selection and through reporting. It must be noted, however, that in an ANT perspective the constructive character of interviews and the “bias” in the use of texts are not limitations, because people and facts do not speak for themselves and do not represent reality “as it is”.

Secondly, I chose to compare three possibly idiosyncratic cases, two of which are different to a certain degree, but I cannot claim that they are either typical or representative of collaborations between information professionals and LIS academics in the two selected countries. I included them because they were the only cases available. Unfortunately, alternative cases that would have increased the heterogeneity of data were not available. Thus, I am aware that the uniqueness and the contexts of the selected cases may restrict my understanding of other cases. However, this study was not meant to provide a statistical representation of the study population. As Stake (1995, p.4) points out, case study research is not sampling research and we do not study a case primarily to learn about other cases. Given the small number of cases, my goal was not to generalize to other projects between information professionals and academics in LIS, but to discern variations and regularities with respect to other studies of remote collaboration reported in the scholarly literature.

# The Analysis of the Three Collaborative Projects: Description and Explanation

The analysis of each collaborative project is spread across two chapters: one describes how actors constructed collaboration and the actor-network that resulted from this process; the other proposes how sociotechnical characteristics of the actors' local work environment influenced such a process of construction.

The descriptive analysis required "to put on paper the text of what the various actors in the setting are doing to one another" (Akrich & Latour, 1992, p. 259). For each project, I built a narrative in which I identified actors, their competences, their activities, and how they formed a local network and aligned their interests. I attempted to bring to life the practical details of how the initiators of collaborations sought to position their projects in their respective larger networks, to obtain the resources necessary to build and develop local networks (Law & Callon, 1992).

Chapter 2 introduced the key concepts and principles that form the basis of ANT. To briefly reiterate, ANT examines the strategies that actors use to enroll allies and resources, and the heterogeneous network that results from this process. A premise of ANT is that actors must seek and enroll allies into a network through a process of negotiation of interest that is a process of translation. Translation is a process of transformation, organization, re-location, or re-configuration of elements, by which actors try to overcome resistance and to stabilize the network. Callon (1986a) identifies four stages of translation in the creation of a network: problematization, intersement, enrollment, and mobilization. This process is marked by the identification of the obligatory point of passage which is an actor indispensable to the network, which defines the problem and the identities of the other actors in a way that persuades them that enrolling the network is in their interest.

The articulation of actor interests can be problematic because ANT does not provide guidelines on how to identify stakeholders in a specific context in the first place (Pouloudi, Gandeche, Atkinson, & Papazafeiropoulou, 2004). According to Vidgen and McMaster (1996), Latour does not seem to assume that the identification of interests poses problems, and interests are defined as *inter-èsse*, which in Latin means being in-between. Therefore, they concluded, interests are between actors and their goals. The representation of actors' interests in the three cases included in this study draws on Vidgen and McMaster (1996, p. 256), who used a multiple perspective approach called ROI to gain a better understanding of stakeholder interests<sup>20</sup>. ROI stands for: Rational, Organizational, and Individual. The Rational perspective is concerned with a logical view of interests; the Organizational perspective is concerned with social and political interests; and the Individual perspective is concerned with personal interests, such as

---

<sup>20</sup> Vidgen and McMaster (1996) analyzed stakeholder interests and concerns. My analysis does not include concerns.

status, career progression, and job security, among others.

Vidgen and McMaster warned that the analysis of the interests of human actors using the ROI approach represents assumptions about these stakeholders' interests (according to the researchers' interpretation of the data), and does not purport to reflect their actual interests. In fact, the two authors stated, these assumptions reflect stakeholders' judgments and perceptions of their personal situation.

In this study, the analysis of the interests of nonhuman actors has been carried out from the perspective of their potential spokespersons or representatives. As Vidgen and McMaster said (p. 261), the analysis of the interests of nonhuman actors is complementary to that of the interests of the human actors, because it can surface human actors that might be overlooked.

As noted in Chapter 2, ANT is not a unified analytic framework, and the literature shows that it has been applied in many different ways to case studies. The style of analysis in these descriptive chapters is indebted to Sarker, Sarker, and Sidorova's (2006) study. They provide a useful example of application of Callon's (1986) model of strategies of network formation (see Figure 4-1), to describe and interpret the sequence of events before, during, and after a business process change initiative at a telecommunications company as a process of creation, development, and failure of actor-networks.

I structured the narrative of each project in terms of the four processes of translation identified by Callon (1986a), and the stages of research collaboration (Sonnenwald, 2007) (see Table 4-4). These processes and stages are not linear in nature. They overlap in reality, and actors are likely to be involved in more than one translation process at each stage of research collaboration. The linear use of these stages served only the purpose of organizing the narrative.

**Table 4-4** Structure of the Narrative of Each Project

TRANSLATION PROCESSES (CALLON, 1986A)	STAGES OF RESEARCH COLLABORATION (SONNENWALD, 2007)
Problematization (including Definition of the Obligatory Point of Passage)	Foundation (e.g., origin of collaboration and building connections)
Interessement and Enrollment	Formulation and sustainment (e.g., involvement of actors; project management; work practices)
Mobilization	Conclusion (e.g., use of the shared experience as a basis for future collaborations)

Each descriptive chapter is followed by an explanatory analysis that uses the tools



provided by ANT and ESA to understand how and why the sociotechnical aspects that characterized the actors' local work environment influenced the process of construction of collaboration. Section 4.4.4 provides an interpretation of the main ESA concepts in ANT terms (see Table 4-3). To briefly summarize the main points, ESA views each translation process as a sequential series of events. An event is a process and dealing with events means dealing with happenings that are significant in understanding the translation phase.

Following the structure of the narratives in the descriptive chapters, I reduced the long and detailed accounts to short sequences of single events which occurred during each process of translation and stage of research collaboration. In listing the events, I built a record of events that were likely to have contributed causally, or have influenced, the stages of foundation, formulation, development, and conclusion of collaboration within each process. Although based on the long narratives, the lists of events are different project inscriptions. They include only the events that appear to be potentially causally important to the creation of the actor-network in a specific project (Griffin, 1993). The following classes of events were included in the temporal sequence:

1. Those that expressed the problematization.
2. Those that aimed to persuade actors to be enrolled in collaboration.
3. Those that aimed to carry out collaboration and bring it to completion.
4. Those that aimed to sustain collaboration after the end of collaboration.

For each event, I also identified key sociotechnical aspects of work affecting the activities and choices of the actors in each event.

The next step in each analysis was introducing this list of events into the Ethno software. Then, I systematically causally linked all events with the help of the software and produced a diagram of the event structure. Indeed, the causal connections among events are not generated by Ethno, but represent the researcher's interpretation of a configuration of events, through a process of inference-making that relies on his/her understanding of the data and knowledge of the phenomenon under study. In causally linking the events in the Ethno diagram, I followed mainly – although not exclusively – a counterfactual logic<sup>21</sup>. Counterfactual logic enabled me to be more confident in causal connections, because when plausible counterfactual questions are asked, other questions are also implied or asked (Griffin, 1993). For example, responding to the question asked by Ethno: "Suppose an event like A does not occur. Can B occur anyway?" implied also reasoning about and responding to questions such as: What is theoretically expected to follow from this counterfactual action or condition? How can

---

<sup>21</sup> Ethno allows to ask four types of questions: prerequisite, implication, historical causation and counterfactual (Heise, 2007)

comparable and analogous events help us understand this particular counterfactual condition? How do these kinds of actors typically respond to these actions? What has been the consistent pattern of action of this actor? (Griffin, p. 1103; emphases in original).

The type of analysis conducted with the help of Ethno was detailed and involved answering a number of questions<sup>22</sup>. The answers to the Ethno questions are shown in the diagram generated for each case. The diagrams represent the logical structure of causal relationships underlying events.

---

<sup>22</sup> Researchers conducting ESA may need to answer to many questions asked by Ethno, depending on the number of events introduced in the software and the connections created among them. The whole set of questions, answers, and reasoning for the answers for the three case studies are available on request.

## 5 Project One: Description of Semantic OPACs 1

This chapter describes the strategies used by the actors to enroll allies and resources to initiate, develop, and complete a project called Semantic OPAC 1 (SemOP1). The narrative describes the actor-network resulting from these processes and its relations with the larger network. Careful consideration is given to place the actor-network within the larger contexts within which it exists.

### 5.1 SemOP1 Overview - Introducing the Actors

SemOP1 was a distributed and collaborative project conducted in Italy in 2003-2004 (timeline in Table 5-3). Human actors included a core group of coordinators consisting of three information professionals and one LIS faculty member, each working at different institutions and in different geographical locations. Other human actors included 13 master's students and several external library professionals, all of whom were enrolled as research assistants (see Table 5-1 for a list of all the human actors involved). Nonhuman actors included a LIS graduate course in electronic documentation, a sample of Italian open public access catalogues (OPACs), subject indexing, and project inscriptions (e.g., an evaluation checklist) (see Table 5-2 for a list of all the nonhuman actors involved).

SemOP1 was initiated because the coordinators thought it was important to evaluate subject access and search functionality in web OPAC interfaces. Therefore, they developed an evaluation checklist of possible semantic search features. Understanding this checklist became the obligatory point of passage (Callon, 1986) for all research assistants. It was necessary for them to use this checklist to participate in the project. In fact, the checklist was an artifact inscribing principles of subject indexing and classification, which the coordinators believed had to be applied during each evaluation. The checklist embedded rules about what a good OPAC interface should be. Together, all actors (people, OPACs, checklist, and subject indexing) were expected to form and sustain a network to evaluate a non-random sample of 25% of all OPACs registered in Italy<sup>23</sup>. Data collected by the students were entered in a spreadsheet and sent to a coordinator in charge of data processing and analysis.

---

<sup>23</sup> Italian OPACs is a section of AIB-WEB, the website of the Italian Library Association. It contains the Directory of Italian OPACs, created in 1997 and maintained by a mostly voluntary editorial board. The directory is available at <http://www.aib.it/aib/opac/repertorio.htm>

**Table 5-1** Human actors<sup>24</sup>

PARTICIPANT	EMPLOYER OR AFFILIATION	DEPARTMENT	JOB TITLE	ROLE IN THE PROJECT
Gnoli	University of Pavia	Department of Mathematics	Library Professional	Coordinator
Ridi	University of Venice	Department of Historical Studies	Associate Professor of Library and Information Science	Coordinator
Rolle	Italian Library Association	Subject Indexing Group (SIG)	Library Professional/Subject Indexing Expert	Coordinator
Visintin	Library Consultancy Firm		Library Professional	Coordinator
13 Master's students in electronic document course	University of Venice	Department of Historical Studies	Students	Research Assistants (12 women and one man)
4 external collaborators	Universities; Local Environmental Agency; One collaborator was unemployed		Library Professionals	Research Assistants

---

<sup>24</sup> Study participants consented to use their real names.

**Table 5-2** Nonhuman actors and their project roles

NONHUMAN ACTORS	ROLE PLAYED IN THE PROJECT
Evaluation checklist	Coordination and management functions; triggering cooperation; Obligatory Point of Passage
OPACs	Initiation of the project
Subject indexing	Initiation of the project
Electronic documentation course	Initiation of the project
Computer lab	Development of the project
Project inscriptions (publications, web site, etc.)	Mobilization of potentially interested volunteers for follow-on projects

**Table 5-3** SemOP1 Timeline

DATE	ACTIVITY AND HUMAN ACTORS INVOLVED
Spring-Summer 2003	Creation of the checklist – Coordinators
Summer 2003	Creation of a literature reference list – Coordinators and external library professionals
Fall 2003	OPACs evaluation – Coordinators, master’s students and external library professionals
Winter- Spring 2004	Data processing and analysis – Coordinators
Summer-Autumn 2004	Dissemination of results – Coordinators

## 5.2 Foundation Stage: The Creation of a Negotiation Space

In this section, I drew upon ANT concepts to interpret the sequence of events before, during, and at the completion of SemOP1 as a process of foundation, development, and completion of a local network. Among the human actors described in Table 5-1, the coordinators are the chosen focal actors from whose perspective and vantage point it makes most sense to describe the translation process in this project. Before starting to describe the creation of the local network, the LIS scene in Italy is introduced to understand where SemOP1 participants work and, in particular, where the LIS professor works.

### 5.2.1 The Low Integration of LIS in Academia in Italy

Ridi teaches library science in a master's degree program of Archival and Library Studies, at a department of Historical Studies placed within a faculty of Literature and Philosophy. As Ridi remarked, in Italy library and information science does not have a clear niche and often it is grouped with historical science disciplines, which is definitely a questionable practice. In 2008, the Italian LIS academic world counted 93 faculty members (including full and associate professors and researchers without tenure)<sup>25</sup>, who work at several university departments in the humanities (e.g., Historical Studies, Preservation of Cultural Heritage, Linguistics, etc.) which are not formally named as LIS schools by the Ministry of University and Research. These departments offer bachelor and master's degrees – and sometimes doctoral degrees – in library and information science. The disciplinary categorization of LIS within the humanities is institutionalised and, arguably, has consequences for the field in terms of perceived quality/prestige and allocation of funding. The Ministry of University and Research has delimited the scope of LIS such that documents are the main research object<sup>26</sup>. The Ministerial view reflects two aspects: one is a traditional approach that sees books, physical libraries, and cultural preservation as the focus of library science; the other is a more professional orientation that also focuses on education of librarians and teaching librarianship. Arguably, positioning LIS within the institutional and disciplinary boundaries of traditional librarianship does not accurately reflect the interdisciplinary nature of the field today, and fails to incorporate the multiple intellectual contributions coming from a number of other fields (e.g., human-computer interaction, computer science, and communication).

Positioning LIS within the humanities, especially within the departments of historical studies, affects possibilities of collaboration, because LIS scholars and historians (and other humanistic researchers) have difficulties finding common interests. This situation leads to a low integration of LIS within academia. Rochester and Vakkari (2003) pointed out that researchers' identification with either the research or the professional community mediates their approach to research. For example, a strong integration of LIS in academia can lead to an identification of researchers with the norms and values of the research community, which leads to an orientation to basic research and theoretically informed formulation of research problems. On the contrary, a weaker integration of LIS in academia leads to a professional orientation, which em-

---

<sup>25</sup> Source : <http://cercauniversita.cineca.it/php5/docenti/cerca.php>

<sup>26</sup> The Ministry of University and Research explains the rationale for positioning LIS in the area including History, Philosophy, Education and Psychology: “The scope of the sub-area of Library Science covers the history of the tradition of texts written on or transmitted via any kind of medium, the organization of these texts and their availability; it also covers the semantic description of documents, and the study of library design, realization, diffusion, information, and preservation, as a constituent of history of culture” (*M-STO/08 Archivistica, Bibliografia e Biblioteconomia*, Enclosure B, Ministry Decree no. 249, 4 October 2000 [The translation from the Italian text is mine]).

braces the research ideals of professionals. This argument pertains to the state of LIS in Italy. There is a strong focus on practice and little interest in basic research. The Italian LIS schools educate professional librarians and teach librarianship. Research is mostly applied and focuses on practical problems and applications. Most of LIS university professors worked as librarians before landing in academia. The weak academic integration of LIS implies a concentration on day-to-day or near term library-related problems, and the search for solutions with immediate application value. These features were reflected in the choice of subject indexing and web-based online catalogues as study objects in SemOP1.

### **5.2.2 Problematization: Subject Indexing and OPACs' Search Features**

In his speech at a roundtable conference of the Italian Library Association on the project of updating the Italian subject heading list, Gnoli (2002), a university library professional and national representative for the International Society for Knowledge Organization (ISKO), stood up for the value of using subject indexing to search and retrieve resources stored in OPACs versus the use of freely chosen keywords when using search engines. An OPAC is a specialized software package designed to allow to allow any library user to search the catalogue database of a library's collection, to be informed on items location and, if the catalogue is linked to the circulation system, to be told whether the item can borrowed or not (Tedd, 1993). In its most simple form, an OPAC could consist of nothing more than a simple index of the bibliographic data catalogued in the system. OPACs that are more complex offer a variety of search capabilities using several indexing techniques and offer interactive request and renewal functionality.

Subject indexing<sup>27</sup> refers to the act of describing or identifying a document in terms of its subject content (ISO 5963:1985) by using controlled vocabularies, including classification schemes and thesauri, as defined by LIS professionals. Traditionally, library cataloguers select subject terms to describe documents and assign these subject terms to the document's metadata record. These subject terms are later used by searchers to retrieve a document. Subject indexing can improve the precision of searching in both traditional manual catalogues and digital catalogues.

In the same speech, Gnoli lamented that the use of subject-based search features in Italian OPAC interfaces was still in a "prehistoric phase" (para. 3), and asserted that it was time to rethink how Italian OPACs were built and managed, and to recommend some minimum requirements in order to add to online catalogues search features which accommodate subject indexes (Gnoli). During an informal exchange of emails, Gnoli talked about this issue with Visintin, a library professional working then at a

---

<sup>27</sup> Subject indexing is the translation of the Italian term *indicizzazione semantica* according to the glossary *Glossario di organizzazione della conoscenza* [Glossary of terms related to knowledge organization] available at <http://www.iskoi.org/doc/glossario.htm>.

consulting firm and living in another city. Visintin was a like-minded colleague who also firmly believed in the value of subject access. They both were interested in assessing the situation to produce a status report on subject access in web-based OPAC interfaces in Italy. However, they did not know how to undertake this evaluation because they lacked the financial and human resources to conduct a large-scale study of Italian OPACs which numbered about 600. Furthermore, Gnoli and Visintin knew they could not count on direct support from their institutions, because the topic of the project lacked relevance for them.

### **5.2.3 Problematization: The LIS Academic Needs a Topic for His Course**

The ally who brought resources to address Gnoli and Visintin's idea was Ridi. An associate professor of library and information science, Ridi had known both of them for many years. Ridi himself had worked as librarian for 10 years before being appointed professor. He knew well the professional community of librarians and coordinated the editorial board of the web site of the Italian Library Association. Together with Gnoli, Ridi had created content for this web site. Therefore, he was used to interacting with library professionals and discussing their needs and professional situations. Ridi wrote an email to Gnoli saying that he needed to find a suitable topic for his electronic documentation course in the master's program in library and information science, something that could engage the students actively in a "real" situation. Every year, he looked to find material close to his field of research and interest, hoping to find a topic that might involve some sort of research or practical experience. The number of students enrolled in the course was small, and so Ridi thought there was the possibility to develop a course that ensured interaction and discussion among students.

In developing the course, Ridi looked after his personal research interests and to someone among the people with whom he had already collaborated and with whom he shared common interests, a willingness to work online, and a "common language". Ridi looked within the network of people with whom he had already worked before, because he knew what to expect from them. He explained:

*In questa fase preliminare, io guardo da una parte ai miei interessi personali di ricerca in corso, e, dall'altra, guardo nell'ambito delle persone con cui collaboro più abitualmente, con cui so che c'è da una parte una certa consonanza di interessi e di stile di lavoro, e dall'altra, e di una comunità di linguaggio e dall'altra, che abbiamo già lavorato insieme con piacere.*

*[During this preliminary phase, on one side, I look after my personal research interests, and, on the other side, I look among the people with whom I collaborate more frequently and with whom I have a degree of common interests and a similar working style, as well as a common ground and previous positive experiences of collaboration] [No. 01].*



In his reply to him, Gnoli presented the idea of evaluating subject access in web-based OPAC interfaces and suggested this topic for Ridi's course. They could involve the students in the evaluation. Ridi accepted this proposal and the three actors decided to set up a new network which they called "Semantic OPACs".

For Gnoli, Ridi, and Visintin, it appears that it was easy to align interests because they had similar disciplinary interests. Their previous ties, established through the collaboration on the web site of the Italian Library Association and other initiatives, also contributed to having common ground which made communication and understanding easier. They knew and appreciated each other's work.

#### **5.2.4 Problematization: Definition of the Obligatory Point of Passage (OPP)**

To carry out a proper evaluation of subject access, the project coordinators (this is how Gnoli and his partners called themselves) devised a checklist of features that they believe OPACs need to facilitate effective use of subject access. This checklist was the OPP because all the research assistants had to use it to do the evaluation task. The checklist embedded rules about what a good OPAC interface should be. Therefore, the choice of features to be included and their wording required special attention, as they were expected to be a stable and possibly unmodified reference for some time (Gnoli, Ridi, & Visintin, 2004). The coordinators, together with Rolle, an expert of the Italian Subject Indexing Group (SIG), elaborated the checklist in the initial phase of the project. The SIG saw the project as an ally to relaunching itself, as they had lost their official status within the Library Association over time. To move forward, they needed contributions from people who were more oriented toward technological applications than their existing members, who were primarily interested in abstract aspects of indexing.

The features included in the checklist were determined prior to the start of the course. This method was aimed at limiting the scope of the information to be obtained and at providing consistent data results, which in turn the coordinators could merge and compare during data analysis. The elaboration of the checklist occurred entirely by e-mail. The checklist was the product of electronic dialogue during which the coordinators translated their different perspectives on subject search by exchanges of opinion, clarification, negotiation, and mutual understanding. For example, although some features appeared obvious to everyone, such as access points by subject heading and class, and display of retrieved records, other features were looked at and discussed carefully. Two of these features included the exact definition of "search by term and subject string", which the Subject Indexing Group considered a crucial function, and the definition of the criteria about subject indexes used in the web OPACs.

#### **5.2.5 The Relations between SemOP1 and the Larger Network**

Following Law and Callon (1992), SemOP1 is seen as a local network developing

within a larger surrounding network. Originated from an informal exchange of emails between the coordinators, SemOP1 developed as an open and autonomous project, without formal institutional ties and no external funding. Being a project without institutional affiliations<sup>28</sup>, Ridi and Gnoli thought it was unnecessary to inform their employers about their participation and, in return, the employers were indifferent to the project. This comment from Ridi sheds insights into the lack of institutional commitment surrounding the project:

*Se io cambiassi università, se Gnoli cambiasse università, a maggior ragione se Visentin cambiasse l'azienda per cui lavora non cambierebbe nulla per la nostra collaborazione al progetto, perchè siamo lì a livello personale sostanzialmente ... Il fatto che poi dichiariamo queste affiliazioni, non voglio dire che sia solo nominale, ma quasi ... La mia università, mah, io direi che non lo sa nemmeno che sta succedendo, cioè lo sa nel senso che queste cose sono pubbliche sul web ... non chiedo finanziamenti, non occupo strutture, e quindi, non saprei nemmeno bene a chi dirlo, in sostanza.*

*[If I were to change university, if Gnoli was to change university, and more so, if Visentin was to change the company she works for, our collaboration within the project would not change at all, because we are in it as individuals and not as representatives of our organizations... the fact that we mention these affiliations with our organizations has, for the most part, only a nominal value ... As for my university, well... I do not even think they know what's going on. I actually think that they do know what's going on, only because these things are available to the public via the web. I have never discussed with them or asked them for any funding...because in reality I do not use any university facility per se, and I wouldn't even know who to ask to] [No. 02].*

Ridi went on to explain that the incentives for researchers offered by his department were too low to motivate him to take part in SemOP1 for producing publications. Exemplary in this sense is what he said about his department's evaluation criteria for the allocation of research funding<sup>29</sup>. Every year the university where he works allocates research funds to each department depending on their evaluation of publications produced by the department members during the prior three years. However, Ridi made clear that even if he produced four articles per year – which he believes is a good pro-

---

<sup>28</sup> Scott (1995) defines institutions in this way:

institutions consist of cognitive, normative, and regulative structures and activities that provide stability and meaning to social behavior. Institutions are transported by various carriers – cultures, structures, and routines – and they operate at multiple levels of jurisdiction (p. 33).

Therefore, the term institutionalization refers to the process by which an organization develops a distinctive structure, such as norms, routines, and a way of doing things (Lamb & Kling, 2003).

<sup>29</sup> The criteria are not available to the public. I contacted the Public Relations Office of the University where Ridi works and I was denied access to these criteria.

duction record in the context of his department – he would not receive more than 2000 Euros per year, which must cover all his expenses for both teaching and research. No one in his department, as far as he could remember, had ever been awarded more than that amount. Thus, it appears that the department’s evaluation criteria for allocation of research funds are taken for granted and assume the connotation of a matter of indifference (Callon & Latour, 1981) for him. In fact, he described them in terms of input/output: he receives a little sum, he produces some publications out of either unfunded or externally funded activities, the department’s committee evaluates his publications, then he receives again a sum between 1000 and 1500 Euros, and the process repeats itself annually.

Lack of institutional commitment did not preclude the use of technological resources to support the project. For example, Gnoli was able to use his department’s server to host SemOP1’s web site (<http://www-dimat.unipv.it/biblio/sem/>). Gnoli created a one way-link to the project on the library web page, but kept the project separated from other library activities. He did not have to submit a formal request to gain authorization for the use of the server. He could enjoy a good degree of autonomy and decided together with the other coordinators that using his department’s server could be a good idea because, as he said, “il sito del progetto sul sito della biblioteca di dipartimento non disturbava nessuno [the project web site on the department’s library web site did not disturb anybody].

The project stood alone, the departmental server simply hosted the project web site, and there was no interference from the department. Gnoli ascribed this “neutrality” to the perceived lack of immediate usefulness of the project findings for his department (mathematics), but he also linked it to the frequent use of the Internet in the department, which, in turn, he saw as linked to the discipline<sup>30</sup>. At this department, each member of the faculty was entitled to his/her personal web site space which s/he managed autonomously. Likewise, the library had its own web space and ran it autonomously.

### **5.3 Formulation and Sustainment of Collaboration**

The interestment and enrollment processes of translation involved persuading additional actors to agree on the goals defined by the SemOP’s coordinators and to enroll the project.

---

<sup>30</sup> As Schonfeld and Guthrie (2007) also argued, faculty members’ attitudes and perceptions evolve differently in different disciplines. For example, whereas laboratory scientists make extensive use of electronic resources, text-based humanists remain more dependent on primary sources, monographs, and other traditional library collections. *EDUCAUSE Review*, vol. 42, no. 4 (July/August 2007): 8–9.

### 5.3.1 Identification of Interests

In Tables 5-4 and 5-5, the interests of human and nonhuman actors enrolling in SemOP1 have been described using the ROI approach (Vidgen & McMaster, 1996). As I wrote in the chapter “The Analysis of the Three Collaborative Projects: Description and Explanation”, these interests are not purported to be actual but are assumed to be those that are important for the human actors and the potential spokespersons of the nonhuman actors based on the analysis of the data. The potential spokespersons of the nonhuman actors include both the human actors in the project and other human actors who can be affected by enhancing subject access in Italian OPACs and can be representatives of the nonhuman actors. I chose to make humans as spokespersons of nonhumans because I have not embraced an extreme symmetrical position in this work, as noted in section 4.1<sup>31</sup>.

**Table 5-4** Human actors' main interests

HUMAN ACTORS	RATIONAL	ORGANIZATIONAL	INDIVIDUAL
Project coordinator (LIS Professor)	provide students with an opportunity for combine learning and research	fulfill educational mission	opportunity to: publish papers, give talks and attend conferences

---

<sup>31</sup> Although, “it makes sense that spokespersons are mostly of the human kind, the point is to see what makes them spokespersons. If Pasteur spoke for the microbe without his petri dish, I think that nobody would reasonably call him a spokesperson. And, as any fine structuralist would put it (from Lévy-Strauss to Lacan), try to make sense of speech without a little help from that ultimate nonhuman agent which is language itself “(Fabian Muniesa, personal communication, 14 January 2010).

HUMAN ACTORS	RATIONAL	ORGANIZATIONAL	INDIVIDUAL
Project coordinators (library professionals)	evaluate subject access in OPACs	enhance subject access to library resources by improving OPAC search capabilities	opportunity to: publish papers, give talks and attend conferences; gain exposure and become a national expert in the field; provide a valuable service to the national community of library professionals
External library professionals	evaluate subject access in OPACs		opportunity to: learn something new; network with colleagues; provide a valuable service to the national community of library professionals
Subject indexing expert	apply principles of subject indexing	relaunch the Subject Indexing Group	opportunity to: apply subject indexing; publish papers
Master's students	pass the course	educate next generations of library and information professionals	opportunity to: learn about OPACs and participate in a research activity; develop marketable job skills; interact with information professionals

**Table 5-5** Nonhuman actors' main interests

NONHUMAN ACTOR	COMPONENTS	INTERESTS	POTENTIAL SPOKESPERSONS
Evaluation checklist	features of OPACs to be examined	represent principles of subject indexing to be applied during the evaluation	subject indexing experts; library professionals; LIS academics
OPACs	types of searches; access points; limiting and search refinement; search history, display and output	have interfaces that allow searchers to use subject indexes; be searched easily and effectively	subject indexing experts; library professionals; software developers; LIS academics
Subject indexing	thesauri, controlled vocabularies, classification systems	be used to enhance subject access to content of OPACs and improve retrieval	subject indexing experts; software developers; library professionals; LIS academics
Electronic documentation course	literature; theory; research; practice	educate next generations of library and information professionals	LIS academics; students
Computer lab	computers, software, internet connection	support collocated collaboration among students and between students and the teacher to support understanding of the checklist	LIS academics; students

NONHUMAN ACTOR	COMPONENTS	INTERESTS	POTENTIAL SPOKESPERSONS
Project inscriptions	data collection spreadsheets, subject indexing formula, evaluation checklist	be shared with other library professionals, software developers, and subject indexing experts; assist in the replication of the study and comparison of results related to either the same sample of OPACs or other OPACs not examined in the evaluation study	project coordinators; subject indexing experts; LIS academics; software developers

### 5.3.2 Interesement and Enrollment: The Creation of the Local Network

SemOP1 was not a conventional collocated team (Katzenbach & Smith, 1993), or a community of practice in any sense (Wenger, 1998). It was not wholly a virtual team because the students often worked face-to-face and some of them never used the mailing list to communicate with other project members. It was an ad hoc assemblage of people and things that came together to collaborate for a specific purpose for a short period. Except for the students who met in a physical class, the other project participants were distributed. The roles of the coordinators and the external library professionals were flexible, and only the role of the students as research assistants was obligatory. They had to work in the project and complete project tasks in order to pass the course. Furthermore, they all performed the same task, that is, they analysed different sets using the same checklist. This non-specialised division of labour among the students was caused by the need of standardising data collection across them (Chompalov et al., 2002).

SemOP1's form of organization shares some important characteristics with “knots” (Engeström, 2008). Engeström defined knots as rapidly emerging, distributed, and partially improvised arrangements of collaborative activities bringing together loosely connected actors and activity systems (p. 194). Roles in knots can be obligatory and non-negotiable, e.g., as in airline crews or neurosurgery. Furthermore, in knots workers can be put together in situation-dependent ways, or assembled through outside

forces. This kind of enrollment is what happened in SemOP1, where the class was involved in the project in an unscripted, and emergent way. In fact, the decision of involving the students was not grounded on an initial deliberate engagement of Ridi's course, but it happened casually as the situation unfolded when Ridi accidentally wrote to Gnoli about his need for a topic for his course without knowing that the latter was thinking about pursuing an evaluation of OPACs. Another salient characteristic of knots is their lack of a stable center (Engeström). In SemOP1, there was a definable and bounded group of coordinators which remained stable throughout the project, although this group can change and be reformed for other projects, depending on available time and commitment of the coordinators.

### **Enrollment of the Course on Electronic Documentation**

The class of students was tied to another nonhuman actor, the electronic documentation course. This course was a good opportunity to set up the project. In fact, Ridi could count on the stable presence of the students for the length of the course. Not only did the course provide the "work-force" that made the project possible, it also became the space of interconnections of multiple activities, such as teaching, learning, and research. It provided the opportunity to go beyond a traditional transmissional model (telling as teaching) and use a different approach to learning inspired by a sort of research-based approach and inquiry-based learning (Dewey, 1938/1991). In this case, research-based learning means that the content of the course was related to the professor's research interests, while the students had the opportunity to learn how to use a method of enquiry.

### **Enrollment of Subject Indexing and OPACs**

Not so convergent were instead the interests of two nonhuman actors<sup>32</sup>, that is, subject indexing and OPACs. Subject indexing and OPACs were treated as actors because they mobilized the human actors to set up the project. Subject indexing was the actor that led the human actors to develop a checklist embedding subject indexing principles.

The coordinators were spokespersons on behalf of subject indexing. Since they

---

<sup>32</sup> Callon (1991) asserted that deciding whether an entity is an actor or an intermediary is an empirical question. In a specific case, if an entity is seen as a simple link in a chain connecting several actors and the "actors are taken to pass through it without stopping" (p. 141), that is seen as an intermediary rather than an actor. The same entity can be either an intermediary or an actor, depending on the circumstances; but an actor acts, that is, seeks to mobilize other entities, leads other entities to take action, and transforms a situation.



thought that OPACs interfaces provided a dissatisfactory subject access, a misalignment existed between these two nonhuman actors. As described earlier, an OPAC is a specialized software package designed to allow any library user to search for items in a library's collection which are catalogued in a database (Tedd, 1993). Users can typically search using authors' names, item titles, and subject, among the other searchable information. When the OPAC finds a match, it returns information about the searched item.

Framed in ANT terms (Akrich, 1992), an OPAC can be seen as a technical object that constrains or enables other actors, particularly searchers to find items included in the catalog (and ideally, all items in a library), so it constrains and enables the relations between searchers and library holdings. It is an object through which users meet libraries and which libraries can use to develop services and products. An OPAC is an object that embeds the decisions of software developers and the visions of information professionals about users and libraries. In fact, when software developers and information professionals, each for their part respectively, design and manage an OPAC, they envision certain practices of information search that users are expected to enact in an OPAC. Therefore, they create an image of the use of this object. As such, an OPAC embeds expected patterns of actions and speaks for certain interests. These interests can be misaligned, because information professionals may not know the technical features of these tools, and software developers may not know subject indexing. Gnoli saw the interests of users versus those of software developers and information professionals as misaligned in Italian OPACs (Gnoli, 2002).

### **Enrollment of the SIG**

The SIG was enrolled to advise the coordinators on the preparation of the checklist. As said earlier, the SIG saw in SemOP1 an ally to relaunching himself or herself, as they had lost their official status within the Library Association over time. To move forward, they needed contributions from people who were more oriented toward technological applications than their existing members who were primarily interested in abstract aspects of indexing. Consequently, the SIG appears to have framed the problem in its own terms. Their translation could affect the way they would decide to be enrolled in the project in the future. In fact, following a change in the translation of their interests, the SIG's role shifted from being mostly an advisor to being a more explicit supporter of one external library professional who offered to do additional data gathering. The SIG's members were attempting to enrol the support of Gnoli and this external library professional to help the SIG pursue their own interests, that is, to evolve their role in the light of technological advancements. In fact, by attempting to create an alliance with other actors who shared an interest in subject indexing, the SIG also tried to reorganize the group. The meeting in which SIG's members talked about "toward the SIG 2" aimed to build the basis for a shared focus with the allies (Gnoli & Casson, 2006). This shared focus was achieved when all the actors at that meeting agreed to conduct another round of data gathering on national OPACs and to present

the findings during a jointly organized workshop.

### **Enrollment of the Class of Students**

A critical resource, and an actor in its own right, was the class of master's students attending the course on electronic documentation. They acted as a collective actor because Ridi enrolled them as a class and not on an individual basis. A student, Francesca, recalled that the coordinators presented the project to them mainly in academic terms, as part of the course on electronic documentation, and not as an initiative in itself, although they knew that the study would go beyond the course and would involve other people. Students' participation in the project was an integral part of the course and was required to pass the final course examination and earn a grade. Setting the project as a requirement was a way to persuade the students that the interests defined by the coordinators for them were also consistent with what their own interests should be. In doing so, it appears that the coordinators attributed to the students the same interests as themselves. The project was presented as an opportunity to put into practice fuzzy abstract principles of subject indexing, and to describe subject access and search functionality in OPAC interfaces from the perspective of searchers. In addition, the project was presented as an opportunity to link course material and current problems in knowledge organization to subject access in OPAC interfaces. As the same student, Francesca, explained:

*Ciò che io ho trovato interessante è che, per la prima volta, si parlava del punto di vista dell'utente, cioè non tanto come elucubrazione sugli aspetti tecnici dell'argomento del libro, ma riuscire a capire come l'utente vorrebbe soddisfare le proprie esigenze informative partendo dagli aspetti argomentativi del documento. Questo è molto importante per me, perchè noi veniamo da una tradizione che è sempre stata molto teorica, in Italia.*

*[What I have found interesting is that, for the first time, we talked about the user's point of view, that is, not just the bookish pondering over the technical aspects of the topic, but to understand how users would like to meet their information needs, starting from the conceptual aspects of the document. This is very important to me because we are often taught with no connection with the real user in Italy] [No. 03].*

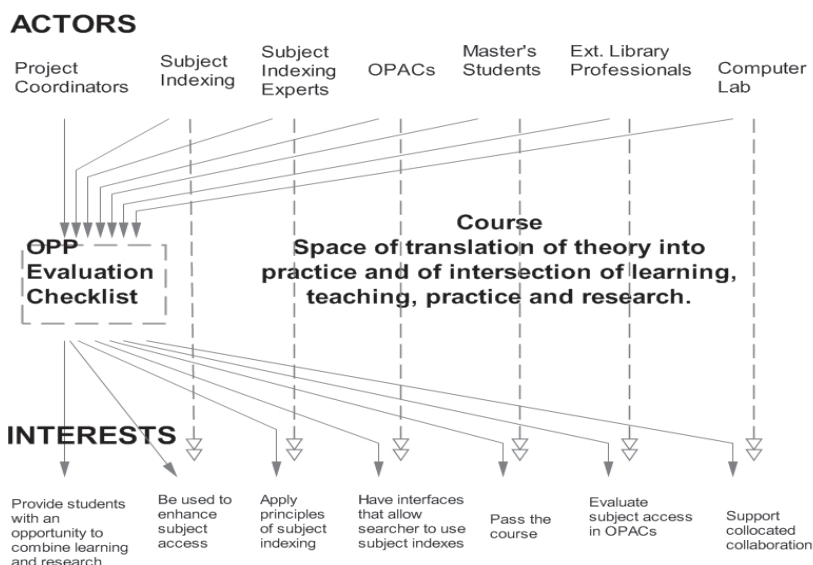
Enrollment of the class in the project started during an initial collocated workshop that served as a kick-off meeting at the start of the course on electronic documentation. During that meeting, the coordinators introduced the project to the students for the first time. They explained the organization of the course and the final exam, the purpose of the evaluation study, and what they were expected to do. Once the "rules of the game" were explained, each student was assigned a specific geographical area in Italy and a set of url of OPACs situated in that area to evaluate against the features of the checklist.

## **Enrollment of External Library Professionals**

Four volunteer external library professionals also participated in SemOP1. They worked for different institutions in different locations, but each had previously established ties with at least one of the coordinators. All of them donated personal time and effort to the project, sometimes without informing their employers. Their participation took different forms, from doing the evaluation to testing the checklist. Their involvement in the problematization phase was slight: only one of them, who was unemployed at that time, participated in some activities prior to the start of the evaluation, including the elaboration of the checklist and preparation of a bibliographic list. This person was involved because she met Gnoli at a course where he taught classification systems. At that time, he mentioned that he had been thinking about some research work, and later on she contacted him to volunteer if he decided to set up a project.

## **Enrollment of the Checklist as OPP**

During the kick-off meeting at the start of the course, Gnoli and Ridi started to explain the evaluation checklist. The checklist was the obligatory point of passage for the students – as well as for the other actors – in the project. Its correct application was crucial in order for the checklist to act as a point of alignment of interests of the actors. Figure 5-1 shows how the actors had to pass through this instrument in order to pursue their interests. For example, the students had an interest in understanding the checklist to do the evaluation properly, learn, and pass the course; the project coordinators had an interest in having the students understand the instrument and apply it properly so that they could combine learning and research successfully; the external library professionals had an interest in using the checklist to evaluate subject access; OPACs had an interest in being evaluated according to the criteria included in the checklist in order to have interfaces that allow searchers to use subject indexes; and the computer lab had an interest in supporting collocated collaboration among students, and between students and the teacher, to understand how to apply the checklist.



**Figure 5-1** SemOP1 as an actor-network

However, problems with the checklist arose from the start. The opacity of abstractly defined features produced the effect of getting the students and Ridi involved in a process of clarification which, in turn, implied that the course changed along the way as difficulties arose and more time than planned was devoted to disentangle problems. A student explained one difficulty:

*La lista di controllo all'inizio non era poi così semplice da affrontare, proprio per via di alcune definizioni che non erano chiare nemmeno a Ridi e a Gnoli ... Ecco il problema da parte nostra era proprio questo, cioè non si sapeva bene cosa significasse stringa, cosa significasse ricerca per termine, e quindi questo ha comportato poi dei problemi sulla rilevazione dei dati.*

*[At the beginning, the checklist was not so easy to use because of some definitions which even Ridi and Gnoli found unclear ... Our problem was exactly this, I mean, we did not know the exact meaning of "string", the meaning of "search by term", and this has caused problems with data collection] [No. 04].*

This student defined the common problem that the students encountered: they did not know how to assess OPACs capabilities against the checklist (the OPAC interface was a resistant). They faced difficulties because the features in the checklist were un-

clear and there was no correspondence between the definitions of the features in the checklist and the feature names in OPACs<sup>33</sup>. The nature of the checklist as actor emerged and introduced the following unplanned complications:

- When the students approached the checklist, it was open to dialogue and re-negotiation to some extent, because of the challenges encountered. Students talked, examined OPACs, compared experiences, and used repeated trials to improve understanding. The checklist turned into an “open discussion” rather than something handed down. Another student said, “*se ci avessero dato una lista fissata, completamente fissata, non ci sarebbe stata tutta la collaborazione che c’è stata [Had they given us a fixed list, completely fixed, we would have not had all the collaboration we had] [No. 05]*”. The checklist raised doubts and questions. It induced the students to take an active role in clarifying the definitions of the included features. Thus the course turned into a collaborative setting in which dialogue played a major part in the learning process. The student added, “*si, la ricerca della definizione ha proprio questo scopo qua: la collaborazione da parte nostra, poi andare ad interagire con quello che dice il professore [Yes, our search for definitions had this purpose: collaboration among us and then interaction with what the professor says] [No. 06]*”.
- The students reported that they engaged in an iterative process of interpretation, adjustment, and clarification (informal small group meetings, class discussions, trials, impasse, and mistakes). They shared encountered problems with each other, by showing their OPACs, asking a peer to have a look at their own OPACs, and then discussing the applicability of the checklist that way.
- It triggered the adoption of an interactive learning process supported by Ridi’s participative management style. The interviewed students described the relationship between Ridi and the class not as the traditional teacher-student hierarchical relationship. Ridi’s attitude did not incline him towards an authoritarian teaching style, but favored participation, involving a different attitude towards the students and also towards his own role of university teacher. It redistributed responsibility for the clarification process and, in turn, for the learning process. Clarifying and learning came to be shared among all the actors in this process. Although the students kept on turning to the coordinators for help, they felt engaged in these processes. They were not “recipients” of information and knowledge transmitted by others, but became

---

<sup>33</sup> The students witnessed the difficulties faced by several groups in translating classification interests into technical requirements, to create a shared representation that results in OPAC interfaces supporting subject-based access. OPAC interfaces appeared to be a weakly aligned network (Callon, 1991)

active learning participants. For example, they took responsibility for monitoring evaluation outputs, both their own and those of their peers, and for communication of problems and difficulties. This aspect was felt especially in the mailing list, where the students were concerned with formulating their thoughts clearly. By communicating via email, they felt that they had the opportunity to respond in detail to a question or topic that they might have answered incompletely in a real-time conversation.

- The need for clarification induced both a process of collocated collaboration among the students, between the students and Ridi, and a process of remote collaboration between the students and the remote coordinators via the mailing list.
- It provided the course with a purpose for group interaction and regular face-to-face meetings, which fostered a socially supportive environment between the students to which the teacher contributed significantly.

### **Enrollment of the Computer Lab**

Before starting the course, Ridi thought that the students could work individually and somewhat independently of one another on the assigned set of OPACs. However, the start of the work in the course was characterized by uncertainty and confusion. At the beginning, the students' work was tightly coupled. There was a strong need for frequent face-to-face interaction to sort out problems. A student explained:

*Io avevo cominciato a fare qualche rilevazione credo addirittura a casa o da sola, nella sala informatica dell'Università ... e però, tutto sommato, di fronte alle difficoltà personali e anche degli altri partecipanti al corso, alla fine ci trovavamo tutti per delle intere mattinate, magari quando c'era lezione con Ridi, tutti insieme occupavamo questa sala informatica e facevamo queste rilevazioni, aiutandoci a vicenda quando c'era bisogno, insomma.*

*[I had started to analyze some OPAC, I think I did it at home or by myself in the computer lab at the university, but because of my difficulties and those of the other course participants, in the end we all met for entire mornings, maybe when there were lectures with Ridi, we all together gathered in the computer lab and did these evaluations, helping each other when we needed it] [No. 07].*

In the computer lab, the students both met spontaneously and serendipitously in subgroups and met with the LIS professor during class hours. Serendipitous and spontaneous meetings were frequent, as some students happened to be near others at a time when they wanted to ask for, or provide, information. Participants reported that those meetings were often continuations of prior conversations. The computer lab was an actor aligned with the kind of collaborative processes that the students felt they needed. Clarification and understanding would have been much more difficult to attain without

the face-to-face environment of proximity in the lab. The interviewed students felt that Ridi's choice of using the lab during the course was crucial. In fact, the lab afforded them to interact with each other *around computers* and with the OPACs *through computers*. The computers helped them create a "shared zone", and physical proximity supported a shared perception of difficulties when there was lack of understanding or agreement among the students. If Ridi wanted to see a difficult OPAC, or a student wanted to show his/her problems with an OPAC, they could do it easily and quickly and all the students could observe and listen to what they said. The students could observe Ridi's reactions to the points they made, they could refer quickly to someone else's ideas, or point to a specific feature in an interface by making a gesture. Nonverbal cues such as facial expressions, gestures, or glances could be immediately interpreted and facilitated communication and interactions. This other comment from the above student clearly expresses the importance of these collocated meetings over the mailing list:

*Il mezzo principale erano, io ricordo in particolare, questi colloqui, nel senso che proprio mi pareva dessero molto di più rispetto alla mailing list. Certo la mailing list la usavamo sì, però veniva usata soprattutto da chi aveva meno possibilità di partecipare a queste rilevazioni collettive.*

*[The main means were, I remember in particular, these conversations, in the sense that I thought they were more rewarding than the mailing list. Yes, we used the mailing list, but it was used mostly by those who had less possibility to join these collective sessions of data collection] [No. 08].*

### **Enrollment of Intermediaries: The Mailing List**

Engagement of the students was critical for the coordinators. As Gnoli said, "*Il problema era la manodopera...e ovviamente non manodopera solo sfruttata ma anche proprio coinvolta* [the problem was the workforce ... not just having a workforce to employ in the project but a really engaged workforce]". The set up of a mailing list for the course based on Yahoo!® Groups was another step towards engagement and close alignment among the students, and between the coordinators and the students. Among the external library professionals, given their slight involvement in the project, only the one who was more engaged used the mailing list. Yahoo!® Groups is a piece of server software, which provided the course with free email and web based online group. Seen from the ANT standpoint, Yahoo!® Groups is seen as an intermediary (Callon, 1991, p. 141) because it played an instrumental role, linking distributed human actors and providing them with a convenient way to connect and communicate with each other. It was a simple and easy-to-use application that project participants learned quickly. Some students used this collaborative technology for the first time but they became comfortable with it quickly.

