Interorganizational Collaboration among Small and Medium-sized Enterprises

A Pan-European Study of the Influence of Type of Collaboration on SME Practice

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**Abstract**

Interorganizational collaboration among Small and Medium Sized Enterprises (SMEs) is a phenomenon surrounded with both ambiguity and cumbersome managerial difficulties. Despite this, the SME constitutes the *primus motor* of the European economy, and the organizational practice of Interorganizational collaboration is considered more and more a necessity for companies today.

With the SMEs competitive ability being restricted by the size and amount of resources available, Interorganizational collaboration as a mode of organizing offers a means for the SME to expand its resource base. The development and diffusion of IT-based infrastructures decreases the costs of Interorganizational collaboration, hence steadily pushing the envelope further in regards to what is economically feasible when it comes to collaborative constellations.

This thesis presents a categorization of types of Interorganizational collaboration among SMEs, and on the basis of this investigates the influence of collaborative setting on three underlying areas of practice. By addressing the influence of collaborative setting on practice within the usage and value of IT, knowledge management and change management, the ambition is to aid SME managers in their everyday work.

The fieldwork underlying this thesis consists of the research conducted within the PLEXUS-project, a three year project within the EU-funded IST-programme spanning from 2001 to 2004. The project aimed to create management techniques and decision support tools for the successful management and assessment of intellectual assets in interorganizational collaborations between SMEs.

*Keywords*: Interorganizational Collaboration, Small- and Medium-sized Enterprise, collaborative settings, IT, value, usage, change management, knowledge management

*Language*: English

*Number of pages*: 175

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Johan: My wonderful Maria and little Theo. Next summer belongs to you, and no one but you.

Andreas: Frida and family for constant support.
“Making feet for children’s shoes.”

Tom Waits, 1983
1. Introduction

The phenomena in focus in this thesis is the interorganizational collaboration (IOC) taking place where one of the participating parties is relatively small in size\(^1\). Regardless of the potential shortcomings in categorizing organizations on basis of their number of employees, turnover and distribution of ownership (www.europa.eu.int, 2005-08-19), the labeling of organizations as Small and Medium Sized Enterprises (SMEs) has become a more or less accepted practice.

In relation to the criteria put forth by the European Commission in 2003 (previously 1996), the type of enterprise in focus fulfills the criteria of having less than 250 full time employees, having a turnover of less than € 50 million (€43 million balance sheet total) and not being majority-owned by a large corporation. To further delimit the scope of claims for this thesis, any company with 10 employees or less would fall into the segment of Micro Enterprises and subsequently not be categorized as an SME.

On a European basis this type of enterprise comprises the vast majority of active players on the market (see table 1 below). Descriptive statistics from the previous years are unanimous in their claims regarding the importance of the SMEs to both previous and future economic growth. Edwards et al (2005:1119) relates this to previous research by Jones & Tilley (2003) by stating that:

> "Encouraging innovation in small and medium sized enterprises (SMEs) remains at the heart of policy initiatives for stimulating economic development at the local, regional, national and European levels."

\(^1\) This formulation highlights the scope of this thesis as not focusing solely on the collaboration between or among SMEs.
SMEs play an essential role in the overall European economy. Accounting for 98.5% of Finland’s and 98% of Norway’s total amount of companies (Haahti et al, 2005), the following table seeks to illustrate the importance of SMEs in relation to the employment share in eight European countries (Dutta, & Evrard, 1999:239, statistics originally from Eurostat).

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage share of SMEs of total employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>59.9</td>
</tr>
<tr>
<td>Spain</td>
<td>81.1</td>
</tr>
<tr>
<td>France</td>
<td>63.4</td>
</tr>
<tr>
<td>Italy</td>
<td>78.7</td>
</tr>
<tr>
<td>Netherlands</td>
<td>60.9</td>
</tr>
<tr>
<td>Belgium</td>
<td>56.2</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>71.0</td>
</tr>
<tr>
<td>UK</td>
<td>57.7</td>
</tr>
</tbody>
</table>

Table 1 – Employment share of SMEs in Europe

Despite the fact that SMEs employ a majority of the European workforce, the lifecycle of the SME is one filled with perils and lethal risks. According to Dutta & Evrard (1999), roughly half of SMEs die a premature death. Populational ecologists such as Hannan & Freeman (1977) have studied this in more detail, and according to Dutta & Edvard, only 50% of all SMEs are still active after their second year of operations.

With SMEs becoming more and more the backbone of the economy, academic interest in phenomena in relation to these companies has soared. With new fields such as entrepreneurship and existing fields such as marketing and informatics, contemporary research is investigating everything from what makes these companies survive to how legislation should better support the increase in new company births. The research project that underlies this thesis is a direct effect of the increased interest being directed towards SMEs.
When it comes to the phenomena at hand being the IOCs taking place where one of the participants is an SME, Narula (2004:153) offers an illustrative backdrop.

“Indeed, the very success of the SME vis-à-vis their larger competitors may be due to their ability to utilise external networks more efficiently.”

In a seminal article from 1994, Noteboom illustrates how SME characteristics often interfere with the creation of competitive capabilities. The issue of firm size in relation to it being a determinant of the resource-base that in turn is a determinant of what potential capabilities an organization is endowed with (see further elaboration on the Resource Based View under the heading of IOC for SME), opens up for a unilateral advocacy for Interorganizational relationships as beneficial for SMEs.

Without the excess of resources that a large organization can create through various buffering tactics (Thompson, 1967), SMEs are prone to the necessity of bridging their resources to other organizations’ resources to meet external demands and windows of opportunity.

This is also noted by Varadarajan & Cunningham (1995) and Lohrke et al (2005:in press):

“Small and medium-sized enterprises (SMEs) are increasingly employing strategic alliances in attempts to build or strengthen a sustainable competitive advantage. In doing so, managers often hope to improve SME performance by developing new skills, obtaining critical resources, gaining market access, developing new technologies, attaining important scale economies, and/or enhancing firm reputation.”

Given this, the phenomena of SME IOC is regarded as relevant for further investigation.
2. Purpose and Scope

This thesis explores the general phenomena of SME interorganizational collaboration. The main rationale behind this is the increased importance of the SME as an economic actor, and the increase in IOC (and different forms of collaboration) as a means of organization.

Our ambition is to aid SME managers in their everyday work related to the areas in focus, as well as increase the overall understanding of the phenomena in question. Given the focus on collaboration and multiplicity in types of interorganizational collaboration, this aim can be expressed through the research question:

How can different Small and Medium-sized Enterprises’ interorganizational collaborations be categorized, and how do these types of collaboration influence practice within the following areas:

- Usage and Value of IT-support
- Change management
- Knowledge management

Throughout the work with the project the initial focus on network organizing came to be re-packaged into the construct of IOC, which according to our ideas more accurately capture the phenomena that we have studied. In this thesis we will however use the concept of IOC rather than network organization apart from in the previously written papers.

Type of collaboration is regarded as an extension of the general notion of IOC, where business-related characteristics are taken into account to further specify the type of IOC. This thesis thereby strives to enhance the previous conceptions of collaborative type in relation to for instance joint ventures, strategic alliances et cetera.

This thesis aims to contribute mainly to the theoretical fields surrounding managerial practice, specifically directed towards SMEs. The overall increase in new organizational forms brought forth in parallel with new technological possibilities such as the
internet and other bridging technologies increase the necessity to aid managers in their everyday practice. In targeting the collaborative type as a determinant or influencing factor, this thesis contributes to the kernel theories surrounding SME and IOC, as well as the factual management of said phenomena.

3. Research Setting: The Plexus Project

The PLEXUS project (www.eu-plexus.com, 2005-08-19), was a Pan-European study of IOC between Small- and Medium-Sized Enterprises conducted between 2001 and 2004.

The PLEXUS project was initiated in the spring of 2001 as a pan-European project spanning over a total of three years. The projects primary objective was the development of decision support tools (a Decision Support System, DSS) for the management and measurement of intellectual assets in networks between small and medium sized enterprises (SMEs) in the EU. The DSS was developed through two prototypes, described in more detail below under the heading “Prototypes”.

The project was funded by the EU under the IST-programme (Information Societé Technologie) within the fifth framework, and the consortia behind the project consisted of ten partners from both industry and academia.

The key deliverable from the Plexus project was Plexus Tools. Plexus tools comprise of a software and a methodology for SMEs that enables inventory, communication and negotiation regarding competencies, skills and know-how. This is given a more detailed presentation in section: Prototypes.

Representatives from Göteborg University participated in the entire project as design researchers involved in everything from the initial feasibility study to the final evaluation of the last prototype.
Industrial Objectives

The overall objective of PLEXUS was the measurement and the monetary assessment of intellectual assets. Intellectual assets was in the project defined as all intangible assets which can be identified, described, measured and converted into value, and developed according to the current business goals and future perspectives (potentials). The Intellectual Assets consist of three categories, namely Human Assets, Organisational Assets and Other Codified Assets.

It is vital for the business success of collaborative constellations to know the value of intellectual assets that the single partner brings in and how those values perform in the network life cycle. Therefore the purpose of measurement and assessment of the intellectual assets is twofold:

- To form the basis to build up a network. Therefore the small and medium sized enterprises appropriate methodologies to monetary assess intellectual assets are needed.
- To effectively manage and coordinate the network on a “day to day” basis and not dependent on an initial agreement. This is to dynamically reflect the single partners performance regarding the value added to the network (e.g. if every partner brings in the core competencies, the network creates more value for each single partner such as more capacity, innovation synergies, cost-efficiency).

Scientific Objectives

The scientific objectives underlying PLEXUS was broken down as below:

- Identification and development of a structure for intellectual assets
• Methodologies for the monetary assessment of the intellectual assets
• Determination of management techniques and methods for the development of the intellectual assets in networks
• Identification of significant indicators for the single category of intellectual assets and correlation with management techniques
• Assessment of conflicting goals between management techniques when applied to intellectual assets categories
• Validation of the concept and development of a software prototype towards a decision support tool

This thesis will follow-up on the activities in Plexus related to the value and usage of IT for SMEs in interorganizational collaboration.

