occasional paper 2003/1

MIKAEL HOLMQVIST

Experiential Learning Processes of Exploitation and Exploration Within and Between Organisations:

An Empirical Study of Product Development

UPPSALA
UNIVERSITET

FÖRETAGSEKONOMISKA INSTITUTIONEN
UPPSALA UNIVERSITET
Department of Business Studies
Uppsala University
2003

MIKAEL HOLMQVIST

Experiential Learning Processes of Exploitation and Exploration Within and Between Organisations:

An Empirical Study of Product Development*

FÖRETAGSEKONOMISKA INSTITUTIONEN
UPPSALA UNIVERSITET
Department of Business Studies
Uppsala University
March 2003

---

* I am grateful for the very helpful contributions by Kimberley Elsbach, Bo Hedberg, James G. March, W. Richard Scott, and four anonymous reviewers. This research has been funded by Jan Wallander and Tom Hedelius' Research Foundation for Social Science and the Swedish Council for Work Life Research.

Experiential Learning Processes of Exploitation and Exploration Within and Between Organisations: An Empirical Study of Product Development

Abstract

This paper empirically examines the relationship between exploitation and exploration in intra- and interorganisational learning processes. Exploitation is about creating reliability in experience and thrives on productivity and refinement. Exploration is about creating variety in experience and thrives on experimenting and innovating. Specifically, the paper explores four learning processes: (a) How intraorganisational exploitation generates interorganisational exploration; (b) how interorganisational exploration generates intraorganisational exploitation; (c) how interorganisational exploitation generates intraorganisational exploration; and (d) how intraorganisational exploration generates interorganisational exploitation. The empirical data consists of two case studies of organisational learning in product development processes of one Scandinavian and one American software producer and their respective interorganisational collaborations with business partners. The findings show how exploitation can be a cause for exploration, and vice versa, that moreover may transcend learning levels. The mechanisms by which such dynamics are generated are discussed. Overall, the framework as proposed in the paper further develops existing theories on organisational learning, by proposing how exploitation and exploration are empirically interlaced within and between organisations.

Keywords. Exploitation, exploration, intraorganisational learning, interorganisational learning, case study, product development.

In this paper I examine two standard and valuable ideas that are implicit and explicit in much contemporary conversation on organisational learning. First, organisational learning is said to involve dynamics between exploitation, i.e., processes by which organisations create reliability in experience; and exploration, i.e., processes by which organisations create variety in experience (Crossan et al, 1999; March, 1999; Marengo, 1993).

Overall, however, most organisational learning studies concerned with these issues have mainly analysed organisational learning as exploitation, for instance, as incremental growth of competence (Argyris and Schön, 1996; Leonard-Barton, 1997), as refinement of existing skills (Starbuck et al, 1978; Miller, 1994), or through control of learning processes (March and Olsen, 1979; Weick and Westley, 1996), and repetition of learnt behaviour in similar or different situations (Kieser et al, 2001; Weick, 1991).

Other organisational learning studies have concentrated on examining organisational learning as exploration, for instance, as highly experimenting activities within learning entities (Engeström, 1995; Kuwada, 1998), as innovation processes between organisations (Freeman, 1991; von Hippel, 1988), that are made possible by relaxed control and loose coupling (Liebeskind et al, 1996; Lyles, 1988), and ambiguous learning structures (Hansen, 1999; Hedberg and Jönsson, 1978).

Compared to the satisfactory understanding of learning *as* exploitation or exploration, relatively little is, however, known how exploitation and exploration are empirically related to each other. The overall situation of organisational learning research of either studying learning as exploitation or learning as exploration is confirmed in several reviews of the field (see, e.g., Dierkes et al, 2001; Dodgson, 1993; Huber, 1991). Similarly, Weick and Westley (1996: 445) concluded in their comprehensive review of the organisational learning literature:

"Existing definitions of organisational learning tend to focus either on learning as exploitative (…) or on learning as exploration".