The coordinators consciously enrolled this instrument for several reasons. First, they could create a mailing list easily and quickly, with no need of a hosting server for

installation and of technical support, and without incurring expenses. Second, the distributed project participants could access the mailing list from anywhere. Third, the mailing list was meant to be a shared discussion space, where students could communicate with all the coordinators and with each other to clarify their doubts, ask questions, and discuss encountered problems<sup>34</sup>. As reported by participants, while the students and Ridi met during the classroom lectures in the computer lab, the mailing list provided a channel of communication among all the project participants, in particular with the remote coordinators and those students who could not meet their classmates in the computer lab during informal meetings. The interviewed students appreciated the mailing list because everyone had access to the same information at the same time, and could raise issues and ask questions freely. It appears that a participatory openness encouraged everyone to have a dialogue, give input, and fully participate in the work of the project.

Fourth, the use of this tool passed through the OPP because it was consistent with the purpose of the project and helped the students address some difficulties with the checklist. Ridi explicitly articulated that he chose the mailing list because it could be easily aligned with the goal of the project and the evaluation task:

*Oserai quasi dire che gli incontri di persona sarebbero fuorvianti, spesso, perchè uno va a finire a parlare di altre cose ... In più aggiungerei che una delle cose che spero di avere insegnato agli studenti è proprio questa: comunicare e lavorare in squadra in questo tipo di ambiente.*

*[I even thought that meeting in person might have been counter productive, because most of the time one ends up talking about something else ... I also would like to add that I hope to have taught the students to communicate and work as a group in this kind of environment] [No. 09].*

Last, the coordinators also used the mailing list to maintain the stability of the network through consensual coordination, adjustment, and tuning throughout the course, as well as to create a shared message archive.

## **5.4 Conclusion of Collaboration: The Role of Project Incriptions**

This stage of collaboration involved the mobilization of the actors, the literary inscriptions they produced in the course of the project, and the use of these inscriptions as speakers or representatives of the project. Following Callon (1986a), the human and

---

<sup>34</sup>The mailing list disclosed only a little part of the actual work in which the students and the other collaborators engaged at their desks when examining the OPACs. This actual work remains largely inaccessible by an external observer, unless one had the opportunity to observe students when they met in the lab, or when they worked on their own. Nevertheless, the mailing list communications referred continuously to their evaluation work.



nonhuman actors involved in SemOP1 together with the project inscriptions resulted from the project (e.g., evaluation checklist, evaluation findings, and publications) could form a single spokesperson. The mobilization of these inscriptions served to increase the visibility of the project and motivate other interested library professionals to be involved in future initiatives, because they were mobile, immutable and combinable (Latour, 1987). SemOP1 inscriptions are mobile because they are made freely available on the Internet; they are immutable because they remain relatively stable over space and time; they are combinable because they can be transformed into other forms of inscriptions (e.g., new data, new journal papers, and a revised checklist).

The coordinators agreed that it was important to make all the project inscriptions, including the data collection instrument, the spreadsheet with the findings, and the publications, openly accessible to increase the visibility of the project and encourage sharing and reuse. The project web site has become a simple data repository where anyone can download and read documents. All documents can be reused by anyone, as long as the authors are properly acknowledged and cited as is commonly accepted practice in academia.

By sharing these inscriptions, the project is no longer fixed and closed, but open to follow-on collaborations with other library and information professionals and researchers. In ANT terms, these inscriptions turned into actors that borrowed their force from their human allies and became representatives of their work. By opening them up to other potentially interested actors, they can be contested and disproved at any time. But they can also act at a distance to instigate further problematization and enrollment, as Ridi remarked when talking about potential involvement of other librarians and researchers who may say: “ yes, we are interested, we want to collaborate”, or “I saw this in an article, tell us what we can do to improve”. By sharing inscriptions, the project is not fixed and closed but open to new collaborations. It allows anyone with an interest in the project to read, and perhaps participate - and that may increase the project’s impact, whether it is librarians seeking to improve the search capabilities of their OPACs, or looking at the details of a method that can enable them to carry out their own evaluation, or software developers wishing to provide better software for OPACs. As Gnoli pointed out: *Noi abbiamo fatto questo tipo di lavoro, uno può prendere il risultato e poi fare qualcos’altro [we have done this kind of work, anyone can take the findings and do something else*”<sup>35</sup>] [No. 10]. Ridi also recalled the importance of open access in complying with some demands of the scientific method, such as replicability of findings, although it was problematic in this case because OPACs, the study objects, change constantly.

---

<sup>35</sup> The spirit is that of Open Access and Open Peer-Review. Open Access enables others to understand research more fully and to build upon it more easily. Open Peer-Review invites discussion between reviewers and authors. The review process is made public and performed online.

## **6 The Sociotechnical Influence of Events, Actors and Networks in SemOP1**

This chapter describes the findings resulting from conducting ESA on a temporal list of events based on the long narrative in the previous chapter. First is a description of the list of events entered in Ethno and a chart of the linkages between events in the collaborative process. Second, a full analysis of all the causal relationships between events is presented. In so doing, I also compared the findings to previously reported research, while highlighting new and relevant results.

### **6.1 ESA: SemOP1 List of Events and the Ethno Diagram**

Table 6-1 provides the list of 33 events occurred during the process of collaboration in SemOP1. For each event, influential sociotechnical aspects of work discussed in the rest of the chapter are identified. To link causally all events, I responded to 119 questions – mainly counterfactual – asked by Ethno. Here is an example of counterfactual reasoning. In the Ethno analysis, I argued that cumbersome university funding mechanisms that discourage the LIS professor from applying for project grants was linked to the decision of setting up an unfunded and unaffiliated project, with the project coordinators joining their forces. This claim was based on the interviews with the LIS professor as reported in section 5.2.5., which elicited the following counterfactual argument: had mechanisms for university funding been less bureaucratically cumbersome, labour-intensive, and costly for applicants, the LIS professor would have applied and SemOP1 might have been affiliated and organized differently.

The results of the Ethno analysis are shown in the diagram in Figure 6-1.

**Table 6-1** List of events in SemOP I

STAGE OF RESEARCH COLLABORATION	EVENTS	TRANSLATION PROCESSES	SOCIOTECHNICAL ASPECTS OF WORK
Foundation	Two library professionals exchange views by email about the lack of proper subject indexing in Web-based OPACs interfaces	Problematization	Lack of resources and institutional commitment
Foundation	The two library professionals lack financial and human resources for conducting the evaluation	Problematization	Lack of resources and institutional commitment
Foundation	A LIS professor looks for a topic for his electronic documentation course in the graduate program in library and information science	Problematization	Lack of institutional commitment
Foundation	The LIS professor wants to provide a research experience to his 13 master's students	Problematization	Lack of resources and institutional commitment – Changing traditional educational practices

STAGE OF RESEARCH COLLABORATION	EVENTS	TRANSLATION PROCESSES	SOCIOTECHNICAL ASPECTS OF WORK
Foundation	The LIS professor emails one of the two library professionals asking for a topic	Problematization	Lack of institutional commitment
Foundation	The LIS professor has known the library professional for long time	Problematization	Previous ties
Foundation	The library professional puts forward the idea of the evaluation of OPACs	Problematization Interessement	Lack of resources and institutional commitment
Foundation	The LIS professor makes his class available for the evaluation	Problematization Interessement	Lack of institutional commitment – Incentives, rewards, and voluntary participation – Changing traditional educational practices
Formulation	The three coordinators set up the Semantic OPAC 1 project	Enrollment	Lack of resources and institutional commitment – Incentives, rewards, and voluntary participation
Sustainment	The coordinators invite the Subject Indexing Group to participate in the project	Interessement Enrollment	Previous ties – Opportunity For external expertise

STAGE OF RESEARCH COLLABORATION	EVENTS	TRANSLATION PROCESSES	SOCIOTECHNICAL ASPECTS OF WORK
Sustainment	The coordinators develop by email a checklist of features which are necessary to ensure effective use of subject access	Enrollment	Nature of work (loosely coupled)
Sustainment	The checklist inscribes rules about effective use of subject access	Obligatory Point of Passage	
Sustainment	The students must use the checklist for the evaluation	Obligatory Point of Passage	Nature of work
Sustainment	The coordinators invite external library professionals to participate in the project	Enrollment	Lack of resources and institutional commitment – Opportunity for external expertise – Incentives, rewards, and voluntary participation
Sustainment	Four external library professionals volunteer to collaborate in various forms	Enrollment	Opportunity for external expertise – Incentives, rewards, and voluntary participation
Sustainment	The project participants are geographically distributed	Enrollment	Nature of work and Collocated and Remote Collaboration

STAGE OF RESEARCH COLLABORATION	EVENTS	TRANSLATION PROCESSES	SOCIOTECHNICAL ASPECTS OF WORK
Sustainment	A coordinator sets up a web-based mailing list for communication	Enrollment	Nature of work and Collocated and Remote Collaboration
Sustainment	The coordinators explain the checklist to the students during a collocated kick-off meeting at the start of the course	Enrollment	Nature of work and Collocated and Remote Collaboration
Sustainment	The coordinators assign the students a sample of OPACS for evaluation	Enrollment	Nature of work and Collocated and Remote Collaboration
Sustainment	The students must complete the evaluation to pass the course	Enrollment	Nature of work and Collocated and Remote Collaboration
Sustainment	The students work individually on their task, either from home or from wherever they have an internet connection	Enrollment	Nature of work and Collocated and Remote Collaboration
Sustainment	The students encounter problems with the use of the checklist	Enrollment	Nature of work and Collocated and Remote Collaboration

STAGE OF RESEARCH COLLABORATION	EVENTS	TRANSLATION PROCESSES	SOCIOTECHNICAL ASPECTS OF WORK
Sustainment	The checklist introduces unplanned complications in the project	Enrollment	Nature of work and Collocated and Remote Collaboration
Sustainment	The students and the LIS professor discuss the checklist both in collocated informal groups and in the classroom	Enrollment	Nature of work and Collocated and Remote Collaboration – Lack of need for formal coordination mechanisms
Sustainment	The students discuss aspects of the project with the coordinators, especially the remote ones, in the mailing list	Enrollment	Nature of work and Collocated and Remote Collaboration – Changing traditional educational practices
Sustainment	At the end of the evaluation, the students enter the data in a spreadsheet	Enrollment	Nature of work
Sustainment	The students send their files to the coordinators by email	Enrollment	Nature of work
Sustainment	The coordinators analyze the data	Enrollment	Nature of work
Sustainment	A coordinator creates a project web site on his departmental server	Mobilization	Lack of resources and institutional commitment

STAGE OF RESEARCH COLLABORATION	EVENTS	TRANSLATION PROCESSES	SOCIOTECHNICAL ASPECTS OF WORK
Conclusion	The coordinators write papers on the findings of the evaluation	Mobilization	Incentives, rewards, and voluntary participation
Conclusion	The coordinators publish all project inscriptions on the project web site	Mobilization	Lack of institutional intellectual property – Incentives, rewards, and voluntary participation
Conclusion	The project inscriptions aim to increase the visibility of the project	Mobilization	Lack of institutional intellectual property – Incentives, rewards, and voluntary participation
Conclusion	The project inscriptions make the project open to new collaborations	Mobilization	Lack of resources and institutional commitment – Lack of institutional intellectual property



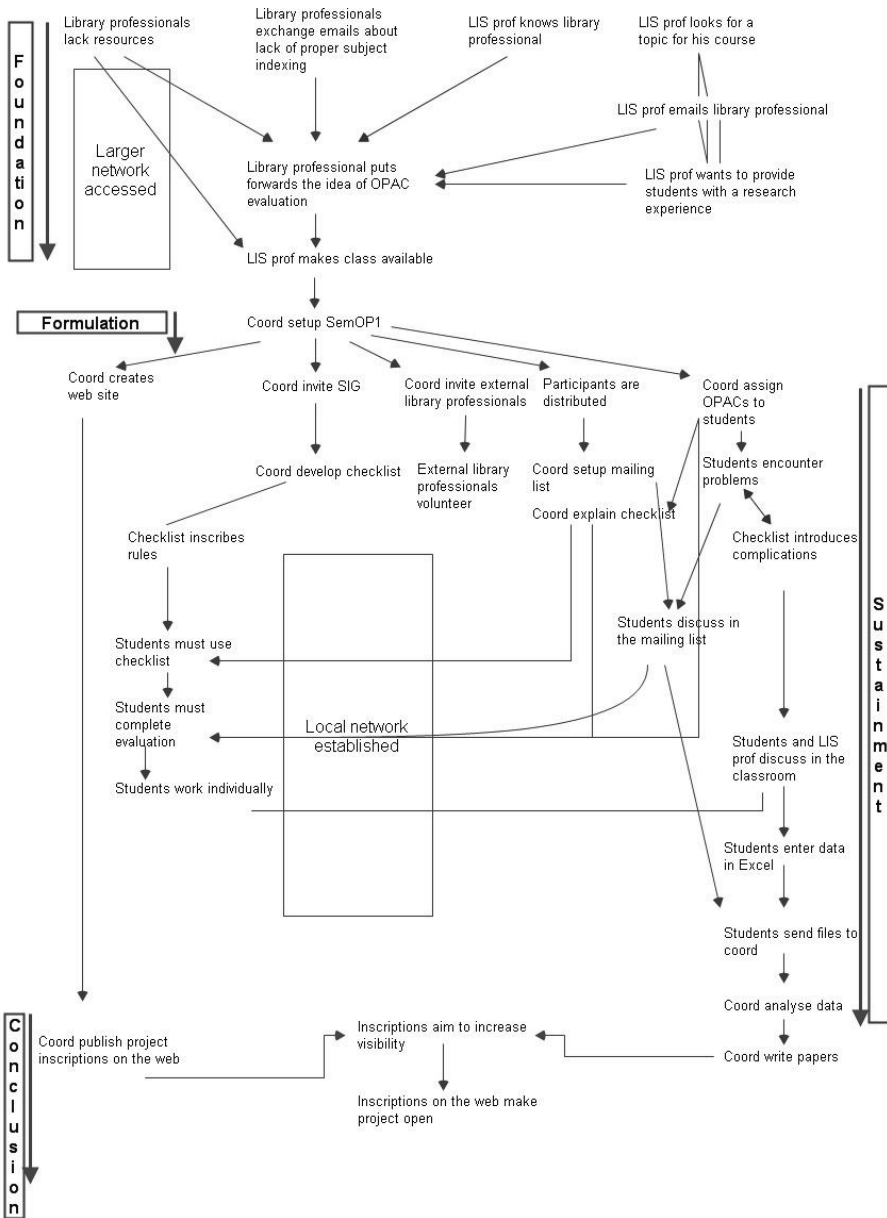


Figure 6-1 Ethno diagram of SemOP1

## 6.2 Project Institutionalization: The Difficult Relationships between Local and Larger Networks

### 6.2.1 Lack of Resources and Institutional Commitment

The initiation and sustainment of SemOP1 arose from the alliance of two library professionals driven by a professional interest, and one LIS professor driven by teaching and learning concerns. In fact, according to the event diagram (see Figure 6-1), two unrelated, but supposedly temporally closed, events [Library professionals exchange emails about lack of proper subject indexing and LIS prof looks for a topic for his course] resulted in the decision of joining forces [Libr professional puts forward the idea of OPAC evaluation and LIS prof makes class available] and setting up the project [Coord set up SemOP1]. What caused the alliance to occur? ESA connects logically [Library professionals lack resources] to [LIS prof makes class available], and shows that the library professionals' lack of human and financial resources on one side, and the need of the LIS professor to interact with people with similar background and interests on the other side, set in motion the decision to join forces and setup the project. SemOP1 was setup as an unaffiliated project, because the coordinators initiated and developed it without institutional support. The LIS professor explained the situation eloquently in the statement No. 02. SemOP1 was not granted external funding, had no budget, nor expenditures. Participation was on a volunteer basis, except for the students who received course credit for their participation. The project coordinators (except for the LIS professor) and the external library professionals worked mostly outside regular working hours, and used software and hardware either from work, at the different employers' locations, or from home. There were no support staff, no contract or other legal agreements tying either individuals or their institutions to the project, and no reporting operations and obligations that would arise had the project been funded (Ponti & Sonnenwald, 2008). SemOP1 achieved a temporary stability because the coordinators were successful in aligning the interests of the network and making the project work. The institutions employing the coordinators acted "neutrally"<sup>36</sup>, in the sense that they did not exert pressures and expectations on the actors

---

<sup>36</sup> Obviously, these institutions are not neutral. Even when we do not see them, they have inertia and tend to persist. Moreover, they have effects. The choice of treating institutions as punctualized macro-actors here does not mean that I took them as naturally given or abstract entities, according to a Weberian model of bureaucracy. I saw them instead as contested organizations, as products of an ensemble of forces leading to the construction of their structures, their rules, and their dynamics. These organizations can be studied to understand how different actors construct a social order and enact the practices that make them going, but this is out of the scope of this work. The apparent neutrality of institutions may be interpreted as a way of masking resistance in the form of departmental values, regulations, and organizational structures that contribute to, and are sustained by, regulations and organizational structures in the university at large that often fail to reward academic productivity and foster a meritocratic environment. These regulations and structures distribute resources on the basis of

(Ponti & Sonnenwald). Thus, they did not respond to the coordinators idea with an “antiprogram of action” (Latour, 1991). They were not asked to take part in the project because the coordinators knew they were not interested, and because they were not involved, the coordinators did not make any request to them. The freedom that the coordinators enjoyed to set up and work with the project was linked to this lack of institutional commitment, which provided them with an opportunity to use their network contacts and aggregate many small and distributed resources. Project participants were able to leverage upon this institutional commitment to their advantage. For example, academic practices, including standards about co-authorship and publication venues, did not influence the choices of the participating faculty member. He chose the collaborators and the subject to work with, as well as where and how to publish his work, with little concern for academic standards regarding scientific publications.

If, contrary to what actually happened, the coordinators had sought financial support – in the form of grants, for example – might they have been successful in the Italian context of library and information science? The accounts of the coordinators provide a clear perspective on this crucial point. In Italy, LIS is a low status discipline receiving little or no grant funding and, given the focus of Ridi’s department on subjects as ancient books and history of libraries, the probability of success for obtaining funding for SemOP1 would have been minimal. As the LIS professor made clear, preparing a proposal is time-consuming and the expected return on labor (e.g., 2000 Euros) does not compensate for the time involved. It is a disincentive to him. The constraining role of academic institutions seems to be clear in this respect. Universities constrained the coordinators choices by restraining resource allocation through cumbersome mechanisms that discourage people from applying for funding, because the transaction costs that they should incur (e.g., the time and effort it requires to understand the rules, to find suitable partners, and to write the proposal) far exceed the gains that they would obtain. If we add to this aspect the fact that the SemOP1 did not touch interests perceived as important by universities<sup>37</sup>, the result is the establishment of an unaffiliated project which is not embedded in a network of interdependence among institutions. The project remains stand-alone, not being part of a broader organizational or national strategy.

## 6.2.2 The Opportunity for External Expertise

Independence from institutional practices can be seen either as an element of risk for a project’s sustainability, or as an element of freedom. SemOP1 participants did not

---

presumably unfavourable criteria to faculty members, and affect actors’ chances of developing university funded initiatives.

<sup>37</sup> The coordinators did not attempt to pursue funding from other national organizations, such as private companies or international organizations (e.g., EU). Asked about applying for funding possibilities to sustain the project in the future, the LIS professor said that the “effort must be worth the trouble”, because the application process would be costly and time-consuming.

have to conform to rules or institutional requirements, but they did not either receive support or legitimacy. However, although all organizations, including projects, are shaped within environments that pose technical and institutional constraints, we should not downplay the role of individual agency. SemOP1 shows that individuals can make choices even when the technical and institutional environment does not offer incentives or support. Indeed, it is the coordinated activity of individual participants that sustains emergent networks. A possible explanation for this is twofold. On one hand, the lack of institutional support limited the organizational capacity of the project and underscored a process of bottom-up mobilization of heterogeneous “things”, e.g., from students’ enrollment to the use of the departmental server to host the project web site. On the other hand, this lack of support also afforded the coordinators autonomy from their institutions. Similarly, lack of people who can dedicate time to a project could be an ongoing problem for its sustainability, but this very feature also encouraged the core group to create space for other part-time actors who brought their professional expertise to the project and quickly became much needed hands. The very fact that SemOP1 was unaffiliated and lacked full-time staff created opportunities for other part-timers, allowing the project to make use of the professional expertise of some collaborators, and to enable novices, e.g., the students, to develop such expertise. As one external library professional made clear in the following statement, it was the emerging and self-organizing nature of the project that opened the door to her and other external library professionals. She appreciated the opportunity of being engaged in the project even though she was not paid for it. She said,

*Non lo vedo come un problema, il fatto di non essere retribuita per l’attività che faccio perché, un po’ come era nato il tutto, era stato “guarda, se hai delle occasioni per farmi fare qualcosa che sia una ricerca, qualcosa di interessante conta su di me”.*

*[I do not see it as a problem, the fact of not being paid for working in the project because of the way the all thing came up. I mean, I said to {Gnoli}, “Look, if you had the chance to involve me in something that is a research, or something interesting, count me in”] [No. 11].*

This analysis brings me to make an initial claim that the autonomy and expertise of SemOP1 participants enabled them to compensate for the lack of institutional commitment and create the basis for the accomplishment of joint-work. At the same time, however, enrolling new actors requires an ongoing process of realignment of interests to keep the order of the network stable, through an ongoing negotiation of actors’ identities and modes of interactions. Achieving and maintaining a convergence of interests over time and with new actors is what the coordinators needed to do to ensure the continuity of the project. Taking notice of this dual effect of the lack of institutionalization is critical in order to understand how other spontaneous and autonomous projects involving LIS academics and library professionals can be developed because it influences the type of research conducted (e.g., choice of research topic and recruitment of participants).

### 6.2.3 Lack of Institutional Intellectual Property

In SemOP1, the coordinators made all the project inscriptions, including the data collection instrument, the spreadsheet with the findings, and the publications, openly accessible to increase the visibility of the project and encourage sharing and use [Co-ord publish project inscriptions on the web – Inscriptions on the web make project open]. SemOP1 – and the follow-on project SemOP2 – showed the characteristics of commons-based peer-to-peer productions, in which the right to distribute over the right of ownership is a key element (Benkler, 2006). Both the projects are forms of small-sized “decentralised, collaborative, and nonproprietary networks, based on sharing resources and outputs among widely distributed, loosely connected individuals who cooperate with each other without relying on either market signals or managerial commands” (Benkler, p. 60).

While lack of institutional commitment and external funding led to the creation of this type of organization, the lack of institutional intellectual property made ownership of data and documentation less complicated. Data were produced in an unaffiliated project without grant funding. Therefore, data ownership only had to be decided among the project participants. In SemOP1, the coordinators decided that all project participants owned the data and that all the data and the findings should be released to all, because they thought it was beneficial to the project and to the Italian community of library and information professionals. There was no concern for “free riders”, because the coordinators did not spend efforts to obtaining grant funding and the investment of resources was limited (Borgman, 2007). For them, it was the most logical choice to release the data and all the other documents in the public domain. Although an open discussion among all the project participants on making project materials openly accessible did not occur, the interviewed students and external library professionals agreed with this decision, and thought that the project could reach a larger audience and make the work more visible than it could have been by appearing in a subscription journal only<sup>38</sup>.

The lack of institutional intellectual property ownership also appears to encourage this “ethos of sharing”. Italy is one of the few countries in the world enacting a “professor’s privilege” system, in which university employees are generally sole owners of their intellectual property and are not pressured by the university to protect intellectual property through copyright, licenses, patents, or other agreements. Professor’s privilege allows flexibility for individuals to greatly determine the creation and fate of their intellectual property, which can be important in collaborative projects. Professor’s privilege may also allow universities flexibility to reward efforts that bring small benefits to departments, which can be important in projects with no external funding.

---

<sup>38</sup> The subscription journal mentioned by two interviewees is *Biblioteche Oggi* (Libraries Today), an Italian-language journal that aims to publish articles of interest to both information professionals and academics. The findings of the evaluation conducted during SemOP1 were published in *Biblioteche Oggi* in October 2004.

However, the lack of institutional commitment in SemOP1 has shown that universities did not act in this direction.

#### **6.2.4 The Lack of Need for Formal Coordination Mechanisms**

The findings of the current study differ from those of previous studies (Corley et al., 2006; Chompalov et al., 2002), which argued that formal management structures are needed when the level of epistemic development in a domain is low. In SemOP1, the coordinators reached a verbal agreement and never wrote anything down even informally. There were not predetermined governance mechanisms. Participants described the project as an informal and non-hierarchical group, whose working relationships remained spontaneous and largely self-managed as they emerged from their collaboration within the project, and/or previous relationships. The configuration of SemOp1 seems to indicate that people can achieve coordination and mutual understanding through social interaction without the need for formal management mechanisms, in concurrence with the situated view of Cleal et al. (2004). This finding confirms evidence from previous studies of collectivist organizations, showing that informal, peer-based coordination and decision-making mechanisms work well when the group is small and fairly homogeneous (Walsh & Maloney, 2007). Therefore, the small size of the project, its relatively homogeneous culture, and participants' compatible expectations can be associated to the lack of need for formal coordinated mechanisms.

### **6.3 Common Ground: The Role of Previous Ties in the Creation of the Local Network**

In line with previous studies (e.g., Thune, 2007; Olson & Olson, 2000; Sonnenwald, 2007), the events [LIS prof knows library professional – Library professional puts forward the idea of OPAC evaluation] show that previously established ties and a history of collaboration were a prerequisite for initiating the project. The coordinators shared a history of joint-work in the Italian Library Association, a voluntary professional association. They knew each other and their working styles, and knew what to expect mutually. This finding suggests that previous ties and joint-experiences of collaboration may be even more important when the collaborative effort is on a volunteer basis, as in this case. When human and economic resources are scarce, the question becomes how to do the job economically and efficiently, while making the best use of the limited resources. In this situation, previously established ties and existing common ground influenced positively the achievement of a stable alignment of interests throughout the project, facilitating communication and understanding and supporting faster and smoother decision-making process.

## 6.4 Changing Traditional Educational Practices and Making Use of CSCL

The chain of events between [Coord assign OPACs to students] and [Students send files to coord] represents a sequence of educational activities aimed at bridging the gap between abstract notions and their application in a LIS graduate course. Lack of institutional commitment played a role here as well and let the LIS professor enjoy freedom of manoeuvre. He could make his own decisions about teaching style and course topic. This is a critical aspect. In fact, even motivated teachers may be unable to implement new approaches in the classroom, because of institutional constraints, including examination requirements, the attitudes of colleagues and heads of department who review the teachers' performances in the classroom, the requirements to teach specific courses in a given curriculum, and the difficulty of getting through the syllabus in the time allotted. This freedom allowed him to change the organization of the course by merging teaching, learning, application of principles of subject indexing, development of research skills, and use of ICT. It provided the opportunity to go beyond the traditional transmissional model (telling as teaching) towards a more collaborative and dialogical approach. A traditional approach to learning and teaching is still prevalent in Italian higher education and is representative of an academic tradition that privileges the transmission of abstract knowledge from the teacher to the student. In comparison, SemOP1 provided the opportunity for a more inquiry-based approach in the course. As one student said, this was an incentive to participate actively in the course. It was a welcomed opportunity to apply the principles of subject indexing in a user-centered perspective. Furthermore, this approach also brought a change in her overall experience of the course; it no longer felt only like a course that must be taken, but like a real research task that could produce useful results.

The emphasis on dialogue between the students and the LIS professor implied a conception of both the role of the learner and the role of the teacher, which was different from what the students were used to experiencing. The LIS academic replaced the traditional unidirectional relationship from lecturer to students with a dialogical and participatory relationship<sup>39</sup>. He did not emphasize students' performance, but rather

---

<sup>39</sup> As Paolo Balboni, Dean of the Department of Modern Foreign Languages and Literature at the University of Venice, said during a speech, "*Noi abbiamo un modello tradizionale, quello della legge Gentile. Cosa diceva la legge Gentile che continua ad essere filosoficamente presente nella scuola italiana in maniera pazzesca? Che in testa sta la materia, la disciplina e poi sotto il docente e lo studente e lo studente non ha un accesso diretto alla materia, la materia arriva allo studente mediata all'insegnante*" [We have a traditional model based on the Gentile reform. What did this reform set forth, whose philosophical assumptions are still so predominant in the Italian educational system? It set forth that at the top there is the subject matter and the teacher and the student are underneath, and the student does not have direct access to the subject, because the subject goes to the student through the mediation of the teacher]". Source: New Learning – Nuove competenze – Lovere, May 23, 2003, <http://www.progettoquite.it/balboni.pdf>.

fostered communication and understanding of problems. He did not act as “the authority” and “the one who is supposed to know”. Although a dialogical approach by no means is a novelty in education, it was an innovation in the context of this course because it was perceived as such by the students<sup>40</sup>. SemOP1 was an opportunity for the LIS professor to use an educational method he believed in.

Given the nature of the research task, technology was integral part of teaching and learning. The interviewed students considered the computer lab critical to support collaboration among them, because they could interact with the OPACs and with each other both around and through computers. As Haythornwaite (1999) argued, computer-supported collaborative learning (CSCL) is not simply collaboration around computers, with the computer providing a means to coordinate tasks or to simulate problem-solving situations, but rather collaboration through computers, where group members use the computer to structure and define their collaborative endeavors. For Haythornwaite, communication, coordination, negotiation, interaction, and exchange of resources are the building blocks of the social networks that sustain and define work groups, learning groups, and communities.

The mailing list played a complementary role to support collaborative learning. The use of this list was also integral part of the course and seemed to be informed by the same implicit educational assumptions as those used in the collocated classroom. Several interviewees associated the different teaching approach and the use of the mailing list to a different use of the forms of address, with a switch to the second-person *tu* form<sup>41</sup> to address interlocutors, regardless of status and/or age. The use of ICT seemed to help introduce an element of “familiarity” in communication. It helped make communication more accessible and unrestricted, and expressed a support for equality (Ardehali, 1990). There seems to be a link between type of relationships and language of communication. Just as a certain types of relationship foster a corresponding use of language to communicate, so a certain use of language can foster a corresponding type of relationship (Putnam, 1993). In SemOP1, communication through the mailing list shared characteristics of informal communication, such as informal language, speech

---

Giovanni Gentile was a philosopher who introduced a sweeping reform of the Italian educational system in 1923. His pedagogical beliefs underpinned a one-directional learning process, from the teacher to the student, and the dualism between high culture, equated to intellectual activity, study and research, and an inferior type of culture, equated to practical activities.

<sup>40</sup> Rogers (2003) affirmed that an innovation is an idea, a practice, or an object that individuals perceive as new although its first use or discovery can date long way back to the history. He said that the perceived newness of an idea determines the way people react to it, and “if the idea seems new to the individual, it is an innovation” (p. 11).

<sup>41</sup> Italian grammars say that *tu* is used with children, with inferiors, and in familiar conversations. Third-person *lei* form is used to address strangers, teachers, professional superiors, distant acquaintances, and anyone about whom we are unsure. Source: *Tu, lei and voi*, Bruno Roselli, Italice, 3(3) (Aug., 1926), 49-53.



register, interactivity, and openness (Kraut, Fish, Root, & Chalfonte, 1990). This informal communication was horizontal because participation in the project was not based on a hierarchical system. Even the relationship between the students and the LIS professor resembled more a peer-to-peer (P2P) form or organization with respect to the students, because it was “based on the assumed equipotency of its participants” (Bauwens, 2005, p. 6). As in other P2P networks/groups, the students did not deny the ‘authority’ of the LIS professor, who in turn did not try to force a fixed hierarchy, but acknowledged his authority based on his knowledge and initiation of the project. Furthermore, although the coordinators determined the objectives and the priorities of the project, each student could have the opportunity to be drawn in and share the responsibility of the project’s decisions and activities in the future, if not immediately – because of other priorities such as completing the course and graduating. In SemOP1, the hierarchical model was replaced with a heterarchy (Hedlund, 1986) where authority and responsibility were relocated within the project. A good example is that of the collaborator who enrolled the project as a research assistant in SemOP1, and then became a coordinator in the follow-on project, SemOP2. Active and competent participants who are willing to volunteer some of their time can contribute at different levels of responsibilities in future initiatives.

## **6.5 Nature of Work and Collocated and Remote Collaboration in the Local Network**

Collocated and remote work played critical roles in different respects and showed complementarity. However, from the students’ perspective, the mailing list would have been unlikely to work without face-to-face meetings. In Chapter 5, I described how the checklist introduced unplanned complications [Checklist introduces complications], which in turn were a prerequisite for collaborative learning [Students and LIS prof discuss in the classroom]: students talked, examined OPACs using the checklist, and compared experiences to improve their understanding. The students felt that the communication necessary to show their difficulties with the checklist and OPAC interfaces was complex and needed frequent and prompt feedback and rich information. For this reason, they stressed the importance of face-to-face interactions as richer and more rewarding than virtual communication.

This finding confirms the importance of spatiality for human interaction and the difficulty of dealing with complexity and ambiguities at distance (Olson & Olson, 2000; Olson, Teasley, Covi, & Olson, 2002; Birnholtz, 2004). It also confirms how collocated work can play a crucial role for understanding and accomplishing work. As interviewed students recalled, collocated collaboration and remote collaboration via the mailing list, with their respective verbal and written communication modes, enacted distinct modes of knowing. Although their tasks were independent and not tightly coupled [Students work individually], at the beginning of the project the students felt interdependent and turned frequently to each other to understand what to do. As the students lacked relevant domain knowledge (they were just learning about sub-

ject indexing for the first time), synchronous verbal communication allowed far easier clarification and understanding than asynchronous communication, and made it easier for them to discuss complex problems. For example, they could show and see OPAC interfaces and point to problems directly and immediately. This finding confirms Kraut et al.'s (2002, p. 151) proposition that people choose face-to-face meetings for tasks that require negotiation because they facilitate grounding. However, it can be argued that had the students had access to a shared virtual work space, such that two or more students could have viewed and interacted with the same OPAC simultaneously, face-to-face meetings might have been less necessary.

Conversely, asynchronous communication enabled further conceptualization of a problem by allowing the students time to think about what they wanted to say and how to formulate their thoughts. The mailing list also supported project-wide information sharing: it enabled all the participants to be aware of what others were talking about at every point in time. It also provided an additional meeting space for the class and enabled all the projects participants to concentrate their attention on specific issues when they emerged.

However, the students feared of being unable to expressing ideas clearly in writing. They felt that writing skills were needed to convey ideas clearly and effectively. In fact, these email conversations, although they kept a seemingly oral form, were written down and edited in the electronic medium. This feature made them a distinctive form of communication as noted previously by Lanzara and Morner (2005, p. 83).

## 6.6 Incentives, Rewards and Voluntary Participation

Given the lack of institutionalization of the project, the coordinators did not think that their work in the project would influence their careers in any way. Ridi made it very clear during the interview how he made his choice against an institutional culture where solitary scholarship and single-author work continue to dominate:

*Tutto dipende se io alla fine ne viene fuori una pubblicazione. Allora, se ne viene fuori una pubblicazione, questa pubblicazione io la aggiungo a quell'elenco di cose che ogni anno metto nell'elenco delle pubblicazioni per i finanziamenti, e ogni tre anni metto nella sintesi delle mie attività scientifiche. Quindi contribuisce in quello lì. Però, devo essere sincero, se io lo facessi per questo, non mi converrebbe perchè, facendo un'analisi costi-benefici biecamente, come si può dire, pragmatica, un progetto del genere, che non è comunque molto impegnativo, anche se c'è una gestione, una organizzazione, ha un riscontro poi alla fine, alla fine si è concretizzato in un articolo di rivista diviso per tre persone.*

*[What really matters is producing a publication in the end. In fact, if there is a publication, I add it to the list of publications I put together every year for financing, and also to the synthesis of my scientific output which I make every three years. But I must honestly tell you that if I were to do it just to receive funding (from the department), I*

*don't think it would be worth it. In fact, if I were to do a blunt cost-benefit analysis, I could have probably written three articles by myself in the amount of time it took to set up a project like this, which was not too difficult but involved some management and organization, and it produced a journal article coauthored by three people][No. 12].*

Neither financial incentives nor professional career goals constituted main motives for the coordinators and the external collaborators. Rather, participants were driven by their values and interests. For example, creating something useful for the community of Italian library and information professionals was an important intrinsic motivation. In this respect, SemOP1 was an example of gift culture (Raymond, 1999), because the coordinators and the external collaborators were not financially dependent on project outcomes. They received their salaries for their full-time jobs, and this would continue irrespective of project participation or outcomes. They had the facilities they needed to work on the project, such as disk space, network availability, computing power, and free software. They either used their own home equipment or office equipment. One coordinator could also piggyback the project web site onto his departmental server where budget and software installations already exist. In this respect, his institution supported this gift culture indirectly.

The prevalence of intrinsic motivations did not preclude extrinsic motivations. Participants had multiple motivations for different reasons. For example, the students were motivated by the need to pass the course and earn a grade, whereas the collaborators were interested in learning something new and networking with colleagues. In a project like SemOP1, participants' motivations are very important for recruiting and retaining volunteers. Volunteering is a two-way relationship. Volunteers may not be paid, as it is the case in this project, but there is always something that they are seeking from the experience. This is the hook that gets them into volunteering in the first place. As one collaborator said, she was looking for learning and work experience. When she started to work in the project, she was still unemployed and did her initial evaluation from home, using her own equipment.

Based on the analysis done in this chapter, I suggest that three closely related aspects influence voluntary participation in a collaborative project: (a) the availability of material resources, such as technologies; (b) the ability to cooperate without relying on managerial commands, and (c) participants' interest in the topic of the project. These three aspects may indicate a relation between initiation of academic-practice collaboration and the type of research possible. Specifically, when the probability of accessing grant funding is very low, a well-delimited applied research topic relevant to professionals, but with implications for academics as well, may trigger voluntary collaboration within the professional community, if the needs for material resources to carry out the project are limited or easy to meet.

## **6.7 Summary**

This chapter detailed the sociotechnical aspects of work that characterised the actors'

local work environment and influenced the process of construction of SemOP1. The findings of ESA suggest three claims. First, the lack of institutional support was compensated by high autonomy of action and expertise of the project participants, which facilitated collaboration. Second, the small size of the project, its relatively homogeneous culture, and participants' compatible expectations can be associated to the lack of need for formal coordinated mechanisms. Third, when the probability of accessing grant funding is very low, a well-delimited applied research topic relevant to professionals, but with implications for academics as well, may trigger voluntary collaboration if the needs for material resources to carry out the project are limited or easy to meet.

The explanatory analysis of SemOP1's follow-on project, SemOP2, which is described in the next chapter, also suggests similar claims, because the conditions for initiating and developing the project remained the same. Chapter 8 provides this analysis.

## 7 Project Two: Description of Semantic OPACs 2

This chapter describes the strategies used by the actors to enroll allies and resources to initiate, develop, and complete a project called Semantic OPACs 2 (SemOP2). The narrative describes the actor-network resulting from these processes and its relations with the larger network.

### 7.1 SemOP2 Overview - Introducing the Actors

In November 2007, Gnoli, Ridi, and Visintin (hereinafter called coordinators) decided to start a follow-on project to SemOP1. They were joined by a new coordinator, Casson, who was an active and competent external collaborator working as research assistant in SemOP1, and was willing to volunteer some of her time in SemOP2.

Instead of involving a class of students as in the first project, they sought volunteers through several mailing lists for library and information professionals. The human and nonhuman actors involved in the project are described below in Table 7-1 and Table 7-2 respectively. When SemOP2 began in April 2008 (timeline in Table 7-3), the volunteers (hereinafter called evaluators) were 18 in number and distributed across the country. Casson prepared a list of 178 OPACs to be evaluated. Five evaluators withdrew because of personal reasons (e.g., start of a new job, move to another city) and 13 completed the evaluation. Two coordinators also offered to conduct the evaluation. As in SemOP1, each evaluator was assigned a set of ten OPACs to be examined over a period of two months. Evaluation results were entered in a spreadsheet and sent to the two coordinators (Casson and Gnoli) in charge of data processing and analysis.

**Table 7-1** Human actors

PARTICIPANT	EMPLOYER OR AFFILIATION	DEPARTMENT	JOB TITLE	ROLE IN THE PROJECT
Gnoli	University of Pavia	Department of Mathematics	Library Professional	Coordinator
Ridi	University of Venice	Department of Historical Studies	Associate Professor of Library and Information Science	Coordinator

PARTICIPANT	EMPLOYER OR AFFILIATION	DEPARTMENT	JOB TITLE	ROLE IN THE PROJECT
Visintin	Library Consultancy Firm		Library Professional	Coordinator
Casson	University of Padova	Department of Mathematics	Library Professional	Coordinator
13 library and information professionals	Universities; Inter-university Consortium; Regional Authority	Library; Office of Relations with the Public	Information and Library Professionals	Evaluators

**Table 7-2** Nonhuman Actors

NONHUMAN ACTORS	ROLE PLAYED IN THE PROJECT
Evaluation checklist	Coordination and management functions; Obligatory Point of Passage
OPACs	Initiation of the project
Subject indexing	Initiation of the project
SemOP1 project inscriptions (publications, web site, etc.)	Mobilization of further interests among library and information professionals
ICT	Coordination and management functions

**Table 7-3** SemOP2 Timeline

DATE	ACTIVITY AND HUMAN ACTORS INVOLVED
November- December 2007	Call for volunteers and setup of the mailing list – Coordinators
April 2008	Start of the evaluation – Coordinators and evaluators
June 2008	End of the evaluation – Coordinators and evaluators
September-October 2008	Data processing and analysis – Coordinators
October 2008	Presentation of findings at a national conference of the Italian Library Association – Coordinators

## 7.2 Foundation Stage: The Creation of a Negotiation Space

In November 2007, the coordinators decided to start SemOP2 to compare the findings with those of the first evaluation and assess whether any improvement had taken place

since 2003. Because their goal was to compare the results of the two evaluations, they applied the same checklist to observe and collect data on subject searching on the same set of OPACs (Casson, Fabbrizzi, & Slavic, 2009).

Asked whether they had received feedback from students, library and information professionals, and/or LIS academics that stimulated their decision to repeat the project, Gnoli and Ridi responded they could not indicate specific comments that spurred their decision. Nevertheless, they recalled to have received encouraging feedback from library professionals via email, articles, and conversations. Gnoli also reported to have received some interested comments from OPAC developers who thought that the new releases of their catalogues could have scored well on the evaluation. Ridi said that he had received no comments at all from the students of his course on electronic documentation, and almost none from other LIS academics, except for one citation in one article. He explained this lack of comments arguing that two-thirds of Italian LIS academics are actually historians of books, as mentioned earlier in section 5.2.1, and have no knowledge of OPACs. He added that the other one-third seldom comments on the work of colleagues for a kind of “respect of the territory”, with few exceptions.

The problematization stage is the same as in the previous project (see section 5.2). As in SemOP1, the coordinators started SemOP2 to learn more about the use of subject searching in Italian OPACs, and to contribute to their improvement (Casson, Fabbrizzi, & Slavic).

### 7.3 Formulation and Sustainment of Collaboration

The intersement and enrollment phases of translation involved persuading additional actors to agree on the goals defined by the SemOP2’s coordinators and to enroll the project.

#### 7.3.1 Identification of Interests

In Tables 7-4 and 7-5, the interests of human and nonhuman actors enrolling SemOP2 have been described using the ROI approach (Vidgen & McMaster, 1996). The potential spokespersons of the nonhuman actors include both the human actors in the project and other human actors who can be affected by enhancing subject access in Italian OPACs and can be representatives of the nonhuman actors.

**Table 7-4** Human actors’ main interests

HUMAN ACTORS	RATIONAL	ORGANIZATIONAL	INDIVIDUAL
Project coordinator (LIS associate professor)	make comparison with previous evaluation		opportunity to: publish papers, give talks and attend conferences

HUMAN ACTORS	RATIONAL	ORGANIZATIONAL	INDIVIDUAL
Project coordinators (library professionals)	make comparison with previous evaluation	enhance subject access to library resources by improving OPAC search capabilities	opportunity to: publish papers, give talks and attend conferences; gain exposure and become a national expert in the field; provide a valuable service to the national community of library professionals
Evaluators	evaluate subject access in OPACs	enhance subject access to library resources by improving OPAC search capabilities	opportunity to: learn and have a new experience; network with other colleagues; publish papers, give talks and attend conferences; provide a valuable service to the national community of library professionals

**Table 7-5** Nonhuman actors' main interests

NONHUMAN ACTORS	COMPONENTS	INTERESTS	POTENTIAL SPOKESPERSONS
Evaluation checklist	features of OPACs to be examined	represent principles of subject indexing to be applied during the evaluation; allow comparison over time	subject indexing experts; library professionals; LIS academics



NONHUMAN ACTORS	COMPONENTS	INTERESTS	POTENTIAL SPOKESPERSONS
OPACs	types of searches; access points; limiting and search refinement; search history, display and output	have interfaces that allow searchers to use subject indexes; be searched easily and effectively; show improvements/changes to interfaces over time	subject indexing experts; library professionals; software developers; LIS academics
Subject indexing	thesauri, controlled vocabularies, classification systems	be used to enhance subject access to content of OPACs and improve retrieval	subject indexing experts; software developers; library professionals; LIS academics
SemOP1 project inscriptions	data collection spreadsheets, subject indexing formula, evaluation checklist	be shared with other librarians, software developers, subject indexing experts, etc.; assist in the replication of the study and comparison of results related to either the same sample of OPACs or other OPACs not examined in the evaluation study	project coordinators; subject indexing experts; LIS academics; software developers
ICT	email; mailing list	be used to coordinate the project, mediate human interaction and support activities	project coordinators; library professionals

### 7.3.2 Interesement and Enrollment: The Creation of the Local Network

#### Enrollment of the Evaluators

The coordinators recruited the evaluators through calls in multiple mailing lists, one of which was the Italian ISKO mailing list used to discuss topics related to information and knowledge organization. Their calls for volunteers showed clearly how the coordinators “locked the others into place” (Callon, 1986a, p. 206) and made themselves indispensable, by defining the interests and competencies of the evaluators in a way that was consistent with their own interests. For example, Ridi sent the following call to the volunteers at the end of November 2007:

*Durante l'anno accademico 2003/2004 gli studenti del mio corso di "documentazione elettronica" collaborarono all'indagine SemOP, volta a verificare la qualità degli accessi per soggetti e per classi nei cataloghi in rete delle biblioteche italiane. I coordinatori del progetto stanno pianificando una nuova serie di rilevamenti. Chi fosse interessato a collaborare, applicando la lista di controllo a un campione di una dozzina di opac che verranno indicati successivamente (lavorando a titolo volontario, via web e email, nell'arco dei prossimi mesi), può inviare un messaggio contemporaneamente a <email> descrivendo in due righe i propri interessi, competenze e disponibilità. Alla fine di novembre sarà quindi contattato per organizzare il lavoro. I rilevatori verranno accreditati sul sito dell'indagine e nelle pubblicazioni eventualmente prodotte.*

*[During the academic year 2003/2004, the students of my course on electronic documentation worked together in the SemOP study, to examine the quality of subject-based access in Italian web-based OPAC interfaces. The project coordinators are planning a follow-on project. Those who are interested in collaborating, by applying an evaluation checklist to a sample of about twelve OPACs that will be indicated later on (working on a volunteer basis, through the Internet and email, over the next two months) can send an email message and describe their interests, competences, and availability. At the end of November, we will be contacting you to organize the work. Volunteers will be acknowledged on the project web site and in the publications produced as outcomes of the project] [No. 13].*

The volunteers who responded to the call were mostly library and information professionals with a degree in library and information studies or preservation of cultural heritage, and with an interest in classification and subject indexing. Some of them had volunteered and worked in the editorial board of the Directory of Italian OPACs, which was an initiative of the Italian Library Association. They were distributed across the country, worked for different institutions, and included both experienced (for example, professionals with good experience of cataloguing, construction and use of subject heading lists, and use of OPACs) and less experienced professionals. They brought their own needs and skills with them as well as their knowledge, which enriched the pool of resources that SemOP could rely upon during the project.