Partner presentation

The project was comprised of partners from all over the EU. In Table 1 below, respective partner, their role and main contributions to the project is presented.

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Country</th>
<th>Role in the Project</th>
<th>Company profile/ main contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAM</td>
<td>Austria</td>
<td>Financial Project Coordinator, Dissemination Manager, Coordinator of a virtual network organisation and end user</td>
<td>Training and education of occupational physicians; Major contribution to Intellectual Asset management methodology and network management guideline; responsible for data analysis and dissemination of results as well as end user (start-up of an virtual network organisation</td>
</tr>
<tr>
<td>Country</td>
<td>Role/Responsibility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>---------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austria</td>
<td>Scientific Co-ordinator and solution provider for the physicians and lecturers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Research institute and technology transfer centre: responsible for the scientific coordination of the project, the development of the Intellectual Asset Methodology and final technological evaluation of the 2nd Plexus prototype.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>Solution provider and network coach</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Research institute and technology transfer centre: responsible for industrial best practice analysis and support for software development, for final technology evaluation as well as network coach</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austria</td>
<td>Co-ordinator of a virtual network organisation and end user</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organisation for certification, verification and assessments: responsible for development of network management methodology as well as end user (existing network organisation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>Solution provider</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Internet-based business solutions provider: originally responsible for software development and exploitation of results. Role was taken over by Indra due to an organisational re-integration in month 3 of the project.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>Solution provider and network coach</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Innovation technology consulting: responsible for supporting the development of Plexus methodology as well as network coach</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulgaria</td>
<td>Solution provider</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Software development: responsible for requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner</td>
<td>Country</td>
<td>Role</td>
<td>Description</td>
</tr>
<tr>
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<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>ROSE</td>
<td>Spain</td>
<td>End user</td>
<td>Telecommunication-engineering company in the area of electronic commerce, data transmission, broadcasting and multimedia technologies: responsible as end user for user requirements and testing. (Role was taken over by the University Carlos 3 de Madrid at month 8 of the project.)</td>
</tr>
<tr>
<td>UC3M</td>
<td>Spain</td>
<td>End user</td>
<td>Research institute and technology transfer centre: responsible as end user for user requirements and testing, major contribution to the final testing and evaluation of the Plexus prototype.</td>
</tr>
<tr>
<td>Indra</td>
<td>Spain</td>
<td>Exploitation Manager and solution provider</td>
<td>Internet-based business solutions provider: responsible for market watch study, software development and exploitation of results. Contribution to the final evaluation of the Plexus Prototype.</td>
</tr>
</tbody>
</table>

Table 2 – Partner presentation Plexus
4. Method

Throughout the project, a number of activities were conducted in close collaboration with the industry. Figure 1 below gives an overview of these activities and their corresponding output.

![Figure 1 - The main methodological steps of the study](image)

One of the priorities in the project was to quickly establish and maintain such a close collaboration in order to ensure relevance of project focus. A major part of the empirical material was collected in WP1, where the focus was to determine industrial (best) practice regarding network- and intellectual assets management. This was done by a pan-European survey comprising of semi-structured expert interviews and a questionnaire. The survey was followed by a series of workshops, seminars and interviews, carried out when design teams where in need of additional intelligence or prototype evaluation. Plexus also had an active Industrial Support Group (ISG). The ISG functioned as a direct link to reality, the problem owners. By a continuous dialog with members of the ISG, the project was able to quickly resolve a number of day-to-day issues ranging from design to access of information to needs from potential future users.

Due to the design orientation of the Plexus project, most of the activities carried out aimed at gathering or analysing design intelligence for the construction of the prototype.

Below follows a detailed description of each activity and their main output.
Expert Interviews

The interview guidelines were constructed in collaboration with the Plexus partners in order to ensure maximum relevance and input to upcoming WP’s. The guideline was focused on six investigatory areas, namely:

- Identification of Industrial (management) measures to enhance existing Intellectual Assets.
- Identification of preconditions for a successful start up of networks
- Identification of constraints for the successful existence of network organizations
- Identification of dominating communication structure and information flow, leadership approaches, management style, network culture, conflict resolution, formal and informal organizational development etc.
- Identification of current definitions and categories of “Intellectual Assets”
- Identification of current use and application of the “Intellectual Assets Approach”

In total 42 interviews in Sweden, Austria, Germany and Spain have been performed throughout June and July 2002. In addition to the above mentioned objectives the interviews served furthermore as possibility to identify further relevant management issue with regards to networks and Intellectual Assets.

When analyzing the results, three major types of networks were identified. It was decided that the best way of presenting the result from the interviews in a comprehensive and ample manner is by describing these types of networks by constructing three network profiles. An alternative would have been to “code” the answers from the interviews and follow up with a quantifying analysis. The
consortium strongly felt that such an approach would not capture the richness of interview answers and thus, not give a nuanced picture of industrial practice. Further more, the questionnaire applies this approach which is another reason for conducting a more qualitative and descriptive approach on the expert interviews.

Questionnaire I

The purpose of the questionnaire was to supply the necessary data that would facilitate the creation of a Network Ability Index and the identification of Industrial Best Practices. This questionnaire was focused on three categories, namely:

- To investigate preconditions for a successful start up of networks
- To investigate constraints for the successful existence of existing network organizations
- To investigate current use and application of the “Intellectual Asset Approach”

The questionnaire was constructed during the spring of 2002 through the close collaboration of the participating partners under the supervision of Gothenburg University.

Translations were made by the participating partners from English to German, Spanish and Swedish, and the result was a final version of the questionnaire that was distributed by GPM (Good People Management) – an independent consulting company in Austria - specialized in conducting surveys - and mandated by the Plexus consortium.

The final dissemination and retrieval of the questionnaire was handled by GPM and directed mainly towards representatives for companies fitting the PLEXUS profile with regional adjacency. The method for the final distribution between GPM and the
respondents varied from e-mail attachments to faxes, due to regional differences.

The target group of the questionnaire was originally SMEs that participate in inter-organisational relationships. The restriction of size was somewhat disregarded due to the fact that large companies often are involved in collaboration with SMEs.

With the method for finding suitable participators in the investigation varying between the participating partners and falling under the responsibility of said partners, the total sample that the investigation was directed towards is not statistically representative. This is however regarded as mainly a statistical shortcoming of the investigation and not (to any extent) a shortcoming affecting the outcome of this explorative investigation.

The questionnaire consisted of 21 questions. Out of these, 15 were multiple-choice and six open. Out of these six open questions a categorization of the answers to four of them was created.

With the factual response-rate being impossible to calculate due to the method for selection of respondents varying over regional distribution, the total number of responses (123) was considered the sample-size and this was thereafter further broken down into smaller clusters with respect to company or collaborative network taxonomies.

The data was first analysed towards frequency, distribution and correlations. After an initial cross-tabulation of all questions, two categories of clusters were identified as functional as a basis for further analysis. The two categories were Company type and Network type and after reviewing the results, a total of 35 (21 & 14) clusters were identified with the fundamental criteria that the cluster needed to be composed of at least 12 (10%) respondents fitting the description. The majority of the clusters had between 12 and 15 respondents, and there are six clusters that have over 20 respondents.
It is however of great importance to bear in mind the statistical shortcomings of the choice in modus operandi when the clusters of correlating company- and network profiles were created (Newbold, 1995). None of the correlations were significant with regards to $P<.001$ and neither were they of any great dignity in regards to Pearson’s $R$. Despite this, it was decided to regard the findings as indicative and thereby of value for further analysis and investigation.

The clustering of Company- and Network-types and a correlation of these profiles towards the findings from the other questions resulted in the creation of Company- and Network-profiles.

After the initial analysis of the expert interviews was completed, three network profiles were identified. With this taxonomy in focus, a complementary analysis of the findings from the questionnaire was initiated with the purpose to investigate how the questionnaire could support the three identified profiles. The profiles where differentiated by the level of their interorganizational Intellectual Asset integration. To facilitate the usage of data from the questionnaire as an aid in supporting the three profiles identified in the expert interviews, a number of basic assumptions regarding certain dimensions of the profile’s attributes were stated.

The first and most important of these was an assumption regarding the dichotomy of control versus adaptability. With the presented trilogy of network profiles, the three can be situated on a sliding scale measuring managerial control (or intent of/aspiration for). It was assumed that the companies being part of a Supply Chain Network are more prone towards managerial control than for instance the companies being part of Innovation Networks.

A second assumption was made to be able to assess the network profiles without having to address the political aspects of the networks. By separating the political structure from that of the
network, we have been able to work more efficiently with the material.

When analyzing the results from the questionnaire and the expert interviews, the consortium identified the diversity of the problem with the successful creation of a “Network Ability Index” as existing parallel over several dimensions. This meant that in order to come as close to the investigatory subject as possible, these dimensions had to be taken into account in the analysis. Through several work-sessions and smaller work-shops with co-workers at the University of Gothenburg, the following dimensions were identified as interesting enough for further discussion:

- IA Integration
- Ownership Structure
- Value Base Integration
- Transparency
- Flexibility
- Network Management
- Commitment

These dimensions helped to better visualize (and ensure comparability) the profiles presented in this report, and could thereafter be used as a first step towards the creation of a Network Ability Index. By specifying the network profiles with above 7 dimensions the consortium believes that the Network profiles become more nuanced and enriched. The next step in creating a Network Ability Index was the development of a procedure for using the seven dimensions as a means to create a comparable profile for a potential partner based on practical experience.

The following charts attempt to illustrate the distribution of respondents.
Figure 2 - Company Country

Figure 3 - Number of employees
Figure 4 - Company industry

Figure 5 - Respondents Position

Figure 6 - Field of expertise
Workshops

“Net-coach” was an initiative taken from Göteborg University. The purpose was to test and evaluate the 1st software prototype and to further validate identified network profiles. This was carried out through three in-depth case studies. The cases were constructed through the help from Informatics students at the masters level. In three joint seminars lead by researchers followed by five individual interviews, the representatives from the ISGs where thoroughly, through questions exercises and observations, examined regarding their day-to-day activities as ‘network managers’ and their opinions regarding possible suitable support. The result of Net-coach was:

- Extensive feedback regarding the 1st prototype
- Additional material enriching the generic network profiles towards validation
- Three master’s thesis’.