Second, organisational learning is said to be a multi-level phenomena, involving dynamics of exploitation and exploration within and between organisations (Baum, 2002; Bierly and Hämäläinen, 1995; Brown and Duguid, 2001; Miner and Mezias, 1996). So far, however, the organisational learning literature has largely been conceptualised as either intraorganisational (e.g., Argote and Ophir, 2002; Hansen, 1999; Schultz, 2002) or as interorganisational (e.g., Child, 2001; Larsson et al, 1998; Miner and Andersson, 1999), and there has been little attention to how intraorganisational learning processes and interorganisational learning processes are interlaced empirically.

Indeed, many students of organisational learning have concentrated on studying intraorganisational learning of exploitation or exploration, e.g., as individuals learning from each other in organised settings (Brown and Duguid, 2001; Kim, 1993; Maier et al, 2001), how groups, departments, and teams of individuals share experience and jointly learn (Argote and Ophir, 2002; Edmondson, 1999; Hansen, 1999), or by paying particular attention to the role of social interaction (Argyris and Schön, 1996; Cyert and March, 1992), and work practices within organisations (Child and Heavens, 2001; Lave and Venger, 1991).

Correspondingly, a large number of organisational learning studies have concentrated on examining interorganisational learning processes of exploitation or exploration, for example, as exchange and transfer of knowledge and skills between organisations (Appleyard, 1996; Mowery et al, 1996), as joint learning of new competencies (Freeman, 1991; Inkpen, 1996), as re-combination of existing experiences (Holmqvist, 1999; Powell et al, 1996) or by analysing the requirements for successful interorganisational learning (Hamel, 1991; Larsson et al, 1998).

Interorganisational learning primarily refers to an organisation's learning with business partners through formal strategic alliances, but may also include learning with customers, competitors, government agencies, etc. (Bierly and Hämäläinen, 1995). Thus, interorganisational interactions are seen as a unique learning entity in itself (Kochan, 1975; Miner and Andersson, 1999; Larsson et al 1998) that is separated from the intraorganisational learning level. Although much valuable research has been devoted to the learning dynamics *within* each of these two learning levels, less attention has, however, been devoted to empirically studying how they are intertwined.

By drawing on the findings of two recent longitudinal qualitative studies on learning within and between organisations, the purpose of this paper is to empirically examine how exploitation and exploration are interlaced in intra- and interorganisational learning processes. Specifically, I will analyse:

1. How intraorganisational exploitation generates interorganisational exploration;
2. How interorganisational exploration generates intraorganisational exploitation;
3. How interorganisational exploitation generates intraorganisational exploration; and
4. How intraorganisational exploration generates interorganisational exploitation;

There are several justifications for examining these issues empirically that would add to the understanding of how organisations learn. An organisation that engages only in exploitation will eventually suffer from obsolescence and risk drifting into a decaying backwater (Hedberg et al, 1976; Levinthal & March, 1993). Experience shows that this often happens (March, 1999; Miller, 1994; Starbuck et al, 1978), but not necessarily so (Brown and Eisenhardt, 1997; Feldman, 2000). Further, an organisation that engages only in exploration will ordinarily suffer from the fact that it never gains the returns of its knowledge. It will merely reproduce experimenting behaviour that eventually leads nowhere (March, 1995;

Marengo, 1993). Experience shows that this often occurs (Brunsson, 1985; Hedberg, 1981), but not inexorably so (Lant and Mezias, 1996; Tushman and O'Reilly, 1996).

As a result of learning's simplifying and specialising logic, organisations learn competence (Bandura, 1997; Janis and Mann, 1977; Levinthal and March, 1993). They become better at things they do repeatedly and successfully, lose competence at things they do infrequently and unsuccessfully (Hedberg, 1981; Miller, 1994). This self-reinforcing nature of learning makes an organisation prone to sustain current focus, maintaining a more-of-the same behaviour of either exploitation or exploration that eventually may become excessive (Tversky and Kahneman, 1982). The effects of such "lock-in through learning" (Arthur, 1989) and "competence traps" (Levitt and March, 1988) has been argued to be the cause of much inability of organisational renewal and radical change (Miller, 1994; Starbuck et al, 1978). As Levinthal and March (1993: 105) put it: "Organisations become trapped in one or more of several dynamics of learning that self-destructively lead to excessive exploitation or excessive exploration".