## **Enrollment of SemOP1 Inscriptions**

The recruiting process confirmed the nature of SemOP2 as a virtual project, in which

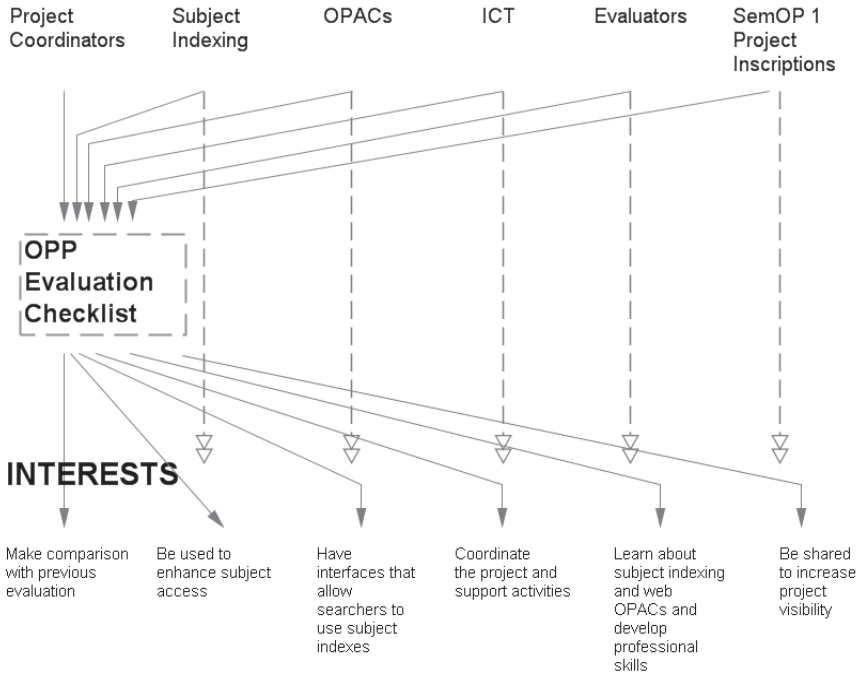
evaluators were distributed and collocated events were difficult to organize. In an early email among the coordinators, Gnoli mentioned the possibility of holding one or two collocated meetings, but these meetings never took place. When I asked him, in a private email in January 2008, if I could participate as an observer in a meeting like a fly on the wall, he said that they had decided to do everything remotely because of the difficulties to arrange meetings.

To counterbalance to some extent the absence of collocated training sessions, Gnoli suggested that the evaluators read some learning materials to familiarize with the project. He pointed them to several texts produced from SemOP1. These materials, including articles and presentations, acted to develop common ground and support sense-making. They made action at a distance possible so that the previous experiences and knowledge developed in SemOP1 could “travel” across time and support the development of the new project. The role of texts as networks (Callon, 1991) emerged here. Callon said that a scientific text may be seen as an object that links to other texts and literary inscriptions (p. 135). They are “objects that define the skills, actions and relations of heterogeneous entities” (p. 136). In this phase of SemOP2, the materials (e.g., articles, data, and checklist) produced during the previous project played the role of helping participants familiarize with the topic and the task of the project, and contributed to stabilize the new project, clarifying and reaffirming the roles and interests of all the actors.

### **Enrollment of the Evaluation Checklist as OPP**

As described in Chapter 5, the checklist was a sociotechnical artifact. It resulted from the translation in the form of a list of features of principles of subject indexing, which were embodied in the work of the Subject Indexing Group and their guidelines to subject indexing. It embodied rules about what a good OPAC should be (Gnoli, 2005). In SemOP2, both the checklist and the procedure to collect and analyze data remained stable. The checklist acted as the OPP and was the same as the one developed in 2003, because the coordinators wanted to compare the findings of the two evaluations. Figure 7-1 shows how the actors had to pass through the checklist in order to pursue their interests.

## ACTORS



**Figure 7-1** SemOP2 as an actor-network

The need of standardizing data collection across evaluators implied that all of them had to perform the same task (although with different sets of OPACs) using the checklist. Although it is doubtful that the checklist had achieved the character of irreversibility, the coordinators were firm in their intention to use it in its existing version during the project. For example, two evaluators problematized the checklist and asked whether it was possible to include further aspects in the evaluation. The following is a quote from the message of one of them:

*Evaluator: ho iniziato a guardare la lista di controllo elaborata per la rilevazione OPAC semantici e ho compreso che, a differenza di quel che credevo, la lista valuta esclusivamente le funzioni di ricerca semantica di un catalogo, prescindendo del tutto dalla quantità e dalla qualità degli accessi semantici del catalogo stesso ... Mi chiedo se questo secondo elemento (altrettanto importante rispetto al primo, se non più importante) non possa essere in qualche modo quantificato e possa diventare oggetto della rilevazione, attraverso ad es. il campionamento. D'altra parte vedo che la tecnica di campionamento è già impiegata nella lista di controllo e, considerato che si tratta di una lista di controllo capillare e dettagliata che richiede già un certo tempo per la compilazione, forse potrebbe essere un'integrazione possibile.*

*[I have started to examine the checklist developed for the evaluation of the OPACs and I understand, unlike what I thought, that the checklist assesses only subject access in a catalog without considering the quantity and quality of subject accesses in the catalog ... I wonder if the latter (as much important as the former, if not more important) cannot be somewhat quantified and become assessed, for example through sampling. By the way, I see that sampling is already used in the checklist and, given that it is a detailed checklist that requires time for completion, perhaps it could be a possible integration][No.14].*

Her idea was not dismissed, and indeed was appreciated, but in the mailing list Ridi remarked on the need to use the checklist in its existing form:

*Osservazione corretta e interessante, ma temo che misurare la quantità (per non parlare della qualità) dei punti di accesso semantici sia estremamente difficile ... però forse, cercando nella letteratura, si trova qualche procedura "sostenibile", da utilizzare però in un eventuale futuro rilevamento, perchè individuare la procedura, metterla a punto e (soprattutto) applicarla implicherebbe parecchio tempo, mentre invece credo che sia imminente la partenza della attuale rilevazione, per la quale sono quasi pronte le liste degli opac da analizzare.*

*[Interesting and useful comment, but I am afraid that assessing the quantity (not to mention the quality) of subject accesses is very difficult ... However, perhaps the literature can provide some "sustainable" procedure to be used in a possible future evaluation. In fact, finding such a procedure, tailoring it, and most of all applying it would require a lot of time, while I think that this evaluation is starting soon, and the set of OPACs to be assessed is almost ready] [No.15].*

Although the coordinators did not incorporate the suggestions of the two evaluators in the checklist, they followed on them in a private exchange of email between themselves. In order to avoid losing those suggestions but to keep the evaluation on track, Visintin offered to bring the changes to the checklist in a separate evaluation together with the two evaluators and who else wanted to participate. Gnoli welcomed the idea:

*Mi pare un'ottima idea. Lo scopo dell'indagine è stimolare riflessioni e valutazioni su queste cose. Ne potrebbero anche uscire studi e pubblicazioni distinte di autori diversi purché tutte esplicitamente ricondotte al progetto Opac semantici.*

*[I think it is a very good idea. The goal of the evaluation is to stimulate reflections and critical opinions on these things. Multiple reports and articles could be produced by several authors, as long as all (these publications) are explicitly linked to SemOP2] [No.16].*

The exchange above suggests that the checklist can be seen as a boundary object that is not a fixed textual form but constitutes social activity, helping communication and cooperation among project participants (Star & Griesemer, 1989). In addition, although it was a stable object and represented commonality of purpose among the

participants, it remained open to interpretations and triggered the idea of a side data gathering that could generate additional publications.

### **7.3.3 Interessement and Enrollment: The Coordination Mechanisms of Artifacts**

In SemOP2, the mailing list, the email, and the checklist played a critical role in coordinating the project, mediating human interaction, and supporting activities. Leaving them out of the picture would make it difficult to explain the performance of the project, and "it would be like trying to account for the flows and patterns of traffic in a big city without mentioning traffic lights, lanes, and signals" (Lanzara & Morner, 2005, p. 89). I argue that these entities embodied some organizational rules and means for coordination. Similarly to what happens in open source projects, not only people but also artifacts can inscribe coordination and management functions that in other projects can be assumed by formal organizational structures (Lanzara & Morner).

The coordination role of the mailing list appears to be linked to the emergent character of SemOP2. Similarly to the previous project, SemOP2 also shared some important characteristics with "knots" (Engeström, 2008). That is, it was a temporal assemblage of people and things enrolled by the coordinators to accomplish a work. It maintained the characteristics of emergence – because it was called into existence for the purpose of the project – and interaction, when people connected to the Internet, opened the mailing list and communicated with each other. When they disconnected, their presence also ended although the project continued. In this respect, the analysis of the mailing list is useful because it reveals not only the actual content, but also the time structure of the conversations. Such time structure shows the temporal gaps in the initial phase of SemOP2. For example, because the coordinators had to commit their time to other professional and personal activities, two months passed between the call for volunteers and the following message posted at the beginning of February by Gnoli in the listserv:

*Non ci siamo dimenticati di voi, ma stiamo preparando la lista aggiornata dei cataloghi da rilevare. [We have not forgotten you, but we are preparing the updated list of the OPACs to be evaluated] [No. 17].*

After two months from the above message, the coordinators gave the go-ahead for the project:

*Poiché è passato qualche tempo da quando avevate dato la vostra disponibilità, vi chiediamo una ulteriore conferma ad oggi ad eseguire i rilevamenti [As some time has passed since you gave us your availability, we ask you to please confirm your participation in the study] [No. 18].*

Although it maintained the characteristics of emergence, SemOP2 also showed some structuring properties. That is, it was an emergent network with some traits in common with strategic communities (McDermott, 2003). These properties are visible

in the above call for volunteers [Quote no. 13]. They are: a) fluid participation but a small and relatively stable group of coordinators; b) evaluators' self-management with respect to the evaluation task; c) decision-making done by the coordinators with respect to the overall project, and d) use of the expertise of library professionals. As a matter of fact, together with a fluid participation of volunteers, there was a stable small group of coordinators who provided a focus of interest and set the project boundaries that regulated the evaluators' contributions. Within those boundaries, the project appears to provide the distributed participants with the opportunity to work on their task freely and independently, without using contractual claims to impose control and ensure that they complete their job in time and at an appropriate level of quality, or complete it at all. When talking about the voluntary and emergence characteristics of SemOP2, Casson, one of the coordinators, said:

*Noi di strutture organizzative non ne avevamo, né di forti, né di deboli. Come avrai visto, siamo proprio tutti sullo stesso piano, anche se c'erano delle persone che erano contrassegnate come coordinatori perché magari siamo noi che abbiamo lanciato l'idea di fare questa rilevazione.*

*[We did not have organizational structures, neither strong nor weak. As you have seen, we all are on the same level, although there were people called coordinators because we launched the idea of this evaluation] [No. 19].*

This project organization based on the interconnectedness of participants, rather than a traditional hierarchical model, makes SemOP2 share some traits of a peer-to-peer production network (Benkler, 2006). Benkler asserted that this kind of networks depends on individual action that is self-selected and decentralized and not hierarchically assigned (p. 62). In SemOP2 there seemed to be a balance of centralization and decentralization. At the beginning of the project, the coordinators allocated to themselves the "authority" to make all decisions regarding recruitment of volunteers, choice of the topic, choice of online work, nature of the task, use of the evaluation checklist, and task completion date. The centralization of decision-making with respect to the project arguably appears to help the project take off in a situation where resources are scarce, without reducing the degree of control on behalf of the other participants. In fact, the work of the evaluators remained largely unscripted, because each of them worked independently and did not have a specific method or other rules to follow when conducting the evaluation. The evaluators chose when, where, and how to carry out the task. They could do as little or as much as they like. They could withdraw at any time (and five did because of personal and professional reasons, such as starting a new job or moving to another city, which changed their time allocation and impeded participation in the project); they could complete the evaluation of all the assigned OPACs, or evaluate only few of them. If they could not finish the job because of their personal circumstances, it was without consequences for themselves. In fact, the coordinators were aware of not being able to exert "force" on the evaluators to have them complete the task. In an email to the other coordinators in November 2007, Gnoli said:

*E' chiaro che non abbiamo le stesse garanzie di continuità che avevamo con gli studenti di Riccardo, che erano obbligati a completare il lavoro.*

*[It is clear that we do not have the same guaranty of continuity that we had with Ridi's students (in SemOP1) who were obliged to complete the job] [No. 20].*

Despite this lack of direct control over their work, the 13 evaluators completed the assigned tasks by the end of June as the coordinators planned.

As in SemOP1, SemOP2 was also unaffiliated and lacked full-time staff. The lack of institutional commitment created opportunities for other part-time volunteers, allowing to use the professional expertise of library professionals and to enable novices to develop expertise.

### **The Use of the Checklist**

As already happened in SemOP1, in this project the use of the checklist implied the observation of OPACs. Therefore, the interaction between the checklist and the evaluators was primarily mediated through the interaction with the checklist and these digital objects. Like in SemOP1, the checklist was meant to structure the work of the evaluators by telling them what to look at. Also similarly to the previous project, doubts about the interpretation of the checklist triggered interaction among the evaluators, instigating a process of clarification and sense-making and focusing attention on certain threads of discussion. The role of the checklist emerges from the following quotes from interviews with three evaluators:

*Mauro: Allora, la prima cosa che ho fatto é stata leggere il libro OPAC Semantici di Gnoli, poi i vari articoli che erano nella bibliografia, non tutti, quelli che ho ritenuto più importanti. Poi ho fatto subito una domanda su cui non avevo capito dei punti della lista di controllo e poi mi sono messo a fare i primi quattro opac. Quando li ho fatti mi sono accorto che non ero certo che fossero giusti e quindi ho chiesto a qualcuno se poteva fare un confronto incrociato, nel senso io controllavo i suoi primi quattro opac, lui controllava i miei primi quattro, e da lì ho visto che alcune cose erano sbagliate, essenzialmente i problemi sulle stringhe e i termini. Da lì ho poi continuato da solo.*

*[The first thing I did was to read Gnoli's book on Semantic OPACs, then the articles in the reference list, not all of them, those I thought were more important. Then, I immediately asked a question because I had not understood some aspects of the checklist and then I started with my first OPACs. When I finished, I realized that I was unsure whether they were right and so I asked someone if they could do a crosschecking, I mean, I would check their (assessment) of their first fours OPACs and they would check my first four. From that (crosschecking), I saw that some things were wrong, basically the problems were with descriptor strings and terms. From there I continued to work on my own] [No. 21].*



*Mario: La condivisione delle informazioni nel progetto] si può anche desumere dalla mailing list, con richieste di chiarimenti, quindi con uno scambio di informazioni più che altro sul modo di operare, sul senso dei vari campi [della lista di controllo]*

*[Information sharing during the project can also be seen in the mailing list through the requests of clarifications, that is, through an exchange of information mainly on the way of proceeding (in the evaluation), on the meaning of the various features of the checklist ] [No. 22].*

In SemOP2, the application of the checklist happened without central planning and control. By lack of central planning and control, I mean that the coordinators were not the “head” of the project, the ones that made things happen. Casson, one of the coordinators, put it this way “*non c’è nessun ruolo al vertice che, diciamo, dà degli ordini o delle direttive forti*” [*there is no role at the top that, let’s say, gives orders or strong directions*][ No. 23].

The coordinators were not at the center of all action and the project did not unfold around them, but rather around the artifacts, namely the OPACs and the checklist. Consequently, the coordinators enjoyed the contribution of the evaluators without exerting control on the ways in which they carried out the evaluation. To a certain extent, it could be argued that the coordinators exercised a form of integrative power (Boulding, 1989), because neither they coerced the evaluators nor promised to reward them monetarily for completing the task. However, following Latour’s (1986) antiessentialist view of power, this integrative power should not be seen as a trait solely possessed by the coordinators. In ANT, power is understood as a verb not as noun and refers to what an actor can do because of its associations. Therefore, it was the number of participants who decided to be involved in SemOP2 who indicated the power the coordinators could exert. The evaluators decided autonomously to participate and contributed to the project in an intentional and deliberate manner. The development of SemOP2 was the result of the convergence of interests of all the actors involved, and the degree of control that the coordinators could exercise over this process was limited, because turning the coordinators’ interests into something agreed upon by all the other actors “entailed metamorphosis and loss of sovereignty” (McMaster et al., 1997, p. 4).

### **The Use of the Mailing List**

As in SemOP1, the coordinators set up a new mailing list using Yahoo!® Groups where the evaluators could interact with them and with each other to communicate, raise doubts, seek clarifications, and ask questions. Unlike SemOP1, where the students had also collocated meetings, in SemOP2 the evaluators never met face to face or synchronously, even virtually. The mailing list was the primary means that all the evaluators used during the project. Thus, SemOP2 took place in an electronic medium that allowed for asynchronous communication, ubiquity, and network-based interactions. The interactive communication of SemOP2 was primarily supported by the Internet. Interaction among participants and OPAC evaluation were internet-based as

they depended on it.

In both SemOP1 and SemOP2, the mailing list was not a construction site where people jointly did some work. In SemOP2, the coordinators divided the work in a systematic way. They assigned groups of different OPACs to each evaluator who worked independently and with little interaction with others. When the evaluators interacted with others, they did it through the mailing list primarily when they encountered problems to understand the checklist features, or a given OPAC was complex and unclear. The mailing list was a crossroad where people discussed problems, exchanged information, and provided solutions. The questions that were asked were usually very specific, technical, and task-related, and no interpersonal interaction occurred. Using the features of the mailing list, the organization of communication stabilized around few relatively persistent threads in order to keep the conversation on track. Messages were archived and provided stability and continuity to otherwise tenuous and transitory relationships. Individual evaluators could access messages, retrieve them, and refer to them at any point during and after the end of the project. The possibility of keeping track of knowledge, ideas and opinions facilitated individual task accomplishment, because it supported sense-making when problems arose during evaluation. The following excerpt is an example of exchange between a doubtful evaluator asking for help while evaluating an OPAC and Gnoli, one of the coordinators:

*Evaluator: Avrei bisogno di delucidazioni sui seguenti campi: +AD: per parola negli equivalenti verbali (0=no, 1=sì)... Mi scuso, ho letto il materiale disponibile ma questo non è per me argomento "quotidiano".*

*Gnoli: Bisogna mettere 1 se l'opac offre una casella per cercare parole degli equivalenti verbali di una classificazione. Ad esempio, se l'opac usa la Dewey, se è possibile trovare la classe della letteratura italiana 850 cercando la parola "letteratura", e non solo cercando il simbolo "850". Se non c'è una funzione del genere, bisogna mettere 0 (...) Hai fatto benissimo a chiedere, questa lista serve apposta...*

*[Evaluator: I need clarifications on the following field {in the checklist}: +AD: per word in the verbal equivalents (0=no, 1=yes)...I apologize, I read the material available, but this is not a topic I am familiar with.*

*Gnoli: You need to enter 1 if the OPAC has a field to search words of the verbal equivalents of a classification. For example, if the Dewey Decimal Classification System is used in the OPAC, if it is possible to find the class 850 related to the Italian literature searching the word "literature", and not only "850". If there is not a feature like this, you need to enter 0... You did the right thing to ask, this is the purpose of this mailing list] [No. 24].*

## **The Use of Private Email**

The coordinators used private emails to make decisions about the setup of the project.

Decision-making was fast, informal, and task-oriented. For example, the coordinators decided about the list of OPACs to be evaluated (a critical task for SemOP2) with seven emails sent over four days. One coordinator, Casson, was in charge of assembling the list and the others could suggest changes. The language of communication was open and participatory, because each coordinator could take an active role in the process and make suggestions if s/he wanted to. The following quote is an excerpt from two emails between the coordinators Casson and Gnoli about the preparation of the set of OPACs to be assigned to the evaluators:

*Gnoli: Va bene, se si fa una versione aggiornata la sostituisco a quella in rete. Non aspetterei oltre oggi per un eventuale parere di Giulia Visintin.*

*Casson: Io oggi vedo la posta solo fino alle 14. Se Giulia si pronuncia dopo quell'ora, dovresti occuparti tu dell'aggiornamento del file. Dando un occhio anche all'eventuale redistribuzione degli opac all'interno dei gruppi.*

*Gnoli: Mh, meglio che lo fai tu, non ho seguito bene la suddivisione e non vorrei fare pasticci. Piuttosto aspettiamo pure un giorno in più.*

*Casson: Si potrebbe mettere sul sito un modello di file excel con la griglia di valutazione e poi ognuno se lo scarica e se lo riempie con gli opac che gli spettano, no?*

*Gnoli: Okay, lo preparerò.*

*[Gnoli: OK, if we create an updated version {of the file with the list of OPACs}, I will replace the old list with the new list on the project web site. I will not wait later than today for Giulia's comment.*

*Casson: Today I will check my email until 14:00. If Giulia sends a comment after that time, you need to take care of updating the file and check how the OPACs are distributed within the groups.*

*Gnoli: Uhm, it is better if you do it, I haven't followed the division into groups carefully and I don't want to make a mess. Better to wait another day.*

*Casson: We could upload an excel file with the checklist and then each evaluator download it and fill it in with the data about his/her assigned OPACs, couldn't we?*

*Gnoli: OK, I'll do that] [No. 25].*

The above messages showed no trace of lengthy discussions or disagreements, and decisions were made rapidly. This efficient process of decision-making may be explained in terms of transactive knowledge, which is knowledge retained by a person about what other group members know (Wegner, 1986). Simply put, transactive knowledge includes knowledge of who knows what. For example, Casson had the re-

sponsibility to assemble the list of OPACs and share it with the other coordinators. So did she. Thus, the other coordinators associated that task with her – as it emerges from the above quotes – whom they appear to consider as the right person for the job, and by doing so they reduced their own responsibility.

The entire process took place at distance and email was the only communication medium used. Occasionally, the telephone was used when the coordinators needed primarily to talk about other things (they reported that the project was never the reason for calling in the first place).

## **7.4 Conclusion of Collaboration: The Role of Project Inscriptions to Sustain the Project**

This chapter described the strategies used by the actors to enroll allies and resources to initiate, develop, and complete SemOP2. The project inscriptions produced in SemOP1 (e.g., evaluation checklist, evaluation findings, and publications) allowed the establishment of new relations with other library and information professionals around the topic of OPACs evaluation, because they were mobile, immutable and combinable (Latour, 1987). As said in section 5.4, these inscriptions have become a delegate speaking on behalf of SemOP1 and SemOP2, and may contribute to the goal of the project of bringing change in online library catalogues, giving rise to an iterative circle in OPACs' design and management. This performative role of the project inscriptions becomes especially important, because the coordinators feel no longer sure about their active involvement in possible future projects on subject indexing and OPACs. Other commitments may prevent them from taking the role again or new interests can prevail. Asked whether there would be a SemOP3, Gnoli said:

*Se qualcuno fosse interessato (a continuare il progetto) ci fa piacere e lo incoraggiamo, ma noi (coordinatori) abbiamo anche tante altre cose da fare. Era proprio l'idea del progetto dare questi riferimenti (bibliografici), questa lista di controllo che poi idealmente ogni gruppo di biblioteche potrebbe applicare da solo.*

*[If someone is interested (in repeating the project) we are glad and we encourage him/her; but we (coordinators) have also other things to do. It was the idea of the project to make available this list of references and this checklist that every group of libraries could apply by themselves] [No. 26].*

Therefore, all Italian library and information professionals interested in evaluating subject access in their OPACs, and who share the ideas behind SemOP2, can be enrolled either to start a new project or to carry out new evaluations autonomously. The presentation of SemOP2 results given by the coordinators at two conferences<sup>42</sup> aimed

---

<sup>42</sup> The results were presented at the National Conference of the Italian Library Association held in Florence in October 2008, and at International Association of Library Association (IFLA) 2009 Satellite Meetings in Florence.

at generating awareness of the work done in the project, and stimulating Italian library and information professionals to embrace the opportunity to improve their catalogues.

However, the role of the inscriptions in the continuation of the project is hindered by the difficulties that these professionals often encounter in their workplaces to enact the practice encouraged by SemOP2. As Tuomi (2001) reminded, “social practices are interlinked in the ecology of communities” (p. 217). Social practices are unlikely to change without breaking the translation processes that impede an element of innovation – in this case SemOP2 – to become a resource of change for other actors. As a library professional explained in SemOP1, even though librarians decided to improve their OPACs and do subject indexing, they would be unlikely to market their efforts and demonstrate the impact of this activity to leaders of city councils and local politicians responsible for library policies<sup>43</sup>. One SemOP2 evaluator working as a library professional for a university expressed the same opinion in the mailing list:

*Ritengo - in base anche alla mia esperienza quotidiana di catalogazione bibliografica - che l'impegno profuso nella soggettazione e nella classificazione sia scarsamente considerato, valutato sia dai direttori di biblioteca sia dai dirigenti dei sistemi bibliotecari che, posseduti da un "furor" digitale, vivono nella convinzione che la "digital library" sia la panacea di tutti i mali - come se la creazione di metadati per il recupero dei microdocumenti in formato elettronico non rappresenti un'operazione fondamentale anche in un contesto non analogico. Questa svalutazione non esplicitamente dichiarata ma percepibile condiziona negativamente la qualità "semantica" del catalogo.*

*[Based on my daily experience of cataloguing, I think that the effort spent in subject indexing and classification is undervalued by both library directors and managers of centers of services for libraries, who are taken in by the digital “craze” and are persuaded that the “digital library” is the panacea – as if creating metadata to retrieve electronic documents were not essential in a digital environment as well. This undervaluation not explicitly stated but perceivable affects negatively the “semantic” quality of catalogues] [No. 27].*

These comments point to the difficulty that Italian library and information professionals can encounter to enhance subject indexing and subject access in OPACs

---

<sup>43</sup> It could be objected that most publishers provide index terms with the materials they sell. For example, OCLC provides index terms, and it could be just a matter of integrating the digital record provided by the publisher/publishing vendor into the OPAC. Gnoli admitted that this is a possibility which might be used as a possible improvement strategy. However, he added, neither do libraries have the same classification systems and subject headings, nor users have the same needs concerning subject access. The list of subject headings in Italian libraries is the *de facto* standard in Italy, and it is used neither by OCLC, nor by other foreign publishers. Neither is used facet analysis that the Italian SIG recommends. Closer to international standards is the Dewey Decimal Classification, but even in this case there are differences in the national editions and usages and verbal equivalents must be translated.

interfaces, enacting the practices encouraged by SemOP2. Change is difficult because of the tendency to maintain deep-seated practices (e.g., using descriptive cataloguing as International Standard Bibliographic Description (ISBD)). Furthermore, the proper use of subject indexing is time consuming and expensive, and it is in contradiction with the work demands placed on most library professionals, especially small and one-person librarians, who are expected to attend to day-to-day activities, provide services, and keep information resources available in spite of financial constraints.

## **8 The Sociotechnical Influence of Events, Actors and Networks in SemOP2**

This chapter describes the findings resulting from conducting ESA on a temporal list of events based on the long narrative in the previous chapter. First is a description of the list of events entered in Ethno and a chart of the linkages between events in the collaborative process. Second, a full analysis of all the causal relationships between events is presented. In so doing, I also compare the findings to previously reported research, while highlighting new and relevant results.

### **8.1 ESA: SemOP2 List of Events and the Ethno Diagram**

Table 8-1 provides the list of 25 events occurred in each process of translation and stage of research collaboration in SemOP2. For each event, influential sociotechnical aspects of work that are discussed in the rest of the chapter are identified. To link causally all events, I responded to 111 questions – of which half counterfactual<sup>44</sup> and half implication questions – asked by Ethno. The results of the Ethno analysis are shown in the diagram in Figure 8-1.

---

<sup>44</sup> See section 4.4.4. about the use of the counterfactual logic.

**Table 8-1** List of events in SemOP2

STAGES OF RESEARCH COLLABORATION	EVENTS	TRANSLATION PROCESSES	SOCIOTECHNICAL ASPECTS OF WORK
Foundation	The coordinators want to repeat the evaluation of the same set of OPACs evaluated in SemOP1	Problematization	Incentives, rewards, and voluntary participation
Foundation	The coordinators want to compare the findings of the two evaluations	Obligatory Point of Passage	Nature of work
Foundation	The coordinators apply the same checklist of features as in SemOP1	Obligatory Point of Passage	Previous project inscriptions
Foundation	The coordinators lack financial and human resources for conducting the evaluation	Problematization	Lack of resources and institutional commitment
Formulation	The coordinators seek volunteers through multiple mailing lists for library and information professionals	Problematization Interessement	Lack of resources and institutional commitment – Opportunity for external expertise – Incentives, rewards, and voluntary participation
Formulation	Several volunteers from across the country respond to the call	Interessement Enrollment	Incentives, rewards, and voluntary participation
Formulation	The coordinators enroll 18 volunteers	Enrollment	Opportunity for external expertise – Incentives, rewards, and voluntary participation
Sustainment	A coordinator sets up a web-based mailing list for communication	Enrollment	Nature of work – Remote collaboration
Sustainment	A coordinator points the evaluators to the documentation produced during SemOP1 and published on the project web site	Enrollment	Previous project inscriptions



STAGES OF RESEARCH COLLABORATION	EVENTS	TRANSLATION PROCESSES	SOCIOTECHNICAL ASPECTS OF WORK
Sustainment	Remote evaluators cannot meet	Enrollment	Nature of work – Remote collaboration
Sustainment	Remote evaluators interact with each other primarily through the mailing list during the project	Enrollment	Nature of work – Remote collaboration
Sustainment	All the evaluators must use the checklist for the evaluation	Obligatory Point of Passage	Nature of work – Previous project inscriptions
Sustainment	The coordinators agree to the sample via email	Enrollment	Previous ties
Sustainment	Each evaluator receives a set of OPACs	Enrollment	Nature of work
Sustainment	Each evaluator works independently on assigned set of OPACs, either from home or from the office	Enrollment	Nature of work – Remote collaboration
Sustainment	The checklist creates difficulties	Enrollment	Nature of work
Sustainment	Five evaluators ask questions in the mailing list actively	Enrollment	Remote collaboration
Sustainment	The coordinators always respond	Enrollment	Remote collaboration
Sustainment	The evaluators complete the task	Enrollment	Nature of work – Remote collaboration
Sustainment	The coordinators analyze the data	Enrollment	Nature of work
Conclusion	The coordinators present SemOP2 at a national library conference	Mobilization	Incentives, rewards, and voluntary participation
Conclusion	The coordinators publish all project materials on the project web site	Mobilization	Lack of institutional intellectual property – Incentives, rewards, and voluntary participation

STAGES OF RESEARCH COLLABORATION	EVENTS	TRANSLATION PROCESSES	SOCIOTECHNICAL ASPECTS OF WORK
Conclusion	A coordinator intends to co-write a paper on the findings of the two evaluations	Mobilization	Lack of institutional intellectual property – Incentives, rewards, and voluntary participation
Conclusion	The project inscriptions aim to increase the visibility of the project	Mobilization	Lack of institutional intellectual property
Conclusion	The project inscriptions make the project open to new evaluations	Mobilization	Lack of institutional intellectual property

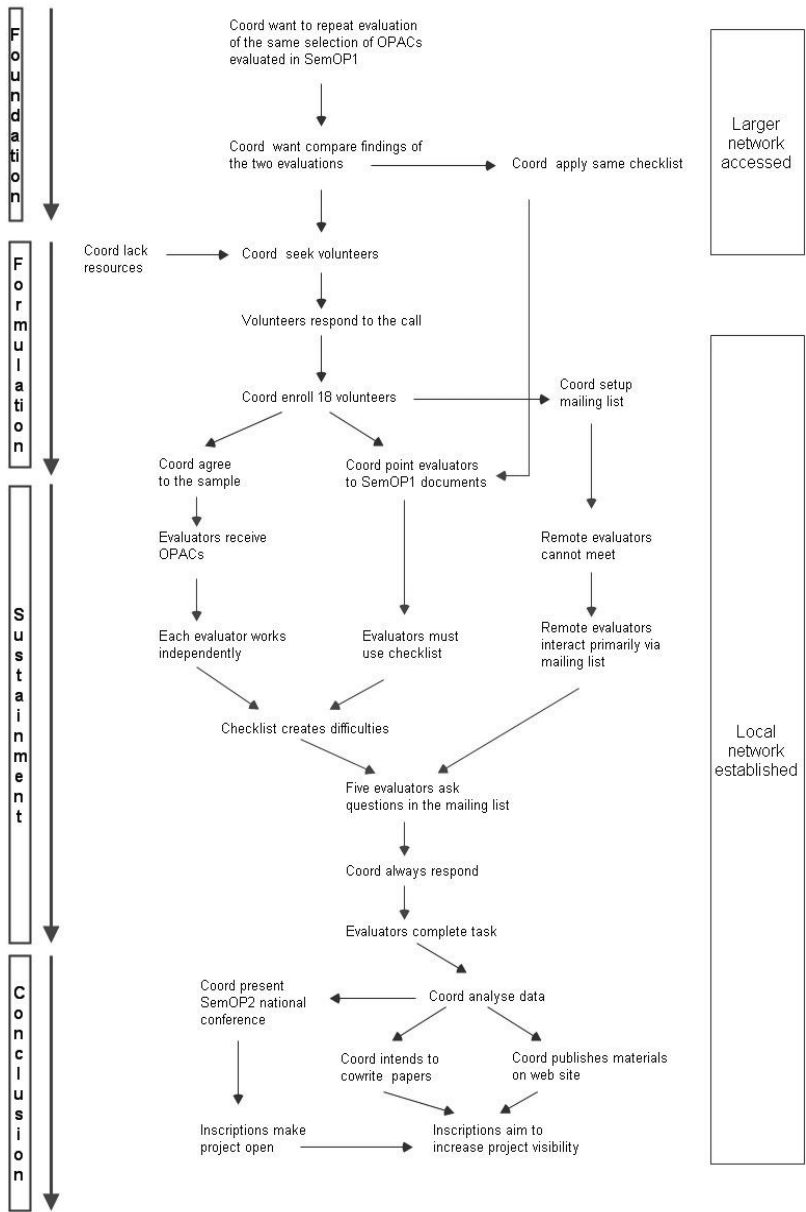


Figure 8-1 Ethno diagram of SemOP2

## **8.2 Project Institutionalization: The Difficult Relationships between Local and Larger Networks**

The initiation and sustainment of SemOP2 arose from a group of coordinators, two of which had already played this role in SemOP1. With regard to lack of resources and institutional commitment, and lack of intellectual property, there are not substantial differences from the previous project. In this respect, the findings of this case study are similar to those in SemOP1. Thus, I refer to section 6.2 for the discussion of the influence of these sociotechnical aspects.

## **8.3 Common Ground: The Role of Previous Ties in the Creation of SemOP2**

The diagram shows that the event [Coord enrol 18 volunteers] diverges into two strands: one is [Coord agree to the sample – Each evaluator works independently], and the other is [Coord point evaluators to SemOP1 documents – Evaluators must use the checklist]. The two short chains of online activities differ because the former represents the activity of the coordinators to organize the project, and the latter represents the communication between the coordinators and the evaluators at the start of the project. Although not evident from the event structure itself, the shortness of the two strands connote the rapidity and the lack of lengthy discussion among the coordinators in making decisions to setup the project. Although physical proximity plays usually a crucial role in facilitating transactive knowledge, in this case mutual trust and shared history of collaboration seem to have sustained the coordinators' efficient decision-making process, and to have overcome the limitations of email communication (Nardi & Whittaker, 2002). In fact, people who have already worked together know better what to expect from each other and have established personal compatibility that is crucial to sustain shared projects (Hara et al., 2003).

Haythornthwaite et al. (2006) provided further insights to understand why the SemOP2 coordinators did not need to spend much time and efforts creating common understanding. They shed light on the difference between experts and novices in the ways they communicate and collaborate. Addressing this aspect can help respond to questions such as: Why did they talk so little? Why was there no discussion, no need for explications, and no request for clarifications? Let us examine this part. SemOP2 was an intradisciplinary project, and the embedded knowledge of the subject (classification and subject indexing) formed an important bond. The coordinators shared disciplinary knowledge and the previous experience of SemOP1 (besides other collaborative experiences), and thus they appear to achieve a joint understanding about the things to be done, including data collection, analysis technique, and publishing practices. The short time taken to arrange things seems to have two implications: one is that

the coordinators spoke the same language, and already knew how to break down tasks; the other is that the project was not complex and the project management tasks were simple so that the coordinators could move along quickly and easily.

## 8.4 Nature of Work and Remote Collaboration in the Local Network

Given that project participants were distributed and arranging face-to-face meetings was difficult, the mailing list made it possible to communicate, raise doubts, seek clarifications, ask questions, and read what other people were doing [Coord setup mailing list – Remote evaluators interact primarily via mailing list]. The use of ICT was crucial because dependence on physical proximity would have hindered the possibility of initiating the project at all, because all the participants were distributed.

However, the use of the mailing list as a medium of, and a space for, communication and interaction was not without its downside. Like in the previous project, in SemOP2 the perceived lack of clarity of the checklist triggered interaction. However, while in the previous project collocated work was critical to understand the checklist, in SemOP2 the mailing list, being a medium that does not support synchronous communication and simultaneity, did not support grounding as well as real-time conversations could have done (Kraut et al., 2002). All the evaluators said that a collocated meeting would have helped disentangle emerging issues and explore concepts. Furthermore, since most of the project participants had never met and did not know each other, a collocated meeting at the start of the project would have also helped to “break the ice”, be acquainted, establish personal relationships, and develop trust. In the words of an experienced participant:

*Si, effettivamente un incontro in presenza ci sarebbe voluto. Sì, mi avrebbe fatto piacere. E probabilmente sarebbe servito anche... Allora, a superare per qualcuno la paura, a superare per qualcun altro la freddezza. Forse avrebbe permesso di condividere di più proprio i punti oscuri. Se si fosse fatto un incontro, magari preliminare, con la spiegazione di che cosa si chiedeva esattamente, anche di una giornata, non lo so, di mezza giornata, forse, ecco, forse, non sarebbe stata una brutta cosa.*

*[Yes, indeed, a face-to-face meeting would have been necessary. Yes, I would have liked it. Probably, it would have been useful... for someone to win their fear, for someone else to overcome the coldness. Maybe, it would have allowed to share more obscure points. Had we had a meeting, maybe an initial one, to explain what we were required to do precisely, a one day meeting, or half a day, well, maybe, it would have been good][No. 28].*

The literature also recommends that virtual groups have a face-to face meeting before engaging in distributed work (for example, Zheng et al., 2002). Without knowing each other, the asynchronicity of the mailing list made it difficult for some evaluators to “take risks”, share ideas, and resolve differences because the delays disrupted the conversation. Furthermore, not all the evaluators shared the same level of collaboration technology readiness (Olson & Olson, 2000). An evaluator explained:

*Io penso che non c'è tanto l'abitudine ancora a lavorare con questo tipo di strumenti {tecnologici}, almeno nel mio ambito professionale. Questo, secondo me, è un po' negativo perchè in un lavoro come questo, dove è fondamentale avere un contatto telematico, invece bisognerebbe proprio cercare di sfruttare al massimo la lista. Quindi, secondo me, la lista poteva essere usata anche di più.*

*[I think that there is not yet the habit to work with this kind of technological tools, at least in my professional environment. I think this is negative because in this kind of work, where it is critical to interact via computer, we should try to make full use of the mailing list. Therefore, I think that the mailing list could have been used more] [No. 29].*

The evaluators with previous experience of participation in mailing lists and virtual work felt more comfortable with the use of the medium (see Appendix 3 for further details on the composition of SemOP2 interview participants in this study). However, despite these intrinsic limitations, the mailing list allowed useful information sharing and practical support, although not efficient like the one that participants could have had in collocated meetings.

#### **8.4.1 Participation in the Mailing List**

The connection [Five evaluators seek help in the mailing list actively – Coord respond] displays that five out of thirteen evaluators posted requests for clarifications and/or questions actively. These five evaluators (four experienced and one novice) posted 49 messages out of the 129 posted until the end of evaluation<sup>45</sup> – on average nine messages per person. The coordinators posted 48 of the remaining 80 messages to respond to requests and share information – on average 12 messages per person. The other eight evaluators rarely participated

---

<sup>45</sup> The total number of messages posted in the mailing list is 153, from December 4, 2007 to August 24, 2009. The evaluation took place between April 10<sup>th</sup> (date in which the set of OPACs was made available on the project web site) and July 2<sup>nd</sup>, 2008 (date in which the evaluation was concluded). Therefore, the evaluators and the coordinators posted messages related to their task during that time. After July 2<sup>nd</sup>, 2008, the messages posted concerned primarily the events (e.g., national library conference, IFLA) at which the coordinators presented the project and the findings.

– the average number of posts per individual was about four during April 10 and July 2, 2008, which was the period in which the evaluation occurred – and preferred to remain at the periphery and read the responses of the coordinators and what the other active contributors wrote. Although it was valid for individual evaluators to interact at different levels, depending on their learning needs and personal circumstances, the wider group appreciated others’ active participation, which brought value to all the evaluators and supported their work. As one experienced evaluator clearly expressed:

*...mi è servito moltissimo che gli altri anche abbiano fatto domande perché poi a volte i dubbi potevano essere gli stessi.*

*[I found it very useful that the others asked questions, because sometimes doubts could be the same] [No. 30].*

Some evaluators noticed that the answers came mostly from the coordinators. The analysis of the 128 messages posted during the time of the evaluation shows that the posts on 17 topics concerning the evaluation task consisted of question-reply exchanges between the evaluator seeking help and one or two coordinator(s). Only in relation to three topics there were also contributions from the other active evaluators. One novice evaluator, who was the only student in the group, was among the active posters, because he sought help repeatedly when he needed, but he did not feel able to respond:

*tutti gli altri interventi li ho letti, ho guardato l’OPAC, ho visto qual era il dubbio, senza rispondere perché non mi sentivo in grado di rispondere, però guardavo la domanda, provavo a dare una risposta, poi vedevo quando rispondevano Gnoli e gli altri se era corretta o meno.*

*[I read all the other messages, I looked at the OPACs, I saw what the doubt was about, without responding because I didn’t feel I could respond, but I looked at the question, I tried to give an answer, then I saw if it was correct or not when Gnoli and the others responded] [No. 31].*

Perhaps inadvertently, the discussion appears to become coordinator-led, although this might not have been a conscious intention of the coordinators, who setup the mailing list in order to enhance cooperation through dialogue, and not to foster a sort of ask-the-expert model.

At times, the low level of participation appears to have frustrated the evaluators. One active poster defined participation “tepid”:

*Sì, tiepidina, nel senso che secondo me hanno partecipato attivamente solo pochissimi. Forse mi ricordo addirittura i nomi, se ci penso, perché credo di aver visto la partecipazione attiva di quattro persone, a parte, voglio dire, i coordinatori.*

*[Yes, tepid, because I think that very few contributed actively. Maybe I recall even the names of these few contributors, because I think I have seen the active participation of four people, besides the coordinators] [No. 32].*

Another evaluator noted that Italian library professionals are not used to working in online spaces:

*Io sono abituata a lavorare in altre liste di discussione per progetti professionali, di altro tipo, però simili, e devo dire che in questi casi si lavora tutti in lista, si condivide proprio tutto ed è un vero e proprio dibattito, ecco. In questo caso, probabilmente, ci sono persone che non sono abituate a lavorare in lista per cui ho notato un po' troppo individualismo nel lavoro, perchè immagino che tanti, che magari stanno lavorando per conto loro a casa avranno dei dubbi, avranno trovato qualche "oh guarda che carina questa cosa, sarebbe bello da segnalare" però non l'hanno fatto. Io penso che non c'è tanto l'abitudine ancora a lavorare con questo tipo di strumenti, almeno nel mio ambito professionale.*

*[I am used to working in other mailing lists for professional projects of other kind but similar. I must say that in these cases we all work in the list, we share everything, and there is a real discussion. Here, probably, there are people who are not used to working in a mailing list, so I have noticed a bit too much of individualism in the work. I think that many, who perhaps are working on their own from home, have doubts, have found some "oh, look at how nice this thing is, it would be nice to share it". But they didn't do it. I think that there is not yet this habit to work with this kind of tools, at least in my professional environment] [No. 33].*

Despite few people doing the bulk of active contributions, thoughtful comments and good questions appear to have benefited the wider group. As another novice evaluator who posted three messages put it clearly:

*Mi pento di non averla usata di più, come dicevo avevo questa resistenza, però adesso la trovo molto efficace perchè è collaborativa e nello stesso tempo ti consente di chiarire aspetti che probabilmente, se tu avessi un manuale o qualcosa del genere, non c'è questa forma interattiva che ti consente di ribattere eventualmente a qualcosa che tu leggi, no?*

*[I regret not having used (the mailing list) more, as I said, I had this resistance, but now I think it is very effective because it is collaborative and, at the same time, it allows you to clarify aspects that probably, if you had a handbook or something like that, (you couldn't do) because there isn't this interaction that allows you to respond to something you read, is it?] [No. 34].*

Posts provided novice evaluators without much knowledge of subject indexing with effective means for fostering thinking and understanding, although



they acted as peripheral members in the mailing list. Being a peripheral member does not mean to be passive (McDermott, 2003; Wenger, McDermott, & Snyder, 2002). McDermott's work (2003, p. 31) helps explain the dynamic of participation in the SemOP2 mailing list. He pointed out that most community members rarely participate. They remain on the periphery, watching the interaction of the core and active members. However, they are not as passive as they seem. They draw their own insights from the discussion, for example by having private conversations about the issues being discussed in the public medium – which is what the novice evaluator who did not use much the mailing list (quote no. 34) did with another evaluator who was an office colleague.

In SemOP2, less active posters had multiple reasons for using seldom the mailing list. For example, one evaluator felt he had nothing valuable to say; another one feared that interacting with others while doing the work would have made the evaluation complicated, should different interpretations and perspectives have arisen. Another participant thought it was unnecessary to contribute and was a free rider on the beneficial actions of others. Another one started her work late, benefited from the contributions posted until that moment, and did not feel she had something else to add. One participant said that she was reluctant to use mailing lists in general, and two seemed to think either that the lack of personal relationships made it difficult to share ideas and brainstorm freely, or that the lack of anonymity discouraged people from contributing for fear of judgment. These findings are consistent with some of the reasons for not posting identified by Preece, Nonnecke, and Andrews (2004) in their analysis of 1,188 responses from posters and lurkers from 375 MSN bulletin board communities. The authors found that there are many reasons for which people do not contribute or contribute little, and that in many successful communities the contributions of a small core of active participants benefits the wider group.