Questionnaire II

“BigEmp” was a complementary questionnaire aiming at identifying current level of sophistication regarding type of information technology support when SMEs communicate with partners, customers and suppliers. Response rate was impossible to calculate due to the fact that potential respondents where i) contacted by phone, ii) convinced to participate, iii) asked to fill in the questionnaire send through an e-mail invitation. A total number of 100 answers were collected, mainly from the financial services industry. A general conclusion was that SMEs are positive towards new forms of technical support, but as for now, investments are rare and faxes and e-mailing is sufficient.
Prototypes

Below follows a set of screenshots from the now operational software, Plexus tools. As stated earlier, the software gives the user the possibility of conducting an inventory regarding her internal intellectual assets. This inventory may be further correlated to the specific intellectual assets in use in respective value-creating process. Through this knowledge, it is possible to conduct a ‘gap analysis’ identifying potential needs for additional intellectual assets. Plexus tools have support for communicating these needs to a wider network of potential partners.

The below screenshots from Plexus tools aims to give the reader a feel for how the software functions.
Figure 7 – Plexus Tools Navigation tree
Figure 8 - Structure of the 1st Plexus Prototype

Figure 9 - Screen R1.2.3. – Partners Management – Define IAs.
Figure 10 - Screen R3.3.1.3b. Projects Management – Gap Analysis.
5. Theoretical Background

The focus of this thesis lies within the intersection of five individual fields of inquiry. With a foundation resting on previous research conducted in relation to SMEs and IOCs, (kernel theory) this thesis further combines findings from the fields of knowledge-and change management, as well as the usage and value of IT-support.

The rationale behind the choice of focusing on these five areas of inquiry in relation to SME and IOC, has (as previously described) been an affect of initial findings from discussions with practicing SME managers/owners and their identification of these five areas as troublesome, along with the basic outline of the Plexus project and the natural areas of investigation that this lead the research process into.

These areas will be further elaborated below after an initial description of the basic building blocks regarding SME and IOC.
Small and Medium Sized Enterprises

The field of studies conducted exclusively towards organizations of relative small size has experienced a radical upswing since the advent of organizational studies during the late 19th century (Day, 2000). Through an ever increasing role in the overall economy being played by companies pending to the SME definition (Morrison, 2003), academics and politicians alike have identified the need for increased knowledge regarding how SMEs function and perform.

The following figure illustrates some of the more prominent and substantive areas of inquiry within the field of SME research during the last decade (this selection of areas is the result of an extensive literary review).

Figure 12 – Areas of inquiry related to SMEs
Central to the field of SME research is the focus on innovation and innovativeness. Besides the factors of financial strength and human capital, research has identified a large amount of factors where the innovativeness of SMEs differ from that of larger organizations (Yap & Souder, 1994).

One of these is the issue of risk-aversion and its relationship with innovativeness, where SMEs to a greater extent than large organizations are prone to aversion (Sivades & Dwyer, 2000). Haussman (2005) differentiate between internal strengths and external weaknesses affecting the level of innovativeness in SMEs; and risk-aversion, lack of managerial expertise (Romano, 1990), along with lacking external contacts (Hausman & Fontenot, 1999) can be seen as significant external weaknesses when it comes to SMEs.

In contrast with these weaknesses the low level of bureaucracy together with more concentrated customer- and operative-knowledge among decision-makers comprise strengths which ultimately lead to an increased ability to adapt to the market and organize efficiently (Sivades & Dwyer, 2000).

Closely tied to the literature surrounding SME innovativeness is that regarding the organization of SME Research and Development (R&D). Researchers such as Izushi (2003) and Narula (2004) have investigated the practice related to product development and research within the SME segment. This research suggests differences between SMEs and larger organizations when it comes to issues such as SMEs having higher R&D productivity (Audretsch & Vivarelli, 1996) and differences in relational quality dependent upon the partners relative size (Narula, 2002).

Bougrain & Haudeville (2002) relate the issues of innovation, collaboration and internal research capacities among SMEs to concepts such as clusters and science parks, and relate findings from Italian (see also Chiarvesio et al, 2004) and US collaborations between SMEs in collaborative R&D initiatives.
When it comes to the issue of organizational learning among SMEs there is a long tradition of research spanning back to the relation between organizational learning and innovativeness (Argyris & Schön, 1974). Weerawardena et al (2005) differentiate between market-, internally- and relationally-focused learning and study how these different forms of learning affect organizational innovation and in turn brand performance. Almeida (2003) and Davenport (2005) complement this differentiation with the more evasive category of external learning.

According to what by some has been labelled the “naïve evolutionary model” (Barnett et al, 1994) organizational learning is positively affected by the level of environmental competition. This has been used by some researchers to justify their focus on learning in SMEs (Van Gils & Zwart, 2004).

Ahlström-Söderling (2003) report on research conducted since the end of the 1990’s where strategic business networks of SMEs are seen as learning organizations and Buratti & Penco (2001) tackle the issue of technology transfer to SMEs.

Perhaps the area within SME research that during the latest ten years has received most academic interest is the area of IT adoption. Through the proliferation of technologies such as EDI, internet technology (see for instance Mehr tens et al, 2001) and electronic business, there has been somewhat of a (often unchallenged) consensus regarding the relationship between technology adoption and competitive advantage.

Researchers such as Bracht & Masurat (2005), Grandon & Pearson (2004) and McGovern & Hicks (2004) have all studied how SMEs adopt to new technologies and what affects the adoption process. In some instances (see for instance Love et al (2004) and Love & Irani (2004) for further references) the research has also transgressed the adoption process to encompassing both the ex-ante and ex-post evaluation of the technology in question.

Regardless if the technology in question is aimed at enhancing the internal or external efficiency of the company, the technology
plays an important role in the value creation of the SME. With its barrier-decreasing attributes, information technology has been seen as an efficient way for an organization to increase its competitive advantage (Carr, 2003).

Drew (2003) reported on the strategic use of electronic commerce by SMEs and concluded that UK SMEs are placing this technology in the very centre of their strategic plans, and Katz & Safranski (2003) reported on the structural affects of the increased usage of the internet among SMEs. Stone (2003) takes the discussion regarding e-business one step further to encompass the ability of this technology to also increase the efficiency of supplier-relations. This is further explored under the heading of collaborative purchasing by researchers such as Quayle (2002), Olson & Boyer (2003) and Mudambi et al (2004).

When it comes to the issues related to organizational structure, the previously mentioned research conducted within collaborative purchasing, Interorganizational systems (Cash & Konsynski, 1985) and integrated supply chains (Faria & Wensley, 2002; Forza & Salvador, 2002; Fagerström & Jackson, 2002) have all received an ample amount of research. Human & Provan (2000) go one step further and look at multilateral networks between small firms and Chiarvesio et al (2004) relate the concept of SME networks to that of virtual industrial districts mediated by technology and regional clusters. Lin & Zhang (2005) identify six patterns of network structures among Taiwanese SME publishing firms.

As can be seen in the (in some aspects) over-simplified presentation of research contributions during the last seven years within the field of SME-research, the focus has to a large extent shifted from IT diffusion-related research towards a focus on organizational and managerial issues. The previous dominating amount of research being conducted on the adoption of electronic business practice and technology among SMEs is now scarcer.

The previous figure illustrating the areas of inquiry within the field of SME research can be further developed towards
illustrating how these areas are related to the overall objectives of this thesis.

Figure 13 – Areas of inquiry related to the focus of this thesis

Interorganizational Collaboration

Companies form Interorganizational relationships in order to decrease time to market, gain access to new markets and new knowledge (Doz & Hamel, 1998). Through combining resources in a novel way, organizations can thereby expand their competitive ability.
This evolution from the previous strongholds of industrial organizations (where the aspect of relative size was the key ingredient of survival), towards a state where competitive advantage is determined by what some researchers (Ojala & Juga, 1992) call collaborative advantage is evident in the large amount of attention the phenomena of IOC has been getting.

Barringer & Harrison (2000) refer to surveys displaying a 25% annual increase in the number of strategic relationships between companies since 1987. The same article also states that the failure of dissolution rate for joint ventures is as high as 50-70%, figures eerily close to the prodigal approximations of Porter (1980).

Ritter & Gemünden (2003) offer a framework for studying the phenomena of Interorganizational relationships. In their study, the phenomenon in question is broken down into the dimensions of level of analysis, theoretical and managerial perspective, and objects of analysis. This framework and its composing parts are further described in the following illustration:

![Figure 14 – Adopted from Ritter & Gemünden (2003)](image)

The field of IOC has undergone several fundamental shifts since its advent under the heading of relationship marketing during the late 1970s. Through early work conducted by the
Industrial Marketing and Purchasing (IMP) group (Håkansson, 1982), the question of relational qualities and their effects on firm performance was investigated. This initial focus on the relationship between companies and individuals (Oliver, 1991) relates back to the morphology of Williamson (1975) and the theories of Transaction Cost Economics where market and hierarchy are seen as contradicting forms of organization and governance.

Thompson (2003) summarizes the differences in market and hierarchal governance and the intermediate form of network governance.