However, although much valuable organisational learning research has shown that exploitation typically generates further exploitation and that exploration typically generates further exploitation, occasionally exploitation provides the basis for organisations' innovative and experimenting activities, i.e., exploration, by enabling combinations of already existing experiences in radically novel ways (Miner et al, 2001; Nelson and Winter, 1982; Galunic and Rodan, 1998). Such learning has, for instance, been the ground for much scientific (Kuhn, 1996) and technological innovations (Utterback, 1994). Similarly, exploration sometimes generates exploitation. Explorative learning may become the ground for much successful exploitation by organisations acquiring specific skills from highly experimenting activities that later are refined and exploited (Von Hippel, 1988; Simon, 1985).

Empirically examining the mechanisms by which organisations transform their learning into exploitation from exploration, or transform their learning into exploration from exploitation, seem in that regard vital to understanding how organisations both learn to pursue refinement, production, and focused attention, i.e., exploitation; and experimenting, innovation, and free association, i.e., exploration. These activities are crucial both to organisations' daily operations and their long-term development (Crossan et al, 1999; March, 1991).

Likewise, as well as there are interdependencies between individuals' learning and organisations' learning (Kim, 1993; Maier et al, 2001), there should be important interdependencies between intra- and interorganisational learning. As Bierly and Hämäläinen (1995: 217) stressed: "Internal learning and external learning are not independent processes. They are mutually interdependent and complementary processes which must be analysed together".

Intraorganisational learning provide much of the experiential knowledge input that may be transferred between organisations as they collectively learn in networks, strategic alliances, and other forms of interorganisational collaborations (Child, 2001; Larsson et al, 1998). Similarly, the learning between organisations provide input to the intraorganisational learning of the various collaborating partners (Hamel, 1991; Lane and Lubatkin, 1998). The explorative character of much interorganisational learning (Liebeskind et al, 1996; Powell et al, 1996) does not occur by itself, but is a result of a confrontation and a combination of single organisations' experiences. And conversely, interorganisational exploration is the requirement for single organisations' exploitation. Organisations may internalise what has jointly been learnt with other organisations that eventually may be reproduced as part of the organisations' experience (Cohen and Levinthal, 1990).

As a result, empirically understanding the relation between intraorganisational learning processes of exploitation and exploration and interorganisational learning processes of exploitation and exploration appear to be of central importance.

The paper is organised as follows. First I discuss how the data was gathered and analysed. Then I present the findings following the four research questions. This section is followed by a discussion of the mechanisms that generate dynamics of exploitation and exploration within and between organisations. The paper is concluded with a discussion of the contribution of this paper relative to the existing literature, potential areas of applicability, and future research.

Methods

My empirical study of organisational learning was based on dynamics between intra- and interorganisational learning in various product development projects in two software companies and their respective sets of collaborating organisations. Product development was defined broadly and included all possible processes that contributed to developing the products. Thus, not only were highly experimental projects given attention, but customary undertakings were looked at as well.

Product development projects provided a manageable centre of attention and were intense of human and organisational interaction, and have for these reasons been argued to be a good arena for studying learning (Liebeskind et al, 1996; Miner et al, 2001; Twigg, 1996). Moreover, product development could help me to understand both how employees *within* the respective companies interacted with one another and how employees *between* the companies interacted. In reference to this aspect, product development projects met the requirements of studying both learning within and between organisations. A limitation of this empirical focus was the exclusion of other potentially important learning processes, e.g., as arising from

organisational crises (Hedberg and Jönsson, 1978), the recruitment of new employees (March, 1991), and other issues.