## **8.5 Incentives, Rewards, and Voluntary Participation**

The connection [Coord lack resources – Coord seek volunteers] shows that SemOP2 relied on willed voluntary participation because of the lack of financial resources. SemOP2 drew people with different educational and professional background, level of expertise in subject indexing and online catalogues, and professional interests. Similarly to what happened with other professional volunteers in SemOP1, participants were mainly driven by their own values and interests. They took the opportunity to learn more about subject indexing, to gain experience in a subject they did not normally work with, or which they intended to work with in the near future, to network with other people, to broaden their horizons, and to gain credentials to be used in public competitions in the public sector. They embraced the possibility to develop

abilities that seem to be stifled in their workplaces. Indeed, the evaluators working at university libraries often reported they were frustrated by their bureaucratic workplaces that offered limited career advancement (and do not reward merit but seniority), stifled initiatives, and provided few opportunities for interesting and challenging work. This dispiriting situation is another aspect of the lack of institutional commitment described in Chapter 6. One participant so described it:

*Quando ho deciso di partecipare era un momento in cui veramente avevo una grossa rottura all'interno, una grossa frattura, diciamo così, per alcuni progetti che stavamo portando avanti nell'ambito della mia Università e mi sono proprio detta: beh, la mia Università non merita niente, meglio partecipare a progetti esterni che almeno si fanno cose interessanti. Senza nessuna aspettativa di particolari cose, ma per imparare proprio delle cose nuove, per ampliare un pochino le conoscenze, per vedere degli ambiti e soprattutto per frequentare degli ambienti che non fossero questa ristrettezza mentale dei nostri atenei, perché non credo di essere l'unica in questa situazione (risata).*

*[When I decided to participate, it was a time when I had a big conflict, a big friction, so to speak, because of some projects that we were carrying out at the university, and I told myself "well, my university does not deserve anything, better to wait for external projects. At least I do interesting things". I had no particular expectations, but to learn new things, to broaden my network a bit, to broaden horizons and, most of all, to visit environments that are not like this narrow mindedness of our universities. I do not think I am the only one in this situation (laughs)] [No. 35].*

Another one laughed when asked if her employer, a university library, would acknowledge her effort of writing an article on the project:

*Le posso dire che nella realtà in cui mi trovo adesso, il mio datore di lavoro non se ne accorgerebbe proprio. Se io scrivo o non scrivo qualcosa (risata). Assolutamente no, mai e poi mai. Ci sono sicuramente bibliotecari più sensibili che sono legati al gruppo SBN a cui potrei dire "guarda, sai che ho collaborato e ho scritto questo?" Ma mi si direbbe, che bello, sei brava, ma queste persone, anche volendo, non avrebbero la possibilità di fare qualcosa di ufficiale nei miei confronti.*

*[I can tell you that in the workplace where I am now, my employer would not even notice it. If I write something or not (laughs). Absolutely not, never never. There surely are some responsive librarians who are linked to the SBN (the Italian Library National service) and to whom I could say "Look, I was involved in a collaborative project and I wrote this". They would tell me how nice it is, how good I am. But these people, even if they wish, could not take any formal initiative to support me] [No. 36].*

To make things worse, budget cuts trim down training expenditures and may force library professionals to use their own leave time and money to attend seminars and training courses, because libraries no longer pay for external training. In this scenario, projects like SemOP2 provide welcome opportunities for informal learning taking place outside traditional educational settings. However, the majority of participants affirmed that they did not expect recognition from their employers for taking responsibility of their learning and professional development. The fact that none of the interviewed participants informed employers about their participation in the project is linked to this lack of expectations. The reason for not informing was twofold: one was the volunteer character of participation; the other was the perception that university libraries – which were the majority of participants' employers – do not value these types of projects and thus they do not show appreciation. For example, one evaluator reported that projects like SemOP are interesting for individual library and information professionals and not for university administrators:

*Nella mia Università in generale è visto abbastanza male il partecipare proprio a cose che non riguardano strettamente l'Università e che poi però alla fine danno visibilità.*

*[My university generally does not see favorably participation in projects that are not strictly relevant for them, even though these projects create visibility eventually][No. 37].*

Another evaluator explained why he did not inform his employer:

*Se devo essere sincera, io penso che questi progetti sono encomiabili, però sono volontari e quindi, secondo me, dal punto di vista delle istituzioni non c'è poi un grande interesse rispetto a queste attività. Può esserci magari un interesse individuale, ma sicuramente non a livello di istituzione, ecco.*

*[To be honest, I think that these projects deserve praise but are voluntary and so, I think, institutions are not that interested in this type of work. There can be an individual interest, but definitely not at the institutional level] [No. 38].*

The quotes above seem to imply that institutions and individual professionals approach problems with different assumptions and goals. Although participation in projects like SemOP2 can benefit library services, university libraries are most likely to disregard or leave them out of consideration, because, as one evaluator said, this kind of project does not have a significant return for them. Whereas SemOP2 individual participants had a stake in seeing improved subject access in web-based OPACs, they reported that their institutions have no interest. Only two participants believed that their employers would have been interested in the project, although they had not informed them anyway. One of these employers is an interuniversity consortium, in which li-

brary automation is an area of interest and which supports the web site of the Italian Library Association for free.

Similar to SemOP1 despite the predominance of intrinsic motivations, different forms of extrinsic motivations played a role as well (see Table 8-2 for a summary of individual motivations in the two projects). Motivations were labelled as extrinsic or intrinsic. According to Ryan and Deci's (2000) definitions, extrinsic motivations are external to the activity itself and consequences are separable from the activity, whereas intrinsic motivations are inherent to the activity itself and consequences are not separable from the activity. Participants wanted to hone skills to be applied in a future job, to add skills and experience to their CVs, to demonstrate to a future employer the willingness to dedicate themselves to projects aside of their daily work, and to obtain a credential for public competitions to land jobs in the public sector. In this respect, it was useful for them to be acknowledged by the coordinators when they presented the results of the project to conferences and in papers. Furthermore, two evaluators benefited from participating in SemOP2 and drew upon the experience of the project to publish their own papers on other, although related, topics.

**Table 8-2** Motivations of individual participants in SemOP1 and SemOP2

INTRINSIC MOTIVATIONS	EXTRINSIC MOTIVATIONS	EXAMPLE	PROJECT
	Need for the topic	Participating in order to help improve OPACs, or to conduct better evaluation studies	SemOP1 SemOP2
	Networking	Participating in order to network with like-minded colleagues and broadening horizons	SemOP2
Enjoyment		Participating because one enjoys it	SemOP2
Goodwill		Participating to promote specific ideas, such as giving something back, helping each other out.	SemOP1 SemOP2

INTRINSIC MOTIVATIONS	EXTRINSIC MOTIVATIONS	EXAMPLE	PROJECT
	Learning	Participating to gain professional skills and experience, with the hope that these skills can be used on the job or can lead to a better one.	SemOP1 SemOP2
	Gain credentials	Participating to gain credentials to be used in public competitions in the public sector	SemOP2
	Mode of work	Gaining experience in working online to be used in future projects	SemOP2

What matters here is the realization that members of the community of Italian library and information professionals are willing to perform activities not for money but for generosity, fun, interest, social relations, and, ultimately, instrumental value, which they can obtain only when they perform such activities through social interactions.

## 8.6 Self-Organization and Coordination Mechanisms

SemOP2 was an autonomous and voluntary project emerging from the actions of a small group of individuals with a shared interest for a period. As described in section 7.3.3, the characteristic of emergence implies that although there were predefined goals, which the evaluators agreed upon when they decided to participate, and the project showed some structuring properties, much of the organization emerged from the actions of participants as a response to the practical necessities of the situation at that time. As discussed in section 6.2.4, this lack of a relatively flat organizational structure can be associated to the small size of the project, its relatively homogeneous culture, its relatively low complexity of project tasks, and participants' compatible expectations (Walsh & Maloney, 2007), but it also appears to be tied to the lack of institutional commitment and external funding. This absence was not considered as a downside by all participants. For example, one evaluator argued strongly that the inclu-

sion of institutional support might have undermined the strength of the project, which lay in its spontaneity and the will of each participant to contribute. In her own words:

*Il punto di forza di questi gruppi di lavoro {volontari} è una volontà comune di approfondimento, di interesse. La sfida secondo me è quando si cerca invece di strutturare questa volontà, che è molto spontaneo. Io non so se mi sono spiegata bene, però la forza di questo progetto è un po' la spontaneità e la volontà di ciascun collaboratore di partecipare al progetto senza che ci siano delle strutture diciamo organizzative molto forti. Se viene meno questa spontaneità temo che le cose purtroppo possano cambiare, nel senso che non ci siano più le condizioni per lavorare.*

*[The strength of these {voluntary} working groups is a shared desire of examining thoroughly {a topic} of interest. The challenge, in my opinion, is trying to structure this shared desire which is very spontaneous. I do not know if I explain myself well, but the strength of this project is the spontaneity and the desire of each evaluator to participate in the project without a strong organizational structure. If we take away this spontaneity, I am afraid that things might change, in the sense that the conditions for doing the work might no longer exist.][No. 39].*

The LIS professor corroborated this comment and said that in universities the allocation of funding to a certain group for a certain purpose would lead to the setup of a more team-based organizational structure, with assigned roles and responsibilities and procedures for making decisions, managing activities, and reporting. Because the effort to apply for grants would not provide significant quantitative benefits, he questioned the worthiness of setting up an organizational structure – once funding is awarded – whose management costs would be equivalent to the amount of the grant. He also pointed out that applying for grants would have two main implications. One is that grant programs may trigger a mechanism for which people could be more interested in having money than in the topic, because these programs have usually specific objectives and agenda settings, and thus they tend to support certain topics and discourage others. Therefore, in his perception, a funded project would tend to lose its character of emergence to become an arrangement where activities need to be more regulated, and tasks need to be performed through a predefined division of labor. This comment seems to reflect the pragmatic attitude of researchers, as Melin (2000) noted. He said that when researchers talk about reasons for and effects of collaboration, they tend to focus on their individual level and act very pragmatic.

The other implication mentioned by the LIS professor is that people who are interested in the topic may not benefit from the grant, because paid participation in a funded project might be incompatible with their job as library

professionals in the public sector. In fact, Italian public sector employees who want to undertake work with external bodies must be authorized by their employers. This bureaucratic complication can discourage some people from asking. Besides, authorization can be denied. According to Ridi, the risk is that of having to exclude enthusiast and competent people – unless they are willing to volunteer – and include disinterested, or incompetent, people.

Ridi's comment resonates with that of an interviewee in Melin's (2000) study of individual reasons for participating in research collaboration. In his study, an interviewed researcher said that "ideas should chase money, not the reverse" (p. 37), and that the funding agencies should not setup projects and ask researchers to join in, because when they do so they find people who need the job but not those who are truly passionate about the topic.

These considerations about the ways in which actors may respond in case of a funded project lead to make the claim that without external control mechanisms and extrinsic incentives, intrinsic motivations play a role in focusing "attention" of participants on the goal of the project. This claim resonates with results from empirical work on human motivation, which shows that, under some circumstances, small payments would have negative – or negligible – effects on participation in work that was otherwise volunteer-based (Benkler, 2006, p. 94). Interest and engagement of a small group of individuals who share the same common concerns appear to be what draws attention on the goal of a project and the task to be accomplished. Therefore, when good will and gift culture prevail, like in SemOP2, external controls and extrinsic rewards seem to be unnecessary to manage the "tensions" between individual self-interest and willingness to contribute to a collaborative endeavor. Casson, one of the coordinators, emphasized this aspect:

*Secondo me il fatto di lavorare su base volontaria è la forza, il fatto che ti senti parte di un progetto, sia da una parte {coordinatori} che dall'altra {rilevatori}. Non ti senti neanche diciamo in minoranza perché comunque si è tutti lì, volontari.*

*[I think that working on a volunteer basis is the strength, the fact that you feel to be part of a project both as a coordinator and as an evaluator. You do not feel being a minority, so to speak, because we are all volunteers in the project] [No. 40].*

## **8.7 Summary**

This chapter detailed the sociotechnical aspects of work that characterized the actors' local work environment and influenced the process of construction of SemOP2. The findings of ESA suggest three claims. First, similarly to SemOP1, SemOP2 also relied on willed voluntary participation of library and

information professionals because of the lack of financial resources. Scarcity of resources drove the coordinators to enroll evaluators who were mainly motivated by their values and interests because financial rewards and employers' recognition were limited. Second, the lack of institutional commitment and external funding appears to be tied to the lack of a formal organizational structure of the project. Indeed, organization emerged from the actions of participants as a response to the practical necessities of the project when they arose. Third, without external control mechanisms and extrinsic incentives, intrinsic motivations played a role in focusing "attention" of participants on the goal of the project. Individual motives unfulfilled by employers, who seemed to be indifferent to, or lack understanding of, certain topics in the subject areas and personal needs of employees, drove participants to the project. Indeed, a strength of the project appears to be its bottom-up and emergent character, which encouraged participants' desire to engage. Interest and engagement of a small group of individuals who share the same common concerns seem to draw attention on the goal of the project and the task to be accomplished.



## **9 Project Three: Description of Impact of Library Services on Patient Care**

This chapter describes the strategies used by the actors to enroll allies and resources to initiate, develop, and complete a project called Impact of Library Services on Patient Care (IMPPRO). The narrative describes the actor-network resulting from these processes and its relations with the larger network.

### **9.1 IMPPRO Overview - Introducing the Actors**

Impact of Library Services on Patient Care (IMPPRO) (pseudonyms used throughout) was a distributed collaborative project conducted in a European country between 2004 and 2007 (see the project timeline in Table 9.3). It was initiated by the Quality Panel, a subcommittee of the Library Development Association, which at that time was a professional association with 60 individual members. The association's main goal was to guide the development of healthcare libraries funded by the National Health Delivery system (NHD hereinafter). At the time of the project, Quality Panel was responsible for three main strands of work: collection of library service statistics, accreditation of libraries serving the NHD, by assessing the quality of library service provision, and studies of the impact of health library services on patient care. Impact studies are empirical studies, either qualitative or quantitative or a combination of both, conducted in healthcare to show the benefits of library services for healthcare staff, managers, and funding bodies (O'Connor, 2002). IMPPRO was developed in this last area of work. In fact, the Quality Panel believed that healthcare libraries in the country needed an up-to-date pragmatic survey toolkit to collect a reliable body of evidence regarding healthcare staff perception of the impact and value of library services on patient care.

In 2005 IMPPRO started with a grant from the Knowledge Development Association (a public organization in charge of procuring and promoting the use of information and knowledge resources in healthcare) with a group of 10 participants (see Table 9.1), taking as a point of departure a systematic literature review of impact studies conducted by two Quality Panel's members in 2004. The nonhuman actors included impact studies (as a key measure of the value of library services), the notion of evidence, healthcare library services, the literature review of impact studies, and project inscriptions (see Table 9.2.). The stated goal of IMPPRO at that time was to produce a new survey toolkit combining both qualitative and quantitative methods to collect data about traditional and online health information and library services. The survey toolkit had to include data collection instruments, such as a healthcare staff survey and an interview protocol, and guidelines for library staff to increase the response

rate, estimate the required sample size, distribute the survey, and conduct interviews and data analysis.

In 2005 a new questionnaire and a new interview protocol were piloted at four sites, including a district general hospital, a shared service, a public health support service, and a clinical librarian service. The questionnaire included an introductory section for demographic information about staff groups, and then the respondents were asked to reflect on a recent occasion when they had wanted information on clinical decisions. Questions explored why information was needed, the format required, the type of information expected, the resources used (formal and informal information resources), success in answering the query, the immediate benefits (cognitive impact), time saved, library contribution to the search, and the likely clinical impacts of the information obtained. A final question asked about the respondents' information seeking habits, perceptions of confidence in and competence of information professionals, and use of library services. IMPPRO's members used several resources for the design of the survey toolkit, including previous impact studies, literature evidence on response rates, advice from statisticians on representative sample size, and advice on ethical/clinical governance approval.

Unfortunately, project members could not interview healthcare staff at these four locations. Therefore, they had to trial interviews with a convenience sample of four staff (a consultant, a medical scientist, a nurse, and a nurse manager) from different sites than those they surveyed.

At the end of the pilot study, the project members analyzed the collected data and prepared a toolkit containing recommended adaptations for the questionnaire and the telephone interview protocols. Questions raised about the effectiveness of some of the associated administrative procedures for conducting impact studies (e.g., on the use of incentives) were addressed by reviewing the relevant research literature together with advice from experts in the field who were contacted by the project group members.

**Table 9-1** Human actors

PARTICIPANT	EMPLOYER	DEPARTMENT	JOB TITLE	ROLE IN THE PROJECT
Research Group				
Carla	University	Department of Information Studies	Faculty Member, Senior Academic	Project research coordinator

PARTICIPANT	EMPLOYER	DEPARTMENT	JOB TITLE	ROLE IN THE PROJECT
Hannah	University	Department of Information Studies	LIS Research Assistant (employed by the university)	Project research assistant
Laura	University	Department of Information Studies	LIS Research Assistant (employed by the university)	Project research assistant
Research Consultant				
Juliet	University	Unit for Research Evidence; Library Services	Unit Director and Head of Library Services	Project research consultant and Quality Panel's member
Information Professionals				
Arianna	NHD	Healthcare Library	Senior Information Professional	Quality Panel member
Mila	NHD	Healthcare Library	Senior Information Professional	Quality Panel member
Sara	NHD	Healthcare Library	Senior Information Professional	Quality Panel member
Lotta	NHD	Healthcare Library	Senior Information Professional	Quality Panel member
Lucia	NHD	Healthcare Library	Senior Information Professional	Quality Panel member
Marcus	NHD	Healthcare Library	Senior Information Professional	New Quality Panel Chair and Medical Library representative
Collective Actor				
Knowledge Development Association (organization funded by the NHD)				

**Table 9-2** Nonhuman actors

NONHUMAN ACTORS	ROLE PLAYED IN THE PROJECT
Impact study (key measure) and notion of evidence	Initiation and development of the project
Notion of evidence	Initiation and development of the project
Healthcare library services	Coordination and management functions
Literature review of impact studies (includes best practices for development of a survey toolkit)	Obligatory Point of Passage
Project inscriptions (e.g., publications, survey toolkit)	Mobilization of potentially interested volunteers among healthcare information professionals for follow-on projects

**Table 9-3** IMPPRO timeline

DATE	ACTIVITY AND HUMAN ACTORS INVOLVED
2004	Systematic literature review of impact studies completed – Quality Panel
2005	Commitment of funds for initiating and developing the project and appointment of the Research Group – Quality Panel, Research Group, Knowledge Development Association
Jun-Aug 2005	Design of a draft questionnaire for the pilot study – Research Group and Research Consultant
Jun-Aug 2005	Arrangements made at healthcare library sites for the pilot – Research Group and Quality Panel
Sept-Dec 2005	Distribution of questionnaires at healthcare library sites, data collection, and analysis – Research Group and Quality Panel
2006	Quality Panel change of chair and structure – Quality Panel

DATE	ACTIVITY AND HUMAN ACTORS INVOLVED
2006	New Quality Panel Chair carrying over the project – New Quality Panel, Research Group and Research Consultant
2007	Preparation of a final report with a toolkit – Research Group and Research Consultant
2008	Publication of a paper about the toolkit in a refereed journal – Research Group and Research Consultant
2008	Presentation of the toolkit at a national health library conference – Research Group and Research Consultant

## 9.2 Foundation Stage: Mobilizing the Larger Network to Create a Negotiation Space

Before describing the formation of IMPPRO, I examine how the project is contextualized, by focusing on one important nonhuman actor, that is, the notion of evidence. My interest is in the rhetoric through which evidence is presented in official project-related documents<sup>46</sup> in order to understand how this concept influenced the project. The term rhetoric here refers to the use of recurring textual devices that give texts their persuasive power (Pinch, Ashmore, & Mulkey, 1992, p. 287). I want to show how actors in both the local and larger networks (Law & Callon, 1992) described and represented the notion of evidence in their texts. Through this representation, they have generated space and resources for the creation of IMPPRO.

### 9.2.1 Problematization: Supporting Evidence-Based Medicine

The need for funding IMPPRO emerged from the Quality Panel, a subcommittee of Library Development Association. At that time, the Library Development Association stated explicitly that a priority in their workplan was

---

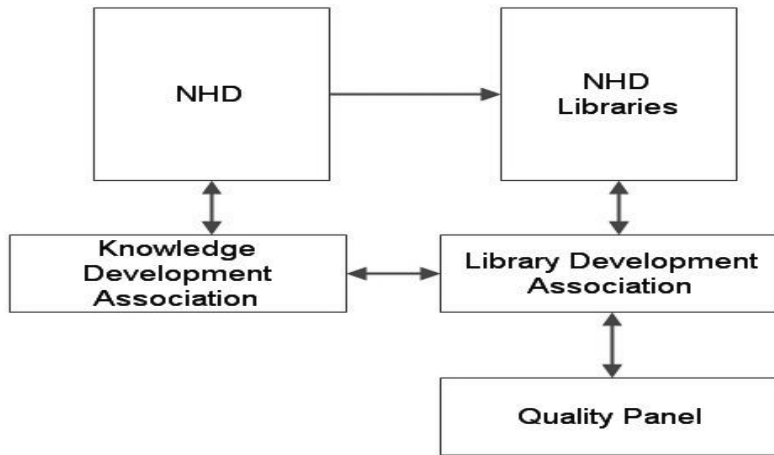
<sup>46</sup> Due to privacy concerns, I anonymized all the human actors. Therefore, I cannot identify the documents produced by these actors and used as sources of data in this study. No direct quotations of statements from such documents have been used but only indirect and paraphrased statements. Quotations of direct statements from interviews were anonymized and participants can be identified only by their job title. However, I made every effort to preserve the integrity of the case. Furthermore, to enhance research validity, I asked the project coordinator to review this case for accuracy and plausibility of my representation.

to develop with the Knowledge Development Association a coordinated approach to the procurement and management of information and knowledge resources. The Knowledge Development Association was a national public organization consisting of a number of partners, including the NHD and the department of health, among the others, and responsible for procuring and promoting the use of information and knowledge resources in healthcare.

One of the Knowledge Development Association's primary aims was to ensure the acquisition, organization, and availability of quality and up-to-date clinical evidence to help healthcare professionals make effective decisions about prevention, treatment, and care of diseases. The use of evidence from systematic research in making decisions about patient care is variously called evidence-based practice (EBP) (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996), or evidence-based medicine (EBM), as the concept originated with and for medical practitioners.

Healthcare staff includes many professional groups, such as nurses, midwives, general and mental health professionals, to name a few. The Knowledge Development Association identified different types of evidence including research reports, guidelines, systematic reviews of literature, synopses, and information about uncertainties, among others. Evidence can come from two main sources. It can be produced by the national department of health and other bodies in the National Health Delivery, or it can be acquired through publicly available journals, books, and databases.

The Knowledge Development Association responded to the National Health Delivery (see Figure 9-1), and aimed at supporting effective and efficient healthcare, offering knowledge services to patients, healthcare staff and managers to inform patient choice and help clinicians with diagnosis, therapy, and monitoring of diseases (Table 9-4 describes the potential benefits for each of these groups).



**Figure 9-1** Organizational relations

Thus, the Knowledge Development Association worked on behalf of the National Health Delivery, and served its interests by streamlining and improving the procurement, management, and delivery of library and knowledge services across the system. Indeed, the Knowledge Development Association managed the annual expenditure for the NHD on knowledge and information services, which amounted to about 200 million Euros.

Each year the department of health and the NHD, two partners of the Knowledge Development Association, spend more than 100 million Euros to produce knowledge for healthcare staff and patients in the form of studies, systematic reviews, and guidelines. As an IMPPRO participant described in an interview, there is a sort of internal market inside the NHD, because the organizations that form the system are becoming commissioners and providers of knowledge services at the same time. This means that they commission the study of healthcare staff needs, and then they provide services based on that evidence.

**Table 9-4** Potential benefits deriving from the provision of health library services

GROUPS	INDIVIDUAL BENEFITS	ORGANIZATIONAL BENEFITS
Healthcare staff	access to relevant and up-to-date information resources and services to improve decision-making process at the point of need (e.g., advice to pa-	increase: effectiveness (e.g., improvement of service delivery/practice, etc.); cost-effectiveness of the service; support the development of policies and procedures re-

GROUPS	INDIVIDUAL BENEFITS	ORGANIZATIONAL BENEFITS
	tients/carers, advice to colleagues, change in practice, etc.); save professional time	lated to clinical care
Patients	improve well-being through continuous improvement of health care (e.g., improved referral, unnecessary tests/procedures avoided, risks avoided/reduced, etc.)	improve indirectly patients' ability to participate in their health care through provision of services to health care staff
National Health Delivery (e.g., hospital managers)		have cost-savings (e.g., cost of care reduced); improve performance

### 9.2.2 Problematization: From Evidence-Based Medicine to Evidence-Based Librarianship

The Library Development Association worked to support evidence-based medicine through evidence-based librarianship (EBL), in order to help health-care librarians contribute to improve patient care and support clinical decision-making. Evidence-based librarianship is a relatively new movement currently involving mainly healthcare librarians in the United States, Canada, and the United Kingdom. EBL grew out of the participation of healthcare librarians in EBM (Lerdal, 2002). In EBM,

*A librarian helps health care professionals to formulate an answerable question, determine where they may best find the answer to that question, and use effective literature searching to find the evidence. The health care professionals can then critically appraise the literature and apply it to their practice (Koufogiannakis & Crumley, 2002, p. 112).*

In healthcare, a key measure of the benefits of library services is their impact on medical staff to improve patient care. Evidence of impact is among the output measures demanded by funders, who seek immediate practical payoffs from delivery of library services. Evidence and its connotation of “objectivity” have a high degree of plausibility to researchers, professionals, the public, and policy makers who may think in terms of economic value. Public institutions can obtain more funding only by proving their positive impact on the government’s



healthcare agenda (Johnson, 2004).

IMPPRO headed in that direction, arguing for greater rigor in studying the impact of library services on patient care and clinical decision-making. Two project members so described their views of the relation between the project and the Government's healthcare agenda.

*The project coordinator: I think it is a political governance aspect. They knew that healthcare has to be evidence-based. If it is going to be transparently evidence-based, then the healthcare [professional] needs to have access to the evidence. I think that the motivation for the health libraries is just to demonstrate they are required... There is the development of the Medical Library, as part of the Knowledge Development Association, so many resources are supplied centrally now. So, in some ways, the decision-making for libraries on what they should have in their collections has been taken from them, because all the decisions on electronic evidence resources are made centrally [No. 41].*

*One Quality Panel's member: What was very difficult for us at health libraries was proving our value to the organizations. We are all monitored and, through the national initiative, [healthcare organizations] have to have a library, but we are fairly low-down in the pecking order. If we can demonstrate that the work that we do actually improves patient care, then we become more valuable for the organizations, because that is the main reason for being in existence [No. 42].*

As these interviewees make clear, evidence can provide the National Health Delivery with a tangible demonstration of the value of library services for existing and potential healthcare staff users, and a justification for further investments in knowledge and information services. Indeed, evidence seems to embody a persuasive power that implies scientific but also upon policy and economic considerations. The language of official documents produced by the Knowledge Development Association and other organizations within NHD talking about "increasing the value derived from information resources", "allocation of resources in healthcare", "improving the health of population", "reducing clinical interventions of low value and increasing those of high value", and "assessing user needs" indicate that evidence has implications for multiple stakeholders. For managers, it is a method for making rational choices regarding resource allocation; for clinicians, it is a scientific foundation for improved decision-making and better integration of current knowledge within the needs of patients; for healthcare information professionals, it is a proof of the value of library services, and a ground for justifying requests for resources; for healthcare policy makers, it is a method to achieve better management of publicly funded services.

The use of evidence might implicate changes in the practices of each of these groups. It might make managers better economic actors concerned with

allocation of resources based on staff and patient needs. It might change clinicians' behavior, supporting their activities of assessment and diagnosis and making them more aware of the economic consequences of treatments. It might change healthcare librarians' practices, such that they would become more aware of the importance of doing research and producing evidence of the impact of their services on clinicians' activities and patient care. Finally, it might make healthcare policy makers aware of the economic benefits provided by libraries and information services, and the extent to which they contribute to achieving broader social objectives.

Thus, the Quality Panel felt that without integration of valid evidence in information management practices, library services could not secure effective development funding to meet healthcare staff needs. Collecting data from healthcare staff was deemed to be essential to provide feedback to the bodies that produce and supply medical research evidence for clinical decision-making and patient care. The evidence-based perspective moved from clinical practice to library practice, to become evidence-based library and information management, which is a way of approaching the management of library and information services by incorporating data into decision-making. Evidence was supposed to assist library and information professionals in overseeing information and services needed by users and in supporting management decisions, thereby promoting and documenting the use of investments.

### **9.2.3 Problematization: Using Best Practices for Impact Studies**

The adoption of EBL enabled information professionals to contribute to a healthcare service discourse that was increasingly data-driven and focused on effective practice and demonstrated quality of care for patients. Therefore, the Quality Panel's members thought that library and information professionals needed to have an up-to-date method to provide a valid account of the impact of their services on patient care and clinical decision-making. Juliet, project research consultant and Quality Panel's member, described the origin of IMPPRO:

*One of the areas the Quality Panel looked at was library impact and how you could measure it. In particular, how health librarians could persuade or could talk to the funders of their services to tell them what effect the library services were having and the value of these services for the organization, the hospital, or whatever [No. 43].*

*I was a member of the Quality Panel when we first had the idea of doing a systematic review of impact studies. This is why I got involved {in the project} in the first place [No. 44].*

When asked about whether all the project members shared the same expectations at the beginning of the project, another Quality Panel member said:

*I think we did. The expectation was that a working toolkit would be developed that would be used throughout the health service in the country to assess whether the work of the health libraries did have direct impact on patient care [No. 45].*

In fact, many information professionals had difficulties with providing rigorous evidence, because they lacked the required research method skills. Not all data constitute valid evidence. To be regarded as valid evidence, data has to be collected using flexible, reliable, and valid data collection methods, in accordance with the standard accepted practices in healthcare library studies.

In the face of these challenges, in 2004 the Quality Panel commissioned a systematic review of empirical studies looking at the impact of library services on patient care and clinical decision-making. The main goal of the review was to identify best practices to inform the development of a survey toolkit that information professionals could use themselves to conduct an impact study. The toolkit was expected to include a questionnaire and a telephone interview protocol, as well as advice about the research methods involved, such as estimating the required sample size, how to distribute surveys best, and how to conduct interviews and analyze data. The toolkit needed to take into account traditional and online services in healthcare libraries. Previous large scale studies (in which the IMPPRO's project research coordinator participated) on the impact of health library services on patient care were conducted several years earlier, and the toolkits developed at that time needed an update to include changes in the type of services offered and user communities. The toolkit's stated aim was to provide information professionals with a structured way of thinking about the sort of issues that can arise when designing an impact study. It also had to provide suggestions and recommendations for conducting the survey and the interviews, analyzing the data, and presenting the results. In so doing, the toolkit could help develop professionals' research skills. As a newly created actor, the toolkit, had to fit into existing healthcare libraries with their work procedures, routines, and institutional rules (all of them representing voices and interests). Hence, it had to be pragmatic, that is, not too long and complex and adaptable to the local circumstances. It had to be a tool that professionals could use themselves to do impact studies in the future.

Having this purpose in mind, the Quality Panel thought they needed help with the development of such a toolkit. This is the point when they drew the research group into the project.

### 9.3 Formulation and Sustainment of Collaboration

The interessement and enrollment phases of translation involved persuading additional actors to agree on the interests defined by the Quality Panel in the problematization phase and to enroll the project.

#### 9.3.1 Identification of Interests

In Tables 9-4 and 9-5, the interests of human and nonhuman actors enrolling IMPPRO have been described using the ROI approach (Vidgen & McMaster, 1996). The potential spokespersons of the nonhuman actors include both the human actors in the project, and other human actors who can be affected by using a survey toolkit for impact studies in healthcare libraries and can be representatives of the nonhuman actors.

**Table 9-5** Human actors' main interests

HUMAN ACTORS	RATIONAL	ORGANIZATIONAL	INDIVIDUAL
Information professionals	opportunity to: continue providing value and impact of their service in terms of patient care and time saved by healthcare staff; provide references to/reports of evidence-based medicine to support individual clinical experience	opportunity to: provide most valued and cost-effective delivery of library services in terms of tangible benefits for healthcare staff and patients; justify investment in healthcare libraries	opportunity to: improve professional visibility; increase possibilities to avoid job cuts

HUMAN ACTORS	RATIONAL	ORGANIZATIONAL	INDIVIDUAL
Quality-Panel/Library Development Association (later merged into the Medical Library)	opportunity to: measure value and impact of their service in terms of patient care and time saved by healthcare staff	opportunity to: meet business objectives by optimizing investments; build up evidence and demonstrate value and impact; apply knowledge to prevent and minimize major problems encountered in healthcare system	opportunity to: improve professional visibility; increase possibilities to avoid job cuts
Knowledge Development Association	use knowledge to improve healthcare staff practice	improve quality of healthcare and improve allocation of resources based on population needs	
Project research coordinator (Senior academic)	opportunity to: conduct funded research on evidence-based librarianship in healthcare	opportunity to: receive funding for research; receive prestige from publications with the institution's affiliation; provide postgraduate students with new research opportunities	opportunity to: publish research papers, give talks and attend conferences; enhance academic career; do interesting work
Project research consultant and Quality Panel's member	opportunity to conduct funded research on evidence-based librarianship in healthcare	opportunity to: receive funding for research; receive prestige from publications with the institution's affiliation	opportunity to: publish research papers, give talks and attend conferences; enhance academic career; collaborate with senior researchers

HUMAN ACTORS	RATIONAL	ORGANIZATIONAL	INDIVIDUAL
Project research assistants (LIS research officers)	opportunity to conduct funded research on evidence-based librarianship in healthcare		opportunity to publish re-search papers; enhance academic career; enhance re-search skills

**Table 9-6** Nonhuman actors’ main interests

NONHUMAN ACTORS	COMPONENTS	INTERESTS	POTENTIAL SPOKESPERSONS
Impact study (methods and quality measures)	qualitative and quantitative methods (survey and interviews); previous relevant research	be complete and generate reliable results	Healthcare information professionals; Medical Library; National Health Delivery; LIS researchers <sup>47</sup>
Notion of evidence	impact studies	be sound and rigorous	healthcare information professionals; Medical Library; National Health Delivery; LIS researchers
Healthcare library services	healthcare information professionals, healthcare staff, patients, databases, Internet, reference/textbooks, manuals, e-journals, health library website, etc.	be used regularly and frequently by healthcare staff; have an acknowledged influence on healthcare staff’s activity; receive funding from the National Health Delivery for improvement and up-to-date	healthcare information professionals; Medical Library; National Health Delivery; healthcare staff; patients; LIS researchers

<sup>47</sup> They include all the LIS researchers in the project and, more generally, all the LIS researchers interested in improving the quality of healthcare library services and information management.

NONHUMAN ACTORS	COMPONENTS	INTERESTS	POTENTIAL SPOKESPERSONS
Literature review	best practices from systematic review of impact studies in health-care	be used in designing the toolkit for impact studies	LIS researchers
Project inscriptions	research results; research papers produced as outcome of the project	be used by healthcare information professionals to measure the impact of their services	healthcare information professionals; Medical Library; National Health Delivery; LIS researchers

### 9.3.2 Intersement and Enrollment: The Creation of the Local Network

The second process of translation was aligning the interests of all the actors in the new local network, IMPPRO, to achieve the goal set for the project by the Quality Panel. IMPPRO's participants shared some characteristics of a conventional team (Katzenbach & Smith, 1993). They were a small number of individuals with different and stable roles and responsibilities based on their expertise and competences, who were committed to a common purpose, at least in the initial phase, and to an agreed-upon approach to do the work for which they held themselves mutually accountable. However, the roles and responsibilities of the project participants were not formalized in written documents, there were no internal written rules and procedures to govern the project (e.g., for reporting and reviewing tasks), and no documents stipulating managerial arrangements, except for a two-page project brief that served also as project proposal. The research contract was held by the university employing the research group which paid the research consultant for her work.

There was a senior academic (hereinafter called project coordinator), who also had the role of research and project leader and was appointed to develop the toolkit, but her role did not appear to entail a "hierarchy of authority" within the project (Shrum, Genuth, & Chompalov, 2007). Although the Quality Panel commissioned the work to her and she assumed the responsibility for the development of the toolkit, IMPPRO seems to share some traits of participatory collaborations<sup>48</sup> (Shrum, Genuth, & Chompalov). The project coordinator led

---

<sup>48</sup> It should be noted that IMPPRO is a collaborative project that does not meet Shrum, Genuth, and Chompalov's (2007) criterion for multi-organizational collaboration because it seems to resemble more the case whereby an organization (e.g., the Quality Panel) conducts research by contracting out for the services of another organi-

the research work, but did not seem to wield more authority than other project members. In fact, IMPPRO formed to carry out the work with no clear internal hierarchy – with the exception of the research group formed by the project co-ordinator and her two research assistants. The division of tasks was clear instead, because there was a clear separation between research tasks, which the research group was responsible for, and arrangements at library sites, which were under the responsibility of the panel volunteers.

The following description of the process of enrollment of the actors details how the collaboration formed and how the organization of the project got its shape.

### **Enrollment of the Research Group**

After the completion of the literature review on impact studies conducted by two Quality Panel's members in 2004, the Quality Panel had the role of steering board to discuss how to fund the development of the toolkit and to explore potential funding sources. Although they never commissioned research projects of the sort of IMPPRO, they found out that they could get access to some money for the work from the Knowledge Development Association. Therefore, the Panel invited Carla, a senior academic, to work with Juliet, one of the two co-authors of the literature review, to put together a grant proposal. Juliet was the link between the Quality Panel and Carla, although Carla had social ties with other Quality Panel members whom she had known for a long time. As a Quality Panel's member said, healthcare management is "quite a small world so you run into people". Juliet knew Carla and her work well. Carla worked at a School of Library and Information Science and had a record of publications in health information management and a demonstrated expertise in impact studies. She had been involved in previous large-scale impact studies of health library services and had published on the topic. Carla's interests were thus closely aligned with those of the Quality Panel. As she recalled:

*What interested me was that they knew the impact toolkit we had was out of date. We needed to update it to take account of people working as clinical librarians, people working as outreach trainers, some of those types of roles that were not covered in the old toolkit" [No. 46].*

The implied interestment, in this case, was the promise of developing a new pragmatic toolkit that health information professionals could use themselves to produce sound evidence regarding the effectiveness of their services.

---

zation (e.g., the LIS department). The authors did not include this type of collaboration in their analysis, therefore participatory collaboration as a form of organization refers to research projects completely different from IMPPRO.



Carla and Juliet wrote a simple two-page project brief, which Carla defined as “very unlike most proposals”, in which they stated the objectives and the scope of the project, and estimated a very simple budget amounting to about 28,000 Euros. The budget allocated most of the resources to the research group (project coordinator and two research assistants), and about 500 Euros per healthcare library site participating in the pilot of the survey. The project was expected to be completed within two years. The bid was successful and the Quality Panel allocated the sum entirely to Carla’s university. The budget did not undergo substantial changes, although Carla had to review it towards the end of the project to check out whether there was money left to pay the additional work of one of her research assistant.

Carla included in the research group two research assistants, Hannah and Laura, who she had worked together with in other projects. They were employed by the university at that time and worked on flexible contracts, meaning that they had to claim for the number of hours they worked on various projects. Carla divided the research work between the three of them. She asked Hannah to design a new questionnaire drawing from previous impact studies and the literature review of impact studies completed in 2004, and Laura, who was more numerate and technically adept, to enter the collected data in a spreadsheet. Then they sent the completed draft to the Quality Panel’s members for comments. The comments were collated by the chair of the panel and sent back via email to the research group. Carla oversaw the work and analyzed the data. Carla, together with Juliet, the research consultant, was also responsible for writing the final report for the Knowledge Development Association to present the project results and the development of the toolkit.

Besides being the research leader, Carla also supervised administrative tasks. Carla and her two research assistants also carried out coordination work. In particular, they took care of the time consuming paperwork needed for ethical approval. One of the two research assistants, Hannah, described how going through ethics for each participating site was a “horrendous” part of her job, because it was bureaucratic and the healthcare organizations hosting the participating libraries were obstructive:

*Carla in particular and I put together the form for obtaining ethical consent, which itself was quite difficult, and then the various forms to obtain research governance. Once the forms were completed and sent off, at that point I suppose it is true to say I carried out the rest of the research - designed the questionnaires, liaised with everybody, liaised with the library and information staff, four of them I think, one in each of the various sites that we were working with. I liaised with the research governance committees and the research ethics committees {at each site}, so really I did all that with Carla helping when she could [No. 47].*

Moreover, Carla recalled that:

*I was always very anxious particularly as we had a lot of work with the research ethics and I could see it was taking a lot of time. My research staff was being paid a lot of money to set up the project and we really did not have that money for it. The university would normally take quite a lot of percentage of overheads on the project and we had to ask that they would not take this money from us [No. 48].*

When asked how Carla, Hannah and Laura defined and negotiated the research activities, whether they discussed them with each other internally, or they also discussed them with the Quality Panel, Hannah said that the discussion occurred within their small group, between the three of them, and that they did all the work. Hannah believed that Carla was very fair in allocating work to them (the research assistants), trying to balance their work in IMPRRO with their work in other projects. As Hannah said:

*Possibly Laura was actually finishing off or was involved in another project, that's why she didn't do more than she did, I think so. I think Carla was also very fair in allocating work to us. I think I had more time available at that point than Laura did, so it was rather arbitrary, but I think it worked well in the end. We were a good team, Laura and I, we were very supportive of each other so if I needed help or advice we contacted each other [No. 49].*

While the collaboration in the research group worked smoothly, Hannah reported that it did not work that well with the Quality Panel's members who volunteered to participate in the project. She believed that much of the time spent to obtain the ethical approval could have been saved, had the panel's members been more collaborative in the application process:

*I assumed that they knew more about the research project than they actually did, but they didn't do as much work, didn't involve themselves as much as they should have. All started at Easter, but it went on during the summer in the end. Any road, they were busy. I found that I was doing much more work, I had far more involvement, because I was actually doing some work which really they should have done, or at least some of them should have done [No. 50].*

## **Enrollment of Healthcare Library Services**

The Quality Panel's members brought in a new ally, that is, their libraries. Four members working in libraries (not all of the Quality Panel's members worked in a library) volunteered their sites to pilot the survey. The research group wanted to involve four different types of healthcare libraries in the pilot study, including the 'traditional' hospital library – which now serves many different types of healthcare professions, but started out serving hospital doctors only – a

shared service, a public health support service, and a clinical librarian service. To enroll their library services in the project, the four Quality Panel members sought the alliance of the human resource departments at their employing organizations to liaise with healthcare staff. For this reason, each organization was supposed to receive about 500 Euros to distribute the questionnaires and do other work. One of the participating Quality Panel's members, Arianna, recalled that this small amount of money eased the attitude of the human resources department toward the project. She said:

*This would have been extra work for one of their people {human resources}, and they probably would have paid overtime to do it. They would have not been able to do it with their own budget and it would have been more difficult [No. 51].*

As part of their role, the Quality Panel's members who volunteered their organizations were also expected to help obtain approval from ethics committees. Each library had to go through the research ethics process, although the project was not a clinical study of patients. As all the interviewed participants said, this process was laborious and very time-consuming, and delayed considerably the start of the project.

## **Enrollment of the Concept of Impact Study and the Notion of Evidence**

The literature review on impact studies conducted by two Quality Panel's members in 2004 put into circulation two critical nonhuman actors: impact study as a key measure of the value of library service on patient care, and the notion of evidence. The link between the two is close, and thus I chose to treat them together as a punctualized actor (Law, 1992), that is, an actor that is reduced to a single primary function, that of providing sound demonstration of the value of library services. Sound evidence obtained with robust methods is valued both in science and in policymaking<sup>49</sup>. Therefore assessing the methods used in previous impact studies can help improve the likelihood that future impact evaluations will be based on tried, tested and appropriate methods, and that they will contribute to performance management and funding allocation (Johnson, Williams, Wavell & Baxter, 2004). As Carla and Juliet pointed out in their presentation at a workshop at a well-known national health library confer-

---

<sup>49</sup> There is a body of research and professional literature on the use of evidence in policy-making. In countries like UK, for example, as part of the Blair government's reforming and modernizing agenda, the aim has been to try to shift away from ideologically driven politics and towards rational decision-making. The Modernising Government White Paper in 1999 called for policies "that are forward looking and shaped by the evidence rather than a response to short-term pressures; that tackle causes not symptoms".

ence at the end of the project, the use of validated questionnaires allows for further validation and testing of the questions, and for comparison among libraries, and the use of tried and tested interview protocols reduces the risk of omitting relevant questions.

In the same presentation, Carla and Juliet treated the concept of impact study as a mechanism of evidence-based librarianship for achieving a twofold purpose. Firstly, to bring changes in healthcare information professionals' activities and skills that lead to future improvements of library services and, in turn, have an effect on clinicians' activities and patient care. Secondly, to determine resource demands and budgetary allocations to healthcare libraries. When resources are scarce, evidence of the impact of library services can help to make allocation decisions that minimize waste of resources on ineffective services, and maximize use of resources on the most useful services for healthcare staff at the time and point of need.

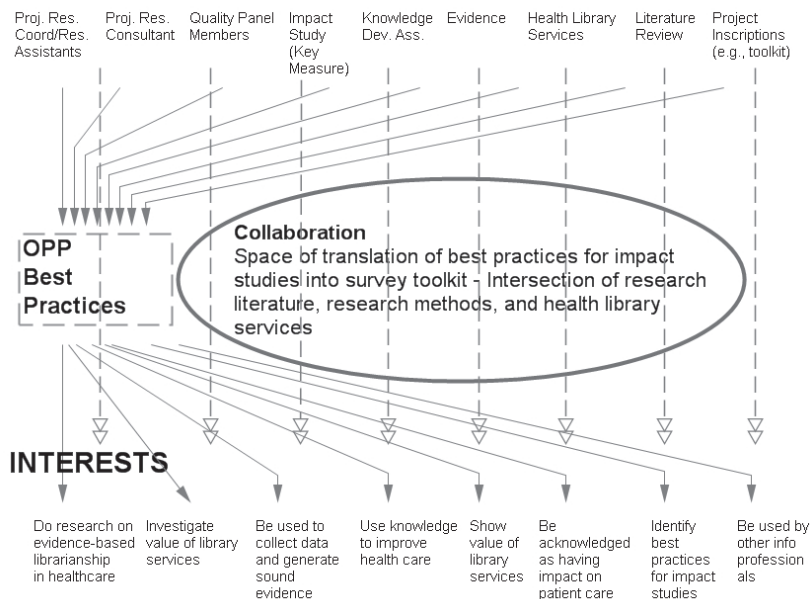
### **Enrollment of Best Practices for Impact Studies as OPP**

As said before, IMPPRO took as a starting point the literature review on impact studies conducted by two Quality Panel's members in 2004. From the minutes of a meeting of the Quality Panel held when they had to decide about funding the development of the toolkit, it appears that the panel passed through this inscription consensually. This literature review<sup>50</sup> identified a body of evidence showing that information provided by healthcare library services can influence patient-care outcomes in various ways, and suggested a set of best practices for impact studies. Because these best practices are well established, the panel agreed to use them as "the obligatory point of passage", that is, as the quality criteria to be used to develop the toolkit. Figure 9-2 shows how the actors had to pass through the best practices in order to pursue their interests. For example, the research coordinator and her assistants had an interest in doing research on evidence-based librarianship in healthcare; the Quality Panel members had an interest in investigating the value of library services; and impact study had an interest in being used to collect data and generate sound evidence.