<table>
<thead>
<tr>
<th>Basic attributes</th>
<th>Hierarchy</th>
<th>Network</th>
<th>Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of order</td>
<td>Designed and conciously organized results</td>
<td>Designed or spontaneous results</td>
<td>Spontaneous results</td>
</tr>
<tr>
<td>Actors behaviour</td>
<td>Rule-based and actively authoritarian</td>
<td>Cooperation and striving for consensus</td>
<td>Private competitive decisions</td>
</tr>
<tr>
<td>Mechanisms of action</td>
<td>Bureaucratic administration, monitoring</td>
<td>Faith, trust and reciprocity</td>
<td>Pricemechanism s, competition and self-regulation</td>
</tr>
<tr>
<td>Type of coordination and management</td>
<td>Ex ante coordination</td>
<td>Formal and informal organizing</td>
<td>Ex post coordination and the “invisible hand”</td>
</tr>
</tbody>
</table>

Table 3 – Adopted from Thompson, 2003

According to Barringer & Harrison (2000), there are six underpinning theoretical paradigms that may assist us in the understanding of interorganizational relationships. According to the authors these are Transaction cost economics, resource dependency, strategic choice, stakeholder theory, organizational learning and institutional theory. Throughout the years, a number
of researchers have made substantial contributions within these fields (Oliver, 1991; Argyris & Schön, 1978; Barney, 1991), and we will focus on the theoretical contributions attributed to the Resource Based View (RBV) (an elaboration and further development of resource dependency) to further describe the phenomena of IOC.

RBV stems from the works of Penrose (1959), Rumelt (1986) and Barney (1991), and at the core of the perspective stands an internal focus as opposed to the external focus of the previously (chronologically) dominant industrial organizational paradigm (often generically illustrated through the 5-forces model of Porter, 1980).

Hamel & Prahalad (1998) describe the basic assumptions of RBV through a differentiation of resource base, capabilities and competitive advantage.

![Figure 15 – Organizational value-creation according to RBV](image-url)
According to RBV the organization creates capability to act (and in turn create competitive advantage) through the combination and management of resources. The resource-construct is in itself rather ambiguous, and there have been a number of different classifications and definitions put forth by scholars over the years (Sanchez et al, 1996; Wade & Hulland, 2004). Through the efficient management of knowledge and people (as some of the valuable resources), organizations hope to better respond to market opportunities (Hamel & Prahalad, 1998).

Inherent to RBV, the ability for an enterprise to create business value is dependent upon the base of resources that they have in their control. Given the previous description of intermediate (or network) governance, the formation of exchange-relationships with other organizational entities hence expands the enterprises resource-base and hence also its capabilities to act on the market (Das & Teng, 1999). Through establishing Interorganizational relationships, organizations can expand their value-base without tying down valuable capital and locking themselves in.

This corresponds well with the early writings of Thompson (1967) where he identifies two basic tactical choices for sustaining and creating competitive advantage. According to Thompson (1967), organizations are either using buffering- or bridging tactics to protect their technological core from harm, or in other words using the element of size/scale (buffering) or relationships (bridging) as tactical measures.


“For most of the twentieth century, it was assumed – both by practitioners and the theorists – that the strongest and most effective ties were those based on ownership, including joint ventures, acquisitions, and mergers. In recent years, however, many organizations have elected to enter into more diffuse, relational contracts and various types of alliances that do not entail changes in ownership; and organization theorists have begun to
recognize the importance of these forms. Strong alliances or networks between independent organizations permit participating units to combine many of the advantages that come from being independent (and perhaps also the flexibility that comes from being small) with the security and strength that comes from being in league with others.”

We have so far discussed the phenomena of IOC from a governance- and management perspective, but the issues of the resulting organizational form have purposefully been avoided up till now. Given that the concept of IOC is so heavily intertwined with the concept of Interorganizational relationships (and networks for that matter), it is easy to get lost if you do not tread carefully.

When it comes to the issue of organizational form, researchers have long communicated an image of a multitude of different organizational forms with individual characteristics. Organizational forms such as Ad-hocracy (Mintzberg, 1979), Virtual Organizations (Handy, 1995) and organizations as Open Systems (Scott, 2003) can be seen as forms where the traditional organizational theory has been influenced by network theory and analysis, resulting in a novel way of conceptualizing organizational form. In the words of Salancik (1996):

“Network analysis corrects a tendency in organizational theory to focus on the trees rather than the forest, on the analysis of individual organizations rather than on the organization of their actions.”

This new way of organizing or perhaps more accurately conceptualizing the process of organization stems from a cybernetic heritage (see Scott, 2003) and regards organizing as self-ordering (the concept of autopoietic according to Maturana & Verula (1980) or Luhmann (1995)) and loosely coupling (Glassman, 1973; Orton & Weick, 1990). Organizations are dynamic and instant, changing not at will but by sufficient external stimuli (Ritter & Gemünden, 2003).
This new organizational form has been referred to as the Network organization (Cravens, Shipp & Cravens, 1994) and its application is further discussed by Burton-Jones (1999:171).

“The model of internal organization best suited to the firm’s future role is loose networks of semi-autonomous knowledge workers forming teams as required.”

According to Salancik (1995), Cravens, Piercy & Shipp (1996) and Hite & Hesterly (2001) there is a lack of a general model for the network organization. This theoretical short-coming resulted in the research conducted within PLEXUS soon changed from focusing on network organizations (actually organizations where the entire body of employees had been replaced by flexible relationships outward) towards IOCs per se.

Other notions referring to the same basic phenomena have been introduced under the heading of strategic alliances (Gulati, 1995), joint ventures (Kogut, 1988) and clusters (Saxenian, 1995). The latter of these combines the concepts of industry and geographical proximity/situatedness with the network-related way of organizing. Inkpen & Tsang (2005) offer an interesting contribution in relating these networking types (and others) to the issues of structure and integration (see the figure below).
Usage and Value of IT-support for SME IOC

Few would argue that IT has become what can be referred to as a key resource for most organizational value-creation today. With expenditures related to IT representing a bulk of the total amount of expenditures (Carr, 2003), organizations of today are dependent upon IT to generate value.

As previously stated, the 1990’s displayed a vast push within SME-related research towards the adoption of new technologies. Researchers such as McGovern & Hicks (2004), Bracht & Masurat (2005) as well as Drew (2003) have gone to great extent in understanding the complex nature of how and why smaller organizations use new technologies such as the Internet and E-business.

Statistics from Eurostat and the Swedish Agency for Statistics (SCB, 2005a) show that as high as 50% of all employees of SMEs use computers with internet connections in their day-to-day work. The industries displaying the highest adoption rate is the financial
sector and Energy production with 80-90% usage. When it comes to the use of computers regardless of internet connection the level of adoption reaches 60-70% (SCB, 2005b), and the level of computerization on the corporate level of SMEs (i.e. not down to individual employees) is almost total (SCB, 2005c).

These figures become interesting when they are related to the level of IT-related budget per employee in large vis-à-vis smaller enterprises. According to a recent study by Exido (2005) regarding Swedish companies, the spendings per employee ranged from roughly 1600 Euros for the small enterprises to 4600 Euros for the large.

Regardless of these apparent statistics, the actual value of IT is constantly questioned (Bannister & Remenyi, 2000). Through the identification of what has become known as the “Productivity paradox”, Brynjolfsson (1993) took an econometric perspective on the value (and hence also role) of IT and questioned whether or not (forgive the analogy) the King was in fact wearing anything (Farbey et al, 1999b; Hitt & Brynjollfson, 1996; Saunders & Jones, 1992).

According to this paradox, there is to date no significant relationship between IT expenditures and an increase in the level of productivity, and based on this the rationale behind IT investments have become less than natural.

Related to this debate regarding the value of IT, Carr (2003) concluded that IT had ceased to be a resource that could create sustainable competitive advantage. By comparing the level of proliferation of IT with the spread of infrastructural components such as electricity and railroads in the US, Carr came to the (by some argued overly populistic) conclusion that IT had become an infrastructural resource and hence lost its role as a strategic resource.

Regardless of how IT expenditures actually relate to the level of productivity, the fact of the matter remains that companies of all sizes and location continue to spend a vast amount of money on IT.
related investments (Exido, 2005). With this in mind, the necessity of evaluating these investments efficiently and soundly becomes an imperative (Weill & Broadbent, 1998; Serafeimidis & Smithson, 2000; Bannister & Remenyi, 2000).

The actual process of IT evaluation is defined in Farbey et al (1999b:190) as:

“A process, or group of parallel processes, which take place at different points in time or continuously, for searching and for making explicit, quantitatively or qualitatively, all the impacts of an IT project and the programme and strategy of which it is a part.”

This extensive and general definition of the process of IT evaluation envelops both what is commonly referred to as ex-post and ex-ante evaluations of both investments and projects (implementations, developments et cetera).

Throughout the literature surrounding IT evaluation there has been a large amount of articles directed towards the creation of techniques and methodologies for evaluating an investment (Bannister & Remenyi, 2000). Despite this, the area of inquiry continues to be related to a large amount of practical problems (Keen, 1985; Currie, 1989; Farbey et al, 1993; Walsham, 1993; Willcocks and Lester, 1993) here summarized by Irani (2002:12)

- Understand the human and organizational mechanics of investment decision making within organizations.
- Enable a better ‘technology fit’ and integration of business systems.
- Understand the concept of ‘value’ and its multidimensional facets.
- Assess the political issues associated with capital budgeting and decision making.
- Navigate through the taxonomies of investment-related benefits.
• Assess the natures of IT/IS benefits (intangible, tangible, financial and non-financial).
• Identify, manage and control investment-related costs (direct and indirect).
• Appreciate the portfolio of investment appraisal techniques.
• Assess the ‘risks’ associated with the different investment-related strategies.
• Understand the scope and impact of developing a IT infrastructure.
• Appreciate the complexity of evaluating incremental system development, integration and upgrades.
• Stakeholder definition, analysis and involvement (inclusive culture).
• Provide appropriate technology management resources.

As this plethora of problems associated with the process of IT evaluation show, the process is far from simple, leaving individuals and organizations involved in the practice of evaluation in somewhat of a tight squeeze.

This is also reflected by the statistics of how organizations actually go about in their evaluation of IT investments and projects. As Hochstrasser (1990) shows, only a small amount of organizations actually apply a method for assessing their potential IT-related investment.

Despite the fact that study of the actual practice of IT evaluation shows that only a small percentage of all firms actually apply a rational model of decision making when it comes to IT investments, the level of expenditures continues to soar.