The one and dominating case study focused on how the Swedish branch of the Scandinavian software producer Scandinavian PC Systems (www.spcs.se) learnt during 1997 through 1999. The other case was based on a more limited study of the American software producer Broadvision (www.broadvision.com) between 1998 and 1999. This case served as a back-up case to strengthen the potential to generalise the findings of the SPCS case. It was similar enough in terms of products and industry; yet different enough in terms of organisational and national context.

Besides the practical requirement of being willing to participate in the research, intensity in product development, both in terms of complexity (e.g., number of participants in a project) and in terms of number of ongoing projects, was regarded as important for the choice of the cases. Both companies were engaged in various projects that sought to develop their respective products, thus potentially breeding a fertile soil for studying learning processes (see Appendix A). Moreover, partnering intensity, i.e., the number of ongoing interorganisational collaborations and the depth of these collaborations, was another factor that was basic to the choice of the cases. The chosen companies fulfilled the requirement of being simultaneously engaged in many different formal collaborations with a deep and committed undertaking.

At the time of the study, Scandinavian PC Systems (SPCS) was Scandinavia's leading manufacturer of administrative PC-programs for small companies, and it prided itself of focusing on "ordinary users' needs". Most of SPCS' customers were owner-led companies without any specialists employed for the administrative tasks to be carried out. SPCS was quoted both on the Swedish and the Norwegian stock markets and had some 400 employees.

Broadvision was a NASDAQ-quoted software company situated in Silicon Valley in California and had some 500 employees during the study.

Much of both companies' production of programs was undertaken within the company in parallel with intense partner collaboration. Partners were legally autonomous companies that collaborated with SPCS and Broadvision respectively through formal, contract-based strategic alliances. Typically, SPCS and Broadvision owned the respective end products, and partners were remunerated according to a royalty system.

The case study of SPCS included its close interaction with "programming partners", such as P-Data and Elicon in Sweden that were responsible for the systems design, programming and technical support of the products, and with its "expert partners", like the companies Anders Andersson Economy, KPMG, and Jan-Erik Persson Advices, which were responsible for providing professional competence to the product development (e.g., requirements for producing a tax program or a program for balancing-of-the-books). The Broadvision case focused on Broadvision's interaction with its "systems integrator partners" (experts in particular skills, such as accounting), "value added resellers" (experts in particular markets, such as telecoms), and "technology partners" (experts in particular software architecture).

Theory of Organisational Learning. The following theory of organisational learning was fundamental to me both when gathering data from the cases and when analysing that data.

Organisations learn from experience that affects their subsequent behaviour (Bandura, 1997; Kolb, 1984; Herriott et al, 1985). Most experience is merely fleeting and chaotic and in order to learn from it, it needs to be interpreted (Hedberg, 1981; Levitt and March, 1988). Interpretive activities typically take place in ongoing organisational activities, where potential and existing organisational members bargain over their diverse and often conflicting

experiences of the same situations encountered (Orr, 1996; Weick, 1995). Bargaining, which typically is informal and implicit in daily talk, discourse, conversation, and other activities, produce sets of incomplete and not necessarily fully consistent behavioural agreements that more or less strongly impose constraints on organisation members' future interaction (Janis and Mann, 1977; Lave and Venger, 1991). These at any point in time dominating agreements over other potential agreements, can be referred to as "organisational rules" (Edmondson et al, 2001; Feldman, 2000; March et al, 2000; Zhou, 1993). Inferences from experience are coded into rules that create certain couplings between otherwise independent behaviours and thus enable some organised activities.

The bargaining processes by which such experiential rules are produced and re-produced can further be regarded as "organisational learning", where the organisation creates knowledge in form of behavioural rules through the transformation of humans' experience (Dodgson, 1993; Fiol and Lyles, 1985; Hedberg, 1981; Huber, 1991). It is always real human beings in real organisations that constitute the motor of organisational learning: it is they that learn from experience. In that regard, organisational learning is commonly seen as "an integral and inseparable aspect of social practice" (Lave and Wenger, 1991: 31), where humans' intellectual and emotional bargaining is of central importance (Cyert and March, 1992; Metcalfe, 1981).