---

<sup>50</sup> This review was later published in a leading journal on healthcare libraries management, and became one of the most-accessed articles in that journal.

## ACTORS



**Figure 9-2** IMPPRO as an actor-network

Therefore, the literature review acted as a program of action that triggered the formation of IMPPRO (Callon, 1991, p. 136). For example, this review described what was acceptable and what was not in a good impact study, and attempted to set epistemic norms to be shared with healthcare information professionals and to be embodied in a survey toolkit. Recommended best practices for conducting impact studies included, among others, appointing researchers who are independent of the library service, ensuring that all respondents are anonymous, using a random sample, and developing a set of questions that are validated, well grounded in previous research, and developed with library users. The literature review sought to make the readers (e.g., LIS researcher, healthcare information professional) aware of these best practices used in respected impact studies. It also sought to convince the reader of the importance of sound and independent impact studies to obtain the trust of funding agencies. The review also implied a relation between evidence-based librarianship, clinical activities, and healthcare management. That is, it implied that evaluating the impact of libraries could have an influence on the perceptions by healthcare staff and managers of the role that information does or could play in supporting patient care and the development of policies and procedures concerning clinical care.

### 9.3.3 Interesement and Enrollment: The Merge of Quality Panel and the Shift of Interests

The larger network and the local network changed during the project following a reorganization of the National Health Delivery. When IMPPRO started in 2005, the Quality Panel was still an independent group, but a year later, when the project was still ongoing, it merged with the Medical Library that was the national library for medicine and also operated under the umbrella of the Knowledge Development Association<sup>51</sup>. Before the merge, the Quality Panel and the LIS academics easily established a common goal because they shared interests. After the merge, the Quality Panel ceased to exist, and a new coordinating group called New Quality Panel covered its functions within the Medical Library. However, other interests, in particular the development of library quality standards, called for the attention of the new Quality Panel members. IMPPRO was not a "sealed actor-network" (Stalder, 1997), in which aligned interests were inscribed in a stable and no longer questionable association.

This merger and the subsequent turnover of the Quality Panel's members affected IMPPRO because views and needs changed. Therefore, I distinguished between a pre-reorganization network and a post-reorganization network of IMPPRO. The pre-reorganization network was convergent and the activities of the heterogeneous actors fit together. Conversely, the post-reorganization network was no longer so convergent. Whereas IMPPRO continued in the post-reorganization network, priorities apparently changed when the previous chair of the Quality Panel, who considered the project as "her baby", retired and another new chair stepped in. This is how Carla described the change in the landscape:

*The previous chair of the Quality Panel, who sponsored the project, moved on, and Marcus became responsible. But he had other things to do, I think. {The project} was not a major priority for him. I think Juliet was communicating with Marcus, so we {the LIS research group} were never invited to the new organization's meetings to do a presentation. So I thought, well... we still had to produce a report. I mean that the Quality Panel wanted the toolkit, but it felt as doing the toolkit was a duty to them rather than the organization {the Knowledge Development Association}. There was not that level of commitment [No. 52].*

When asked about the reason why for not being invited, Carla responded that it was odd, but it was the way the Quality Panel had always operated. Even in the phase of the pre-reorganization network, when interests were convergent,

---

<sup>51</sup> At present, the Quality Panel is subsumed within a coordinating group of the Medical Library, whose board it reports to, and still holds responsibility for, the development of library services.

Carla recalled to have attended only one meeting of the Quality Panel, where she met Lotta, chair of the panel at that time, and few other members but not all of them.

The reorganization changed priorities and affected the level of commitment of the new Quality Panel to the project. Although IMPPRO managed to stay enrolled in the new larger network and did not undergo modifications, the development of the toolkit for impact studies seemed to be no longer in the foreground, because of a view that put impact study and quality standards into separate boxes, as Carla explained<sup>52</sup>:

*They {the new panel} had their own problems. They were just overseeing the impact project and we had other concerns. The other difficulty was that at the same time there was the development of standards for the libraries working for the National Health Delivery. I think that the development of library standards and that of the toolkit should work together. However, there are two competing forces here: there is one standard research approach wanting to look at the impact of library service on patient care, and there is the other one, rather more managerial approach, which says, "we need to have x number of staff, we need to have this side of the collection". At the same time, as the committee was carrying out the impact study, it was also partly concerned with developing the library standards" [No. 53].*

Shifts of positions and personnel turnover had consequences in terms of loss of human capital (individual memory and knowledge) and social capital (relations among project members). Marcus, new chair of the new Quality Panel, described the situation in these terms:

---

<sup>52</sup> Carla explained during the interview that in the National Health Delivery librarians and information professionals are paid on a higher grade for managing more staff, so there is a temptation to build empires and not to work efficiently and effectively. If librarians want a higher grade, they need to manage a library with lots of staff. While this is changing a little, the fact remains that there is more pressure on libraries to get 'accredited', which often requires them to have things, have people – they are measured by inputs and to some extent by outputs, but less by outcomes of their service. In the previous set of library standards, the National Health Delivery did include impact studies – encouraging libraries to do impact surveys to assess the effect of their service on patient care but she did not think many libraries actually did this. She said that *"the statistics collection that they normally do count inputs and outputs, and even with outputs – e.g. accesses made of the e-journals and databases – they tend to be collected regionally and nationally. I think that learning about service outcomes should help strategic library planning so that you plan for the inputs and outputs based on what you have learnt about the service outcomes. I think the standards and the impact studies are intertwined. And probably that will not happen until the managerial approach really takes true account of the evidence-based approach to library management – evidence-based librarianship"*.

*When one side is in so much turmoil and change, like the national health side was, I suspect it might be quite a constrain for Juliet, because she often was not speaking to the same people. There was no continuity on the National Health Delivery side, because there was so much change and so much turmoil. People changing jobs and being made redundant and retiring. So, when I inherited the project, maybe on reflection, I should have asked if I could have a meeting with Juliet and see if she could bring me up to speed. We just had this email correspondence and one phone call, and I probably did not have a real understanding of this project and the background to it. Maybe the thing I would tell {is that} it is really on the National Health Delivery side that we need to be clear and give more corporate memory to the people who are taking on these ongoing projects [No. 54].*

It appears that the lack of face-to-face communication between the new chair and the research group hindered the development of human relationships underlying project work. Because human relationships are grounded in social bonding and symbolic expressions of commitment, the lack of face-to-face meetings appears to hinder those social aspects of communication that sustain social bonding (Nardi & Whittaker, 2002).

### **9.3.4 Lack of Conventional Project Management**

The changed situation described in the previous section frustrated some IMPPRO's participants. For example, Arianna, a senior information professional, expressed her disappointment for the loss of control over the management of the project:

*I think the time was unfortunate, because when it first started there was a lot of enthusiasm for {the project} and it was going to be done almost in half {time}. Then, one of the people retired, and the other person {Lotta, previous chair of Quality Panel}, who was doing the work, changed job, and it was no longer appropriate for her to carry that on. It was a change in landscape that just made it quite difficult. If you manage a project, you need somebody who is a project manager, who is going to keep very tight reins on everything, but because people changed roles and {there were} changes in landscape of organizations, it kind of got away [No. 55].*

Unlike many of the projects she worked in for the NHD, using a structured approach to project management for public sector projects, Carla said that the same approach did not work in IMPPRO at all:

*I am happy with that structured approach, as long as people apply it with their brains in gear. In fact, it is possible to do it in a very mechanical and unhelpful way. However, this structured approach requires a steering board and ours disappeared to some extent through the project {due to the reorganization*



*of the Quality Panel}, although it worked at the start. Also, this approach usually has regular reports but there were delays with that because of ethics clearance [No. 56].*

A structured project management approach entailing the use of conventional project management artifacts (e.g., project management plan) was not used in IMPPRO. From the quote above, it emerged that the contingent circumstances through which the project went did not fit the requirements of such an approach. In the interview, Carla reported that, had they used such an approach, they would have been asked for an exception report when they had problems with getting one site involved in the pilot; the steering group might have been formed in a different way; and the reporting would have been more structured and would have required a few more face to face meetings. Consequently, the use of such an approach would have costed more. She made the example that for her to attend a day meeting would have costed more than 600 Euros and the budget did not include such expenses. It appears that the use of a structured project management approach would have changed the nature of the relationships in the network, and would have involved unnecessary formalization, additional costs, and more time.

For the reasons stated above, Carla affirmed that IMPPRO was not conventionally managed compared to other projects in the public sector. She also believed that another reason was that several of the involved sites were also the workplaces of the panel's members. This means, according to Carla, that those people were involved with local arrangements and did not necessarily look out for the big picture.

Juliet, project research consultant and Quality Panel's member, did not think that this unconventional approach caused damage to the project:

*I would see conventional management as the Quality Panel having regular meetings and updates and acting as a steering group, and Carla and I attending meetings with them and say "how is it going?" and so on. It has not been formally managed in that way. However, although it may have gone a little quicker if it had been more formally managed, I do not think there would have been a huge difference. It worked quite well. I think both Carla and myself and the team were keen to do the work and to get the work done. I think it has gone reasonably well [No. 57].*

The lack of a structured approach and conventional project management tools in the project reflects the non-bureaucratic character of IMPPRO and its small size, and connotes an alternative perspective on project management for which projects are not just instruments to achieve predetermined goals within a stipulated time frame (Vaagaasar, 2006). Using process theories including ANT to study the management of a technology management project, Vaagaasar disagreed with traditional project management theories assuming that projects

succeed when people manage them in a rational way, as they were linear and controllable. She observed that underpinning these assumptions is the view that projects are closed, predictable, and apolitical units regulated by project management systems, instead of being socially constructed entities that are embedded in relations. The vicissitudes of IMPPRO following the reorganization of the Quality Panel show that the project was far from being a predictable and apolitical entity, because the changes in the institutional landscape clearly affected the project.

### **9.3.5 Enrollment of Intermediaries: The Use of ICT**

Project participants shared the characteristics of a virtual team distributed across space and organizational boundaries and connected by email and phone. Even the research group formed by Carla and her two research assistants worked mostly in a distributed fashion, although they were collocated at the same university. Indeed, two of them often worked away from their desks, because office computers were old, slow, and lacked needed features. For example, the department policy pushed Carla to work from home, because she could not download programs on her office computer without authorization:

*We {the research group} collected the questionnaire data, and I was going to use SPSS to look at some of the questions in more details, but I am afraid that I never managed to do that. We have a problem in the department, we have a different computer system from the rest of the university, in the sense that we are on a different network, ruled by a computer officer who does not allow us to download programs. When I do the research work, I work mainly from home, so I do more processing of my research data at home. I used Excel instead of SPSS. I think one of the research staff, Laura, just put all the answers in the database [No. 58].*

Carla used Excel to analyze the questionnaire data from her home computer and kept in contact with Hannah and Laura via email and phone. As a senior academic, Carla received a new computer, but neither Hannah nor Laura got one. Unlike the rest of department who were given new equipment, they still had old PCs running old versions of Windows, the programs run slowly, and Internet collapsed often. However, Carla, for much of the research she did, had to work from home, because she had installed the reference management software and the qualitative data analysis software on that computer. Because her family home was very far away from the university, she commuted weekly to go to the university to teach and do administrative work, but she did the research work from home.

Carla and her research assistants did not have a shared database to analyse data collaboratively, and they worked individually on stand-alone PCs. One of the two research assistants entered the data into an Excel database, copied it on

a CD and a memory stick, and brought it in to share with her two colleagues. Hannah, one of Carla's two research assistants, described the situation at that time:

*We were just left alone....I know we always felt that researchers did not have a high priority within the department. I am not saying that the Head of Department did not value us and the money that we all brought in, but we were not seen as part of the staff, really. We were perhaps support staff, if that, and we were low. At that time, the academic staff was having new computers, new systems, and we researchers did not have anything new. It was all very old and slow. It was just the way we felt we were treated [No. 59].*

As it is typical in intellectual groupwork (Galegher & Krout, 1994), in IMPPRO communication needs varied over time and over tasks. The interviewees said that email was the main communication medium, although when they had to discuss and solve problems, such as disentangling ethics issues, they chose to talk over the phone, or to have collocated meetings. However, arranging meetings was difficult especially for Carla and her assistants, whose location was a long way from other project participants. IMPPRO participants did not have a common digital place and used primarily email and phone to communicate. Unfortunately, the few emails available for analysis did not allow to reconstruct properly how this medium was used during the project. The messages I had access to show that email was used primarily to support individual communications between two people (usually a third one being copied). I observed that by using this form of communication individual participants addressed specific aspects/topics that related to the tasks they were directly involved with.

For example, Carla wrote about the paperwork for the several ethics committees they had to deal with to Lotta, the chair of the Quality Panel (and to Hannah who took care of the task), but not to others, as this message shows:

*Subject: IMPPRO  
From: Carla*

*Date: 9 June 2005  
To: Lotta  
Cc: Hannah*

---

*Lotta,  
We are hoping that we may be spared the full ethics treatment, but suspect we still need to go through research governance at each site.  
I have completed the form in draft, but we need to have agreement from the funder to be the sponsor of the project as set out in the research governance framework. We're not guaranteeing that we get this right first time, as it is not a*

*form that really fits the research but Hannah and I have struggled through most of it this afternoon. I think a letter/email from you is all that is necessary, just saying that you agree to be sponsor under the terms of the research governance framework. The difficulty is that there may be several research governance frameworks floating around, so the wording might need to be 'the relevant research governance framework(s)'.*

*Thanks [No. 60].*

In the same manner, Carla wrote about problems with the development of the toolkit to, and talked/met with, Lotta and Juliet. Communication in the analyzed emails appears to address mainly project administration and not tightly coupled tasks such as problem definitions and negotiations. For example, in the email below Carla informed Lotta that she wanted to brainstorm with Juliet about a research problem (the lack of volunteers for interviews that could jeopardize the outcome of the whole project) over the phone:

*From: Carla*

*To: Lotta*

*CC: Juliet*

*Regretfully, the research is throwing up problems with putting theory into practice as far as the NHD is concerned. I have chatted briefly about this with Juliet as I think we will need to devise ways of selling a toolkit as anything but research. I was going to move along those lines anyway but the response rate is so poor (with one exception). I aim to devote Friday (or the better part of it) to looking at the results in some detail and then contacting Juliet for some brainstorming. Is there a good time to contact you, Juliet? [No. 61].*

Email communication between participants was used to ask/answer quick questions, solicit input for a decision, share conference and meeting information, and suggest amendments to the report in progress. Coordination work carried out via email included brief updates, reminders about paperwork needed for ethical approval, and questions about people to contact for statistical advice, rather than problem definitions, negotiations, or exchanges of opinions.

While the interviewed participants acknowledged the usefulness of email when people are distributed and the timescale for the completion of the project is tight, they also thought that more regular face-to-face meetings would have helped:

*Carla: I think I would have liked another face-to-face meeting somewhere with that committee, which we did not have. Indeed, it would be very good to discuss progress periodically. It can be quite difficult to get responses from*

health librarians. I think Hannah as a researcher had to phone people a lot [No. 62].

*Juliet: I think (email) worked quite well. I think probably, until about 18 months ago, I was attending the quality group meetings. I think, in fact, if I'd carried on attending the quality panel's meetings {Juliet changed her job during the project and no longer sat in the panel officially}, that might have been more helpful. I think there are some advantages, sometimes, to have a face-to-face discussion rather than doing everything by email and feedback. I think it is probably a better way to get consensus than collating individual feedback. In addition, it can help if there are any issues of clarification or explanation. If the people you are working with closely on the project are there, then they can clarify and explain what everyone is discussing. I think that is actually a little bit more difficult by email [No. 63].*

## **9.4 Conclusion of Collaboration: The Toolkit as a Developing Infrastructure for Mobilization**

I have described thus far how IMPPRO translated resources, actors and texts into a new inscription that allows influence at a distance. Project participants inscribed their interests into this new toolkit (textual representation that is supposed to remain stable for some time and applicable across library settings in healthcare). Therefore, the toolkit can be seen as an immutable mobile (Latour, 1987). It is mobile because conference presentations and publications put it into circulation and made it accessible; it is immutable because it remains relatively stable over space and time; it is combinable because it can be transformed into other forms of inscriptions (e.g., new data, new journal papers, a revised toolkit).

What makes this immutable mobile powerful is that it can mobilize other actors around impact studies and evidence-based librarianship. The toolkit can become a rallying point for healthcare information professionals and LIS academics. Developing the toolkit means balancing reliability and validity of research evidence, value and impact of professional practice, and visibility of a professional practice. A host of different resources representing the interests of both methodological rigor and practical viability are inscribed in the toolkit. These resources include scholarly literature on the methods used in impact studies, evidence from previous impact studies of library services on patient care and clinical decision-making, advice from statisticians and ethical committees, and experience of conducting previous impact studies. For example, the choice of embedding the critical incident technique derived from a past survey in which health information professionals used this technique in their interviews. Thus, it was thought to be a viable method in library settings, something that other professionals could use as well to do evidence-based librarianship.

The development of the toolkit occurred against the backdrop of changes in the NHD and of the widespread increase in electronic information (e.g., use of Internet, databases) in healthcare.

The toolkit shares some characteristics of an information infrastructure (Star & Ruhleder, 1996):

*Embeddedness*: it is sunk into other structures. The design of the toolkit is embedded in established practices of research studies measuring the impact or value of library services on health outcomes.

*Transparency*: it does not have to be reinvented all the time. The new toolkit aims at providing practical “ready to hand” principles and methods that information professionals can apply to evaluate their own information services, with some adaptations to the circumstances. Instead of designing research methods from scratch, professionals are suggested to turn to the toolkit to get practical advice.

*Having reach or scope*: the toolkit aims at providing healthcare information professionals across the country with a piloted and validated method to measure the impact of their services on patient care; to help them secure evidence of this impact in order to support future development of library services; to identify ways in which the effects of the information service on patient care may be enhanced; to enhance professionals’ research skills; and to integrate other survey tools whose focus of study includes quality of service.

*Can be learned as part of membership*: it is associated with communities of practice. Healthcare information professionals in the country have long recognized the need to evaluate their services and have tools to support assessment.

*It is linked with conventions of (research) practice*: it shapes and is shaped by research principles firmly in place in impact study design, such as use of critical incident technique, random sampling, and data triangulation. A key design issue is the fit with the conventions of impact study design.

*Multifunctionality*: it supports several functions. The toolkit can support more functions, from data collection and evidence-based librarianship to legitimating information services in health-care and justification of investments

Carla, project coordinator, and Juliet, research consultant, saw the toolkit as a work in progress and hoped that other people would become interested in taking the project on, and actually working with them, on using the toolkit and trying to develop it further. They presented it at a workshop at a well-known national health library conference and received positive feedback. Several libraries showed interest in having evidence of the impact of some of their services, and Carla discussed ways forward with a new group (a sort of successor to the panel who funded the IMPPRO initially) to plan impact studies in at least five sites. However, after that initial discussion, initiatives have taken

place slowly. For example, Carla and Laura had been working with a group of health information professionals, using and adapting the toolkit to do an impact study in order to find what is valued before developing a new service in a new organizational structure. Carla had also other contacts with other information professionals who were interested in impact studies, and she adapted the toolkit for a survey in a healthcare library that was looking at service delivery options for the future.

Carla and Juliet also published a paper on the development of the toolkit in a refereed journal for health information professionals. They thought that publishing in a journal would have been the best method of ensuring a wide dissemination of the work. Publication was delayed because the review process was very lengthy, but the authors got throughout that eventually, and the journal editor decided to publish the article as an e-print ahead of publication. Apparently, Carla said, this publisher only does this for important items that need to be published.

To write the paper, Carla and Juliet drew upon the final project report they produced for the Knowledge Development Association at the end of IMPPRO. The report has been made available on the web site of the association for library and information professionals interested in impact studies. Lastly, Carla has organized for one of her postgraduate students in the department to write her dissertation testing out some of the toolkit data collection instruments in a pilot project. The health information professionals involved in this pilot were not funded, but they helped the student by organizing interviewees and helped with distribution of the questionnaire.

All these initiatives show that the toolkit has turned into an actor that has become a representative of the work of the project participants. It is not definitive but provisional and open-ended. By opening up to other potentially interested stakeholders, it can be contested, rejected, or ameliorated. It can act across distances and over time to instigate further problematization and enrollment of other information professionals, and LIS academics and students within the country and abroad. The toolkit can act to sustain the interests and goals of IMPPRO's stakeholders by becoming a delegate speaking on behalf of evidence-based librarianship and leading to new impact studies.

## **10 The Sociotechnical Influence of Events, Actors and Networks in IMPPRO**

This chapter describes the findings resulting from conducting ESA on a temporal list of events based on the long narrative in the previous chapter. First is a description of the list of events entered in Ethno and a chart of the linkages between events in the collaborative process. Second, a full analysis of all the causal relationships between events is presented. In so doing, I also compare the findings to previously reported research, while highlighting new and relevant results.

### **10.1 ESA: IMPPRO List of Events and the Ethno Diagram**

Table 10-1 provides the list of 30 events occurred in each process of translation and stage of research collaboration in IMPPRO. For each event, influential sociotechnical aspects of work that are discussed in the rest of the chapter are identified. To link causally all events, I responded to 257 questions – mainly counterfactual – asked by Ethno. The results of the Ethno analysis are shown in the diagram in Figure 10-1.



**Table 10-1** List of events in IMPPRO

STAGES OF RESEARCH COLLABORATION	EVENTS	TRANSLATION PROCESSES	SOCIOTECHNICAL ASPECTS OF WORK
Foundation	In 2004 Quality Panel commissions a systematic review of the literature on impact studies	Problematization	Institutionalization of the project – Previous inscriptions
Foundation	Two Quality Panel members volunteer to carry out the review	Problematization	Institutionalization of the project
Foundation	The review identifies best practices for development of a toolkit	Problematization	Institutionalization of the project
Foundation	Quality Panel agrees on using the best practices identified in the review for development of the toolkit	Obligatory Point of Passage	Institutionalization of the project
Foundation	Quality Panel commits national money for the development of a toolkit	Problematization	Institutionalization of the project
Foundation	Quality Panel knows a senior academic with experience of impact studies	Problematization	Role of previous ties
Foundation	Quality Panel invites the senior academic to pilot a questionnaire and an interview protocol	Interessement	Role of previous ties
Foundation	Senior academic meets Quality Panel	Interessement Enrollment	Role of previous ties
Formulation	Senior academic and Quality Panel agree on research outcomes	Enrollment	Institutionalization of the project
Formulation	Quality Panel commits funds to the senior academic's university	Enrollment	Institutionalization of the project

STAGES OF RESEARCH COLLABORATION	EVENTS	TRANSLATION PROCESSES	SOCIOTECHNICAL ASPECTS OF WORK
Sustainment	Four Quality Panel members volunteer their library sites for the pilot study	Enrollment	Incentives and Rewards – Cooperation, remote work
Sustainment	Research group designs a draft questionnaire and a draft interview protocol in a distributed and cooperative fashion	Enrollment	Cooperation, remote work
Sustainment	Research group sends the draft questionnaire and the interview protocol to Quality Panel by email for comments	Enrollment	Cooperation, remote work
Sustainment	Quality Panel's individual members comment on the drafts	Enrollment	Cooperation, remote work
Sustainment	Quality Panel's chair collates comments	Enrollment	Cooperation, remote work
Sustainment	Quality Panel's chair sends comments to research group via email	Enrollment	Cooperation, remote work – Nature of work – Use of ICT
Sustainment	Research group mails revised draft questionnaire to Quality Panel's volunteers for the pilot study	Enrollment	Cooperation, remote work – Nature of work
Sustainment	Quality Panel's volunteers pilot the questionnaire at their sites	Enrollment	Cooperation, remote work – Nature of work
Sustainment	Quality Panel's volunteers do not obtain interviews from healthcare staff	Enrollment	Cooperation, remote work – Nature of work
Sustainment	Quality Panel's volunteers have to interview a convenience sample from a different site	Enrollment	Cooperation, remote work – Nature of work

STAGES OF RESEARCH COLLABORATION	EVENTS	TRANSLATION PROCESSES	SOCIOTECHNICAL ASPECTS OF WORK
Sustainment	Quality Panel's volunteers send back completed questionnaires to research group	Enrollment	Cooperation, remote work – Nature of work
Sustainment	Senior academic analyzes data from the pilot	Enrollment	Cooperation, remote work – Use of ICT
Sustainment	Due to a reorganization of the National Health Delivery, Quality Panel merges into Medical Library, the national library for medicine	Enrollment	Institutionalization of the project
Sustainment	Quality Panel changes chair, structure, and priorities	Enrollment	Institutionalization of the project
Sustainment	New Quality Panel Chair carries over the project in its final stage	Enrollment	Institutionalization of the project – Lack of previous ties
Conclusion	At the end of the pilot study, research group prepares a final report with a toolkit for impact studies	Enrollment	Institutionalization of the project
Conclusion	Research group publishes a paper about the toolkit for impact studies in a refereed journal for healthcare information professionals	Mobilization	Incentives and Rewards
Conclusion	Research group presents the toolkit at a workshop at a well-known national health library conference	Mobilization	Incentives and Rewards

STAGES OF RESEARCH COLLABORATION	EVENTS	TRANSLATION PROCESSES	SOCIOTECHNICAL ASPECTS OF WORK
Conclusion	Research group persuades five health libraries to test out the toolkit in their own impact studies	Mobilization	Incentives and Rewards
Foundation	Senior academic discusses ways forward with a new group	Interessement	Incentives and Rewards

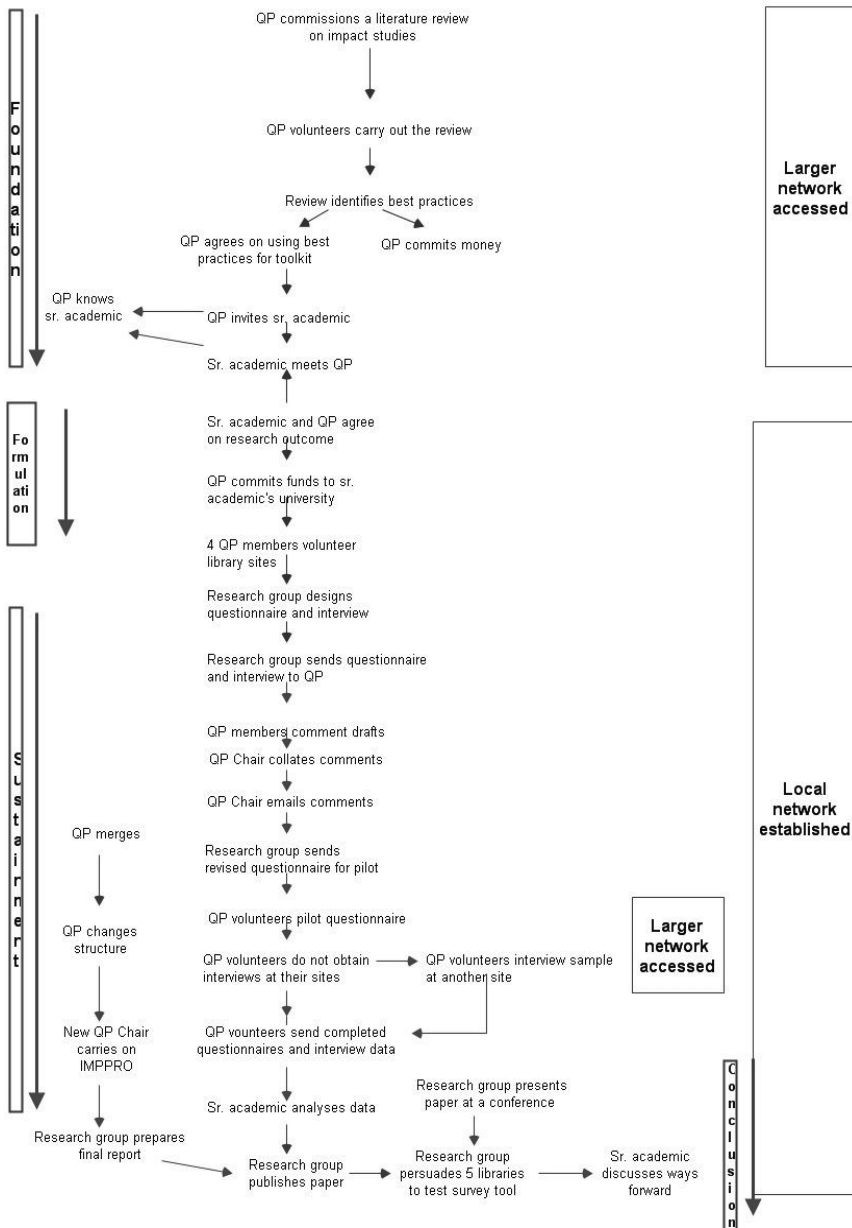


Figure 10-1 Ethno diagram of IMPPRO

## 10.2 Project Institutionalization: the Difficulty of Connecting Local and Larger Networks

The initiation and sustainment of IMPPRO arose from within a group of information professionals, the Quality Panel, who were driven by a professional problem, that is, to show the benefits of library services on patient care and clinical decision-making. Carla, the project coordinator, defined the Quality Panel and overall the Library Development Association as a group trying to represent the bottom-up view of health libraries within the Knowledge Development Association. Thus, the project was institutionalized to some extent, because the Quality Panel provided financial resources to it through the Knowledge Development Association. The diagram reveals that the main sequence of cooperative events in the project has its point of departure in the decision of the Quality Panel to commission the systematic literature review of impact studies in 2004. The decision of using the best practices to conduct impact studies identified in the review [QP agrees on using best practices for toolkit] as obligatory point of passage shows the need of the Quality Panel to contribute to the Medical Library's primary aims, by collecting a reliable body of evidence to determine healthcare staff perceptions of the value of library services. Through this event, the best practices for impact studies brought to the project a program of action consistent with the values and practices of the Medical Library and of the National Health Delivery.

Two kinds of transactions appear to be critical for the project to start. On one side, in return for a politically motivated perception of the need for an evidence-based instrument to measure the impact of library services on patient care, the Quality Panel would be able to allocate financial resources to support the development of such an instrument. On the other side, in return for the provision of funds, the project would provide a final report with a toolkit for healthcare library staff to carry out impact studies. The Quality Panel used resources from actors (the Knowledge Development Association) in the larger network to create a negotiation space where IMPPRO (the local network) could develop. However, as Law and Callon (1992) remind us, it is problematic for a project to control the local and the larger networks. They affirm that "the degree and form of mobilization of the two networks and the way in which they are connected determines both the trajectory and success of the project" (p. 47). The subplot [QP merges – Research group prepares final report] in the diagram displays changes in the structure of the sponsoring panel that affected their level of commitment to the project because priorities changed. Marcus, chair of the new Quality Panel, and Carla, project coordinator, reported (quote No. 54 and No. 52 respectively, chapter 9) that these changes caused a loss of human capital (individual memory and knowledge) and social capital (relations among project team members). The human capital was lost because, when long-tenured staff left, they took with them their knowledge, skills, and other valuable project-related information. The social capital was lost because the turnover of the panel members disrupted long-established relationships that were not replaced because of a lack of communication to recreate social bonding.

As far as the human capital was concerned, IMPPRO had not set up a collaborative technology integrating features that could support both social interactions and information and knowledge sharing. This absence appears to have contributed to a knowledge loss caused by unrecorded off-site meetings, staff changes, phone calls, and deleted emails. Therefore, when members of the old panel left, including the chair who was the main sponsor of the project, the new Quality Panel seemed to be unable to mobilize the expertise and the knowledge of IMPPRO's participants without getting involved in search and adaptation (e.g., establish a relationship with the LIS research group through meetings and emails, and reading all the existing documents). This is a process that the new chair seemed not to have started, as it emerged from his statement (quote No. 54). Without the knowledge of the previous sponsor of the project (who appeared to be indispensable for the stability of the project, so, when she retired, a major ally was gone), the new chair – who entered the project in its final stage and was busy with other priorities – no longer knew what to do with the project, as he said he did not have the knowledge of the context and the understanding of what had been done up to that moment.

As far as the social capital was concerned, the organizational restructuring also disrupted the social bonds created over time. When the new chair stepped in, these social bonds vanished and they were not rebuilt, because a “communication zone” within which all the project partners could communicate was not re-established (see quote No. 52). Because the project was a responsibility to the panel, as Carla said, the research group kept on working on it. However, in the last phase of the project, communication between them and the new Quality Panel was reported to be limited to a few progress updates with no face-to-face meetings. This low degree of interaction suggests an exchange of information rather than collaboration among participants. In fact, there appears to be a low level of interdependence between the research group and the Quality Panel in the final stage of the project with respect to data analysis, production of the final report, and review of the project output. The connection between low level of interdependence – that is the ability to work together across boundaries (Huxham, 1996) – and low level of hierarchy and formalization emerging in IMPPRO seems to be the opposite of that detected in previous studies of collaboration in physics, which found that greater interdependence was associated with decentralization of responsibilities and less hierarchy and formalization (Shrum et al., 2007). One reason for the association between low level of interdependence and low level of hierarchy and formalization can be found in the type of project. Unlike the projects studied by Shrum et al., IMPPRO resembles more the case whereby an organization conducts research by contracting out for the services of another organization. The contractor, the Quality Panel, purchases a service on a contract basis from another party, the LIS department, rather than being committed to dedicating resources (e.g., time, knowledge) to agreed upon goals. This type of cooperation entails a low level of interdependence when boundaries are clearly set with respect to task responsibilities.

The institutional character of the project also emerges from the fact that healthcare

informational professionals are likely to need the support of their organizations (e.g., human resources at hospitals) to carry out future impact studies. The research group made it clear that if healthcare organizations consider future impact studies as research, instead of audits on the impact of health library services<sup>53</sup>, ethical approval will be necessary and this would be a considerable barrier, because meeting the requirements for ethical review can be a daunting job, as stated by Hannah and Carla in the previous chapter (Quotes No. 47 and No. 48). Furthermore, employers should allow information professionals to take time off to team up to conduct impact studies in each other's library sites to avoid biased results. As Juliet, the project research consultant, noted during the interview, if the evaluation were carried out by internal library staff, then library users would probably give different responses from if the evaluation were carried out by people outside the library, or by other libraries' staff. Hence, methodological issues can turn into organizational issues for future impact studies. This finding suggests that the toolkit inscribes a program of action that can encourage information professionals to produce and use evidence in their professional practice and decision-making, as well as to find opportunities for professional growth, development, and collaboration. As pointed out by the research group in the final report of the project, healthcare organizations can support this program of action by letting information professionals team up to conduct impact studies in each other's library sites and consider them as audit projects to avoid the need to obtain research ethics approval.

## **10.3 Cooperation, Remote Work and Collocated Work in the Local Network**

### **10.3.1 Cooperation, Interdependence and Nature of Work**

The main sequence of cooperative events [Research group designs questionnaire and interview – Research group publishes paper] displays the co-operative and asynchronous character of the work. The research group including the research consultant and the information professionals played different roles and performed different tasks. Some scholars distinguish between collaboration and cooperation according to the degree of division of labor. Whereas division of labor in collaboration is dynamic, in cooperation there is a fixed division of labor generally made explicit in the initial stage (Dillenbourg, 1999). In a similar vein, Melin (2000, p. 36) stated that two different types of working conditions can be identified in collaboration. One where there is a clear division of labour and one person coordinates all the tasks and makes decisions. Another one where mutual discussion and intellectual exchange take place for quite some time over many research issues, before starting the project and collecting data and meeting regularly. These two types can be considered two ends of a spectrum in

---

<sup>53</sup> The distinction between audit and research is not clear-cut. The major bureaucratic distinction between audit and research is that research investigates what should be done, whereas audit investigates whether it is being done, and if not, why not (Wade, 2005, p. 468).



which different combinations of working conditions exist.

As described in section 9.3.2, in IMPPRO, the division of tasks was clear, and Carla played the role of research leader and did coordination work as well. However, the structure of the project was developed and maintained without applying hierarchical management or formal arrangements, and collaboration did not appear to be hierarchical in decision-making. In IMPPRO, the work was divided in a systematic way at the outset according to allocation of funding, expertise, and the opportunities that each participant brought with her in the project. The research group performed research tasks cooperatively, as described in section 9.3.2, based on the respective expertise and workload, with the advice of the project research consultant. The Quality Panel's members who volunteered their sites for the pilot were involved locally with arrangements (such as liaising with the human resource department) for their own library. Interactions between the research group and the information professionals occurred primarily after the former produced a draft questionnaire and interview protocol [Research group sends questionnaire and interview to QP]. In other words, a greater degree of interaction seems to have occurred between the research group and the information professionals during the process of development of the data collection instruments. The Quality Panel's members commented the content of these instruments asynchronously. Their feedback was collated individually from the chair and sent back to the research group [QP members comment drafts – QP Chair emails comments]. The degree of interdependence appears to be low throughout the project, although it seems greater during the phase of construction of the data collection instruments and during the pilot study. This finding confirms that communication can be more intense during the design of a research instrument than in other temporal phases of a collaborative project (Shrum et al., 2007). The greater flow of communication in this phase of IMPPRO can be associated to the need of representing the viewpoints of the Quality Panel in the questionnaire. As noted in chapter 9, from the beginning IMPPRO was characterised by no clear internal hierarchy of authority, although there was a research leader. Carla and her research group were responsible for the development of the questionnaire, but the Quality Panel's members had the opportunity to comment on it. This is a characteristic of collaborative interactions (Dillenbourg, 1999). In collaboration, “one partner will not impose his view on the sole basis of his authority, but will - to some extent - argue for his standpoint, justify, negotiate, attempt to convince” (p. 9). Some negotiations of this type seemed to have occurred in IMPPRO and to have influenced the content of the questionnaire which was revised collaboratively [Research group sends revised questionnaire for pilot], as Juliet reported:

*The initial questionnaire and interview schedule were based on good practices from the systematic review and the work that Carla and her team had done. Once Carla and her team had done the research and had developed the tools, than those went back to the Quality Panel for comments and the Quality Panel did comment on those tools. I would say that this process has occurred in collaboration [No. 64].*

However, Juliet's view was not shared by all the interviewed project participants. For example, one of the LIS research assistants, Hannah, recalled to have received few comments:

*I contacted the Quality Panel's individuals for them to look at the questionnaire for suggestions. I did not have very good {little} feedback from them, I remember that [No. 65].*

The degree of interdependence was very low after data were collected and sent back to the research group. This group was contractually responsible for these tasks and worked on them only with the contribution of Juliet. Also in this case, one reason for the association between low level of interdependence and centralization of responsibilities for the research tasks can be found in the type of project, whereby the Quality Panel contracted out the research work to the LIS department. In addition, the merge of the Quality Panel with the Medical Library appears to have reduced the level of interdependence even further. As described in section 9.3.3, communication and cooperation between the research group and the Quality Panel were disrupted by the merger, and interdependence between the two groups reached its minimum in the final stage of the project. Consequently, accountability for the delivery of the final report was not shared but rested only with the research group – in particular with Carla, the project coordinator – and the research consultant.

### **10.3.2 Remote Work and Collocated Work**

As all project members were distributed and the location of the research group was a long way from other project participants, arranging meetings was difficult. Therefore, most of the cooperative work took place by email. The use of email may have strengthened the cooperative nature of the project based on the division of tasks, because groups forced to rely on e-mail tend to work more independently, especially in the early stages of a project, when they are setting direction (Galegher & Kraut, 1994). At the same time, the division of labor is better suited to collaboration over distances (Borgman, 2007). E-mail and telephone made it possible for dispersed people to work together, removed the requirement for proximity, and, as a result, facilitated communication among people whose schedules did not align easily. Furthermore, dependence on physical proximity would have undercut the possibility of initiating the project and staying on the budget, once the project started. Consistently with Nardi and Whittaker (2002, p. 106), IMPPRO appears to show that “as little travel as possible is the optimal solution to the problem of distributed work, to minimize the substantial personal and organizational costs”, especially in a low-budget project like this. However, Nardi and Whittaker also said that quantifying “as little as possible” is problematic and depends on many situational factors. Too little face time can hinder understanding and make communication more difficult. In line with this argument, none of the interviewed IMPPRO participants considered remote work as a full substitute for collocated work. Lack of face-to-face conversation can lead to ineffectiveness of communication and can limit the amount of feedback, because of the lack of responses from project par-

ticipants, as exemplified by the comment No. 62 from Carla, project coordinator.

Regular face-to-face meetings or synchronous communication over the phone were still regarded as most useful to discuss work and support grounding (Finholt, Sproull, & Kiesler, 1990). As Arianna, a Quality Panel's member and senior information professional, said:

*I think it depends on what it was you wanted to be doing at that time. Email was fine for some things. If emails were getting very tangled, I would ring up. Sometimes you can go and on in emails and you think you are not getting anywhere [No. 66].*

A relatively static medium such as writing could be sufficient for exchanging information, but tasks that involve multiple perspectives and information that is susceptible to multiple interpretations—characteristics of the planning and integrative phases of intellectual teamwork—are typically associated with high levels of direct, informal, and face-to-face communication (Galegher & Kraut, 1994). This could be the case with the discussion of the questionnaire: that was a part of the project that needed multiple perspectives and it might have been better supported by more frequent collocated meetings rather than email. The effect of the lack of proximity on collaboration seems to emerge here. The research group appeared to be unlikely to complete their task by relying only on email. Because some Quality Panel's members did not respond to emails, as exemplified by statements No. 62 and No. 65, the research group had to call them on the phone to solicit feedback on the draft of the questionnaire. Had they all been collocated, it might have taken relatively less effort for them to start interacting. This claim is consistent with evidence from the literature showing that proximity facilitates planned meetings, and avoids or minimizes problems that researchers are likely to face at work (e.g., Kiesler & Cummings, 2002; Olson, Teasley, Covi, & Olson, 2002; Olson & Olson, 2000). For this reason, physical collocation has consequences for the frequency of encounters (Kraut et al., 2002, p. 140). For example, in IMPPRO proximity appeared to be important for Carla and Juliet when they had to write the final project report. Research similarity between the two researchers and geographical closeness enabled them to meet in person and supported successful collaborative drafting. This is an instance of collaborative work showing both synchronicity and interactivity. Meeting face-to-face to write the report allowed the writers to provide feedback to each other during the composition process and engage mutually in the process.

In the absence of face-to-face meetings, the project participants seemed to prefer synchronous media, such as the phone, for addressing complex matters and disentangle things. This finding is consistent with the literature (e.g., Olson & Olson, 2000; Nardi & Whittaker, 2002; Kraut et al., 2002). As to the use of the phone, Kraut et al. (2002, p. 151) suggested that telephone supports interactive grounding, and Galegher and Krout (1994) said that telephones permit easy communication across both short and long distances, and support naturalistic interaction embodying many of the features of face-to-face conversation.

## 10.4 The Role of Previous Ties in Starting the Local Network

The enrollment of human actors in IMPPRO shows the importance of personal networks. It is critical to be part of a scientific network, know people in one field, and communicate with them (Melin, 2000). Therefore, successful collaborators must identify and form connections to others whom they believe they are both competent and relevant with respect to a work project (Kraut et al., 2002). As described in section 9.3.2, the senior academic was invited to participate because the Quality Panel had known her for a long time and valued her knowledge and expertise in the field of health information management and impact studies [QP knows senior academic]. Consequently, several Quality Panel's members and Carla had already developed common ground, liking and trust through working together or educational experiences. Common ground and mutual knowledge developed through previous interactions are likely to have compensated for the lack of physical proximity in the project. These aspects were a necessary precondition for the initiation of IMPPRO and confirm previously reported results in the literature (e.g., Nardi & Whittaker, 2002; Melin, 2000). Juliet made it clear in this statement:

*Probably one of the things that helped with Carla and myself working together with the other members of the group [was that] we did already know one another. It was easier to collaborate and create understanding. From other projects that I have done, I would support that getting to know one another at the beginning is very important and after that you have much more flexibility in the tools that you use, or the ways you collaborate [No. 67].*

## 10.5 Incentives and Rewards

### 10.5.1 Extrinsic Rewards

All the interviewees' responses indicate a lack of extrinsic rewards (e.g., wages, bonuses, and job promotion) from their employers. Publications derived from the project were a reward per se, and although they were acknowledged by employing universities, they did not affect future career or bring monetary rewards. For example, Carla, the project coordinator, reported not to have received significant acknowledgements from her employer – a university – because, she said, the activity was “unusual” for her department and there were almost no other colleagues sharing her interests and working in the same area of research. Asked whether she was the only person interested in impact studies within her department, Carla said:

*One other colleague has been interested in performance measurement in the past and has some background interests, but yes, I think I am probably the only academic*

*in the department with experience of impact projects, and the research staff - well, they are the only research staff in the department at present to collaborate [No. 68].*

This finding confirms that when there is only one researcher in a department working in a specific area and involved in a collaborative project with external collaborators, this researcher tends to be marginalized because his/her presence in the department is small (Cummings & Kiesler, 2005). Carla's university supports collaborative projects because they can bring money, but IMPPRO was a low-budget project and Carla asked the university administration not to take overheads off the top of their small operating budget:

*Well, we can only ask, but what actually happens is another matter! If the research staff actually used up the grant - in their pay - then there is no surplus for the department. I do not think we overspent - otherwise the finance officer in the department would have moaned, but we did not have the usual surplus expected to feed other department costs [No. 69].*

Carla also added that the small scale of the impact project probably meant that very little money went into her private fund. The lack of surplus from the project did not allow the purchase of new equipment for the two research assistants who had to use older computers, as described in the previous chapter, which were surplus to department requirements because other computers in the department had been replaced.

## **10.5.2 Intrinsic Rewards**

Against this lack of extrinsic rewards, intrinsic rewards, such as satisfaction or a feeling of accomplishment, played an important role. Participants felt intrinsically motivated to work in the project. For example, Carla recalled:

*I enjoyed being able to have a goal and update the impact stuff. Now, it was good to get some people involved, people who were interested and tried to sustain their interest. And to use the toolkit would be good [No. 70].*

One of Carla's research assistants:

*I enjoyed the fact that I was given that responsibility {in the project}, but Carla was always very good at that. She was very good with her research staff - used our initiative, gave us a challenge, but she was there to support us or for advice, so it was enjoyable [No. 71].*

Good will drove Arianna, a Quality Panel's member:

*I have done a lot of research over the years and you just do not expect rewards, you know you are not going to get them (laughs), concrete rewards I mean. I have monthly meetings with my manager, and every study that has taken place I tell her and she says very good and well done, but that's about it, really. I think the rewards are for yourself, you are helping the cause [No. 72].*

Intrinsic motivations were very important to the Quality Panel's members also because they acted in a volunteer capacity, as only a small sum was allocated to their employers, which the panel's members did not receive personally, but was paid to the human resource departments.

The sense of achievement was also very important. For example, Arianna commented that having produced the toolkit was most satisfying for her:

*The toolkit and how it is been produced {was most satisfying}. I am the chair of the Quality Panel in this region, and we have a web site and I have been able to put a link to the toolkit and widely disseminate it. That has been very good [No. 73].*

The links to the toolkit becomes an actor that connects IMPPRO to the larger network and shows an achievement, one to which the panels' members have contributed. Consequently, the display of such a link appears to act as a form of legitimation that lent the Quality Panel's members authority and respectability as information professionals in the face of other organizations in healthcare. Mila, another Quality Panel's member and information professional, said:

*As a professional person in librarianship, I feel that if people are doing research you've got to support them, because people can't do it on their own, especially when they're doing a survey over the country. If everybody says "I can't be bothered to do it," nothing would ever get done. I'm a firm believer in actually participating in these things to improve and when, obviously, the results are published, they hopefully raise the profile of libraries and what they do [No. 74].*

In addition, the link to the toolkit via the web site could help mobilize other actors from the larger network. These actors may include other healthcare libraries, higher education institutions, and healthcare knowledge organizations focussed on patient care and interested in helping information professionals provide value in this respect. These actors are important because they can provide resources, as the Knowledge Development Association did at the beginning of IMPPRO, to start and support new projects.