The rationale behind this development is often described as a “Leap of strategic faith” or an “Act of faith” (Bannister & Remenyi,
attributing the diversion from rational models of decision models to the perception of some sort of strategic value in the investment. A wonderful quote by Bernstein (1996) connotes this:

“Our lives teem with numbers, but we sometimes forget that numbers are only tools. They have no soul; they may indeed become fetishes.”

The historical development of approaches related to IT evaluation are fittingly described in Serafeimidis & Smithson (2000) as a drift from positivist to interpretive and entrepreneurial perspectives. According to the authors, this shift from a rational/functionalist external perspective on the IT-artefact to a more situated and contextually dependent perspective where the involvement of all stakeholders in the evaluation is key, is mainly an academic development. With the practice currently verisimilitude being interpretive (Walsham, 1993; Smithson & Hirschheim, 1998; livari, 1988), practitioners have gotten lost somewhere along the way in the limbo state referred to as “entrepreneurial”.

This evolution from rational to interpretive approaches to IT evaluation highlights an increasingly complex composition of the evaluation process. Together with the fundamental shift in perceptions of technology towards social constructivist influenced perceptions displayed in among others Orlikowski (1992) and Boland & Hirschheim (1987), a multitude of different dimensions of IT evaluation become relevant:

- Role of IT (Carr, 2003)
- Type of IT (Klein et al, 1997)
- Organizational context (Love & Irani, 2004)
- Risk (Sutton & Hampton, 2003)
- Definition of value (Bannister & Remenyi, 2000)
These dimensions can be seen as key ingredients for the development of new techniques/tools/frameworks for IT evaluation and are further addressed in the paper regarding evaluation of IT in this thesis (Enquist et al, 2004) and in the discussion.

When it comes to recent research within the field of IT evaluation among SMEs, a previously mentioned shift from the diffusion of the Internet and e-business technology towards more organizational and economic aspects of SME and IT has become apparent. Researchers such as Zheng et al (2004), Grandon & Pearson (2004), McGovern & Hicks (2004) and Olson & Boyer (2003) have recently investigated the phenomena of IT adoption, yet there is still a lack of research conducted with the aim of understanding the evaluation/justification (Gunasekaran et al, 2001) process of IT investments in SMEs. Notable exceptions from this can be found in Love & Irani (2004) and Love et al (2004) that investigate how Australian SMEs handle IT evaluation, benefits management and cost monitoring.

The level of debate surrounding the value of IT and the process of evaluation is highly politicised and in some instances the notion of evaluation should more correctly be referred to as justification (Gunasekaran, 2001). With IT becoming more and more an infrastructure (Carr, 2003) and part of the natural eco-system for business (what business is not in some instance electronic today?), we see the questions raised by the advocates of the productivity paradox as somewhat obsolete and outdated. With IT becoming infrastructure, the question of “IT” or “not IT” becomes irrelevant (and hereby also the notion of “leap of strategic faith”) and the only added value of new and improved means of evaluation becomes related to weighing different investments against each other.

Given the fact that the role of IT among SMEs differ from the role of IT for large corporations (see for instance the differences in percentage of budget related to IT), it also needs to be evaluated using different methods than among large corporations. At
present, there is a lack of methods specifically designed for the evaluation of IT-related investments for SMEs. Issues such as that of the lifecycle of the investment and differences in stakeholder perceptions of the value and costs related to the investment are necessary to take into account yet have not so far been addressed by any current frameworks.

**Change Management for SME IOC**

The field of inquiry related to the management of change has long been the subject of interest for academia and industry alike (Siegal et al, 1996). Attempts at understanding the intricate web of events that leads to actual change on an individual, group, organizational or societal level can according to some researchers be seen as one of the most fundamental of all.

As one of the first modern organizational theorists, Lewin (1958) described the process of organizational change through a three-step-model encompassing the phases Unfreezing, Movement and Refreezing. On a macro-level, this rather mechanistic view of the process of change highlights change as something that at any given time either happens or not. This notion of change can be seen as somewhat lacking in relation to the present discourse of continual change, expressing the belief that we are in a state of more or less constant flux (Drucker, 1993).

On this note, few subjects have been so squandered by the leagues of management consulting authors during the past two decades as change management. Through an almost endless stream of publications such as Kanter (1983), Kotter (1995), Peters & Waterman (1983), the almost fascist approach towards the need for change and the possibility to lead it has been advocated.

Van de Ven & Poole (1995) categorize the theoretical building blocks of organizational change and development (these terms are often used in a somewhat casual manner) into four categories. These categories are described through the headings of lifecycle,
teleology, dialectics and evolution. The table below can be seen as a summarization of the discussions in Van de Ven & Poole (1995).

<table>
<thead>
<tr>
<th>Metaphor</th>
<th>Lifecycle</th>
<th>Teleology</th>
<th>Dialectics</th>
<th>Evolution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Organic growth</td>
<td>Purposeful cooperation</td>
<td>Opposition, Conflict</td>
<td>Competitve survival</td>
</tr>
<tr>
<td>Logic</td>
<td>Imminent program</td>
<td>Envisioned end state</td>
<td>Contradictory forces</td>
<td>Natural selection among competitor s in a population</td>
</tr>
<tr>
<td></td>
<td>Predefined sequence</td>
<td>Social Construction</td>
<td>Thesis, antithesis, synthesis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compliant adaptation</td>
<td>Equifinality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pioneers</td>
<td>Comte</td>
<td>Mead</td>
<td>Hegel</td>
<td>Lamarck</td>
</tr>
<tr>
<td></td>
<td>Spencer</td>
<td>Weber</td>
<td>Marx</td>
<td>Darwin</td>
</tr>
<tr>
<td></td>
<td>Piaget</td>
<td>Simon</td>
<td>Freud</td>
<td>Mendel</td>
</tr>
</tbody>
</table>

Table 4 – Summarization of Van de Ven & Poole (1995)

According to Siegal et al (1996), theoretical contributions regarding change management can be understood from two main perspectives, namely process-oriented or strategic planning. The latter of these is regardless of its over-representation (Beer, 1994) as corporate support, often over-simplified and based on assumptions regarding change that are also they suffering from over-simplification.

Siegal et al (1996) go on to further elaborate three underlying perspectives within the process-oriented approach. These are summarized in the table below.

<table>
<thead>
<tr>
<th>Underlying Assumption</th>
<th>Main contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change is typified through certain patterns</td>
<td>Lewin, 1958; Schein, 1987</td>
</tr>
<tr>
<td>Organizations struggle to maintain entities and identities throughout transition</td>
<td>Beckhard &amp; Harris, 1987; Duck, 1993</td>
</tr>
<tr>
<td>Change is more fundamental on an individual then on an organizational level</td>
<td>Bridges, 1986; Jick, 1990</td>
</tr>
</tbody>
</table>

Table 5 – Summarization of the process-oriented perspective in Siegal et al (1996)
As stated previously, the process of organizational change is one of utmost complexity. According to Beer & Nohria (2000), this is one of the main reasons for organizational change initiatives having a failure rate as high as 70%.

Researchers such as Smirich (1983) have advocated for an understanding of organizations as cultures, and related to this one of the most signifying issues within the field of change management has (rather ironically given Smirich’s almost anti-functionlistic approach) become the instrumental management of culture. By relating the issues of culture and politics to the process of change management, researchers such as Pettigrew (1985) and Dawson (1994) have discussed the important role that organizational culture plays in the change initiative.

Kotter (1995) also highlights the aspects of culture in one of the most popular models used to understand and manage the change process. This model along with Jicks (1991) and General Electrics (according to Garvin (2000)) has become one of the most popular models to illustrate the process of change.

Common to the models is the focus on creating an organizational understanding or sense of the urgency and necessity for change. The organization is constituted of individuals that can be either change masters or change adversaries (forgive us this ostentatious use of terminology), and no individual will champion change from a state well known to a state less known without feeling an urgent and pressing need.

Management models for understanding and analyzing change come a dime-a-dozen (see for instance McKinzeys 7S (Pascale & Athos, 1995), Scott-Mortons framework (1991), Six Sigma (De Feo, 2002), Henderson & Venkatramans Strategic Alignment model (1999)).

When it comes to understanding the process of change in SMEs, there has been rather scarce substantial research. The previously mentioned frameworks and theoretical mainlines have all more or less focused on large organizations and how change
can be understood in this context, but according to Lin & Zhang (2005) SMEs have a somewhat different stance in viewing change.

Most of the research conducted within the realm of change management for SMEs would fall under the heading of technology adoption and implementation rather than purely organizational change (see for instance McGovern & Hicks (2004), Stone (2003) and Morell & Ezingard (2002)). On a more general level Fernandez et al (2005) have analyzed how the practice of using Balanced Scorecards as a model for business monitoring and management accounting was implemented in SMEs and there has also been substantial investigations (Weerawardena et al (2005); Van Gils & Zwart, 2004) into how SMEs handle organizational learning (which could be seen as a model of organizational change (Liebowitz, 1999)).

Damaskopoulos & Evgeniou (2003) analyze how eastern European SMEs adopt to new economy practices and Ahlström-Söderling (2003) gives an account of the lifecycle of strategic alliances in SMEs. There is however still a shortage of research being conducted within the field of change management for SMEs. Regardless of the “lightness” of theory related to the field of change management and the tendency of the literature to become somewhat over-simplified and over-packaged, we still feel as if there are a number of interesting lessons to be learnt from perhaps foremost the packaging of change management related literature.

With the area of research (being the process of change) being both highly relevant and highly complex, there is perhaps a need for what may at first glance be regarded as over-simplification. Working within the field of change management, the choice between high-grade theories such as Smirchich (1983) and low-grade theories such as Kotter (1995) is necessarily linked to the level of application. Whereas a deep, fundamental understanding of the process of change might require an elaborate theoretical foundation, a more applied and user-centric understanding might benefit from a more “down-to-earth” theoretical choice.
Knowledge Management for SME IOC

The 1900’s displayed a veritable onslaught of ideas about how the essence of the firm, organizations and value creation could best be described. The emergence of theoretical approaches such as Industrial Organization (Porter, 1980), Organizational Economics, Resource Based View (Wernerfelt, 1984), Evolutionary Economics (Penrose, 1952), Organizational Ecologies (Hannan & Freeman, 1987), and Institutional Theory (Powell and DiMaggio, 1991) (to name but a few) can in one aspect be characterized through their distinctions on epistemology.

In his seminal work from 1996, Spender relates the perception of the “information age” to the emergence of more and more knowledge-focused organizational theories; and on the basis of sociotechnical systems theory and social constructivism, he proposes a theory of the firm as a dynamic knowledge-based system.

Spender’s contribution is set in the aftermath of Nonaka and Takeuchi’s 1995 book “The knowledge creating firm” which in true Quality Management traditions highlights the Japanese manufacturing industry as a positive role-model for (American) managers. As Nonaka & Takeuchi (1995, 1996) presents their views on epistemology as something other than bits of data in a database and the importance of “silent knowledge” along the lines of the revived construct of tacit knowledge from Polaniy (1956), the distinction of knowledge as a process or a product comes into focus.

With the 1990’s coming to an end and the IT-hausse becoming more and more apparent, the field of knowledge management risked to become turned into a fad. The over-productification of knowledge as displayed in Stewart (1997) where knowledge management was seen as the process of converting (a highly mechanistic approach) human capital to structural capital, gave rise to a somewhat problematic perception of what kind of value
KM could actually add. The strive for computerization of KM practice became more and more questioned in articles such as Walsham (2003), and as Nelson et al (1999) stated, the need for diversified strategies for KM was necessary.

The epistemological assumptions underlying KM research can basically be divided into two major theoretical camps, where the first sees knowledge through a positivist lens where knowledge is held as objective facts. This traditional perception of knowledge as something that is easily productified (Spender, 1996), is opposed by a more relativistic perception of knowledge as characterized by the process of knowing (Nelson & Winter, 1982), in other words individualistic and relative to the task at hand.

This latter stream of epistemological standing becomes highly apparent in the works of among others Blackler (1995), Tsoukas (1996), Starbuck (1992) and Alvesson (1993), where the management of knowledge is perceived as the management of the process of knowing (and in some instances also sensemaking (Weick, 1987)). Given these evolutionary directions within the field of KM, we can start to identify a split between research conducted on the basis of perceiving knowledge as either product of process.

Another key differentiation (other than the standing point in terms of underpinning epistemological assumptions) of the field of KM can be made on the basis of research approach, where the level of situatedness can be seen as a dividing line.

Lucy Suchman’s work on representations (1995a, 1995b) and the linkage between understanding practice and designing IT-support is only one representative of the segment of the field that has moved research closer and closer to the actual work-practice of the individual. Other examples of this kind of research can be found in Lave & Wenger (1991), Orlikowsky (2002), Brown & Duguid (1991). Common among most of these researchers is the perception of knowledge as a process.
According to McAdam & Reid (2001) and Liao et al (2003) there has only been a small amount of research directly addressing knowledge management practice among SMEs.

Directly related to the area of inquiry for this thesis, (SME IOC), previous research regarding KM has been rather scarce. However, with the recent focus on the organization of SMEs into networks (partly as a result of increase technological capabilities) and a more extruded focus on the process of innovation and entrepreneurship, researchers such as Van Gils & Zwart (2004), Davenport (2005) and Haai et al (2005) have made some interesting contributions towards the understanding of how SMEs actually practice KM.

Throughout the work underpinning this thesis our understanding of the field of knowledge management has undergone a somewhat radical transformation. From first being genuinely interested in understanding the process of knowledge management and the management of knowledge as knowing (Blackler, 1995), we have moved more directly towards the perception that the focus of knowledge management should be that of transforming human capital into structural capital (Stewart, 1997).

The starting point for our work within the Plexus-project was the construct of “intellectual asset” as the measurable atom of SME-collaboration. This under-emphasizing of the social aspects (Granovetter, 1987) resulting in a perception of KM as Intellectual Capital Management (ICM) through the measurable intellectual asset was first regarded as a-political and lacking in taste, yet after socialization with the German and Austrian managers and researchers in the project we reached somewhat of a synthesis in relation to our perception of successful KM.

The critique against solely technological solutions for KM (see for instance Walsham (2001)) may be seen as somewhat over simplified (or perhaps more correctly leading to an oversimplified debate) when it leads to a general stance against productification of knowledge. When it comes to the design of IT-based solutions
for KM, we believe that the current state of research (see for instance Hardless, 2005; Lindgren, 2002; Henfridsson et al, 2005) has come a long way from the polemic times around the turn of the century/late 1990’s.

This does not, however, imply that the field is either mature nor has turned into an empty fad. We still see a lack of research within the area surrounding how SMEs apply KM-practices (Liao et al, 2003) and even more so around the field of how SMEs involved in IOCs practice KM.
Summarization of Theoretical background

The table below we have tried to summarize the chief theoretical foundations in relation the research question of this thesis.

<table>
<thead>
<tr>
<th>Issue</th>
<th>References</th>
</tr>
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<tbody>
<tr>
<td><strong>Usage and Value</strong></td>
<td></td>
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<tr>
<td>IT as infrastructure</td>
<td>Carr, 2003</td>
</tr>
<tr>
<td>Value of IT</td>
<td>Bannister &amp; Remenyi, 2000</td>
</tr>
<tr>
<td>Investments</td>
<td>Brynjolfsson, 1993</td>
</tr>
<tr>
<td>Productivity paradox</td>
<td>Weill &amp; Broadbent, 1998</td>
</tr>
<tr>
<td>Leap of strategic faith</td>
<td></td>
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<tr>
<td>Multiple dimensions</td>
<td></td>
</tr>
<tr>
<td><strong>Change Management</strong></td>
<td></td>
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<tr>
<td>Everything is in constant flux</td>
<td>Druker, 1993</td>
</tr>
<tr>
<td>Lifecycle, Teleology, dialectics and evolution</td>
<td>Van de Ven &amp; Poole, 1995</td>
</tr>
<tr>
<td>Suffering from oversimplification</td>
<td>Smirchich, 1983</td>
</tr>
<tr>
<td>Organization as culture</td>
<td>Kotter, 1995</td>
</tr>
<tr>
<td>Rational models</td>
<td>McGovern &amp; Hicks, 2004</td>
</tr>
<tr>
<td>Implementation and technology adoption</td>
<td></td>
</tr>
<tr>
<td><strong>Knowledge Management</strong></td>
<td></td>
</tr>
<tr>
<td>Theory of the firm</td>
<td>Spender, 1996</td>
</tr>
<tr>
<td>Knowledge creation</td>
<td>Nonaka 6</td>
</tr>
<tr>
<td>Structural capital</td>
<td>Takeuchi, 1995</td>
</tr>
<tr>
<td>Diversified strategies</td>
<td>Stewart, 1997</td>
</tr>
<tr>
<td>Process or product</td>
<td>Nelson et al, 1999</td>
</tr>
<tr>
<td>Situated knowledge</td>
<td>Blackler, 1995</td>
</tr>
<tr>
<td></td>
<td>Lave &amp; Wenger, 1991</td>
</tr>
</tbody>
</table>

Table 6 – Summarization of theoretical foundation

With the focus of this thesis being the categorization of types of Interorganizational collaboration between SMEs and the influence of these types of collaboration on three underpinning areas, the issues addressed in Table 6 above can be seen as the quintessence of our theoretical approach.
6. Results

The results of this study are presented in relation to the different papers and later summarized into implications for practitioners.

The papers

**Paper 1**


In this paper a taxonomy of SME IOC is presented and used as a basis for deriving design implications for IT-support. Through the application of Zachmann’s architectural framework (1987), the dimensions of data, function and network are used as the foundation for a systemic analysis of possible design implications.

The findings are based on empirical data from 49 interviews, 19 case studies and a survey (n=120) with respondents from SMEs based in a total of five European countries.

The principal finding in Paper 1 is the value of using generalised network taxonomies in combination with architectural reasoning. It provides i) specific, categorised design intelligence, and ii) a holistic, systems-view over the research domain.

**Paper 2**


This paper revolves around the previously described typology of SME IOC combined with previous findings of the DELTA project (Enquist et al, 2001) in the form of the meta-architectural
framework of DELTA. The framework is combined with the typology and used as a foundation for analysing potential management issues in regards to change management of SME’s involved in IOC.

The paper rests to a large extent on the empirical work surrounding PLEXUS (previously described) and DELTA, encompassing a large number of interviews and workshops with mainly participators from large corporations such as SKF, Volvo Cars, Aerotech Telub, the Swedish Defence and the Swedish Defence Agency for Materials Acquisition.

The principal finding in Paper 2 is the differentiation of means to resolve common management issues (ends) depending on IOC context.

**Paper 3**


In this paper the knowledge management practice of the SMEs involved in the PLEXUS project are further explored and their approaches categorized into the previously described network taxonomy. Drawing on a perception of KM along the lines of Blackler (1995) and Tsoukas (1996), the activities related to the management of knowledge in the companies involved in the study are seen as either facilitating or intervening.

The findings are based on the same set of data as previously described in relation to the PLEXUS project.

The principal finding in Paper 3 is the identification of the value of studying knowledge management through the manifestation of decisions and actions. Following this delineation, the paper identifies principle means for the management of knowledge depending on IOC taxonomy.
**Paper 4**


This paper explores the theoretical foundations of contemporary knowledge management theory as a result of a perceived shortcoming in theoretical support for the context of SME IOC.

The principal finding in Paper 4 is the identification of shortcomings in ‘general KM theory’ with regard to relevance for an IOC setting.

**Paper 5**


This paper reports on the practical evaluation of the resulting PLEXUS software conducted with practitioners involved in SME IOC according to the previously described taxonomy. Based on a large literary review, a framework combining Oliver’s (1991) framework for relational criticalities for inter-firm collaboration together with the PLEXUS taxonomy was tested along with a more traditional method of IS evaluation (Saarinen, 1996). The difference in perceived strengths and weaknesses was then elaborated upon and implications for the evaluation of IS for SME IOC were discussed.