## **10.6 Use of ICT and Intellectual Property**

In section 9.3.5, I described how department policies regulating the use of ICT constrained the LIS research group. These policies were oblivious to the needs of researchers by imposing upon them limitations on the use of ICT. Thus, the LIS research group decided not to setup a web site for the project because they were not granted the autonomy to publish their content when they needed. Carla commented the situation:

*It is difficult to set up a web site in the department. I have my own web site but I just use it to put research reports on that. The main difficulty is to try to get a web site. It is difficult to set up one in the department, because we have to feed materials to some-*

*body else to put materials up. That doesn't work. We paid for the web site for another project. That worked all right, but we have ceased to pay the subscription so the web page no longer exists [No. 75].*

The lack of a common digital place (e.g., a project web site) can be a problem for the sustainability of the digital resources (e.g., data, publications) produced by a small project, especially when issues about other long-term preservation are not addressed in project plans (Ikonomov & Dobрева, 2009). The space granted to the research group by the university was the institutional repository, where scholarly publications (e.g., academic papers, academic conference presentation materials) are stored, managed, and disseminated.

Carla uploaded IMPPRO final report there, but the lack of a common digital place for the project led to the perception by the Quality Panel of the “disappearance” of the final report. Arianna said:

*I have been asking our regional director what actually happened to this impact study and he {did not know}. We did not actually know what happened to it and it was only very recently that we found out that it was published internally on the web site at the LIS research team's university [No. 76].*

But the final report was also sent to the Medical Library, Carla reported:

*We did send the report to them and it appeared on their website around the same time I was putting the report in the repository. God only knows where it is now that the Medical Library has changed again into something else. At least the report is still there in the repository!! [No. 77].*

The two quotes denote two difficulties. One concerns the lack of communication between the research group and the new Quality Panel. The information professionals who volunteered in the pilot did not know where to find the final report. This absence of communication seems to confirm the disruption of the local network that followed the merge of the Quality Panel, as described in the previous chapter.

The other difficulty concerns two main disadvantages of institutional repositories, which are visibility and accessibility of publications (Eriksson, 2007). While these repositories provide researchers with an infrastructure made up of tools, practical assistance, and copyright, among others, they can make it difficult to search publications (Eriksson, 2007). In this case, the institutional repository seems to have failed to grant visibility to the project final report. Consequently, it has constrained the ability of the toolkit to act as an immutable mobile and connect with other actors interested in conducting impact studies and applying evidence-based librarianship. In this respect, presenting the toolkit at the health library conference appears to have been a more effective way of mobilizing other information professionals around the toolkit.

In addition to managing and disseminating traditional scholarly publications, institutional repositories could provide a framework for managing, preserving, and providing access to other digital objects such as primary data (Lynch, 2003). Given the

absence of a digital common space for the project, the participants may have benefited from an infrastructure taking stewardship responsibility for the content, for example the small dataset<sup>54</sup>, they had produced. As far as the access to this data was concerned, Carla said that it depends on the project and the informed consent arrangements. With projects conducted for the NHD, the emphasis is on confidentiality and data protection, and the general intention is that data is stored for the minimum time possible – until all analysis and reporting is complete – and then destroyed after that. For qualitative data, she thought there should be more access to original data sets, but it would demand much processing after the project to remove all possibly identifying labels, plus deciding whether only extracts should be put up, always for confidentiality reasons. Small budgets do not afford this work, she concluded:

*For our dataset – a simple spreadsheet – even that would require some time to tidy it up for public consumption. With limited resources – well, it is not going to happen [No. 78].*

Asked who owned the copyright of the published work, Carla responded that this aspect was never discussed in the project. However, the university policy is to retain the intellectual property rights created by employees in the course of their employment wherever possible. As the Medical Library had disappeared into yet another organisation, she thought that the practical answer was that the toolkit belonged to her university, as she and her group did the work and made the alterations. This comment seems to reflect a lack of interest on the part of the university in this intellectual property. This lack of interest may be associated to the small size of the project, and/or the perceived no commercial value of the toolkit.

As networks are unstable and actors come and go, technologies appear to be necessary to confer relative stability to the work done during a project, and to avoid project outputs go unnoticed and/or records of things done vanish. While institutional repositories can play a role to provide access to datasets as integral part of the record and discourse of scholarship, questions arise about how to process the data before making it accessible, when economic and organizational resources are scarce. It is clear that providing data to institutional repositories raises complex questions about roles, responsibilities over resources, and strategies (Lynch, 2003). When research data management is not taken care of in some forms at the institutional level, digital datasets are managed by individual researchers, and the risk of disappearance may be high, especially in small, stand-alone projects like IMPPRO.

## 10.7 Summary

This chapter detailed the sociotechnical aspects of work that characterised the actors' local work environment and influenced the process of construction of IMPPRO. In this

---

<sup>54</sup> Carla said that the dataset they produced was less than 100 MB. As she and her research group were doing a pilot study, the need to store data was minimal.



case, the project group shared many characteristics with conventional project teams. The project was institutionalized to some extent and the changes in the funding organization affected collaboration, by disrupting the long-established social bonds among project participants and bringing about loss of human and social capital.

The findings of ESA suggest the following claims. First, the “gift culture” (Raymond, 1999) played an important role because the professionals participated without compensation. Intrinsic rewards motivated them to contribute to the project, whose goal was to produce an outcome that would be shared and beneficial to the larger community of health library and information professionals. Second, common ground and trust developed through previous ties were a necessary precondition for the initiation of IMPPRO, because they sustained collaboration and understanding, and were likely to have compensated for the lack of physical proximity in the project. Last, the lack of a collaborative system supporting both social interactions and information and knowledge sharing appears to have contributed to the knowledge loss caused by unrecorded off-site meetings, staff changes, phone calls, and destroyed emails.

# 11 Sociotechnical Framework and Propositions

## 11.1 Introduction

Collaboration between and researchers in a virtual organization enables geographically distributed people to work interactively on a common project. Each participant is a stakeholder who aligns his/her interests and contributes to the project under the influence of sociotechnical characteristics of his/her local working environment. Collaboration is never “location neutral”, thus an understanding of these aspects is needed to enable the process and increase the likelihood of success.

In this chapter, I present a sociotechnical framework (STF) to show how sociotechnical aspects of work organization enable or constrain the foundation, formulation, sustainment, and completion of small-scale, distributed, no grant-funded or small grant-funded collaborative research projects between academics and professionals in LIS under certain circumstances. The STF has its empirical base in actor-network theory, which I used to conceptualize sociotechnical aspects of work organization as a set of structural relations that either enable or constrain actors’ decisions and activities in collaborations. In developing the STF, I have drawn from the findings of the three case studies and from the research literature reviewed in chapter 3. After clustering and describing the sociotechnical aspects that emerged from the analysis, I derived four testable propositions about the relations among such aspects that can affect the foundation, formulation, and sustainment of small-scale, distributed, no grant-funded or small grant-funded collaborative research projects between academics and professionals.

## 11.2 Extension of Olson et al.’s TORSC

As noted in Chapter 3, Olson et al. (2008) have proposed an initial theory of remote scientific collaboration (TORSC) describing the aspects that they and other researchers believe are important in determining the success of remote collaboration in science. Olson et al. identified five main key elements that affect distributed collaborations but are also critical to collocated projects. These factors include the nature of work, the amount of common ground among participants, participants’ readiness to collaborate, participants’ management style and leadership, and technology readiness. At its core, the TORSC states that groundbreaking thinking can happen when diverse scientists work together and bring multiple perspectives to bear on a common problem. Technology allows distant and diverse scientists to carry on and coordinate their collective work. However, when large-scale and multi-disciplinary groups of scientists work together, major tensions may arise, because these groups tend to have less common ground, lower degrees of trust, and the need for stricter coordination and management. Drawing generalizations from the Science of Collaboratories (SOC)’s database and

from the research literature, the authors identified the main factors that appear to be important for successful large-scale, multi-institutional, and multi-disciplinary distributed collaborations in science and engineering. They concluded that further research is needed to explain the logical connections between the factors and to identify which factors are the most significant and under what circumstances they apply.

The STF presented in this chapter attempts to extend the TORSC to the context of small-scale, distributed, no grant-funded or small grant-funded collaborations between academics and professionals in a social science. The goal of the sociotechnical framework is to indicate patterns from the three case studies and use them for a threefold purpose: (a) contribute to a better understanding of collaboration between academics and professionals, not only in LIS but in other fields affected by the research-practice gap; (b) augment research on small-scale and distributed practice-research collaboration; and (c) inform the way we might go developing and sustaining this type of collaboration.

The projects examined in this study are very different from the large-scale collaborations in science and engineering included in the SOC's database, which constitute the basis of the TORSC. On one side, the observed projects are small, relatively homogeneous, strapped for resources, intradisciplinary, lowtech, and tend to relate their possibility of being setup and funded to contacts and relationships outside institutions. On the other side, the projects included in SOC are much larger and far more complex, given that they can involve multiple individuals and groups across disciplines and institutions; they have much more human, financial, and time resources to handle organizational complexity and expensive experiments; they often use specialized and complex technologies to study particular problems, and they are primarily institutionally based, as they relate their possibility of being setup and funded to their embeddedness in universities or research institutes.

The results of this study support the idea that size of the project, limited resources, lack of need for high performance computing or very innovative scientific tools, and ties and relationships with groups external to institutions are important features to take into account in the development of a theory of remote scientific collaboration. In fact, these features are the product of underlying social processes that are different from those in large-scale collaborations, and result in different collaborative practices. Although several sociotechnical aspects identified in the TORSC are patterns occurred in slightly different ways in the three observed projects, other aspects unfolded very differently. These salient differences suggest an extension of the theory. Whereas the TORSC points to areas that call for attention and remedial actions when collaborations are large and diverse, the suggested extension calls for attention when collaborations are emergent, small-scale, with no or little external funding, and need the help and goodwill of volunteers. This extension may apply to collaborations between academics and professionals not only in LIS but also in other fields affected by the research-practice gap.

## 11.2.1 Sociotechnical Influences on Practice-Research Collaboration

The analysis of the three cases of practice-research collaboration provides a rich picture that describes key actors, different reasons for collaborating, and different sociotechnical influences on the practices of collaboration. However, it also identifies a number of common experiences. The analysis of the data suggests the emergence of patterns of influence. Such patterns form the basis of the STF. In this section, I described them by clustering the sociotechnical aspects emerged from the data analysis in the five categories established by Olson et al. (2008). These categories have been used to organize the findings of the literature review in Chapter 3 (see Table 3-4). Furthermore, the clusters of sociotechnical aspects are arranged in the four processes of translation (Callon, 1986a) and the stages of research collaboration (Sonnenwald, 2007), used to structure the narrative of each project (see Table 4-4).

The details of the STF are listed in short form in Table 11-1 and are discussed below.

**Table 11-1** Sociotechnical aspects influencing practice-research collaboration (based on Olson et al. (2008))

<p>PROBLEMATIZATION AND INTERESSEMENT – STAGES OF FOUNDATION AND FORMULATION</p>
<p><b><u>Collaboration Readiness</u></b></p> <p>Common interest in developing solutions to improve practical problems and applications spur collaboration</p> <p>Motivation to work together includes the need to join forces because of economic and organizational constraints, and a mix of required skills required, similar disciplinary background, compatible expectations, pleasure from working together</p> <p>A culture of inclusiveness prevails, as neither academics nor professionals dominates</p> <p>Professional interests, altruistic and personal values prevail over extrinsic interests (although publications are the main extrinsic motivation for academics)</p> <p>Effects of successful collaboration on careers of both academics and professionals are negligible</p> <p>Collaborations are initiated and developed autonomously by professionals and academics without being mandated by employers or funding agencies</p> <p>Participants decide autonomously whether to join projects or not. There can be exceptions though (e.g., students, who can be obliged)</p> <p>Participants are likely to be used to working collaboratively or cooperatively</p>

**Common ground**

Previous ties, shared experiences of collaboration and knowledge sharing, similar disciplinary background and compatible work styles facilitate common ground among remote participants

ENROLLMENT – STAGE OF SUSTAINMENT

**Nature of Work**

Participants can work independently for the most part because they have established common ground, and /or work is divided into discrete pieces that they can handle individually

**Collaboration Readiness**

Mutual trust and transactive knowledge help reduce time and effort needed to make decisions when resources are constrained

When contracts and sanctions for non-compliance are not in place, intrinsic motivations and an open and informal management style spur empowerment that fosters mutual trust

**Management, Planning and Decision Making**

No institutional involvement and commitment

Applying for funding is not seen as worth the effort when mechanisms are complex and cumbersome

Projects rely on contacts and relationships with external associations to recruit collaborators, most of which volunteer

Agreements among project participants can be informal and unwritten, relying on goodwill and without legal implications in case of withdrawal or non-completion

No financial issues may exist

Projects do not have a structured management approach (e.g., no formal management plan) and external control mechanisms

Intrinsic motivations can play a role in focusing attention of participants on the goals of the projects, when there are no external control mechanisms

Artifacts (e.g., technologies) can play coordination and management functions

No knowledge management plan is in place

**Technology Readiness**

General-purpose technologies play a main role

Collaboration technologies must provide the needed functionalities, and be web-based, easy to use, and inexpensive

Need for technical support must be minimal, as it can be unavailable

MOBILIZATION – STAGE OF CONCLUSION
------------------------------------

<b><u>Management, Planning and Decision Making</u></b>
--

Unless there is a requirement for data protection and confidentiality, there is open access to project outputs and a repository is available or made available
--

Project outputs (e.g., publications, conference presentations, data) are likely to play a critical role to increase visibility and outreach
---

## **Stages of Formulation and Foundation – Collaboration Readiness**

### ***Collaboration Goals and the Need to Collaborate***

In all the three projects, professional interests in developing solutions to improve practical problems and applications spurred collaboration between academics and professionals. The findings indicate that in all the three cases academics and professionals co-constructed collaborations goals and aligned interests during the formulation stage. An implication of this is the possibility that doing research valuable and relevant to professionals motivates them to collaborate and makes it easier for academics to obtain their buy-in, which can be a real challenge otherwise (Sonnenswald, 2007). However, articulating collaboration goals that motivate both professionals and academics requires that both the groups are willing to respect each other's needs and frames of references (Ospina et al. 2001). None of the examined collaborations appears to be dominated by either group. On the contrary, the project coordinators in the three projects appear to have considered the potential contribution of each participant and the resources that each of them could bring to the project. They also negotiated shared goals for mutual participation – that is, goals for cooperation, shared benefits, shared decision-making, and completion of the task. The motivation to work together included the need to join forces because of economic and organizational constraints, and a mix of elements, such as skills required to achieve the goal, similar disciplinary background, compatible expectations and working styles, and the belief that collaboration can be beneficial to everyone.

### ***Incentives and Rewards***

The finding from this study accords with earlier observations of participants in the open-source phenomenon (Markus et al., 2000; Wasko & Faraj, 2000) and scientific collaborations (Olson & Olson, 2000; Bos et al., 2006), and indicates that what motivates individuals to decide to volunteer in collaborative projects are primarily professional interests and altruistic and personal values, such as giving something back, helping each other out, and enjoyment. In all the projects, self-interest was not the main driver of participants, although researchers had the opportunity to collect data for publications and professionals enjoyed relatively inexpensive help to study a practical problem. Rather gift-culture was an important aspect, and people were mainly

driven by intrinsic interests. Despite the prevalence of intrinsic motivations in the formulation and foundation stages, extrinsic motivations including development of new skills and networking with like-minded colleagues also count, as previously reported in the literature (Corley et al., 2006; Barrett et al., 2004; Arzberger & Finholt, 2002; Hara et al., 2003; Olson & Olson, 2000).

The analysis of the three cases shows that producing publications was still the main extrinsic motivation for academic participants. Interestingly, in all the three cases, both academics and information professionals did not expect that career or promotion opportunity resulted from their work in the projects. Therefore, in all the three cases, the effects of successful collaboration on careers seem negligible, contrary to what the TORSC states (e.g., scientist being able to make stronger tenure cases because of successful participation in collaborations) (Olson et al., 2008). A possible explanation for this is twofold. One is that participation in these collaborations was either voluntary (except for the students) or bottom-up, initiated and developed autonomously by information professionals and LIS academics, who had a genuine interest in a given topic and not because they were mandated by their employers or funding agencies. This finding is consistent with those of Melin (2000) who, in his study of collaborations in Sweden and the USA, found that they were initiated only by the researchers themselves, without other initiators, and that their forms were the product of the researchers' own organizational design. This pragmatism, together with a high degree of self-organization that he found in his study, also appears in the three investigated cases, not only in the two Italian projects but also in that in the other European country. Even though the latter project was funded through a small grant of a national organization, a pragmatic attitude to collaboration was dominant, because the information professionals themselves chose the researcher they wanted to collaborate with, and negotiated with her the form of collaboration. In addition, participants had ample discretionality over how to conduct the project.

The other explanation is that participants' (both academics and professionals) employers did not appear to reward the work in these collaborations, because either they did not see much value in them, as in the Italian projects, or they did see a value but did not reward these efforts nevertheless, as in the other European project.

### ***Shared Collaborative Culture***

The majority of information professionals and academics involved in the three projects are likely to be used to working collaboratively or cooperatively with colleagues. In both the countries, information professionals collaborate within professional associations. For example, the Italian Library Association is driven by a spirit of voluntary contribution and cooperation. This gift culture is rooted in a long-established tradition of forming partnerships based on volunteer work, and has been seen as a way to promote participation, solidarity, and pluralism. In the other European case, health information professionals have been networking with each other and with other partners, to develop and support initiatives to develop library workforce capacity. As far as

LIS researchers were concerned, they also shared a strong willingness to participate in collaborations, even on a personal level, and even when their departments did not put much emphasis on this type of activities. These results are in agreement with the TORSC construct that people are more motivated to collaborate when they have experience of working in domains whose culture is collaborative (Olson et al., 2008).

### **Stages of Formulation and Foundation – Common Ground**

This study indicates that common ground is relatively easy to achieve in small, relatively homogenous, and intradisciplinary groups. This finding confirms Olson et al. (2008)'s belief that common ground is inversely associated with diversity among participants. It also seems to be consistent with other research, which found that participants with previous ties, shared experiences of collaboration and knowledge sharing, similar disciplinary background, and compatible work styles are more likely to achieve common ground when they work remotely (Sonnenwald, 2007; Thune, 2007; Hara et al., 2003; Nardi & Whittaker, 2002; Olson & Olson, 2000). Through shared past experiences and personal relationships, participants develop mutual trust and transactive knowledge about each other's knowledge, expertise, methods, working styles, available time, and commitment (Haythornthwaite et al., 2006). In addition, transactive knowledge supports quick decision-making because members know who does what tasks and who has responsibilities (Brandon & Hollingshead, 1999). One of the implications emerging from this finding is that mutual trust and transactive knowledge, developed through shared experiences and personal relationships, play a critical role in resource-constrained collaborative projects, because they reduce the amount of time and effort needed to achieve common ground when participants are distributed.

### **Stage of Sustainment – Nature of Work**

This study indicates that small, resource-constrained, and distributed collaborative research projects manage by relying on participants who can work independently for the most part, because they have established some common ground, and/or by separating the work into discrete pieces that individuals can handle alone. The division of labor is better suited to collaboration over distances and asynchronous communication (Borgman, 2007). However, when participants find the task ambiguous and complex, like the students in SemOP1, or the information professionals and researchers in IMPPRO, either they need to meet face-to-face or to talk in real time via a synchronous medium (e.g., phone) to understand better what to do and how to do it. If participants find the work relatively unambiguous and tasks are independent, like in SemOP2 and IMPPRO, asynchronous communication such as email and mailing lists can be used. However, in all the three projects, participants said that a few collocated meetings would have helped disentangle issues and helped people to become more acquainted with one another.

The use of asynchronous media appears to have strengthened the loosely coupled



nature of the project, as individuals forced to rely on these media tend to work more independently, and have weakened the communication flow. For example, the level of participation in the mailing lists in the examined projects was low. These results corroborate the findings of a great deal of the previous work in this field (Olson et al., 2007; Barrett et al., 2004; Birnholtz, 2004; Kraut et al., 2002; Chompalov et al., 2002; Olson & Olson, 2000).

## **Stage of Sustainment – Collaboration Readiness**

### ***Mutual Trust and Transactive Knowledge***

Similarly to what has been discussed regarding common ground, mutual trust and transactive knowledge, developed through shared experiences and personal relationships, also facilitate alignment of interests in resource-constrained distributed collaborative projects both at the stages of foundation and formulation and during the sustainment of the project, because they help reduce time and effort needed to make decisions. This result is consistent with those of previous studies which show the importance of mutual trust (Olson & Olson, 2000), and sharing of transactive knowledge (Haythornthwaite et al., 2006; Brandon & Hollingshead, 1999).

An implication of this finding is the possibility that mutual trust and transactive knowledge are associated to performance in non-institutionally based and resource-constrained collaborative projects. Therefore, in contrast to the claim of Shrum, Chompalov, and Genuth (2001), it is possible that, in this type of projects, collaboration depends on a distribution of work “in ways that are not conducive to building trust among those without some prior history” (p. 682).

Additionally, when contracts and sanctions for non-compliance are not in place, like in SemOP1 and SemOP2, intrinsic motivations and an open and informal management style spur a sense of empowerment that, in turn, can foster trust among project participants, especially between project coordinators and the other participants. This relationship allows individuals to engage in the project with minimal or no personal or professional risk and cost.

## **Management, Planning and Decision Making**

### ***Institutional Embeddedness***

The findings related to this aspect indicate significant differences between the observed projects and those which the TORSC applies to, as mentioned earlier in this section. The examined projects were voluntary and/or bottom-up, formulated and led autonomously by information professionals and LIS academics, without participants' employers mandating the projects. When the projects were voluntary, the coordinators did not involve their institutions purposefully, because applying for funding would

have not been worth the effort from their perspective. Therefore, these institutions remained extraneous to the projects and did not exert pressures or expectations on the coordinators. As a result, the projects were unfunded and volunteer participants were recruited drawing from previous contacts and relationships with external associations (e.g. Italian Library Association, and Italian ISKO). Volunteers worked in their spare time without informing their employers. The agreements among participants in these projects were informal and unwritten and relied on goodwill, without legal implications in case of withdrawal or non-completion of the assigned task. Only in the other European case, the university employing the research group signed a contract with the funder of the project. However, in this case, the steering committee – rather than the funder – was committed to sustaining the project, which made it vulnerable to changes in committee membership and poor organizational handover. When these changes occurred, the project was at risk of failure, because the participants became distracted by other priorities and lost motivation.

### ***Project Organization, Decision-Making and Leadership***

Two different types of project organizations emerge from the study. One type concerns the two Italian projects organized more as “knots” (Engeström, 2008), that is, as distributed and partially improvised arrangements of collaborative activities bringing together loosely connected actors and activities<sup>55</sup>. In these voluntary projects, the project structure (members, tasks, roles, and tools) consisted of a set of relations based on the actions of participants, as responses to the practical necessities of the situation at that time. This structure guided and constrained subsequent actions. The character of emergence was linked to the lack of institutional commitment and external funding, which provided the coordinators with the opportunity to use their contacts and relationships with external associations to recruit both expert collaborators and novices eager to learn.

In contrast, the other European project was organised more as a conventional team (Katzenbach & Smith, 1993). In this project, the structure (members, tasks, and roles) appears to have been agreed upon in the initial phase, and to have been relatively stable until a disrupting event took place.

Concerning funding, the results show that no financial issues are likely to exist (e.g., either project is voluntary or the money is distributed to fit the work). However, when there is a low budget, there may be circumstances under which project participants need to ask for special financial treatments, such as not paying research

---

<sup>55</sup> The structure of SemOP2 is similar to collaborative community-based projects like SETI@home (<http://setiathome.berkeley.edu/>), a scientific experiment that uses Internet-connected computers in the Search for Extraterrestrial Intelligence (SETI). In SETI, volunteers from around the world use their own computers to run programs and contribute the results to the project. This is similar to what was done in SemOP2, in that people used their own computers to collect info/data that was contributed to the project.

overheads.

The findings related to project organization, decision-making and leadership also indicate some differences from the TORSC. The theory suggests that the complexity of coordination and communication in large-scale, distributed, and diverse projects require clear management plans articulating goals, tasks, and interdependencies. These plans often must be formulated before projects start, because they are required by funding agencies as part of grant proposals (Olson et al., 2008). On the contrary, the observed projects did not have a structured project management approach entailing the use of conventional project management artifacts (e.g., project management plan). The characteristics of the projects and the contingent circumstances in which they started and developed did not require such an approach.

Consistent with a situated view for which coordination emerges through social interactions (Cleal et al., 2004), in the three projects organization of activities was flexible and not predetermined rigidly, leaving room for change and adaptation. All the projects adopted informal and peer-based coordination and decision-making. For example, there were no formal management plan and no external control mechanisms. In SemOP1 and SemOP2, there were no sanctions for non-compliance, as participants were volunteers. Roles and responsibilities of the project participants were not formalised in written documents, and there were no internal written rules and procedures to govern the projects, and no documents stipulating managerial arrangements. Although IMPPRO might have benefited from formal written documents, for example a formal document created at the beginning with organizational buy-in regarding testing the instruments at the health library sites, were these libraries used to dealing with such documents for projects. However, this is not always the case.

Without external control mechanisms, intrinsic motivations seem to play a role in focusing “attention” of participants on the goals of the projects. In peer-based and participatory projects, input and participation from all the project members, regardless of their status, are encouraged and taken into consideration. Similarly to what happens in open source projects, artifacts can also inscribe coordination and management functions that in other projects can be assumed by formal organizational structures (Lanzara & Morner, 2005).

### ***Knowledge Management***

Given the informal organization of the three projects, none of them had a knowledge management plan in place to document the collaborative process through records of events and activities. This study confirms the TORSC regarding the importance of a knowledge management plan (Olson et al., 2008). For example, the IMPPRO case shows that the group faced knowledge loss through undocumented off-site meetings, staff changes, phone calls, and deleted emails. There was a lack of collaboration technology, including document sharing, discussion forum, project/site messaging, and search facilities. In SemOP1 and SemOP2, the project web site played an essential role

as basic dissemination system, making available project data and documents. However, this web site did not record the process of collaboration, thus much part of it has remained uncaptured (e.g., emails) and cannot be leveraged in future initiatives.

### **Stage of Sustainment – Technology Readiness**

The study shows that in all the projects the participants were comfortable with general-purpose technologies, such as email, word processing, spreadsheet, and online searching. In accordance with the TORSC and other previous studies, the use of technology to support this kind of projects should take into consideration existing work practices, technology learning curve, ease of use, affordability, and interoperability (Ruhleder, Jordan, & Elmes, 1996; Olson & Olson, 2000; Olson et al., 2008; Sonnenwald, 2007). The findings of this study indicate that technologies should be the lowest common platforms. In these cases, they should be web-based to allow anyone access from anywhere, regardless of the equipment and operating system used and existing institutional policies (the only barrier could be that people cannot access the web from their office, which does not seem to be the case in the three examined projects). In voluntary projects, costs can discourage the use of expensive technologies requiring high upfront investments for network infrastructure and equipment, which institutions only can bear – it should not be taken for granted that the institutions where the project participants work have such technologies in place. Furthermore, applications easy to install and maintain must be given priority, because technical support is generally unavailable.

Collaboration participants can have different levels of technology readiness. Thus, different abilities to interact with others through technologies must also be given serious consideration (Olson & Olson, 2000). For example, in SemOP1 and SemOP2 some participants felt reluctant to contribute to online asynchronous environments and preferred to read what others wrote instead. This finding strengthens the argument that qualities such as willingness to interact effectively with peers and engage in group processes, the ability to communicate effectively through writing, and a willingness to “take risks” and speak up if problems arise are necessary to ensure an effective participation in online collaboration (Brown, 1999).

### **Stage of Conclusion – Management, Planning and Decision Making**

#### ***Intellectual Property (IP)***

The TORSC suggests that intellectual property issues can create serious problems for the collaborative scientists, because their institutions can take full legal ownership or control the disclosure, including publications, of their results (Olson et al., 2008). Therefore, it is recommended that scientists discuss and negotiate issues concerning IP rights at the formulation stage to avoid conflicts later on (Sonnenwald, 2007).

In the observed projects, IP rights were never discussed, and the differences of IP practices in the two countries allowed two different kinds of control over research results. In Italy, the lack of institutional intellectual property and the voluntary character of the projects made the ownership of data and documentation clear. All participants in SemOP1 and SemOP2 co-own the data and are acknowledged in the outputs of the projects. They think that this is the most logical and appropriate choice to increase visibility and motivate other interested information professionals to be involved in future initiatives. In the other European country, projects conducted for organizations such as the National Delivery Service require confidentiality and data protection, and the general intention is that the data is stored for the minimum time possible – until all analysis and reporting are complete, and then deleted after that.

Despite these differences, the features of the projects in both countries resemble the types of open commons described by Benkler (2006). In Italy, there was open access regulated only by the expectation that the source was acknowledged and cited. In the other European country, there was open access to some project outputs, such as the project final report stored in the institutional repository and then also made available on the web site of the Medical Library, whereas access to data and other internal documents was restricted to project participants.

### **11.3 Propositions of the Study**

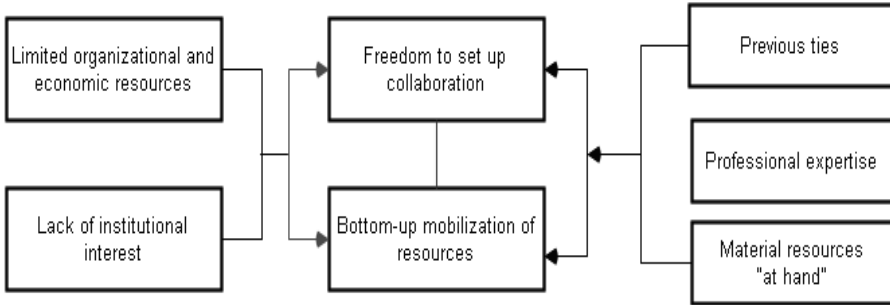
I used the STF as a basis for four testable propositions. They describe the associations among sociotechnical aspects that can affect the foundation, formulation, and sustainment of small-scale, distributed, no grant-funded or small grant-funded collaborative research projects between LIS academics and professionals. To establish these associations, an idiographic approach has been used in chapters 6, 8 and 10 with the help of ESA to examine three cases and find out how a series of concrete events resulted in particular outcomes at a particular time and place. It should be stressed that it is precisely relations that ESA has helped to identify, and not nomothetic causation. As explained in section 4.4.4, I adopted an idiographic approach that focused on three cases to examine how a series of concrete events resulted in particular outcomes at a particular time and place. Indeed, the existence of an association between two aspects does not prove causation. When analysing the data, the associations among sociotechnical aspects were drawn based on my interpretation of events, through a process of inference-making that relied on my understanding of the data and knowledge of the phenomenon under study. Therefore, the directions of the associations established in the following propositions can only be inferences, and there is the possibility that these directions are different from those which are anticipated. The four propositions are the following:

#### **Proposition 1**

Limited organizational and economic resources and lack of institutional interest can be

positively associated with freedom to setup collaboration and bottom-up mobilization of human and nonhuman resources including previous ties, professional expertise, and material resources “at hand”. This process of mobilization provides the opportunity to allocate resources easily available with minimum amount of efforts from project participants. Previous ties with external associations provide access to professional expertise that compensates for the lack of human resources and creates the basis for accomplishing collaboration.

This proposition identifies aspects in the foundations stage that influence the formulation and the sustainment stages.

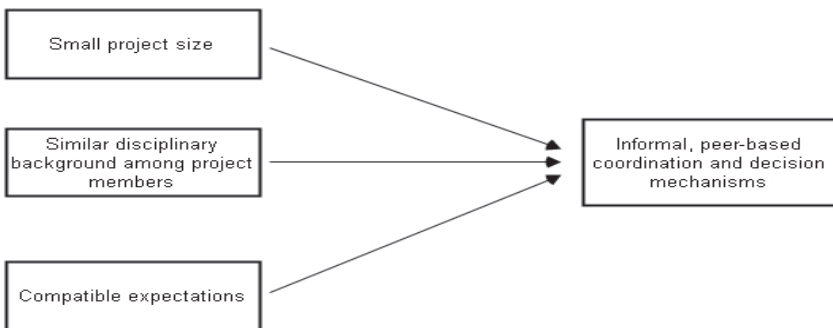


**Figure 11-1** Representation of proposition 1

**Proposition 2**

Small size, similar disciplinary background, and compatible expectations can be associated with informal, peer-based coordination and decision mechanisms.

This proposition identifies aspects in the foundation and formulation stages that influence the sustainment stage.



**Figure 11-2** Representation of proposition 2

### Proposition 3

Mutual trust and transactive knowledge, developed through previous ties and past experiences of collaboration, can lead to establishing common ground faster, because they allow participants to make the best use of their limited organizational and economic resources and perform their tasks more efficiently.

This proposition identifies aspects in the formulation stage that influences the sustainment stage.

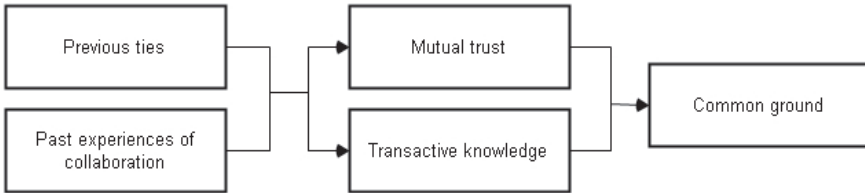


Figure 11-3 Representation of proposition 3

### Proposition 4

Voluntary collaboration is likely to be initiated, when the probability to access external funding is low, and the needs for organizational and economic resources are limited, but sufficient material resources (e.g., technologies) are available, participants have a strong interest in an applied research topic, can cooperate in a small research project based on informal and peer-based coordination and decision-making, and perceive as beneficial to contribute without regards to financial rewards or career promotions (gift culture).

This proposition identifies aspects in the foundation and formulation stages that influence the sustainment stage.

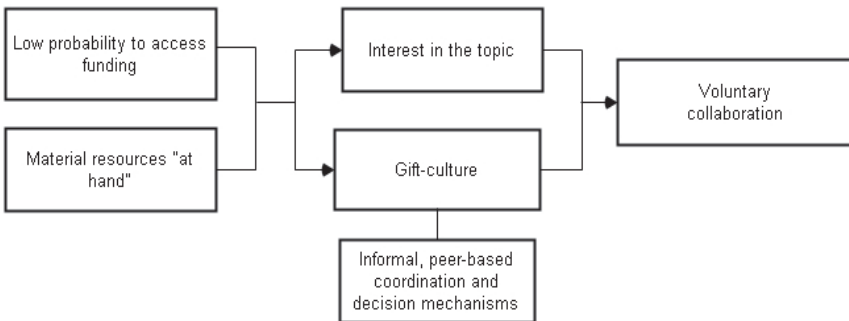


Figure 11-4 Representation of proposition 4

## 11.4 Conclusion: The Difficulties of Building a Prescriptive Model of Collaboration

In their attempt to develop a theory of remote scientific collaboration, Olson et al. (2008) suggest more research to understand the connections between sociotechnical aspects of work organization and the circumstances under which they operate. Olson et al. are concerned with building a prescriptive model of remote collaboration that provides insights for the design of remote collaborative environments and predicts the consequences of certain decisions. Building this kind of model is an attempt to go beyond description to prediction, for example, prediction of what might happen to collaborative groups working remotely, if certain conditions are not met. I have no objection in principle to such a model, because it can be used as a useful signpost for those who need directions, and I decided to build upon it. However, in my view, the construction of a normative “model” of collaboration presents three main challenges.

First, the relation between sociotechnical aspects of work organization and collaboration cannot be seen as necessary and inevitable, because such a relation is contingent upon specific organizational settings. Therefore, although sociotechnical aspects are bound to have an effect, it is difficult to predict the precise nature of their impact on collaboration. Similar aspects can seemingly produce different outcomes in different institutional settings and cultural circumstances. Consequently, the sociotechnical aspects supposed to influence collaboration need to be explained and not be assumed explanatory causes in themselves, because the relation between these aspects and success or failure of collaboration is unlikely to be linearly causal. Informed by ANT, the methodological position adopted in this study is that collaboration is best studied in terms of the processes through which actors align their interests. This stance means that collaboration is constituted through a process of interaction among the interests of people, things, and the larger relevant contexts, and implies that collaboration should be treated and analysed as a process of construction. This investigation cannot be done by relying on an analytical framework that treats collaboration as a product and considers sociotechnical aspects of work organization as antecedent explanatory causes. Accordingly, my premise is that collaboration is best studied by tracing how sociotechnical aspects interplay with the ways in which actors negotiate their interests to initiate, sustain, and conclude collaboration. Therefore, I argue that successful collaboration is not contingent on sociotechnical aspects of work. Rather it is contingent on the result of the contested interests of those who are involved in collaboration.

Second, sociotechnical aspects of work organization are not fixed and well-bounded properties of the relevant contexts, but they continually shape and are shaped by activities. They are better understood as processes that people start, maintain, and change to foster, or hinder, collaboration, rather than external properties of the contexts.

Third, and last, studying why collaboration succeeds or fails is problematic because there seem to be no standards by which to assess successful research collaboration –



except for some traditional measures such as publication, citation counts, and patents – and no firm theories yet about what constitutes a successful collaboration. Therefore, it seems difficult to establish what proper type of evidence should be generated to prove that a collaboration is “successful” or a “failure”. In addition, what has proved to lead to success in large-scale collaborations in physical and life sciences and in projects largely dominated by American participants should not be viewed as “one best way” (Shrum et al., 2007) to collaborate at distance, because collaborations are tied to their social, cultural, and political contexts, and depend on the interests of the stakeholders involved.

In comparison, the proposition presented here describe relations among sociotechnical aspects of work organization that can affect the foundation, formulation, sustainment, and conclusion of small-scale, distributed, no grant funded or small grant-funded collaborative research between researchers and professionals in two European countries. In extending Olson et al.’s (2007) TORSC, they suggest that size of the project and limited resources are important issues for further consideration, and support the view that collaboration is a sociotechnical practice, emerging from local practical situations involving people and artifacts and their complex mutual interactions.

## 12 Implications and Conclusions

This study set out with the purpose of examining how sociotechnical aspects of work organization influence the initiation, development, and conclusion of collaboration between LIS academics and professionals in distributed research projects. This examination aimed to derive implications for the further development of theory on remote scientific collaboration. Additionally, some initial implications for the design of a sustainable collaboratory to support small-scale, distributed research projects between LIS academics and professionals are also derived from the findings of this study.

The research design and data collection and analysis were informed by ANT, in particular by Callon's (1986) model of translation of interests. Qualitative interviews and analysis of literary inscriptions formed the key sources of data for the three case studies. ANT was used to view collaboration as a process of negotiation of interests and construction of out-comes, involving people, artifacts, and practices. The unit of analysis were collaborations themselves, and using ANT I followed the social processes by which collaborations started, ideas were accepted, and tools and artifacts were used. This approach allowed to bridge the gap between micro and macro levels of analysis, because it took into consideration both how actors' decisions and actions shaped projects, and how events external to the local network exerted their influence.

Sociotechnical aspects of work organization were treated as forming a set of structural relations that either enable or constrain actors' decisions and activities. However, enablements and constraints were not seen as intrinsic to sociotechnical aspects, but as effects of the interplay between these aspects and actors' activities. This chapter begins with a brief summary of the key research findings, followed by a discussion of the broader implications of these findings for theory development. Some initial implications for the design of a sustainable LIS collaboratory are outlined, and some suggestions for future research conclude the chapter.

### 12.1 Key Research Findings

The research questions that guided the analysis of the three collaborative projects in this study were:

1. How and why are collaborations between LIS academics and information professionals initiated and developed?
2. What sociotechnical aspects of work organization influence how LIS academics and information professionals initiate, develop and conclude collaboration, and how these influence processes play out?

In relation to the first question, the analysis of how and why collaborations between LIS academics and professionals initiated and developed revealed that the initial motivation to pursue collaboration has to do with the lack of financial and organizational

resources on either or both sides, and with a genuine interest in a topic from both academics and professionals. The examined case studies were decentralised and bottom-up projects, in which LIS academics and professionals pursued collaborative research because they had a genuine interest in a given topic, and not because they were mandated by their employers or they hoped to be acknowledged and promoted by them based on their participation in the project. Market conditions and/or institutional pressures did not exert much influence on the start and development of these collaborative projects, although IMPPRO was influenced by political considerations and funding conditions in healthcare.

In order to start a collaboration, the analysis shows the importance of previous ties between information professionals and LIS academics. The networks individuals were embedded in influenced the formation of collaborative research projects, by providing opportunities and resources needed to form ties. Through shared past experiences and personal relations, participants developed mutual trust and transactive knowledge about each other's knowledge, expertise, methods, working styles, available time and commitment. All these resources enabled people to start a collaboration without taking much risk initially (Thune, 2007), and were critical when economic and organizational resources were scarce. An implication of this finding is that starting collaborations between previously unconnected individuals can be difficult (Thune).

In relation to the second question, this study found that lack of institutional resources and interest, and presence of gift-culture seem to have influenced the bottom-up mobilization of people and other resources characterising the projects. Lack of institutional interest in the projects and cumbersome mechanisms to access funding drove participants to rely on resources "at hand", and to draw from previous contacts and available technological facilities. In the Italian projects, high transaction costs imposed by the university grant application process led people to volunteer, to start and develop collaborations on a self-selected topic of shared interest. Thus, transaction costs were reduced by developing collaborations within self-managed contexts that required minimal individual transactions to carry out the project. Spurred by the lack of institutional commitment, the three projects shared some traits of commons-based peer-production (Benkler, 2006). In fact, in all the three projects, access to and use of resources were symmetrical. Resources were shared, either freely or conditionally, and remained available to all the project participants at their discretion. In Italy, the presence of a "professor's privilege" system enabled flexibility for individuals to determine the creation and fate of their intellectual property, and allowed to reward the contributions of all participants, which was important in projects with no external funding.

In all the projects, self-interest was not the main driver of participants, although academics had the opportunity to collect data for publications, and professionals enjoyed relatively inexpensive help to study a practical problem. Rather gift-culture was an important aspect, and people were mainly driven by intrinsic interests. Although acting on diverse motivations, most participants did not expect immediate recognition

from their employers and found intrinsic social rewards in working with others in the course of de-veloping and completing a research project. Furthermore, in SemOP1 and SemOP2, students found that being part of a research project that allows to “hook” theories on practical ex-perience was valuable.

The three projects were based on autonomous initiatives on self-selected topics of interest. This autonomy gave rise to decentralized project organizations that did not rely on formal structures of coordination. The dominance of a gift-culture supported this decentralization, making external controls and extrinsic rewards unnecessary to manage the “tensions” between individual self-interest and willingness to contribute to a collaborative endeavour.

## **12.2 Implications for Theory Development**

This study aims to increase understanding of remote scientific collaboration by providing a theoretically informed and empirically grounded sociotechnical framework showing how several sociotechnical aspects of work organization enable the initiation, development, and completion of small-scale, distributed, no grant-funded or small grant-funded collaborative research projects between LIS academics and professionals under certain circumstances. This framework is intended to extend Olson et al.’s (2007) TORSC to the context of projects that are very different from the large-scale collaborations in science and engineering, included in the Science of Collaboratories database and that constitute the basis of the TORSC. Indeed, size of the project and limited resources are important issues for further consideration. The suggested extension may form the basis for the development of a model of remote practice-research collaboration in LIS and other social sciences and humanities.

The goal of the sociotechnical framework is to indicate patterns from the three case studies and use them for a threefold purpose: (a) contribute to a better understanding of collaboration between academics and professionals, not only in LIS but also in other fields affected by the research-practice gap; (b) augment research on small-scale and distributed practice-research collaboration; and (c) inform the way we might go developing and sustaining this type of collaboration.

## **12.3 Implications for Design: Values for a LIS Collaboratory**

Some initial implications for the design of a sustainable LIS collaboratory that supports small-scale and distributed research projects between academics and professionals and can be derived from the findings.

The motivation for this study is the acknowledged importance of bridging the gap between research and practice in LIS, and producing research that influences practice. Hess (2001) affirmed that “all research is ultimately guided by values” (p. 15), which can be defined as cognitive and affective beliefs that orient our actions in the world

(Fleischmann, 2007). This work is no exception. In this study, advocacy of collaborative research between academics and professionals is guided by values including access to and participation in research of different groups – including non-elite academics and professionals who are least able to travel and/or to meet academics; appreciation of different experiences and points of reference; and acceptance of different motivations and needs. As Akrich (1992) argued, technologies inscribe designers' values and their design is compatible with specific types of social relationships in relation to power and participation. I relate her argument to the design and use of a LIS collaboratory, emphasising that the support of small-scale, no grant-funded or small grant-funded collaborative research projects between academics and information professionals should be a key service function of such a collaboratory.

Guided by the results of this study, this artifact should be driven by the following core values: equity of access and participation; pluralism; opportunity; information and communication; and sustainability. These values should be at the core of the design of a LIS collaboratory and should shape its technical and administrative aspects. Furthermore, a LIS collaboratory inscribing these values could test Sproull & Kiesler's (1991) peripherality hypothesis, see if it helps reduce barriers to access and participation, and support communication, common ground, and mutual trust.

A LIS collaboratory is envisioned as a boundary object (Star & Griesemer, 1989; Wenger, 1998), that is, a trading zone that couples different partners, types and levels of knowledge, and can become a mutual point of reference (Chrisman, 1999) for social interactions and activities. This boundary object can show agency by influencing the relationships between academics and professionals. In fact, a collaboratory does not remain passive at the intersection of practice and research, but plays an active role in shaping the relationships among participants.

### **12.3.1 The Role of Mundane Technologies**

Evidence from the three case studies summarised in the sociotechnical framework (STF) can provide some initial insights into planning the functionalities to be included in a LIS collaboratory. Although additional research is necessary to understand in more detail which features would be needed, this evidence can contribute to develop stories or scenarios showing how project participants could use technologies to collaborate. These stories can also describe enablements and constraints exerted by sociotechnical aspects of work organization on the initiation, development and com-

pletion of collaborative research, and can be used to develop service-usage models<sup>56</sup> (SUMs, 2008) to show how ICT services can be integrated to support the work of specific groups of collaborating participants (Mascord et al., 2007). The e-Framework for Education and Research, an international initiative that provides information to institutions on investing in and using information technology infrastructure, has defined general capabilities (Service Genres, 2009) describing services that can be relevant for a LIS laboratory. Voss and Procter (2009, p. 179) suggested a number of them including service authentication, communication and collaboration, data transfer, and data archive, among others.

Shortage of economic and organizational resources in the three projects suggest that free or inexpensive, open source, and easy-to-use applications should be used to support open community-based projects. To keep costs down participants can set up a low-cost server running open source software, and those participants who do not have the necessary financial resources or technical skills to maintain their own server may piggyback their material onto their departmental server where budget and software installations already exist. The use of generic tools, most of which already exist or are easily obtainable, such as email, word processing, spreadsheet, and wikis, should be acknowledged as helpful to support and enhance research practices in projects strapped for resources. Moreover, using existing tools facilitates the use of existing skills on the side of project participants (Voss & Procter, 2009).

Unlike the sciences that need vast computational resources and high-performance facilities to process large amount of data, the studied LIS projects need simpler and not project-specific tools to process small data sets.

Rather than developing new tools to support collaboration, small-scale and distributed research projects between LIS academics and professionals like those studied here could benefit from using Web 2.0 tools (e.g., wikis, blogs, file sharing, social bookmarking, and Google Wave) because of their usability. Indeed, applications easy to install and maintain should be given priority, as technical support is generally unavailable in projects like IMPPRO and SemOP1 and SemOP2. In this type of projects, even the development of simple laboratories can be a major challenge. On one side, no academic reward is likely to be available for developing tools that engage a wider non-research audience (Schroeder & Spencer, 2009). On the other side, developing a simple collaborative environment needs the competences and skills of system administrators to integrate tools (Voss & Procter, 2009). As Voss and Procter affirmed, project participants are unlikely to be able to develop these environments themselves, thus the

---

<sup>56</sup> Service-usage models (SUMs) provide “a description of the needs, requirements, work-flows, management policies and processes within a domain and the mapping of these to a design of a structured collection of Service Genres and Service Expressions, resources, associated standards, specifications, data formats, protocols, bindings, etc., that can be used to implement software applications within the domain” (Service Usage Models, e-Framework, 2008).

problem of tool integration can be a challenge difficult to solve if support for configuration and adaptation of tools is not available.

Thinking along the lines of translation of e-research (Beaulieu & Wouters, 2009), as suggested in chapter 2, a LIS collaboratory emerges as an actor that interplays with existing attitudes and practices in research of academics and professionals, and potentially enhances new forms of collaboration and knowledge creation. To support a plurality of projects, a LIS collaboratory should not be thought of as fixed sets of functionalities transferred to users to support a single model of research, but as a flexible environment enabling a range of research practices. Indeed, it needs to be a configuration of different tools that project participants can assemble and manage without too much effort to suit their changing needs (Voss & Procter, 2009).

## **12.4 Conclusions about the Research Problem**

The purpose and rationale for this study were set in the context of innovation and research practices aimed at fostering closer collaboration between LIS academics and professionals. They were also prompted by the wish to contribute to a better understanding of the potential of e-research in LIS, by uncovering sociotechnical aspects influencing the uptake of collaboratories to support collaboration between research and professional practice. This study was underpinned by the belief that there is a need to conduct research on collaborations between LIS academics and professionals to understand how they form and develop. This research is necessary to enable LIS research and practice to continue to address important complex problems, discover new ways of working, and avoid being left behind in the scientific and professional digital divide (Sonnenwald et al., 2009).

This in-depth study of three projects has provided an account of how sociotechnical aspects of work organization influence the initiation, development, and completion of heterogeneous networks of people, practices, and artifacts to pursue collaborative research between LIS academics and professionals. It has highlighted the contextual- and project-specific issues of collaborative research in two European countries. Unsurprisingly, the study has shown that collaborative research between academic and professional partners in LIS resembles more collaborative research in community organizations and nonprofit organizations than traditional academic-based research in science and engineering, where the majority of collaboratories exists.

The results of this study suggest that a spirit of cooperation between academics and professionals exists in all the three cases, although the amount of collaboration varies at different stages of a project. For example, academic and professionals in all the three cases worked together in shaping the research issue, developing the research design, and collecting data. They have not collaborated to analyse the data and write up the results. Similarly to collaborative research models between academics and non academics in community and non profit organizations (Nyden et al., 1997), the results of the described projects are relevant for solving professional problems, such as im-

proving OPAC interfaces, and assessing the impact of healthcare library services on patient care. This type of research can be more actionable than traditional academic-based research, because the results are more likely to be immediately usable to library and information professionals, OPAC developers, and healthcare administrators. My first conclusion is consistent with the argument made by Ospina et al. (2001) that doing research relevant to professionals can be considered a requirement for collaborative research.

This study also confirms that when collaborative research involves students as part of the research group, it can produce invaluable experiences for them. Collaborative research provides an approach to learning and teaching grounded on dialogue and the possibility to hang abstract concepts onto real experiences.

I argue that LIS laboratories may help promote progress in the formation and development of collaborative research if they are used to support and legitimate a broad spectrum of research practices, in which professionals, researchers, and graduate students are involved. However, the involvement of these actors in collaborative research, and the alignment of their interests can be a challenging endeavour. Both academics and professionals need to establish common ground and mutual trust in order to work together effectively. Unfortunately, the widely perceived divide between practice and research and the radically different experiences of academics and professionals make it difficult to build trust and common ground. Based on the findings of this study, my second conclusion is that past experiences and personal relationships allow prospective collaborators to develop mutual trust and common ground, and thus enable them to work together more easily. Without these previous ties, academics and professionals are likely to encounter more difficulties in developing trust and collaborating.

## **12.5 Suggestions for Further Research**

The most obvious starting point for further research would be to study the influence of sociotechnical aspects and conduct other in-depth case studies of collaborative research between LIS academics and information professionals to extend our learning of the local practices, local cultures, participants' concerns, and use of technologies and artifacts to initiate, develop, and complete collaboration. It would be worthwhile to test the propositions emerged from the sociotechnical framework and investigate whether the relations among the aspects identified in this study hold in other cases of small-scale, distributed, no grant-funded or small grant-funded collaborative research projects between LIS academics and information professionals, as well as in other types of collaboration in areas different from LIS.

Another helpful next step could be to test the propositions to contribute to a practical theory (Cronen, 1995) about how to carry out collaborative research to bridge the gap between research and practice in LIS and other social sciences and humanities. Within these realms, practical theory could help all the actors involved in collaborative



research co-produce socially useful descriptions, explanation, critique, and change in professional practices (Cronen, 1995).

## **12.6 Final Remarks: Challenges Ahead and Sustainability**

This study claims that there are similarities between the analysed collaborative projects and commons-based peer-production activities such as open source projects (Benkler, 2006). Indeed, the same bottom-up, community-driven processes, which, for example, grow open sources software applications and maintain the online encyclopaedia Wikipedia, have also led to the setup of the projects included in this study, although on a very small scale. Similarly to open source projects aimed at creating sustainable software, the analysed projects face the difficulties of surviving between one project and the next. They are provisional, unstable, and need effort in order to keep them going. However, access to funding is difficult and there is no longer-term infrastructure to support collaboration and achieve better visibility. Furthermore, the main stakeholders are individuals and not their institutions, because the projects are “standalone” and do not take place under a parent organization. Uncoordinated efforts among standalone projects may hinder further collaborative development and new forms of scholarship and innovation. For these reasons, it is difficult for these projects to “grow”. In ANT terms, it is difficult to stabilize these projects because actors are not linked in a durable way. None of the actors in the cases has strong contractual force, so they can act primarily upon the intrinsic motivations of potential collaborators to attract them into a collaboration. For this reason, academics and professionals should think strategically about the development of initiatives aimed at coordinating and aggregating isolated efforts. There are examples of aggregation and federation of resources and services in LIS. One of them is dLIST, a cross-institutional, disciplinary, and open access archive, established in 2002 to connect LIS educators, researchers and practice communities by means of a digital library that besides research materials has curriculum and practice (pathfinders, information literacy) materials (Coleman & Roback, 2005). The authors reported that another reason for creating dLIST was the relatively small size and location of many academic LIS units, in the United States and globally, which meant that they might not be able to afford their own institutional repositories.

Grassroots projects can especially benefit from decentralised web-based laboratories. However, the grassroots approach may be insufficient to support a longer-term view of collaborative research. Options need to be investigated for sustainability so that these small projects do not rely exclusively on their original coordinators, and can turn into larger efforts and important modalities of practice-research collaboration. The experience of software sustainability (OSS Watch, 2007) can shed insights into sustainability models and provide ideas for projects like those included in this study. For example, when individuals are unable to push the discourse forward and to surmount institutional indifference, fostering “communities of practice” of professionals and

academics that keep applying and developing the toolkit, or evaluating OPACs, could help sustain projects. Indeed, it could be a way not only to provide the means for the work to be continued, but also to provide an opportunity for participants to communicate, share ideas, and enable a new type of peer-to-peer networking. Although LIS communities of academic and are far smaller than OSS communities, an open and community-based approach could encourage long run involvement and provide resources, such as skills and time of participants, either volunteers or paid.

Collaborative research can open windows to new experiences for professionals, academics, and students. It can create stronger academic-practice networks. Even after a project is completed, interpersonal relationships remain and constitute a social capital from which to draw to initiate new projects. Economic slowdowns and budget cuts in universities and libraries may produce the need for more collaboration between professionals and LIS academics, as a way of using limited resources more efficiently and equipping libraries to understand better the present and identify the problems of the future. In this vein, it might be beneficial if private foundations and research funding public agencies encouraged practice-research collaboration in LIS, by making it a precondition to some grants<sup>57</sup> and streamlining funding mechanisms, thereby reducing the administrative burden involved in preparing an application. However, as this study shows, it would be important to support collaborative models that walk the thin line between planning and flexibility in relation to research design so that collaboration can be carried out efficiently without stifling ideas that emerge in the process, but ensuring the possibility to change relationships as the work progresses. Following the lesson of open source, although on a much smaller scale, these models should help the projects to “grow organically”, by letting them react to the needs of the participants and avoiding putting structures into place proactively (OSS Watch, 2007). Preserving flexibility is crucial to support bottom-up collaborative projects, and ensure that they meet both rigorous academic standards and professional needs for applied outcomes. Striking balance between planning and flexibility can be also a new consideration for scholars, who are used to have sole responsibility for the research design in more traditional research (Ospina et al., 2001).

To summarise my position thus far, I acknowledge that a LIS collaboratory may have a role to play in creating a level playing field and developing stronger partner-

---

<sup>57</sup> An example of grant program designed to build collaboration between practice and research in the humanities is Advancing Knowledge, a joint collaboration between the Institute of Museum and Library Services and the National Endowment for the Humanities in the USA. This program is aimed at promoting large-scale digital humanities collaborations among museums, libraries, archives, and universities. Collaboration among these different organizations is a prerequisite for submitting applications (Boble, 2007). In addition, in the USA, in the nonprofit area, the Social Science Research Council funds researchers and practitioners to work together to define and address critical knowledge needs concerning policy and organizational practices. Their program is at <http://mediaresearchhub.ssrc.org/grants>.

ships, if it is designed to facilitate a range of collaborative practices and provides overall, rather than just research, benefits. By providing a trading zone for collaboration that helps break boundaries between research and practice, and cross-fertilizes professional activity and academic research, a collaboratory can be used to reshape collaborative research activities and create an environment welcoming to new participants, including the professionals who do not have access to researchers or think that cannot have a role in doing research. The potential of network technologies to redraw traditional central-peripheral models of power should be further exploited, to make a collaboratory a vehicle for transformation that broadens participation in research and integrates diversity of contributions.

# Svensk Sammanfattning

Syftet med denna studie var att undersöka hur sociotekniska aspekter av arbetsorganisation påverkar hur man initierar, utvecklar och avslutar samarbete mellan universitets- och övriga yrkesverksamma biblioteks- och informationsvetare (BIV) i distribuerade forskningsprojekt. I studien undersöktes hur tre samarbetsprojekt i Italien och i ett annat europeiskt land, utvecklades från början till slut. Ett av målen med analysen av de tre projekten var att härleda slutsatser som kan ligga till grund för vidare utveckling av teorier om vetenskapligt samarbete på distans och för design av hållbara kollaboratorier som stöd för småskaliga distribuerade forskningsprojekt mellan de olika grupperna av BIV.

För forskningsdesign, datainsamling och dataanalys användes Actor Network Theory, ANT och då särskilt Callons (1986) modell för bildande av nätverk ("translation of interests"). De huvudsakliga källorna för de tre fallstudierna utgjordes av kvalitativa intervjuer och analys av skriftligt material. ANT användes för att få en föreställning om samarbete som en förhandlingsprocess om intressen och om det som producerades som omfattade människor, artefakter och olika praktiker. Analysenheten utgjordes av de olika samarbetena och ANT användes för att följa de sociala processer som uppstod när samarbeten inleddes, idéer accepterades och verktyg och andra artefakter användes. Detta tillvägagångssätt gjorde det möjligt att överbrygga gapet mellan mikro- och makronivåerna i analysen då det tog hänsyn till både hur aktörernas beslut och handlingar formade projekten och hur händelser utanför det lokala nätverket utövade inflytande.

Sociotekniska aspekter av arbetsorganisation behandlades som en uppsättning av strukturella relationer som antingen möjliggjorde eller verkade hindrande på aktörernas beslut och aktiviteter. Men möjligheter och hinder sågs inte som inbyggda i de sociotekniska aspekterna utan som en effekt av hur dessa samspelade med aktörernas handlingar.

Detta sammanfattning börjar med en kort summering av viktigare forskningsresultat följt av en diskussion om de övergripande konsekvenser som resultaten kan få för teoriutveckling och utformningen av uthålliga BIV kollaboratorier. Några förslag till fortsatt forskning avslutar kapitlet.

## Forskningens centrala resultat

Forskningsfrågorna som vägledde analysen av de tre kollaborativa projekten i denna studie var:

1. Varför och hur initieras och utvecklas samarbete mellan universitets- och övriga yrkesverksamma BIV?

2. Vilka sociotekniska aspekter av en arbetsorganisation påverkar hur universitets- och övriga yrkesverksamma BIV initierar, utvecklar och avslutar samarbete samt hur kommer dessa processer till uttryck?

Viktigare resultat och slutsatser diskuteras mot bakgrund av de två frågorna i detta avsnitt. Analysen av varför och hur samarbete mellan de studerade grupperna av BIV initierades och utvecklades visar att den ursprungliga motivationen att fullfölja samarbetet hade sin grund i knappa ekonomiska och organisatoriska resurser hos endera eller båda parter och att båda parter delade ett genuint intresse för det gemensamma ämnesområdet. De här presenterade fallstudierna var decentraliserade och startades av det gemensamma intresset för ämnesområdet och inte för att deltagarna hade mandat av sina respektive arbetsgivare eller trodde sig få stöd och bekräftelse på grund av att man tagit initiativ till samarbetet.

Vare sig förhållanden på den privata marknaden eller påtryckningar från institutionerna hade någon större betydelse för starten och utvecklingen av dessa samarbeten även om projektet i det ej namngivna landet påverkades av politiska intressen och ekonomiskt stöd till sjukvårdssektorn.

Analysen visar att när ett projekt med universitets- och övriga yrkesverksamma BIV startas är det viktigt att projektdeltagarna åtminstone är bekanta med varandra sedan tidigare. De nätverk som projektdeltagarna ingår i påverkar bildande av de kollaborativa forskningsprojekten därför att de bidrar med resurser och möjligheter som är nödvändiga för att skapa sammanhållning bland deltagarna. Genom delade erfarenheter och personliga relationer bygger de upp ömsesidig tillit och kännedom om varandras kunskap, erfarenheter, metoder, arbetssätt, tillgänglig tid och engagemang. Denna kännedom möjliggör samarbete utan att ta alltför stora risker (Thune, 2007) och visade sig vara kritisk när organisatoriska och ekonomiska resurser var knappa. En slutsats är därför att det kan vara svårt att starta ett samarbete mellan personer som inte tidigare haft kontakt med varandra (Thune). På frågan om vilka sociotekniska aspekter som påverkar hur universitets- och övriga yrkesverksamma BIV initierar, utvecklar och avslutar samarbete och hur dessa aspekter uttrycks framkom det i denna studie att avsaknad av institutionella resurser och intresse och närvaro av en gåvokultur påverkade mobiliseringen av ”nedifrån och upp”-processen hos blivande projektmedlemmar och för andra projektresurser.

Bristen på institutionellt intresse i projekten samt den omständiga processen att erhålla medel medförde att projektmedlemmarna litade till de resurser som fanns ”till hands” , till gamla kontakter och tillgängliga tekniska resurser.

I de italienska projekten medförde höga kostnader i samband med ansökningar av medel från universiteten att personer frivilligt startade och utvecklade samarbete kring ämnesområden de själva valt och som var av gemensamt intresse för parterna. Genom självstyrning av projekten kunde kostnaderna hållas nere eftersom ett minimum av ekonomiska transaktioner inom projektet behövde ske.

De tre projekten sporrades av avsaknaden av institutionella åtaganden och delade

vissa gemensamma drag av ”Commons-based peer production” (Benkler, 2006). Faktum var att deltagarna i de tre projekten hade lika stor tillgång till resurser vilka de kunde använda fritt eller i vissa fall med villkorad användning. I Italien gav systemet med ”professors privilegium” (intellektuell äganderätt till egenproducerat material) stor frihet för projektdeltagarna att själva avgöra hur de skulle hantera och dela med sig av det egenproducerade materialet vilket är viktigt för projekt som inte har någon extern finansiering. Egenintresse var inte den huvudsakliga drivkraften hos projektdeltagarna även om forskarna fick möjlighet att samla data för publikation och praktikerna hade fri tillgång till forskarnas expertkunskaper för att bättre förstå yrkesproblem. Det var snarare gåvo-kulturen som var avgörande men även andra inre drivkrafter hade stor betydelse.

Trots att deltagarna hade olika motiv förväntade de sig de flesta inte ett omedelbart erkännande från arbetsgivaren utan det var ett inneboende belöningsystem som aktiverades i arbetet med att tillsammans med andra, genomföra och fullfölja ett forskningsprojekt. Särskilt för studenter kändes det meningsfullt att vara del av ett forskningsprojekt som tillät att teorier kopplades till en praktisk erfarenhet.

De tre projekten baserades dessutom på egna initiativ och på självständigt valda ämnesområden. Denna självständighet medförde att de relativt sett decentraliserade projektorganisationerna var för sig kunde koordineras utan att vara beroende av en formell organisation. Den dominerande gåvokulturen stöttade decentraliseringen av projekten och medförde att yttre kontroll och belöningar inte behövdes för att hantera spänningar mellan individens egenintressen och vilja att bidra till ett gemensamt arbete.

## **Följder för teoriutveckling**

Denna studie syftar till att öka förståelsen av det distansbaserade vetenskapliga samarbetet genom att tillhandahålla ett teoretiskt och empiriskt grundat sociotekniskt ramverk. Studien visar hur olika sociotekniska aspekter av arbetsorganisation under vissa omständigheter möjliggör initiering, utveckling och avslutning av småskaliga icke bidragsfinansierade distribuerade samarbetsprojekt mellan universitets- och övriga yrkesverksamma BIV. Detta ramverk syftar att vidga Olson et al. (2007) teori (theory of remote scientific collaboration, TORSC) till att omfatta projekt vars förutsättningar skiljer sig högst betydligt från de storskaliga samarbeten i naturvetenskap och teknik som finns i databasen Science of Collaboratories och som utgör basen i TORSC. Projektstorlek och begränsade resurser är speciellt viktiga faktorer att fortsättningsvis ta hänsyn till. Den föreslagna utvidgningen kan utgöra basen för utvecklingen av en modell om distansbaserad samverkan inom BIV och inom andra samhällsvetenskaper och humaniora.

Målet med det sociotekniska ramverket var att försöka se mönster i de tre fallstudierna och att använda dem i tre olika syften:

- Medverka till en bättre förståelse av samarbetet mellan akademiker och praktiker inte bara inom BIV utan även övriga samhällsvetenskaper och humaniora där det finns ett gap mellan forskning och praktik.
- Utvidga forskningen om småskaliga och distribuerade forskare-praktikersamarbeten och ge information om möjliga vägar för att utveckla och underhålla denna typ av samarbete.
- Det sociotekniska ramverket ska också vara ett stöd i utformningen av processer som stödjer uthålliga kollaboratorier inom BIV och andra discipliner inom ”e-social science”.

## References

- Akrich, M. (1992). The de-description of technical objects. In W. E. Bijker & J. Law (Eds.), *Shaping technology/Building society: studies in sociotechnical change* (pp. 205-224). Cambridge, MA: MIT Press.
- Akrich, M., & Latour, B. (1992). A summary of a convenient vocabulary for the semiotics of human and nonhuman assemblies. In W. E. Bijker & J. Law (Eds.), *Shaping technology/Building society: studies in sociotechnical change* (pp. 259-264). Cambridge, MA: MIT Press.
- Allen-Meares, P., Hudgins, C. A., Engberg, M. E., & Lessnau, B. (2005). Using a collaborative model to translate social work research into practice and policy. *Research on Social Work Practice, 15*(1), 29-40.
- American Council of Learned Societies Commission (2006). *Our cultural commonwealth: The report of the American Council of Learned Societies Commission on cyberinfrastructure for humanities and social sciences*. New York: ACLS. Retrieved March 5, 2007 from [www.acls.org/cyberinfrastructure/acls.ci.report.pdf](http://www.acls.org/cyberinfrastructure/acls.ci.report.pdf)
- Ardehali, P. E. (1990). Pronoun exchange as a barometer of social change. *Dialectical Anthropology, 15*(1), 82-86.
- Arzberger, P., & Finholt, T. A. (2002). *Data and laboratories in the biomedical community: Report of a panel of experts meeting*. Ballston, VA: Alliance Center for Collaboration Education Science and Software (ACCESS).
- Atkinson, M. (October, 20, 2006). Open your hearts. *The Times Higher Education Supplement on e-Science*. Retrieved January 21, 2010 from <http://www.timeshighereducation.co.uk/story.asp?storycode=205903>
- Axelsson, A.-S., Sonnenwald, D. H., & Spante, M. (2006). Needs and challenges with respect to establishing a collaborative within library and information science: ' perspectives. In J. Steinerova (Ed.), *Information use in the information society* (pp. 5-12). Bratislava, Slovak Republic: Centrum vedecko-technických informácií.
- Austrin, T., & Farnsworth, J. (2005). Hybrid genres: Fieldwork, detection and the method of Bruno Latour. *Qualitative Research, 5*(2), 147-165.
- Barrett, M., Cappleman, S., Shoib, G., & Walsham, G. (2004). Learning in knowledge communities: Managing technology and context. *European Management Journal, 22*(1), 1-11.
- Bates, M. J. (1999). *The role of the PhD in a professional field*. Srygley Lecture, October 16, 1999, Florida State University.



- Bauwens, M. (2005). *P2P and human evolution: Peer to peer as the premise of a new mode of civilization*. Foundation for P2P Alternative, Draft 1.1, March 1, 2005. Retrieved March 12, 2009 from [http://www.networkcultures.org/weblog/archives/P2P\\_essay.pdf](http://www.networkcultures.org/weblog/archives/P2P_essay.pdf)
- Beaulieu, A., & Wouters, P. (2009). E-research as intervention. In N. W. Jankowski (Ed.), *E-research: Transformations in scholarly practices* (pp. 54-69). New York: Routledge.
- Belkhdja, O., & Landry, R. (2007). The Triple-Helix collaboration: Why do researchers collaborate with industry and the government? What are the factors that influence the perceived barriers? *Scientometrics*, 70(2), 301–332.
- Benkler, Y. (2006). *The wealth of nations. How social production transforms markets and freedom*. New Haven, Connecticut: Yale University Press.
- Berman, F., & Brady, H. (2005). NSF SBE-CISE workshop on cyberinfrastructure and the social sciences: Final report. Retrieved March 3, 2007 from <http://www.sdsc.edu/sbe/reports/SBE-CISE-FINAL.pdf>
- Bijker, W. (1995). *Of bicycles, bakelites, and bulbs*. Cambridge, MA: MIT Press.
- Brown, A., Bimrose, J., & Hughes, D. (2005). Bringing guidance research and practice closer together: The UK National Guidance Research Forum Website. *International Journal for Educational and Vocational Guidance*, 5(2), 229-240.
- Birnholtz, J. (2004, April 24-29). Factors affecting the utility of technology-mediated collaboration in science and engineering. *Paper presented at the Conference on Human Factors in Computing Systems. CHI '04 extended abstracts on Human factors in Computing Systems, New York*.
- Birnholtz, J. (2005). *When do researchers collaborate? Toward a model of collaboration propensity in science and engineering*. (Unpublished doctoral dissertation). University of Michigan, Ann Arbor, MI, USA.
- Bobby, B. (2007). Digital humanities the IMLS/NEH Advancing Knowledge Partnership. *First Monday*, 12(7). Retrieved December 1<sup>st</sup>, 2009 from <http://www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/1925/1807>
- Booth, A. (2003). Bridging the research-practice gap? The role of evidence based librarianship. *New Review of Information & Library Research*, 9(1), 3-23.
- Borda, A., Careless, J., Dimitrova, M., Fraser, M., Frey, J., Hubbard, P., ... Wiseman, N. (2006). *Report of the working group on virtual research communities for the OST e-Infrastructure Steering Group* (pp. 46). London: Office of Science and Technology. Retrieved January 3, 2008 from <http://eprints.soton.ac.uk/42074/>
- Borgman, C. L. (2007). *Scholarship in the digital age: Information, infrastructure, and the internet*. Cambridge, MA: MIT Press.

- Bos, N., Olson, J. S., & Olson, G. M. (2006). *Science on the net*. Paper presented at the Human Computer Interaction Consortium, Winter Park, CO.
- Bos, N., Zimmerman, A., Olson, J. S., Yew, J., Yerkie, J., Dahl, E., & Olson, G. M. (2007). From shared databases to communities of practice: A taxonomy of laboratories (Electronic Version). *Journal of Computer-Mediated Communication*, 12(6). Retrieved February 7, 2007 from <http://jcmc.indiana.edu/vol12/issue2/bos.html>
- Bowker, G. C. & Star, S. L. (2001). Social theoretical issues in the design of laboratories: Customized software for community support versus large-scale infrastructure. In G. M. Olson, T. W. Malone, & J. B. Smith (Eds.), *Coordination theory and collaboration technology* (pp. 713-738). Mahwah, NJ: Lawrence Erlbaum Associates.
- Brandon, D., & Hollingshead, A. (1999). Collaborative learning and computer-supported groups. *Communication Education*, 48(2), 109-126.
- British Academy (2005). *E-resources for research in the humanities and social sciences. A British Academy policy review*. Retrieved March 5, 2007 from <http://www.britac.ac.uk/reports/eresources/report/index.html>
- Brown, B.M. (1999). Digital classrooms: Some myths about developing new educational programs using the internet. *T.H.E. Journal* [Online], December 1-5.
- Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18, 32-42.
- Brown, J. S., & Duguid, P. (1991). Organizational learning and communities-of-practice: Towards a unified view of working, learning, and innovation. *Organizational Science*, 2(1), 40-57.
- Brown, J. S., & Duguid, P. (2001). Knowledge and organization: A social-practice perspective. *Organizational Science*, 12(2), 198 – 213.
- Bryman, A. (2004). *Social research methods*. Oxford, UK: Oxford University Press.
- Buckland, M. K. (2003). Five grand challenges for library research. *Library Trends*, 51(4), 675-686.
- Callon, M. (1986a). Some elements of a sociology of translation: Domestication of the scallops and the fishermen of St Brieuc Bay. In J. Law (Ed.), *Power, action and belief: A new sociology of knowledge?* (pp. 196-233). London: Routledge & Kegan Paul.
- Callon, M. (1986b). The sociology of an actor-network: The case of the electric vehicle. In M. Callon, J. Law, & A. Rip (Eds.), *Mapping the dynamics of science and technology* (pp. 19-34). London: Macmillan Press.

- Callon, M. (1991). Techno economic networks and irreversibility. In J. Law (Ed.), *A sociology of monsters: Essays on power, technology and domination* (pp. 132-161). London: Routledge.
- Callon, M. (1999). Actor-network theory - The market test (draft). In J. Law & J. Hassard (Eds.), *Actor network theory and after* (pp. 181-195). Boston: MA: Blackwell.
- Callon, M. (2005). Why virtualism paves the way to political impotence: A reply to Daniel Miller's critique of the laws of the markets. *Economic Sociology: European Electronic Newsletter*, 6(2), 3-20.
- Callon, M., & Latour, B. (1981). Unscrewing the Big Leviathan: How actors macro-structure reality and how sociologists help them to do so. In K. Knorr-Cetina & A. V. Cicourel (Eds.), *Advances in social theory and methodology: Towards an integration of micro and macro-sociologies* (pp. 277-303). London: Routledge & Kegan Paul.
- Casson, E., Fabbrizzi, N., & Slavic A. (2009). Subject search in Italian OPACs: An opportunity in waiting? *Paper presented at IFLA 2009 Satellite Meetings, Florence, Italy, 20 August 2009*. Retrieved September 10, 2009 from <http://www.ifla2009satelliteflorence.it/meeting2/program/program.html>
- Chompalov, I., Genuth, J., & Shrum, W. (2002). The organization of scientific collaborations. *Research Policy*, 31(5), 749-767.
- Chrisman, N. (1999). Trading zones or boundary objects: Understanding incomplete translations of technical expertise. *Social Studies of Science (4S) Annual Meeting*, San Diego, CA.
- Clark, H. H. (1996). *Using language*. Cambridge, UK: Cambridge University Press.
- Cleal, B. R., Andersen, H. H. K., & Albrechtsen, H. (2004). Collaboration, communication and categorical complexity: A case study in collaborative evaluation. *Journal of Digital Information Management*, 2(1), 13-20.
- Coleman, A., & Roback, J. (2005). Open access federation for library and information science: dLIST and DL-Harvest. *D-Lib Magazine*, 11(12). Retrieved November, 21, 2009 from <http://www.dlib.org/dlib/december05/coleman/12coleman.html>
- Collins, H. M., & Pinch, T. J. (1982). *Frames of meaning: The social construction of extraordinary science*. Henley-on-Thames, UK: Routledge and Kegan Paul.
- Corley, E. A., Boardman, C. P., & Bozeman, B. (2006). Design and the management of multi-institutional research collaborations: Theoretical implications from two case studies. *Research Policy*, 35(7), 975-993.
- Cornwall, A., & Jewkes, R. (1995). What is participatory research? *Social Science and Medicine*, 41(12), 1666-1676.

- Crampton, C. D. (2001). The mutual knowledge problem and its consequences for dispersed collaboration. *Organizational Science*, 12(3), 346-371.
- Cronen, V. (2001). Practical theory, practical art, and the pragmatic-systemic account of inquiry. *Communication theory*, 11 (1), 14-35.
- Cummings, J. N., & Kiesler, S. (2005). Collaborative research across disciplinary and organizational boundaries. *Social Studies of Science*, 35(5), 703-722.
- D'Este, P., & Patel, P. (2007). University - industry linkages in the UK: What are the factors determining the variety of interactions with industry? *Research Policy*, 36(9), 1295-1313
- Daugaard, V. (2003). The co-operation across cultures in public and scientific libraries: The co-operation in net librarian / BiblioteksVagten: A Danish "ask the librarian" – service. *Paper presented at the World Library and Information Congress: 69th IFLA General Conference and Council, Berlin, 1-9 August 2003.*
- David, P. A. (2005). *Towards a cyberinfrastructure for enhanced scientific collaboration: Providing its 'soft' foundations may be the hardest part.* SIEPR Discussion Paper Series No. 04-01. Stanford, CA: Stanford Institute for Economic Policy Research.
- Dennett, D. C. (1996). *Kinds of minds: Towards an understanding of consciousness.* London: Weidenfeld & Nicolson.
- Dewey, John (1938/1991). Logic: The theory of inquiry. In J. A. Boydston (Ed.), *John Dewey: The later works, 1925—1953, Vol. 12 (pp. 1–527).* Carbondale, IL: SIU Press. (Originally published in 1938).
- Dillenbourg, P. (1999). What do you mean by collaborative learning? In P. Dillenbourg (Ed.), *Collaborative-learning: Cognitive and computational approaches* (pp.1-19). Oxford, UK: Elsevier.
- Dormans, S. (2009). Uncovering collaboratories in social and economic history. In *Proceedings of the 5<sup>th</sup> International Conference on e-Social Science, Cologne, Germany, 24-26 June 2009.*
- Dortins, E. (2002). Reflections on phenomenographic process: Interview, transcription and analysis. In A. Goody, Herrington, J., & Northcote, M. (Ed.), *Proceedings of the 2002 Annual International Conference of the Higher Education Research and Development Society of Australasia (HERDSA), Perth, Australia* (pp. 207-213). [Online conference proceedings].
- Dreher, M. C., Everett, L., & Hartwig, S. (2001). The University of Iowa Nursing Collaboratory: A partnership for creative education and practice. *Journal of Professional Nursing*, 17(3), 114-120.
- Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532-550.

- Engeström, Y. (2008). *From team to knots. Activity-theoretical studies of collaboration and learning at work*. Cambridge, MA: Cambridge University Press.
- Eriksson, J. (2008). *The OAI-PMH protocol and search services*. Retrieved October 12, 2009 from Open Access Information Web Site: <http://www.searchguide.se/oa/eng/?p=73>
- Finholt, T. A., Sproull, L., & Kiesler, S. (1990). Communication and performance in ad hoc task groups. In J. Galegher, R. E. Kraut, & C. Egido (Eds.), *Intellectual teamwork: Social and technological bases of cooperative work* (pp. 291-325). Mahwah, NJ, USA Lawrence Erlbaum Associates.
- Fleischmann, K. R. (2007). Digital libraries with embedded value: Combining insights from LIS and science and technology studies. *Library Quarterly*, 77(4), 409-427.
- Fontana, R., Geuna, A., & Matt, M. (2003). *Firm size and openness: The driving forces of university-industry collaboration*. Science and Technology Policy Research, the Freeman Center, University of Sussex, SPRU Electronic Working Paper Series, Paper n. 103. Retrieved December 15, 2009 from <http://www.sussex.ac.uk/Units/spru/publications/imprint/sewps/sewp103/sewp103.html>
- Fry, J., & Schroeder, R. (2009). Towards a sociology of e-research. In N. W. Jankowski (Ed.), *E-research: Transformations in scholarly practices* (pp. 35-53). New York: Routledge.
- Fuchs, S. (1992). *The professional quest for truth: A social theory of science and knowledge*. Albany, NY: State University of New York Press.
- Galegher, J., & Kraut, R. E. (1994). Computer-mediated communication for intellectual teamwork: An experiment in group writing. *Information Systems Research*, 5(2), 110-138.
- Geertz, C. (1973). Thick description: Toward an interpretive theory of culture. In C. Geertz (Ed.), *The interpretations of cultures*. New York: Basic Books.
- Gnoli, C. (2002). Indicizzazione semantica nell'era digitale. *Testo dell'intervento presentato alla tavola rotonda sul Progetto di rinnovamento del Soggettario, organizzata a Roma il 17 ottobre 2002 dal GRIS e dalla Biblioteca nazionale centrale di Firenze, nell'ambito del 49esimo congresso nazionale dell'AIB (Bibliocom 2002)*. Retrieved December 20, 2007 from <http://www.burioni.it/forum/gnoli-sem.htm>
- Gnoli, C., & Casson, E. (2006). Organizzazione semantica e recupero per soggetto nell'epoca del Web 2. *Seminario GRIS con la collaborazione di ISKO Italia*. Retrieved October 22, 2007 from <http://www.iskoi.org/doc/gris06.htm>

- González y González, E. M., & Lincoln, Y. S. (2006). Decolonizing qualitative research: Non-traditional reporting forms in the academy [41 paragraphs] [Electronic Version]. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research [On-line Journal]*, 7, Art. 1. Retrieved March 20, 2008 from <http://nbn-resolving.de/urn:nbn:de:0114-fqs060418>.
- Griffin, L. J. (1993). Narrative, event-structure analysis, and causal interpretation. *American Journal of Sociology*, 98 (5), 1094-1133.
- Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods*, 18(1), 59-82.
- Hagedoorn, J., Link, A. N., & Vonortas, N. S. (2000). Research partnerships. *Research Policy*, 29 (4-5), 567-586.
- Hammersley, M. (2004). Qualitative data archiving: Some reflections on its prospects and problems. In C. Seale (Ed.), *Social Research Methods* (pp. 290-294). London: Routledge.
- Hara, N., Solomon, P., Kim, S. L., & Sonnenwald, D. H. (2003). An emerging view of scientific collaboration: Scientists perspectives on collaboration and factors that impact collaboration. *Journal of the American Society for Information Science and Technology*, 54(10), 952-965.
- Haythornthwaite, C. (1999). Collaborative work networks among distributed learners. *Paper presented at the Proceedings of the 32nd Hawaii International Conference on System Sciences, Piscataway, NJ.*
- Haythornthwaite, C., Lunsford, K. J., Bowker, G. C., & Bruce, B. C. (2006). Challenges for research and practice in distributed, interdisciplinary collaboration. In C. Hine (Ed.), *New infrastructures for science knowledge production* (pp. 143-166). Hershey, PA: Idea Group.
- Heise, D. R. (1989). Modeling event structures. *Journal of Mathematical Sociology*, 14, 139-169.
- Heise, D. R. (1995). Specifying event content in narratives. Retrieved September 22, 2007 from <http://www.indiana.edu/~socpsy/papers/EventContent.html>
- Heise, D. R. (2007). *Event structure analysis*. Available at David R. Heise's World Wide Web site at Indiana University, Bloomington, Indiana, at <http://www.indiana.edu/~socpsy/ESA/>
- Heise, D. R., & Durig, A. (1997). A frame for organizational actions and macroactions. *Journal of Mathematical Sociology*, 22, 95-123.
- Hess, D. J. (2001). *Selecting technology, science, and medicine: Alternative pathways in globalization*. Vol. 1. Niskayuna, NY: Letters & Sciences.
- Hossain, L., & Fazio, D. (2009). The social network of collaborative process. *Journal of High Technology Management Research*, 20, 119-130.

- Hughes, T. (1998). *Rescuing Prometheus*. New York: Pantheon Books.
- Huxham C. (1996) Advantage or inertia? Making collaboration work. In R. Paton, G. Clark, G. Jones, J. Lewis, & P. Quintas (Eds.), *The New Management Reader*. London: Routledge.
- Humanistisk-samhällsvetenskapliga forskningsrådet (2002). *Forskningsetiska principer i humanistisk-samhällsvetenskaplig forskning*. Stockholm, Sweden: Humanistisksamhällsvetenskapliga forskningsrådet.
- Hutchins, E. L. (1995a). *Cognition in the wild*. Cambridge, MA: MIT Press.
- Ikonomov, N., & Dobрева, M. (2009). What small projects producing digital resources need to know about digital preservation? In S. Momati & T. Hedlund (Eds.), *ELPUB2009. Rethinking electronic publishing: Innovation in communication paradigms and technologies*. Proceedings of the 13th International Conference on Electronic Publishing (pp. 565-577). Milano, Italy, 10-12 June 2009.
- Isaacs, E. A., Whittaker, S., Frohlich, D., & O'Conaill, B. (1997). Informal communication re-examined: New functions for video in supporting opportunistic encounters. In K. E. Finn, A. J. Sellen, & S. B. Wilbur (Eds.), *Video-mediated communication* (pp. 459-485). New Jersey: Lawrence Erlbaum.
- ISO (1985). *Documentation -- Methods for examining documents, determining their subjects, and selecting indexing terms*. International Organization for Standardization, ISO (5963) 1985.
- Johnson, I. M. (2004). Are you making any impact? *Library and Information Update*, 3(6), 34-5.
- Johnson, I. M., Williams, D. A., Wavell, C., & Baxter, G. (2004). Impact evaluation, professional practice, and policy making. *New Library World*, 105 (1196/1197), 33-46.
- Kanfer, A. G., Haythornthwaite, C., Bruce, B. C., Bowker, G. C., Burbules, N. C., Porac, J. F., & Wade, J. (2000). Modeling distributed knowledge processes in next generation multidisciplinary alliances. *Information Systems Frontiers*, 2(3/4), 317-331.
- Kaptelinin, V., & Nardi, B. (2007). *Acting with technology. Activity theory and interaction design*. Cambridge, MA: MIT Press.
- Karsten, H. (1999). Collaboration and collaborative information technologies: What is the nature of their relationship? In T. J. Larsen, L. Levine, & J. I. DeGross (Eds.), *Information systems: Current issues and future changes*. Laxenburg, Austria: IFIP.
- Katz, J. S., & Martin, B. R. (1997). What is research collaboration? *Research Policy*, 26, 1-18.
- Katzenbach, J. R., & Smith, D., B. (1993). *The wisdom of teams*. Cambridge, MA: Harvard Business School Press.

- Kesselman, M. A. (2004). Library collaborations. In M.A. Kesselman & I. Weintraub (Eds.), *Global librarianship* (pp. 89-99). New York: Marcel Dekker.
- Ketter, J., & Stoffer, B. (2008). Getting real: Exploring the perceived disconnect between education theory and practice in teacher education. *Studying Teacher Education*, 4(2), 129-142.
- Kiesler, S., & Cummings, J. (2002). What do we know about proximity and distance in work groups? A legacy of research. In P. J. Hinds & S. Kiesler (Eds.), *Distributed work* (pp. 57-80). Cambridge, MA: MIT Press.
- Kling, R. (1999). What is social informatics and why does it matter? [Electronic Version]. *D-Lib Magazine*, 5. Retrieved February 3, 2007 from <http://www.dlib.org/dlib/january99/kling/01kling.html>.
- Knapik, M. (2006). The qualitative research interview: Participants' responsive participation in knowledge making [Electronic Version]. *International Journal of Qualitative Methods*, 5. Retrieved August, 4, 2008 from [http://www.ualberta.ca/~iiqm/backissues/5\\_3/pdf/knapik.pdf](http://www.ualberta.ca/~iiqm/backissues/5_3/pdf/knapik.pdf).
- Knorr-Cetina, K. (1999). *Epistemic cultures: How the sciences make knowledge*. Cambridge, MA: Harvard University Press.
- Koufogiannakis, D., & Crumley, E. (2002). Evidence-Based Librarianship. *Felicitier*, 48(3), 112-114.
- Kraut, R. E., Fish, R. S., Root, R. W., & Chalfonte, B. L. (1990). Informal communication in organizations: Form, function, and technology. In S. Oskamp & S. Spacapan (Eds.), *Human reactions to technology: The Claremont symposium on applied social psychology* (Vol. 145-199). Beverly Hills, CA: Sage Publications.
- Kraut, R.E., Egidio, C., & Galegher, J. (1990). Communication in scientific research. In J. Galegher, R. E. Kraut, & C. Egidio (Eds.), *Intellectual teamwork* (pp. 149-171). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Kraut, R. E., Fussell, S. R., Brennan, S. E., & Siegel, J. (2002). Understanding effects of proximity on collaboration: Implications for technologies to support remote collaborative work. In P. Hinds & S. Kiesler (Eds.), *Distributed work: New ways of working across distance using technology* (pp. 137-162). Cambridge, MA: MIT Press.
- Kvale, S. (1996). *InterViews: An introduction to qualitative research interviewing*. London: Sage.
- La Pelle, N. (2004). Simplifying qualitative data analysis using general purpose software tools. *Field Methods*, 16(1), 85-108.
- Lamb, R. (2006). Alternative paths toward a social actor concept. *Paper presented at the Proceedings of the Twelfth Americas Conference on Information Systems, Acapulco, Mexico, August 4-6, 2006*.



- Lamb, R., & Davidson, E. (2005). Information and communication technology challenges to scientific professional identity. *The Information Society*, 21(1), 1-24.
- Lamb, R., & Kling, R. (2003). Reconceptualising users as social actors in information systems research. *MIS Quarterly*, 27(2), 197-235.
- Lanzara, G. F., & Morner, M. (2005). Artifacts rule! How organizing happens in open source software projects. In B. Czarniawska & T. Hernes (Eds.), *Actor-network theory and organizing* (pp. 67-90). Malmö, Sweden: Liber & Copenhagen Business School Press.
- Latour, B. (1986). The powers of association. Power, action and belief. A new sociology of knowledge? *Sociological Review*, 32, 264-280.
- Latour, B. (1987). *Science in action: How to follow scientists and engineers through society*. Cambridge, MA: Harvard University Press.
- Latour, B. (1993). *We have never been modern*. London: Harvester Wheatsheaf.
- Latour, B. (1996). *Aramis, or the love of technology*. Cambridge, MA: Harvard University Press.
- Latour, B. (1996). Social theory and the study of computerized work sites. In W. J. Orlikowski, G. Walsham, M. R. Jones, & J. I. DeGross (Eds.), *Information technology and changes in organizational work* (pp. 295-307). London: Chapman & Hall.
- Latour, B. (1998). On actor-network theory. A few clarifications [Electronic Version]. *Centre for Social Theory and Technology (CSTT)*. Retrieved June 4, 2007 from <http://www.nettime.org/Lists-Archives/nettime-l-9801/msg00019.html>.
- Latour, B. (1999). On recalling ANT. In J. Law & J. Hassard (Eds.), *Actor network theory and after* (pp. 15-25). Oxford, Malden, MA: Blackwell.
- Latour, B. (2004). How to talk about the body? The normative dimension of science studies. *Body and Society*, 10(2-3), 205-229.
- Latour, B. (2005). *Reassembling the social: An introduction to actor-network-theory*. Oxford, UK: Oxford University Press.
- Latour, B., Mauguin, P., & Teil, G. (1992). A note on sociotechnical graphs. *Social Studies of Science*, 22, 33-57.
- Latour, Bruno (1991). Technology is society made durable. In J. Law (Ed.), *A sociology of monsters: Essays on power, technology, and domination* (pp. 103-131). London: Routledge.
- Law, J. (1991). Introduction: Monsters, machines and sociotechnical relations. In J. Law (Ed.), *A sociology of monsters: Essays on power, technology, and domination* (pp. 1-23). London: Routledge.

- Law, J. (1992). Notes on the theory of the actor network: Ordering, strategy and heterogeneity. Retrieved January 12, 2007 from <http://www.comp.lancs.ac.uk/sociology/papers/Law-Notes-on-ANT.pdf>
- Law, J., & Bijker, W. E. (1992). Postscript: Technology, stability, and social theory. In W. E. Bijker & J. Law (Eds.), *Shaping technology/Building society: Studies in sociotechnical change* (pp. 290 - 307). Cambridge, MA: MIT Press.
- Law, J. (1997). Traduction, trahison: Notes on ANT. Retrieved January 12, 2007 from <http://www.lancs.ac.uk/fss/sociology/papers/law-traduction-trahison.pdf>
- Law, J., & Callon, M. (1992). The life and death of an aircraft: A network analysis of technical change. In W. E. Bijker & J. Law (Eds.), *Shaping technology/Building society: Studies in sociotechnical change* (pp. 21-52). Cambridge, MA: MIT Press.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.
- Lee, Y. S. (2000). The sustainability of university-industry research collaboration: An empirical assessment. *Journal of Technology Transfer*, 25, 111-133.
- Leonard-Barton, D. (1990). A dual methodology for case studies: Synergistic use of a longitudinal single site with replicated multiple sites. *Organization Science*, 1(3), 248-266.
- Lerdal, S. N. (2006). Evidence-based librarianship: Opportunity for law librarian? *Law Library Journal*, 98(1), 33-60.
- Lin, Y.-W., Procter, R., Halfpenny, P., Voss, A., & Baird, K. (2007). An action-oriented ethnography of interdisciplinary social scientific work. *Paper presented at the E-Social Science Conference, Ann Arbor, MI, October 7-9, 2007*.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage Publications.
- Lipponen, L. (2002). Exploring foundations for computer-supported collaborative learning. In G. Stahl (Ed.), *Computer support for collaborative learning: Foundations for a CSCL community. Proceedings of the Computer-Supported Collaborative Learning 2002 Conference* (pp. 72-81). Hillsdale, NJ: Erlbaum.
- Lougee, W. P. (2002). *Diffuse libraries: Emergent roles for the research library in the digital age*. Washington, DC: Council on Library and Information Resources.
- Lynch, C. A. (2003, February). Institutional repositories: Essential infrastructure for scholarship in the digital age. *ARL Bimonthly Report*, 226, 1-7. Retrieved October 23, 2009 from: <http://old.arl.org/newsltr/226/ir.html>.
- Lunsford, K. J., & Bruce, B. C. (2001). Collaboratories: Working together on the web. *Journal of Adolescent and Adult Literacy*, 45(1), 52-58.
- Markus, M. L., Manville, B., & Agres, C. E. (2000). What makes a virtual organization work? *Sloan Management Review*, (Fall) 2000, 13-26.