The study rests on empirical data from five individual senior management consultants considered experts of IS evaluation and their feedback on the proposed model, together with three workshops with practitioners representing the different types of SME IOC where they elaborated on the proposed framework. This was complemented by four workshops where practitioners using Saarinen’s (1996) quantitative framework for IS evaluation examined the PLEXUS software.
The principal finding in Paper 5 is the value of combining ‘hard’ evaluation techniques with context sensitive tools when evaluating IOC support software.

Summarization of implications

The results of the research conducted in relation to the Plexus project can be summarized through alterations and applications of the basic network taxonomy presented in all the encompassed papers. To ensure readability, a summarization of the implications found for usage and evaluation of IT-support, Knowledge- and Change Management is presented in the table below. This will later form the foundation for a more detailed discussion.

The results are presented as implications (with no internal order of presentation whatsoever) in relation to the three fields of inquiry stated in the research question and broken down into implications surrounding the issue in relation to the specific type of Interorganizational collaboration.

<table>
<thead>
<tr>
<th>IOC-Type Implication</th>
<th>Supply-chain</th>
<th>Business</th>
<th>Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usage</td>
<td>Logistics interface data</td>
<td>Only system support regarding logistics</td>
<td>Project management data</td>
</tr>
<tr>
<td></td>
<td>Product data</td>
<td>Logistics e.g. order, delivery, tracking, product</td>
<td>Project E.G. time budget</td>
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<tr>
<td></td>
<td>Local product and process data</td>
<td>Coordinate knowledge and resources of network partners</td>
<td>Goals Research</td>
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<tr>
<td></td>
<td>No specific management data</td>
<td>Monitor knowledge and</td>
<td>Collaborative knowledge creation projects</td>
</tr>
<tr>
<td></td>
<td>Logistics e.g. order, delivery, tracking, product</td>
<td></td>
<td>Create transparency of partner</td>
</tr>
<tr>
<td></td>
<td>Well defined common supply chain processes</td>
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</tbody>
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57
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<thead>
<tr>
<th>Exchange of:</th>
<th>resources of business partners</th>
<th>knowledge enhancement</th>
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<tbody>
<tr>
<td>- product data</td>
<td>Continually scan market needs</td>
<td>Monitor knowledge</td>
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<tr>
<td>- logistics data</td>
<td>Management</td>
<td>Control and power</td>
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<tr>
<td>Local production process</td>
<td>Coordinate business process</td>
<td>Interface intelligence,</td>
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<td>Negotiation of interfaces</td>
<td>network</td>
<td>measures</td>
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<tr>
<td>Performance monitoring in</td>
<td>Educate partners</td>
<td>Reduced uncertainty</td>
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<tr>
<td>supply chain</td>
<td>towards culture of mutual</td>
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<td></td>
<td>understanding</td>
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</table>

| Value                          | Current market regulatory      | IC, Patents           |
|                               | settings                       | Result transparency   |
|                               | Political hub agenda           | R&D cost efficiency   |
|                               | Cost efficient                 | Continuity and reduced |
|                               | Flexible partner constellation | uncertainty          |
|                               | Product branding               | R&D project branding  |
|                               |                                | R&D project in larger |
|                               |                                | businessmodel         |

<p>| ICT, Solution                  | Partner 1                      | Partner 2             |
|                                | Partner 3                      | Partner 4             |
|                                | Partner 5                      | Hub Partner 6         |
|                                | ICT Solution                   |                      |</p>
<table>
<thead>
<tr>
<th>IOC-Type Implication</th>
<th>Supply-chain</th>
<th>Business</th>
<th>Research</th>
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<tbody>
<tr>
<td>Change management issues and implications</td>
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<tr>
<td>Cost-cutting through the optimization of</td>
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<td>interfaces between the partners</td>
<td>update partner</td>
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<td>Clear roles and incentives for each partner</td>
<td>constellations</td>
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<td>due to place in supply chain</td>
<td>in order to</td>
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<td>Make visible and understandable the mutual</td>
<td>ensure optimal</td>
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<td>benefit of cost-cutting through partner</td>
<td>network to</td>
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<td>interface optimization</td>
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<td>Measure cost-cutting progress from</td>
<td>changing</td>
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<td>interface optimization project, difficult</td>
<td>market needs</td>
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<td>due to low transparancy</td>
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<td>Decentralise action, let involved (with</td>
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<td>the interface), partners run</td>
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<td>Elimination</td>
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<td>of collaborative</td>
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<td>bottlenecks;</td>
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<td>and costs;</td>
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<td>research</td>
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<td>and group</td>
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<td>background</td>
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</tbody>
</table>
| Projects | Ensure future Hub overview of interface, implies an agreement concerning increased transparency of respective interface.

Increase acquisition of optimal partner constellation towards each specific market opportunity.

Recursive refinement/re-evaluation of change goals based on continuous new knowledge from development and research activities.

Ensure political power through selective information distribution.

Align research tasks with overall goal.

Recursive refinement/re-evaluation of change goals based on continuous new knowledge from development and research activities.

Research facilitators (sponsors, owners, etc) and researchers shall run change project together; this ensures mandate to manage and creation of an environment suitable for the two-tailed network management.

Difficult to relate specific activities to a directly correlating goal.

Market change and profit turnover.

Research tasks and research facilitators.

Network management.

| Knowledge and interests | Increase acquisition of optimal partner constellation towards each specific market opportunity.

Recursive refinement/re-evaluation of change goals based on continuous new knowledge from development and research activities.

Ensure political power through selective information distribution.

Align research tasks with overall goal.

Recursive refinement/re-evaluation of change goals based on continuous new knowledge from development and research activities.

Research facilitators (sponsors, owners, etc) and researchers shall run change project together; this ensures mandate to manage and creation of an environment suitable for the two-tailed network management.

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Network management.
<table>
<thead>
<tr>
<th>IOC-Type Implication</th>
<th>Supply-chain</th>
<th>Business</th>
<th>Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge management issues and implication</td>
<td>Identify ‘cost cutting competence’ / knowledge Strong support and facilitation of employees placed at partner interfaces In-line and in-time with context maturity, invest in interorganizational information systems Promote individual action</td>
<td>Continually identify and keep track of employees involved in the gathering or analyzing of business- and market intelligence Strategic knowledge and information distribution, use the power of knowing in network politics</td>
<td>Research management Facilitate research environment, administration Support knowledge creation Knowledge broker, internal and external</td>
</tr>
</tbody>
</table>

Tabell 7 – Summarization of implications
7. Discussion
Discussion of implications

The following discussion brings up the main issues, findings and results that provide the foundation of this thesis. The discussion is not restricted to the presented results, but also includes the author’s personal insights and comments. The discussion is structured according to the previously presented IOC taxonomy.

Supply-chain Interorganizational collaboration

The Supply-chain IOC (S-IOC) is to a large extent a vertical collaboration. In practical terms this means that a partner in a S-IOC has close collaboration with her (upwards) suppliers and with her (downwards) customers. In operations, this seemingly simple constellation is highly complex with the possibility of substantial cost savings and stability as a positive outcome.

Successful management of a S-IOC has a lot to do with being a ‘good’ partner rather then practicing ‘management’; i.e. good management equals judging when to manage and when not to. Most decisions take place locally; common issues surrounds the interfaces between participating partners, involved parties must have the authority and support to decide and act without the timeconsuming involvement of central mandate/experts.

Change management in the S-IOC is significantly different from general management. Just as management does best in not getting involved in details, resting on a high level of decentralisation, and thus, is seemingly uncomplicated, change management is the opposite. Managing change departs with the activity of ‘selling the vision’ to involved stakeholders. All involved parties with influence on the execution of the change agenda must i) agree on the need for change, ii) agree on a common view of the current situation, and lastly, iii) agree on the goal state after a successful implementation of the planned change.
Partners in a S-IOC are generally accustomed to highly decentralised management. But in order to execute the network change agenda, strong change management is required, thus, change manager(s) in S-IOCs have high initial barriers before even receiving the required attention from the partners in order to start ‘selling the vision’. As an effect, most change programs and agendas in Supply-chain networks grow bottom-up.

Partners position themselves politically, discussing and planning informally, usually outside the network. When adequate common understanding and support is reached, change agendas may be formalised and operationalized. This is very timeconsuming and ineffective, successful S-IOCs are good at speeding up this process.

Knowledge management in S-IOCs is dominated by the task of creating, sustaining, sharing and enhancing knowledge regarding interface optimization. This may be operationalized by formal forums for internal as well as external meetings, ICT support for the sharing of documents such as easy searchable problem-solution databases, yellow pages of who knows- and has done what, when and where. Many issues regard logistical concerns surrounding the product and or service that is to be delivered. It is not unusual that issues from above forums lay the foundation for later, larger, change management initiatives.

Usage and Value of IT-support in S-IOCs highlights the logistic support system(s). IT support for material acquisition has a long tradition, especially in the manufacturing industry, and was pioneering their field of IT supported IOC. During recent years, the transaction cost has decreased substantially. Expensive EDI solutions are being replaced by web-service solutions, with the possibility of cheap inter-operability between different system- and software families, even different generations of IT solutions. Large scale standardisation and integration projects are being replaced by smaller, targeted initiatives; smart middleware is being used in combination with cost-effective, commercial-off-the-shelf software.
These initiatives are taking place both inside and between partners in a S-IOC. Relevant evaluations of these IT systems must take into account the economics and the diversified fields of usage that the systems encounter. Context sensitivity is very important. It is no longer possible to compare the software system with the system specifications and draw conclusions; design, development and evaluation of the system must be as adaptive as the context is dynamic. This also applies to the IT budget.