- Mascord, M., Argüello Casteleiro, M., Fraser, M., Voss, A., Procter, R., Halfpenny, P., & Jirotko, M. (2007). *Scoping e-infrastructure usage: Interim report*. Retrieved June 13, 2009 from <http://www.eius.ac.uk/>
- Martin, J. R., & Veel, R. (Eds.). (1998). *Reading science: Critical and functional perspectives on discourses of science*. London: Routledge.
- Mattessich, P. W., Murray-Close, M., & Monsey, B. R. (2001). *Collaboration: What makes it work* (2<sup>nd</sup> ed.). Saint Paul, MN: Amherst H. Wilder Foundation.
- McMaster, T., Vidgen, R. T., & Wastell, D. G. (1997). Towards an understanding of technology in transition: Two conflicting theories. *Information Systems Research in Scandinavia, IRIS20 Conference*. University of Oslo, Hanko, Norway.
- McDermott, R. (2003). Building spontaneity into strategic communities. Eight tips to put excitement into management-created CoPs. *Knowledge Management Review*, 5(6), 28-31.
- McNicol, S., & Dalton, P. (2004). Striking a balance: Priorities for research in LIS. *Library Review*, 53(3), 167-176.
- Melin, G. (2000). Pragmatism and self-organization: Research collaboration on the individual level. *Research Policy*, 29, 31-40.
- Meyer, E., Park H.W., & Schroeder, R. (2009). *Mapping global e-research scientometrics and webometrics*. In *Proceedings of the 5<sup>th</sup> International Conference on e-Social Science, Cologne, Germany, 24-26 June 2009*.
- Miczka, S., & Größler, A. (2005). The dynamics of soft factors in collaboration. *Paper presented at the EMNet 2005 - Economics and Management of Networks: Franchising Networks, Alliances, Joint Ventures and Cooperatives, Budapest, Hungary*.
- Middleton, M. (2005). Applying research to practice in information and library studies. In M. Middleton (Ed.), *Research applications in information and library studies seminar (RAILS). Proceedings of the Research Applications in Information and Library Studies Seminar held at the Queensland University of Technology Brisbane* (pp. 3-6). Wagga Wagga, AU: Charles Sturt University Centre for Information Studies.
- Minna, J. D., & Gazdar, A. F. (1996). Translational research comes of age. *Nature Medicine*, 2(9), 985-991.
- Monteiro, E., & Hanseth, O. (1995). Social shaping of information infrastructure: On being specific about technology. In W. Orlikowski, G. Walsham, M. R. Jones, & J. I. DeGross (Eds.), *Information technology and changes in organisational work* (pp. 325 - 343). London: Chapman & Hall.
- Nardi, B., & Whittaker, S. (2002). The place of face-to-face communication in distributed work. In P. Hinds & S. Kiesler (Eds.), *Distributed work: New ways of working across distance using technology* (pp. 83-110). Cambridge, MA: MIT Press.

- Newell, A., & Simon, H. A. (1972). *Human problem solving*. Englewood Cliffs, NJ: Prentice Hall.
- Newman, M. E. J. (2001). Clustering and preferential attachment in growing networks. *Physical Review E* 64, 025102 (2).
- Nyden, P., Figert, A., Shibley, M., & Burrows, D. (1997). *Building community: Social science in action*. Thousand Oaks, CA: Pine Forge Press.
- O'Connor, P. (2002). Determining the impact of health library services on patient care: A review of the literature. *Health Information and Libraries Journal*, 19, 1-14
- Office of Science and Innovation (OSI) e-Infrastructure Working Group (2007). Developing the UK's e-infrastructure for science and innovation. Retrieved March 5, 2007 from [www.nesc.ac.uk/documents/OSI/index.html](http://www.nesc.ac.uk/documents/OSI/index.html)
- Olson, G. M., & Olson, J. S. (2000). Distance matters. *Human-Computer Interaction*, 15, 139-179.
- Olson, G. M., Teasley, S., Bietz, M. J., & Cogburn, D. L. (2002). Collaboratories to support distributed science: The example of international HIV/AIDS research. *Paper presented at the SAICSIT 2002: Enablement through Technology. South African Institute for Computer Scientists and Information Technologists*. Port Elizabeth, South Africa.
- Olson, J., Teasley, S., Covi, L., & Olson, V. (2002). The (currently) unique advantages of collocated work. In P. Hinds & S. Kiesler (Eds.), *Distributed work: New research on working across distance using technology* (pp. 113-135). Cambridge, MA: MIT Press.
- Olson, J. S., Hofer, E., Bos, N., Zimmerman, A., Olson, G.M., Cooney, D., & Faniel, I. (2008). A theory of remote scientific collaboration (TORSC). In G. M. Olson, A. Zimmerman, & N. Bos (Eds.), *Scientific Collaboration on the internet* (pp. 73-97). Boston, MA: MIT Press.
- Olson, G. M., Olson, J. S., & Venolia, G. (2009). What still matters about distance? *Proceedings of HCIC 2009*. Retrieved 15 December, 2009 from <http://research.microsoft.com/apps/pubs/default.aspx?id=78697>
- Ospina, S., Godsoe, B., & Schall, E. (2001). Co-producing knowledge: and scholars working together to understand leadership. *Paper based on a roundtable presentation given by Sonia Ospina at the 2001 International Leadership Association Conference*. Retrieved December 15, 2009 from <http://wagner.nyu.edu/leadership/publications/files/co-producingknowledge.pdf>
- OSS Watch (2007). *Moodle: A case study in sustainability*. Retrieved June 27, 2009 from <http://www.oss-watch.ac.uk/resources/cs-moodle.xml>
- Owen-Smith, J. (2001). Managing laboratory work through skepticism: Processes of evaluation and control. *American Sociological Review*, 66(3), 427-452.

- Pinch, T. J., Ashmore, M., & Mulkay, M. (1992). Technology, testing, text: Clinical budgeting in the U.K. National Health Service. In W. E. Bijker & J. Law (Eds.), *Shaping technology/building society: Studies in sociotechnical change* (pp. 265-289). Cambridge, MA: MIT Press.
- Ponti, M., & Sonnenwald, D. H. (2008). Investigating the potential uptake of e-research within a social science discipline: Sociotechnical issues within library & information Science. In *Proceedings of the 4<sup>th</sup> International Conference on e-Social Science, Manchester, UK, 18-20 June, 2008*.
- Pouloudi, A., Gandecha, R., Atkinson, C., & Papazafeiropoulou, A. (2004). How stakeholder analysis can be mobilized with actor network theory to identify actors. In B. Kaplan, D. P. Truex III, D. Wastell, A. Trevor Wood-Harper, & J. I. DeGross (Eds), *Information systems research: Relevant theory and informed practice* (pp. 705-710). Boston, MA: Kluwer.
- Preece, J., Nonnecke, B., & Andrews, D. (2004). The top five reasons for lurking: Improving community experiences for everyone. *Computers in Human Behavior*, 20(2), 201-223.
- Price, C. A., Zavotka, S. L., & Teaford, M. H. (2004). Implementing a university–community–retail partnership model to facilitate community education on universal design. *The Gerontologist*, 44, 697-702.
- Putnam, R. D. (1993). *Making democracy work: Civic traditions in modern Italy*. Princeton, NJ: Princeton University Press.
- Raymond, E.S. (1999). *The cathedral and the bazaar: Musings on Linux and open source by an accidental revolutionary*. Beijing, China: O'Reilly.
- Rochester, M. K., & Vakkari, P. (2003). International library and information science research: A Comparison of national trends. *IFLA Professional Reports*, Nr. 82, Section on Library Theory and Research. Retrieved 12 December, 2009 from <http://archive.ifla.org/V/pr/>
- Rogers, E. M. (2003). *Diffusion of innovations*, 5th Ed. New York, NY: Free Press.
- Rosenberg, A. (1995). *Philosophy of social science* (2<sup>nd</sup> ed.). Boulder, CO: Westview Press.
- Roth, W.-M. (2006, November). Textbooks on qualitative research and method/Methodology: Toward a praxis of method [63 paragraphs] [Electronic Version]. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research [On-line Journal]*, 7, Art. 11. Retrieved March 22, 2008 from <http://www.qualitative-research.net/fqs-texte/1-06/06-1-11-e.htm>.
- Ryan, R.M., & Deci, E.L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, 25, 54-67.
- Rynes, S. L., Bartunek, J. M., & Daft, R. L. (2001). Across the great divide: Knowledge creation and transfer between and academics. *The Academy of Management*

- Journal*, 44(2), 340-355.
- Ruhleder, K., Jordan, B., & Elmes, M. B. (1996). Wiring 'the new organization': Integrating collaborative technologies and team-based work. *Paper presented at the Annual Meeting of the Academy of Management*.
- Sackett, D. L., Rosenberg, W. M. C., Muir Gray, J. A., Haynes, R. B., & Richardson, W. S. (1996). Evidence based medicine: what it is and what it isn't. *BMJ*, 312(7023), 71-72.
- Sarker, S., Sarker, S., & Sidorova, A. (2006). Understanding business process change failure: An actor-network perspective. *Journal of Management Information Systems*, 23 (1), 51-86.
- Schroeder, R., & Spencer, D. (2009). Social scientists and the domestication of e-research tools. In *Proceedings of the 5<sup>th</sup> International Conference on e-Social Science, Cologne, Germany, 24-26 June 2009*.
- Science of Collaboratories (2003). *Workshop on the social underpinnings of collaboration: Final summary*. Retrieved August 2<sup>nd</sup>, 2006 from <http://www.scienceofcollaboratories.org/Workshops/WorkshopJune42001/index.php>
- Scott, W. R. (1995). *Institutions and organizations*. Thousand Oaks, CA: Sage.
- Service genres* (2009). Retrieved October 9, 2009 from <http://www.e-framework.org/Contributions/ServiceGenres/tabid/987/Default.aspx>
- Service Usage Models (SUMs)* (2008). Retrieved June 13, 2008 from <http://www.e-framework.org/Default.aspx?tabid=607>
- Shachaf, P. (2003). Nationwide library consortia life cycle. *Libri: International Journal of Libraries and Information Services*, 53, 94-102.
- Shapin, S. (1995). Here and everywhere: Sociology of scientific knowledge. *Annual Review of Sociology*, 21, 298-321.
- Shrum, W., Genuth, J., & Chompalov, I. (2007). *Structures of scientific collaboration*. Cambridge, MA: MIT Press
- Shrum, W., Chompalov, I., & Genuth, J. (2001). Trust, conflict and performance in scientific collaborations. *Social Science of Studies*, 31 (5), 681-730.
- Schutt, R. K. (1996). *Investigating the social world: The process and practice of research*. Thousand Oaks, CA: Pine Forge Press.
- Silverman, D. (2005). *Doing qualitative research* (2<sup>nd</sup> ed.). London: Sage Publishing.
- Sismondo, S. (2004). *An introduction to science and technology studies*. Oxford, UK: Blackwell.
- Sonderegger, P. (2009). Creating shared understanding across distances. In N. W. Jankowski (Ed.), *E-research: Transformations in scholarly practices* (pp. 129-

146). New York: Routledge.

- Sonnenwald, D. H. (2003). Expectations for a scientific collaboratory: A case study. In *Proceedings of the 2003 International ACM SIGGROUP Conference on Supporting Group Work, Sanibel Island, Florida, USA, 09-12 November, 2003* (pp. 68-74). New York: ACM Press.
- Sonnenwald, D. H. (2007). Scientific collaboration: A synthesis of challenges and strategies. In B. Cronin (Ed.), *Annual review of information science and technology* (Vol. 41, pp. 643-681). Medford, NJ: Information Today.
- Sonnenwald, D. H., & Pierce, L. G. (2000). Information behavior in dynamic group work contexts: Interwoven situational awareness, dense social networks and contested collaboration in command and control. *Information Processing & Management, 36*(3), 461-479.
- Sonnenwald, D. H., Solomon, P., Hara, N., Bolliger, R., & Cox, T. (2003). Collaboration in the large: Using video conferencing to facilitate large group interaction. In A. Gunasekaran & O. Khalil (Eds.), *Knowledge and information technology in 21st century organizations: Human and social perspectives* (pp. 136-155). Hershey, PA: IGI Global.
- Sonnenwald, D.H., Lassi, M., Olson, N., Ponti M., & Axelsson, A-S. (2009). Exploring new ways of working using virtual research environments in library and information science. *Library Hi Tech, 27*(2), 191-204. Special Issue on Virtual Research Environments: Issues and Opportunities for Librarians.
- Stake, R. (1995). *The art of case research*. Thousand Oaks, CA: Sage Publishing.
- Stalder, F. (1997). *Actor-network-theory and communication networks: Toward convergence* [Electronic Version]. Retrieved May 21, 2007 from [http://felix.openflows.com/html/Network\\_Theory.html](http://felix.openflows.com/html/Network_Theory.html).
- Stanforth, C. (2007). Using actor-network theory to analyze e-government implementation in developing countries. *The Massachusetts Institute of Technology Information Technologies and International Development, 3*(3), 35-60.
- Star, S. L., & Griesemer, J. R. (1989). Institutional ecology, "translations" and boundary objects: Amateurs and professionals in Berkeley's museum of vertebrate zoology, 1907-1939. *Social Studies of Science, 19*(3), 387-420.
- Star, S. L., & Ruhleder, K. (1996). Steps toward an ecology infrastructure: Design and access for large information spaces. *Information Systems Research, 7*(1), 111-134.
- Suchman, L. (1987). *Plans and situated actions: The problem of human machine communication*. New York: Cambridge University Press.
- Swedish School of Library and Information Science (SSLIS) (2007). *Samspel mellan praktik och forskning*. Borås, Sweden: Högskolan i Borås.
- Tedd, L. A. (1993). *An introduction to computer-based library systems*. New York:

Wiley.

- Temple, B., & Young, A. (2004). Qualitative research and translation dilemmas. *Qualitative Research*, 4(2), 161-178.
- Thiel, U., Brocks, H., Frommholz, I., Dirsch-Weigand, A., Keiper, J., Stein, A., & Neuhold, E. (2004). A collaboratory supporting research on historic European films. *International Journal on Digital Libraries*, 4(1), 8-12.
- Thune, T. (2007). University-industry collaboration: The network embeddedness approach. *Science and Public Policy*, 34(3), 158-168.
- Traweek, S. (1988). *Beamtimes and lifetimes: The world of high energy physicists*. Cambridge, MA: Harvard University Press.
- Tuomi, I. (2003). *Networks of innovation: Change and meaning in the age of Internet*. Oxford, UK: Oxford University Press.
- Vaagaasar, A. L. (2006). *From tool to actor: How a project came to orchestrate its own life and that of others*. (Unpublished doctoral dissertation). BI Norwegian School of Management, Oslo.
- Vidgen, R., & McMaster, T. (1996). Black-boxes, nonhuman stakeholders and the translation of IT through mediation. In W. J. Orlikowski, M. R. Jones, & J. I. DeGross (Eds.), *Information technology and changes in organisational work* (pp. 250-271). London: Chapman and Hall.
- Voss, A., & Procter, R. (2009). Virtual research environments in scholarly work and communications. *Library Hi Tech*, 27(2), 174-190.
- Walsh, J. P., & Maloney, N. G. (2007). Collaboration structure, communication media, and problems in scientific work teams. [Electronic Version]. *Journal of Computer-Mediated Communication*, 12(19). Retrieved April 2, 2009 from <http://jcmc.indiana.edu/vol12/issue2/walsh.html>
- Walsham, G. (1997). Actor-network theory and IS research: Current status and future prospects. In A. S. Lee, J. Liebenau, & J. I. DeGross (Eds.), *Information systems and qualitative research* (pp. 466-480). London: Chapman and Hall.
- Wasko, M. M., & Faraj, S. (2000). "It is what one does": Why people participate and help others in electronic communities of practice. *Journal of Strategic Information Systems*, 9(2-3), 155-173.
- Webster, P. (2006). Introduction. *Library Trends*, 54(3), 343-345.
- Wegner, D. M. (1986). Transactive memory: A contemporary analysis of the group mind. In B. Mullen & G. R. Goethals (Eds.), *Theories of group behavior* (pp. 185-208). New York, NY: Springer-Verlag.
- Wenger, E. (1998). *Communities of practice: Learning, meaning and identity*. Cambridge, MA: Cambridge University Press.
- Wenger, E. (2000). Communities of practice and social learning systems. *Organiza-*



- tion, 7(2), 225-246.
- Wenger, E., McDermott, R., & Snyder, W. (2002). *Cultivating communities of practice: A guide to managing knowledge*. Boston, MA: Harvard Business School Press.
- Wouters, P. (2004). *The Virtual Knowledge Studio for the Humanities and Social Sciences@The Royal Netherlands Academy of Arts and Sciences*. Program proposal. Amsterdam, the Netherlands.
- Wulf, W. A. (1989). The national collaboratory: A white paper. In J. Lederberg & K. Uncaphar (Eds.), *Towards a national collaboratory: Report of an invitational workshop at the Rockefeller University, March 17-18, 1989 (Appendix A)*. Washington, D.C.: National Science Foundation, Directorate for Computer and Information Science Engineering.
- Yin, R. K. (1994). *Case study research: Design and methods* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage Publishing.
- Zand, D. E. (1972). Trust and managerial problem solving. *Administrative Science Quarterly*, 17(229-239).
- Zheng, J., Veinott, E., Bos, N., Olson, J. S., & Olson, G. M. (2002). Trust without touch: Jumpstarting long-distance trust with initial social activities. In *Proceedings of the SIGCHI conference on Human factors in computing systems: Changing our world, changing ourselves* (pp. 141 – 146). Minneapolis, MN, USA. New York: ACM Press. Retrieved January 11, 2010, from <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.126.2910>

# Appendix 1 – Call for Volunteers for a Pilot Study

## Purpose of the Pilot Study

My name is Marisa Ponti and I am doctoral student at the School of Library and Information Science at Göteborg University and the University College of Borås. My main supervisor is Prof. Diane Sonnenwald. My dissertation research examines the social and technical aspects of work that hinder and/or support collaboration between librarians/information professionals and researchers in the field of Library and Information Science (LIS). As part of my research, I would like to study groups participating in a collaborative project involving librarians and/or information professionals, and LIS academics. Ideally, the project is ongoing, but either a recent or a planned collaborative project would be useful. The collaboration should not involve training projects or teaching, but, ideally, would be about joint-research activities, or other activities in which the parties are involved to solve a significant problem together. The project should include at least one library/information centre and one department of Library and Information Science. The library can be of any type – e.g., university, research, corporate, public, specialized library, etc. The LIS academics involved in the project can be located in Sweden or in another country. I wish to conduct a pilot, or initial, study in the Fall 2007 (possibly October-December, or as best fits your schedule) and the purpose is to obtain data and experience to help me plan the rest of my dissertation study. The objective of this pilot study is to describe the collaborative project, and the technical, institutional and cultural work environments of collaborating participants, including the use and non-use of ICT in the project.

## What Volunteers Are Expected To Do

All project group members will be asked to participate in interviews of approximately 1 hour. During each interview participants will be asked to discuss the project, their role in the project, etc I would also like to have access to internal documents (e.g., web site, reports, conference papers, technical papers, contractual documents, etc). Some observations of meetings, etc. may be beneficial to me depending on the circumstances.

## Volunteer process

To get involved with this pilot study or to learn more about it, please phone me (073 621 3051) or email me (Marisa.ponti@hb.se). If you have any questions, please contact me as well.

And finally... Thank you very much for considering participation in my pilot study. I

appreciate your interest, look forward to hearing from you, and would be happy to answer any questions you might have.

## Appendix 2 – Protocol for Selection and Use of Literary Inscriptions

(Adapted from Hammersley and Atkinsons, 1995)

WHAT TO WATCH FOR IN AN INSCRIPTION ACCORDING TO CALLON	QUESTION TO USE TO SELECT AND USE THE INSCRIPTION
Who inscribes	Who produced the inscription?
	Was the person or group that produced the inscription in a position to write authoritatively about the subject or issue?
What it is inscribed	Why was the inscription produced? On what occasion?
	For what overt purpose?
	With what outcomes?
	What may have been other underlying purposes?
	What is recorded? What is omitted?
	What interests are the author(s) translating? What assumptions, beliefs, and values are the author(s) communicating?
	What is taken for granted?
How it is inscribed	How is the text written?
How powerful the inscription is	Are there different interpretations of the inscription from the one the author(s) offer and if so what are they and why did the authors discount them?
	What do I need to know (as a researcher) to make sense of the inscription?

## Appendix 3 – Details on Interview Participants

ROLE OF INTERVIEW PARTICIPANTS PER PROJECT	INSTITUTION	JOB ACTIVITIES
SemOP1		
Associate Professor of Library and Information Science	University of Venice	Teaching, research
Library Professional	University of Pavia	Library management, research in classification theory, teaching
Library Professional	University of Padova	Collection management
School librarian (Former Master's Student)	Upper secondary school	Library management
Ph.D. Student (Former Master's Student)	University	Thesis on history of book
Archivist (Former Master's Student)	Free-lance	Archiving
Library Professional (Former Master's Student)	City museum	Archiving
Information Architect (External Collaborator)	Environmental regional agency	Portal information design
SemOP2		
Associate Professor of Library and Information Science	University of Venice	Teaching, research
Library Professional	University of Pavia	Library management, research in classification theory, teaching
Library Professional	University of Padova	Collection management
Assistant Librarian	University	Administrative work
Library Professional	University	Cataloguing
Officer in the Citizen Information Service	Regional Authority	Back-office, front-desk
B.A. student in Digital Communication		
Library Informatics Expert	Interuniversity consortium	Library automation

ROLE OF INTERVIEW PARTICIPANTS PER PROJECT	INSTITUTION	JOB ACTIVITIES
Head Library Professional	University	Library management
Head Library Professional	University	Library management
Officer in the Citizen Information Service	Regional Authority	Database management
Lecturer/ Information Professional	University	Academic teaching/ information retrieval, cataloguing of ancient books
Library Professional	University	Database management
SemOP2 (Drop-out)		
Library Professional	Public library	Library management
IMPPRO		
Faculty Member, Senior Academic	University	Teaching, research
LIS Research Assistant (retired during the project)	University	
Unit Director and Head of Library Services	University	Research and Library Management
Senior Information Professional	Healthcare Library	Knowledge management
Senior Information Professional	Healthcare Library	Knowledge management
Senior Information Professional	Healthcare Library	Library management

## Appendix 4 – Interview Guide to Project Participants

The following is the interview guide used for interviews in the other European country. The guide used in Italy is slightly different to accommodate the characteristics of the local projects.

### Introduction

Before we start, I would like to thank you very much for giving me the opportunity to talk with you, and learn from you. As I mentioned, this interview should take about one hour. I would like to ask you some questions about the project. What I am interested in hearing about is how this project got started and developed, and the social and technical aspects that influenced your participation in this project. I am very interested in your personal views and thoughts and how you experienced your participation in this project.

1. Background Information on Interviewee 1.1. Could you please tell me about your background?	
2. Project Formation (Problematization, who set the stage for the project)	Sociotechnical Aspects
2.1. Can you please describe how this project got started? Probes: How was the topic (or focus or problem the project addresses) chosen or identified? Who were the promoters of the initial idea? How were they involved? What was your role in the project at this stage? What was the motivation for the project? E.g., How does the project relate to the Government's healthcare agenda? Did the initial goals change in any way during the course of the project? If so, how did they change and how did the changes affect the project?	Collaboration Goals
2.2. Were there barriers that you had to overcome before you could establish, or begin working on the project? If so, could you please de-	Collaboration

scribe them? Probe: Any other barriers? What was easiest at this stage?	Goals
2.3. Can you please tell me how the project activities were initially defined and negotiated? Probe: Were there changes during the project (e.g., distribution of roles, organization of work, etc.)?	Collaboration Goals
2.4. When the project started, do you think that all the project participants had the same expectations regarding the project outcomes? If no, what were the different expectations?	
3. Formation (Interessement) and Project Expectations (Enrollment)	
3.1. Can you please tell me how the project group was formed? Probe: How did you personally come to be involved in the project? 3.2. Did you have already established ties with other project participants (e.g., had you already worked together, etc.) when the project started?	Common Ground History of collaboration Mutual Trust
4. Project Development and Coordination (Mobilization)	
4.1. Could you please describe how the work was organised within the project? Probe: Was there a distribution of roles?	Nature of Work
4.2. Project participants were geographically dispersed, so how did you interact during the project? Probe: Did you encounter challenges with respect to participation during the project? If so, how did you first come to notice them? How were the challenges addressed?	Nature of Work Integrated Use of ICT Formal Management Structures and Organizational Policies
4.3. What technologies did you use (besides email) in the project? Probes: How was this decided? What worked best from your perspective? Why? What did not work so well, and why?	Integrated Use of ICT



4.4. How did your employer view your participation in this project (supportive, hostile, neutral)? Did this change at all during the course of the project? Can you give me some examples that illustrate how your employer viewed your work (e.g., Some examples of recognition, or lack thereof, from your employer?)	Incentives and Rewards  Current Work Practices
4.5. What is most satisfying to you personally about working on this project? 4.6. What is most dissatisfying?	Incentives and Rewards
4.7. How do you describe your employer's attitude towards collaborative activities?	Shared Collaborative Culture
5. Project Completion and Future Sustainability	
5.1. What do you consider main successes of the project? Probe: If you were to do the project or a similar one again, what would you do differently? (what could be improved)	
5.1. Did you think about setting up a web site to share project materials (findings, toolkit, etc.)? Yes or No? Why?	
5.3. Can you please tell me if you are trying to continue the work begun in this project? Why? What do you see as the main difficulties or challenges to be overcome to sustain this project?	

## Conclusion

Do you have any questions for me?

Ask permission to follow up on issues by telephone/email

Thank you for your time!

## Appendix 5 – Working Framework for Coding Interviews and Literary Inscriptions

ATTRIBUTES	CODE	DEFINITION
Title	1	Title of the inscription
Outlet	2	It refers to the place of the inscription (e.g., journal, mailing list, email, etc.)
Theme	3	What the inscription is about
Author(s) Name and Professional Position	4	
Author's Role in the Project	5	
Recipient (in case of personal correspondence)	5.1	
Date	6	Date of the issue of the inscription
Explicit Purpose of the Inscription	7	
Underlying Purpose of the Inscription	9	
Outcome	8	It refers to the conclusion/implications drawn by author in the inscription
Mode of inscription	9	Text, picture, etc.
Assumptions and values communicated by the author(s)	10	
Problematization	11	The main actors make themselves indispensable to the others by defining the nature of the problem, defining identities and interests of other actors in a way that is consistent with their own interest, and trying to convince the others to accept their program
Interessement	12	The main actors lock the others into place by interposing themselves and defining the linkages between the others and external actors (the program of the main actors becomes the Obligatory Point of Passage, through which the other actors must pass and by which the focal actors become indispensable)

ATTRIBUTES	CODE	DEFINITION
Enrollment	13	The other actors accept the program, and the main actors define the roles that are to be played and the way in which the others will relate to one another within these networks
Mobilization	14	The main actors borrow their force from their allies and turn themselves into their representatives or spokespersons
Black Boxing	15	"The way scientific and technical work is made invisible by its own success. When a machine runs efficiently, when a matter of fact is settled, one need focus only on its inputs and outputs and not on its internal complexity. Thus, paradoxically, the more science and technology succeed the more opaque and obscure they become." (Latour, 1999, Pandora's Hope).
Sociotechnical Aspects	Code	
Nature of work	A	
Common Ground	B	
History of Collaboration	C	
Tacit Knowledge/Transactive Knowledge	D	
Incentives and Rewards	E	
Current Work Practices	F	
Shared Collaborative Culture	G	
Collaboration Goals/Need to Collaborate	H	
Mutual Trust	I	
Formal Management Structures	L	
Integrated Use of ICT	M	

## Appendix 6 – The Event Frame

THE EVENT FRAME	
Element	Definition
Agent (Actor)	Who or what performs an action/instigates an event (can be both human and nonhuman)
Action	What the actor does
Object	Who or what the action is directed to (transformed, moved, etc.)
Instrument	People and/or nonhuman entities that mediate the action
Setting	The specific arena in which the event occurs. The arena is identified as a space-time domain of the action.
Alignment	Specific spots or moments at which an instrument is applied or an action occurs
Product	The outcome of the action. In general products are achieved by object being transformed, reorganized, re-located, or re-configured
Beneficiary	Those who are affected by the action

Some adaptations of the terms to accommodate ANT:

Agent: to be meant as Actor.

Action: is a Gestalt that unites elements, so action is the convergence of a network (for example, a doctor, ill person, administered drug, and recovered patient).

Alignment: can also refer to coordination of interests, such as competing demands on actors.

Product: the effect of displacement and translation.

## Appendix 7 – Summary of Studies Included in the Literature Review

SOCIOTECHNICAL ASPECTS	SETTING OF COLLABORATION	AUTHOR(S)	METHOD	SAMPLE
Academic collaboration				
- Current Work Practices	Prospective use of a laboratory in psychology	Finholt & Olson (1997)	Review paper	
<ul style="list-style-type: none"> <li>- Common Ground</li> <li>- Formal Management Structures and Organizational Policies</li> <li>- Incentives and Rewards</li> <li>- History of Collaboration</li> <li>- Integrated Use of ICT</li> <li>- Shared Collaborative Culture</li> <li>- Mutual Trust</li> <li>- Nature of Work</li> </ul>	Synchronous intra-disciplinary collaboration in a variety of formal and informal distributed settings, e.g., corporate sites and scientific laboratories (space physics and medicine) – USA	Olson & Olson (2000); Olson et al. (2008)	Over 10 years' investigations of co-located work: observations, interviews with team members and managers, surveys of team members, participants' diaries; and remote work: observations, quality, process, and satisfaction measures from small groups	Formal and informal distributed groups, in corporate sites and scientific laboratories (space physics and medicine)

SOCIOTECHNICAL ASPECTS	SETTING OF COLLABORATION	AUTHOR(S)	METHOD	SAMPLE
- History of Collaboration	Collaboration in the military – USA	Sonnenwald & Pierce (2000)	Document analysis, observation, and interviews	Selected U.S. Army documents, a simulated battle exercise, seven interviews with experienced military staff
- History of Collaboration	Intradisciplinary collaboration networks in biology and physics – USA	Newman (2001)	Statistical analysis	Records from two bibliographic sources over a period of six years for each database
- Incentives and Rewards	Co-located multidisciplinary neuroscience lab – USA	Owen-Smith (2001)	Ethnography	11-month field work in a lab
- Mutual Trust - History of Collaboration	Inter-institutional collaborations in several fields of physics and allied sciences – mostly USA	Shrum, Chompalov, & Genuth (2001)	Unstructured and semistructured interviews, document analysis	53 collaborations
- Nature of Work - Formal Management Structures and Organizational Policies	Same as above	Chompalov, Genuth, & Shrum (2002)	Interviews	53 collaborations

SOCIOTECHNICAL ASPECTS	SETTING OF COLLABORATION	AUTHOR(S)	METHOD	SAMPLE
<ul style="list-style-type: none"> <li>- Current Work Practices</li> <li>- Formal Management Structures and Organizational Policies</li> <li>-History of Collaboration</li> </ul>	Collaboratories in natural sciences and engineering – USA	Finholt (2002)	Review paper	
<ul style="list-style-type: none"> <li>- Incentives and Rewards</li> <li>- Integrated Use of ICT</li> <li>- History of Collaboration</li> <li>- Shared Collaborative Culture</li> <li>- Collaboration Goals</li> </ul>	Collaboratories in HIV/AIDS research – USA, South Africa	Olson, Teasley, Bietz, & Cogburn (2002)	Baseline assessment of prospects and challenges of collaborative development	Two collaborative opportunities
<ul style="list-style-type: none"> <li>- Incentives and Rewards</li> </ul>	Collaboratories in biomedicine – USA	Arzberger & Finholt (2002)	Review paper	
<ul style="list-style-type: none"> <li>- Common Ground</li> </ul>	Scientific research – USA	Kraut, Fussel, Brennan, & Siegel (2002)	Use of decompositional approach to examine the influence of media affordances on collaboration	Several examples from the domain of scientific research
<ul style="list-style-type: none"> <li>- Mutual Trust</li> </ul>	Students – Usa	Zheng, Veinott, Bos, Olson, & Olson, (2002)	Experimental study	Two-hundred undergraduate and graduate students.

SOCIOTECHNICAL ASPECTS	SETTING OF COLLABORATION	AUTHOR(S)	METHOD	SAMPLE
- Current Work Practices	NSF Science and Technology Center for Environmentally Responsible Solvents and Processes – USA	Sonnenwald, Solomon, Hara, Bolliger, & Cox (2003)	Action research	25 interviews and 50 observations of videoconference meetings over one year
- Incentives and Rewards - History of Collaboration	Distributed, multidisciplinary academic research center (four universities) – USA	Hara, Solomon, Kim, & Sonnenwald (2003)	Sociometric surveys and interviews, observation of videoconferences and meetings.	Survey with all members of the research center; interviews with members of one research group, observations of videoconferencing meetings.
- Incentives and Rewards - Current Work Practices	Scientists in university, national research lab, and industrial R&D lab in nanotechnology – USA	Sonnenwald (2003)	Semi-structured interviews	17 scientists working in a variety of settings and in different positions
- Formal Management Structures and Organizational Policies - Common Ground	Collaboratory in film research – DK	Cleal, Andersen, & Albrechtsen (2004)	Videos and transcriptions from evaluation workshop	Archivists involved in the collaboratory project



SOCIOTECHNICAL ASPECTS	SETTING OF COLLABORATION	AUTHOR(S)	METHOD	SAMPLE
- Shared Collaborative Culture - Nature of Work	Inter-institutional collaboration in high energy physics, earthquake engineering, and thyroid research – USA, Switzerland	Birnholtz (2004, 2005)	Multiple methods (interviews and survey) over three years.	138 interviews with researchers in the three fields. Questionnaire deployed in a population of 900 scientists and engineers
- Formal Management Structures and Organizational Policies	Multidisciplinary projects in science and engineering – USA	Cummings & Kiesler (2005)	Workshop (participants' notes and reports) and post-workshop survey	62 collaborative projects
- Incentives and Rewards	Collaboratories in natural sciences and software development – USA	Bos, Olson, & Olson (2006)	Review paper	
- Incentives and Rewards - Formal Management Structures and Organizational Policies - Collaboration Goals	Large interdisciplinary and inter-institutional scientific collaboration involving universities, private industry groups, federal laboratories, etc. in medicine and environmental science – USA	Corley et al. (2006)	Two case studies	Two inter-institutional collaborations involving universities, private industry groups, federal laboratories, etc./medicine and environmental science

SOCIOTECHNICAL ASPECTS	SETTING OF COLLABORATION	AUTHOR(S)	METHOD	SAMPLE
- Common Ground - Collaboration Goals	Distribute, interdisciplinary and inter-institutional research collaboration – USA	Haythornthwaite, Lunsford, Bowker, & Bruce (2006).	Conceptual paper	
- Common Ground - Incentives and Rewards - Current Work Practices - Collaboration Goals	Scientific collaboration	Sonnenwald (2007)	Review paper	
- Current Work Practices - Tacit Knowledge and Transactive Knowledge	Inter-institutional laboratories in sciences and engineering – USA	Bos et al. (2007)	Review paper	
- Formal Management Structures and Organizational Policies	Scientific collaboration in four fields – USA	Walsh & Maloney (2007)	Survey - Statistical analysis	Survey scientists in experimental biology, mathematics, physics, and sociology
<b>Academia/not-for-profit collaboration</b>				
- History of Collaboration - Incentives and Rewards	University-professional collaboration in the health sector – USA	Dreher, Everett, & Hartwig (2001)	Non-empirical paper	
- Incentives and Rewards	University–community–retail partnership in human development – USA	Price, Zavotka, & Teaford (2004)	Non-empirical paper	

SOCIOTECHNICAL ASPECTS	SETTING OF COLLABORATION	AUTHOR(S)	METHOD	SAMPLE
- Integrated use of ICT - History of Collaboration - Collaboration Goals	Interdisciplinary partnerships between human services providers, university, and policy makers – USA	Allen-Meares et al. (2005)	Multiyear and multisite evaluation. Multiple forms of qualitative data employed	10 participatory research-based laboratories
Academia/government/industry collaboration				
- Tacit Knowledge	Multidisciplinary, inter-institutional collaboration – USA	Kanfer et al. (2000)	Multimethod over three years	Distributed, multidisciplinary scientific teams in the National Computational Science Alliance (Alliance)
- Common Ground	University-industry collaboration in material science and economic/administrative science – Norway	Thune (2007)	Semistructured interviews	29 researchers and R&D managers
- Common Ground	University-industry collaboration – UK	D'Este & Patel (2007)	Survey–Statistical analysis	Large-scale survey of university researchers
Business Collaboration				

SOCIOTECHNICAL ASPECTS	SETTING OF COLLABORATION	AUTHOR(S)	METHOD	SAMPLE
- Integrated use of ICT	Intra-organizational and intra-professional team-based work – USA	Ruhleder, Jordan, & Elmes (1996)	Case study. Ethnography over four months	One small company
- Integrated use of ICT - Shared Collaborative Culture - Collaboration Goals	Inter-professional and inter-organizational use of collaborative technologies – various countries	Karsten (1999)	Review based primarily on research by others	18 research case studies collected from scholarly journals, conferences, and directly from the researchers between 1992 and 1998.
- Incentives and Rewards	Virtual communities of practice – USA	Wasko & Faraj (2000)	Survey	Three virtual communities
- Incentives and Rewards - Shared Collaborative Culture	Intradisciplinary and intra-professional, no profit (open-source software movement) – global	Markus, Manville, & Agres (2000)	Small case study (literature review, email, and triangulation of these sources with the academic literature on management, virtual organizations, etc.)	Small number of open-source developers

SOCIO-TECHNICAL ASPECTS	SETTING OF COLLABORATION	AUTHOR(S)	METHOD	SAMPLE
- Common Ground	Distributed teams	Crampton (2001)	Qualitative analysis of e-mails and chat sessions	13 geographically distributed teams
- Nature of Work - Integrated use of ICT - Incentives and Rewards - Shared Collaborative Culture - Collaboration Goals - Current Work Practices	Intraprofessional (corporate and professional settings), intra- and interorganization knowledge communities – UK	Barrett, Capleman, Shoib, & Walsham (2004)	Review paper	
- Common Ground - Integrated use of ICT	17 R&D centers involved in international distributed research collaboration – India	Sonderegger (2009)	Interviews	31 researchers



## **Publications in the series Skrifter från VALFRID**

Enmark, Romulo: Defining the Library's Activities. (ISBN 91-971457-1-X) International Publications; 1

Biblioteksstudier. Folkbibliotek i flervetenskaplig belysning. Red. Romulo Enmark. (ISBN 91-971457-0-X) Skriftserien; 1

Biblioteken och framtiden, del I. Red. Romulo Enmark. (ISBN 91-971457-1-8) Skriftserien; 2

Biblioteken och framtiden, del II. Red. Lars Seldén. (ISBN 91-971457-2-6) Skriftserien; 3

Hjørland, Birger: Emnrepræsentation og informationssøgning. (ISBN 91-971457-3-4) Slut

Hjørland, Birger: Emnrepræsentation og informationssøgning. 2. uppl. med register. (ISBN 91-971457-4-2) Skriftserien; 4

Biblioteken, kulturen och den sociala intelligensen. Red. Lars Höglund. (ISBN 91-971457-5-0) Skriftserien; 5

Hjørland, Birger: Faglitteratur. Kvalitet, vurdering og selektion. (ISBN 91-971457-6-9) Skriftserien; 6

Limberg, Louise: Skolbiblioteksmodeller. Utvärdering av ett utvecklingsprojekt i Örebro län. (ISBN 91-971457-7-7) Slut

Hjørland, Birger: Faglitteratur. Kvalitet, vurdering og selektion. 2. rev. udgave. (ISBN 91-971457-8-5) Skriftserien; 8

Pettersson, Rune: Verbo-visual Communication – Presentation of Clear Messages for Information and Learning. (ISBN 91-971457-9-3) Skriftserien; 9

Pettersson, Rune: Verbo-visual Communication – 12 Selected Papers. (ISBN 91-973090-0-1) Skriftserien; 10

Limberg, Louise: Skolbiblioteksmodeller. Utvärdering av ett utvecklingsprojekt i Örebro län. (ISBN 91-973090-1-X) Skriftserien; 11 (nytryck av nr 7, bilaga inne i boken)

Barnbibliotek och informationsteknik. Elektroniska medier för barn och ungdomar på folkbibliotek. Red. Anette Eliasson, Staffan Lööf, Kerstin Rydsjö. (ISBN 91-973090-2-8) Skriftserien; 12

Folkbildning och bibliotek? På spaning efter spår av folkbildning och livslångt lärande i biblioteksvärlden. Red. Maj Klasson. (ISBN 91-973090-3-6) Skriftserien; 13

Zetterlund, Angela: Utvärdering och folkbibliotek: En studie av utvärderingens

teori och praktik med exempel från folkbibliotekens förändrings- och utvecklingsprojekt. (ISBN 91-973090-4-4) Slut

Myrstener, Mats: På väg mot ett stadsbibliotek. Folkbiblioteksväsendets framväxt i Stockholm t o m 1927. (ISBN 91-973090-5-2) Skriftserien; 15

Limberg, Louise: Att söka information för att lära. En studie av samspel mellan informationssökning och lärande. (ISBN 91-973090-6-0, Slut). (ISBN 91-89416-04-X, nytryck 2001 och 2003) Skriftserien; 16

Hansson, Joacim: Om folkbibliotekens ideologiska identitet. En diskursstudie (ISBN 91-973090-7-9) Slut

Gram, Magdalena: Konstbiblioteket: en krönika och en fallstudie. (ISBN 91-973090-8-7) Skriftserien; 18

Hansson, Joacim: Klassifikation, bibliotek och samhälle. En kritisk hermeneutisk studie av "Klassifikationssystem för svenska bibliotek". (ISBN 91-973090-9-5) Skriftserien; 19

Seldén, Lars: Kapital och karriär. Informationssökning i forskningens vardagspraktik. (ISBN 91-89416-00-7 Slut). (ISBN 91-89416-08-2, nytryck 2004) Skriftserien; 20

Edström, Göte: Filter, raster, mönster. Litteraturguide i teori- och metodlitteratur för biblioteks- och informationsvetenskap och angränsande ämnen inom humaniora och samhällsvetenskap. (ISBN 91-89416-01-5) Slut

Röster. Biblioteksbranden i Linköping. Red. Maj Klasson. (ISBN 91-89416-02-3) Skriftserien; 22

Stenberg, Catharina: Litteraturpolitik och bibliotek. En kulturpolitisk analys av bibliotekens litteraturförvärv speglad i Litteraturutredningen L 68 och Folkbiblioteksutredningen FB 80. (ISBN 91-89416-03-1) Skriftserien; 23

Edström, Göte: Filter, raster, mönster. Litteraturguide i teori- och metodlitteratur för biblioteks- och informationsvetenskap och angränsande ämnen inom humaniora och samhällsvetenskap. Andra aktualiserade och utökade upplagan. (ISBN 91-89416-05-8) Skriftserien; 24

Sundin, Olof: Informationsstrategier och yrkesidentiteter - en studie av sjuksköterskors relation till fackinformation vid arbetsplatsen. (ISBN 91-89416-06-6) Skriftserien; 25

Hessler, Gunnel: Identitet och förändring - en studie av ett universitetsbibliotek och dess självproduktion. (ISBN 91-89416-07-4) Skriftserien; 26

Zetterlund, Angela: Att utvärdera i praktiken - en retrospektiv fallstudie av tre program för lokal folkbiblioteksutveckling. (ISBN 91-89416-09-0) Skriftserien; 27



Ahlgren, Per: The Effects on Indexing Strategy-Query Term Combination on Retrieval Effectiveness in a Swedish Full Text Database. (ISBN 91-89416-10-4) Skriftserien; 28

Thórsteinsdóttir, Gudrun: The Information Seeking Behaviour of Distance Students. A Study of Twenty Swedish Library and Information Science Students. (ISBN 91-89416-11-2) Skriftserien; 29

Jarneving, Bo: The Combined Application of Bibliographic Coupling and the Complete Link Cluster Method in Bibliometric Science Mapping. (ISBN 91-89416-12-0) Skriftserien; 30

Limberg, Louise, Folkesson, Lena: Undervisning i informationsökning: Slutrapport från projektet Informationsökning, didaktik och lärande (IDOL). (ISBN 91-89416-13-9) Skriftserien; 31

Johannisson, Jenny: Det lokala möter världen: Kulturpolitiskt förändringsarbete i 1990-talets Göteborg. (ISBN 91-89416-14-7) Skriftserien; 32

Gärdén, Cecilia, Eliasson, Anette, Flöög, Eva-Maria, Persson, Christina, Zetterlund, Angela: Folkbibliotek och vuxnas lärande: Förutsättningar, dilemman och möjligheter i utvecklingsprojekt. (ISBN 91-89416-15-5) Skriftserien; 33

Dahlström, Mats, Under utgivning. (ISBN 91-89416-16-3) Skriftserien; 34

Nowé Hedvall, Karen, Tensions and Contradictions in Information Management: An Activity-theoretical Approach to Information Activities in a Swedish Youth/Peace Organisations. (ISBN 978-91-85659-08-1), Skriftserien; 35

Francke, Helena, (Re)creations of Scholarly Journals. Document and Information Architecture in Open Access Journals. (ISBN 978-91-85659-16-6), Skriftserien; 36

Hultgren, Frances, Approaching the future: a study of Swedish school leavers' information related activities. (ISBN 978-91-89416-18-5), Skriftserien; 37

Söderlind, Åsa, Personlig integritet som informationspolitik. Debatt och diskussion i samband med tillkomsten av Datalag (1973:289). (ISBN 978-91-89416-20-8), Skriftserien; 38

Nalumaga, Ruth, Crossing to the mainstream – Information Challenges and Possibilities for Female Legislators in the Ugandan Parliament. (ISBN 978-91-89416-20-1), Skriftserien; 39

Johannesson, Krister, I främsta rummet. Planerandet av en högskolebiblioteksbyggnad med studenters arbete i fokus. (ISBN 978-91-89416-21-5), Skriftserien; 40

Kawalya, Jane K. The national library of Uganda: its inception, challenges and prospects 1997-2007. (ISBN 978-91-89416-22-8), Skriftserien; 41

Gärdén, Cecilia. Verktyg för lärande. Informationssökning och informationsanvändning i kommunal vuxenutbildning. (ISBN 978-91-89416-23-9), Skriftserien; 42