**Business Interorganizational collaboration**

A Business IOC (B-IOC) is what it sounds like, collaboration among a set of partners in order to do business, increase the acquisition of load. It includes vertical as well as horizontal collaborations. The degree of formality vary to a large extent, some B-IOCs operate under strict rules of conduct, whilst others depend on more subtle, informal practice. We have not seen either as generally more successful then the other, but we have seen situations that are more suitable for respective solution. For instance, a B-IOC involved in the design, production and distribution of relatively complex goods, e.g. computers, has more to gain by keeping a relatively stable partner structure, than for instance a B-IOC selling soap. The reason is the difference in the investment concerning specific competence and supporting technology. The more specific the product is, the higher is the cost for substitution.

This seemingly obvious relationship has significant impact on the management of a business network in general and the degree of formality in particular. If a B-IOC partner is difficult and expensive to replace, she should be treated with care and locked into the collaboration by formal agreements; if a B-IOC partner is easy and cheap to replace, he should be kept at arms length, put in constant competition with others and replaced when necessary. Management of a B-IOC is to a large extent a game of politics and smart usage of power. Winners are the networks who manage to reach win-win agreements over time.
Change management in a B-IOC has many similarities with regular management. The difference is the degree of reconfiguration; change management is concerned with the complete reconfiguration of the partner constellation, meaning a re-trial of the partner configuration. Usually, changes are minor and future states of the collaboration tend to include a majority of the previous partners. This highlights the importance of trust and the emotional aspects of partner selection rather than rational.

Knowledge management in B-IOCs is the act of knowing how to maximize capitalization by facilitating innovative knowledge constellations while securing business benefits. Knowledge management is usually done by the hub and the collaboration manager, this is natural since few others in the collaboration have a complete view of the value creation and the underlying operations.

IT support for B-IOCs are naturally run by the collaboration Hub. In many cases, the IT support is more used as means for the Hub to realize her political agenda, then as ‘most appropriate rational choice’ for the task at hand. An example of this is when the Hub is in need of a commodity competence; one way of utilizing IT is to market the need for this competence and have an internal market where partners may bid for the job. In this case, IT helps to create distance between partners and push for the lowest price. On the other hand, if the Hub is afraid of losing a partner in the future, she may convince the partner in question to collaborate in a joint IT investments, shared forums and inter-process and information operability etc. The lock-in effects from sharing IT resources are often not obvious for the collaboration practitioners. Evaluating IT must from a Hub-company point of view, include the potential political aspects. This further enhances the need for context specific additions to established evaluation procedures.

Research Interorganizational collaboration

A Research IOC (R-IOC) is a collaboration of experts. Organizational home and formal arrangements are not in focus for
its active participants; focus is on explorative problem solving and knowledge creation. However, the R-IOC is usually part in a larger collaboration where business scope and means to get there are clearly defined. The collaboration may comprise of representatives from both vertical and horizontal partners. Management of a R-IOC is very similar to managing an internal project regarding the same issue. The issue at hand defines appropriate management.

*Change management* in R-IOCs deals with the facilitation of the research environment. This includes the securing of resources, monetary and human, the definition and re-definition of goals in correspondence with market monitoring and analysis. As most research initiatives are directly tied to a perceived market opportunity, this market and opportunity must be continually monitored in order for the future research result to be relevant to productify. Results and changes must directly influence the research agenda; this may affect the partner constellation significantly.

*Knowledge management* in R-IOCs is closely related to both management and change management. The prime objective for the knowledge manager is the orchestration of competences most likely to achieve defined goals by using planned resources. This involves both the facilitation of the research environment and the active leadership of the research in question. The most general truth for the knowledge manager in the R-IOC is the need for her to establish an environment that strongly supports and promotes knowledge sharing and collaboration.

*Usage and Value of IT-support* in the R-IOC is tricky to position. IT may be used to market competence needs, support distributed collaboration, administer research etc. Most solutions are closely tied to the research topic in question and hard to generalise. As a consequence, it is hard to generalize regarding evaluation of the same.
General

Our thesis and complementing papers aim to illustrate SMEs in interorganizational collaboration, showing static snapshots of how one may manage specific situations, or design, implement and use specific types of technical support, depending on a set of given assumptions regarding the collaboration in question. Our rationale for choosing this approach for presenting our findings, is our belief that a harder, statistically focused presentation aiming at ‘proving’ narrow details of an irrelevant relationship characteristica with shaky statistical gymnastics never can compete (in a social setting) with qualitative descriptions.

However, our IOC taxonomy is still a generalization; three snapshots of how many complicated aspects may work and work together in a networking context. This is not to be confused with a book of rules to follow. So how then, is the practitioner supposed to benefit from this thesis? What is the contribution to practitioners?

Rather then reading this as a book of rules to follow, we aim to describe, in detail, three settings. These settings (the IOC taxonomy) comprise organised (often in architectures) descriptions of key relationships between key elements. By this thesis we aim to support and increase the practitioners understanding of these relationships and elements. She will then, armed with this understanding, interpret her own IOC situation and make better decisions.

Further research

Given the ongoing tendency to attribute more and more economic significance to the SME, along with the increase of IOC as a model of organization and organizing; research into this area will continue to be of relevance for both the development of theory and the development of successful practice.
The importance of collaborative type as a determinant of successful practice can be regarded as continuingly relevant as a field of inquiry, and this thesis has stressed (among other things) the potential benefits of applying architectural frameworks to the management of SME IOC.

This stresses a need for continued research into the field of architectural frameworks for factual management, where the usability and applicability of the resulting frameworks is put in strong focus. We believe that the strive for relevance and rigour within the field of SME IOC needs to start with a solemn and sincere will to understand and approach the practice of the SMEs in order to practically assist them.

The first judges of relevance and researchability (in relation to the development of architectural frameworks) must be the potential users of the frameworks. Hence, we need to regard the development of architectural frameworks for SME managers as an instance of design science, and not a means towards gaining theoretical understanding. The first level of stakeholders need to be strictly practical, in order for the research not to be counterproductive.

The choice of formulation “counterproductive” instead of the more passive negation of “productive”, “non productive” is a way to imply the role of theory within the field of SMEs and its institutionalizing and disciplinary attributes, as stressed by Ackroyd (1993:104)

“Organizational analysis is an organized and an organizing institution.”

Given that this thesis is a joint effort (or should we even go so far as to call it a joint venture), the road ahead towards further research could be regarded as a bifurcated strip.

On one hand, we will continue to investigate the field of architectural frameworks for practically aiding managers that exist and act out their professional career in the space between organizational and IT-related development. The coordinated
development of business, organization and enterprises along with the technical development and deployment of IT-related artifacts still remains a complex endeavour in dire need of further research.

This is contrasted by an increased focus on the IT-artifact itself in the form of interorganizational systems (IOSs) and the impact the technical development of later days have on the development of business and collaboration. With new technological developments such as Service Oriented Architecture (SOA), open standards such as eXtended Markup Language (XML) and the diffusion of Web Services as a foundation for loose coupling of systems, the threshold for initiating and terminating collaborations (in other words the switching cost) is steadily being diminished.

The effects of these developments are yet to be fully understood and hence further research is needed. The potential usage of collaborative type as a construct for understanding the differences in institutional forces related to the initiation and termination of collaboration may be a way forward, but this requires further investigation in itself.

IOS as a construct relates back to a bulk of research conducted during the 1980s (see paper 5 for further details) and concentrates on the joint ownership of one system between two or more organizations. With the development of the enterprise systems market surrounding Enterprise Resource Planning (ERP) systems during the late 1990s, along with the diffusion of open standards and internet-enabled technology, this notion of a commonly owned system becomes somewhat obsolete. Instead the notion of infrastructures (Hanseth, 2003) may prove more useful along with concepts such as ecologies (Davenport & Prusak, 1999) and social systems (Luhmann, 1995). Further research into the founding characteristics of technology is needed, and the current state of affairs are not adept, neither theoretically or practically to handle this.
Conclusion

This thesis aimed to aid SME managers in their factual work, by answering the general research question:

How can different Small and Medium-sized Enterprises interorganizational collaboration be categorized, and how do these types of collaboration influence practice within the following areas:

- Usage and Value of IT-support
- Change management
- Knowledge management

The results were summarized into an architectural framework that through diversifying the general construct of IOC into three underlying types (forms) more context-sensitively aids the SME managers in their work practice.

The findings indicate that type of IOC influences the necessary pre-requisites for successful practice within the three underlying areas of usage and evaluation of IT-support, change- and knowledge management. Hence, successful practice within these three areas needs to take the specific collaborative type into account.

The resulting framework fulfils the practical contribution strived for in this thesis, by creating a result that directly can be applied by individual SME managers to their everyday practice. The value of applying the four (Usage and Evaluation are regarded as separate) underlying normative frameworks has been proven in the respective papers, and by combining them into one (super-, if you so will) framework the managers are given a well defined, packaged aid in their everyday practice. SME Managers have a clear need for pre-digested, packaged solutions that albeit not rigorously proven and all encompassing give them some sort of idea of direction.

On a more theoretical level, the study of SME IOC from the four underlying dimensions has hopefully increased the general understanding of the phenomena in question. By looking at the
differences in collaborative type in three typified collaborative settings, the thesis shows that a further diversification of the general notion of SME IOC is necessary (one might even argue general IOC). The proposed three-tier taxonomy is one way of diversifying the concept that, as we have shown, leads to vast differences in practice for the SMEs. Context-sensitivity is needed, and for this to be plausible and research be approachable, this can be categorized into a variance of collaborative type.
8. References


Bougrain, F. & Haudeville, B. Innovation, collaboration and SMEs internal research capacities. Research policy, 31:735-747


Harrison, B. 1994. Lean and mean: the changing landscape of corporate power in the age of flexibility. New York, basic books
Izushi, H. 2003. Impact of the length of relationships upon the use of research institutes by SMEs. Research policy, 32:771-788


Mintzberg, H. 1979. The structure of organizations. Upper saddle river, NJ. Prentice hall


Spender, J-C. 1996. Making knowledge the basis for a dynamic theory of the firm. Strategic management journal, 17: 45-62


Waits, Tom. 1983. Raindogs. Island Records,
www.eu-plexus.com 2005-08-19