Following this line of reasoning, it makes conceptual sense to assume that on behalf of an organisation individuals can undertake experiential learning processes that, in their turn, can yield learning outcomes as reflected in organisational rules that encode them (Argyris and Schön, 1996; March et al, 2000). Thus, when saying that *an organisation learns* it is not assumed that "because there is the single noun-word 'organisation', something in nature must correspond to it – something that is independent, unique, unchanging, and capable of entering subject-predicate relations with other things" (Weick, 1979: 34). Instead, organisational

learning are concerned with individual behaviours that are dynamic, political, process-like, and that possess some kind of character that make it reasonable to call them organisational.

To study organisational learning processes, I thus followed the tradition in organisational learning theory to concentrate on the social production and re-production of organisational rules, which included highly formalised and written rules and routines, and more tacit and informal conventions, roles, and codes based on experience Following the standard theory, I assumed that the respective organisations had learnt when a set of individuals started to act according to some tacit or explicit rules produced. Based on such reasoning I studied how organisational members from the various companies jointly produced experiential rules through bargaining when confronted with specific situations in new or ongoing product development projects. The bargaining that was at hand between different professional groups either within the respective companies, or between members of the different companies was of crucial importance to analyse the learning dynamics.

Data gathering. Interviews, observations and documents are three main ways of determining what behavioural rules an organisation uses and how these are changed as a result of learning (Janis and Mann, 1977; March & Simon, 1958).

Interviews. Respondents were chosen based on their experience of working in product development projects, assuming that they could provide detailed information of the phenomenon of rule-production, i.e., learning. At SPCS, all managers and most employees filled these criteria. At the partner companies of SPCS, all employees also had such experience, which is why no selection between them was necessary. At Broadvision, all respondents were active in various product development activities.

Both ‘formal’ and ‘informal’ interviews were conducted. Formal interviews refer to interactions that had been agreed upon in advance and where I was the sole person asking the questions. Informal interviews refer to discussions at lunches, coffee breaks, etc. The latter

activity was undertaken mainly during the SPCS study, though it did occur during the Broadvision study as well. At SPCS and their partner companies, I could move freely within their offices where I had the opportunity to talk with people on a regular basis.

At the beginning of each interview, each respondent was informed that a product development study was conducted, but such words as "learning" or "exploitation" were never used in order to avoid any unnecessary bias in the reporting by the respondent. Interviews lasted about 45 to 60 minutes. After each interview and in the presence of the respondent, I reviewed my written notes and then summarised my major impressions of the session. This procedure permitted the respondent to give immediate feedback and add to or correct what I had noted. This process of "member check" is said to be important to a study's credibility (Lincoln & Guba, 1985).

In the case study of SPCS and their partner companies, 47 formal interviews, documented on cassette tapes and as notes, were undertaken with 30 persons (Appendix B). Within the formal organisation of SPCS, each person was interviewed at least twice during different phases of the study. In the case study of SPCS interviews were undertaken with both top managers and employees. Interviews were not restricted to SPCS only, but included interviews with partner companies' managers and employees as well. In the Broadvision case, 15 interviews with senior managers (the CEO and the vice presidents) and managers (mainly project managers of specific product development projects) were undertaken (see Appendix B).

Observations. Observations are normally regarded as necessary to the understanding of a case study's context (Patton, 1990). Observations of how individuals relate to each other may in that respect reveal organisational rules by studying distinct behaviour. Overall, the surrounding milieu of the case contained much information, which served as a background when analysing the cases. I noted and wrote down in documents, for instance, clothing style,

how people were working (open-office landscapes or sealed-off offices) and how people related to each other. This was particularly important in the SPCS-case that emphasised an 'informal' and 'laid back' behaviour. By observing for myself, I also had the possibility to evaluate what the respondents had said to me interviews and thereby judge their credibility, e.g., regarding their statements on how product development activities were undertaken.

Observations, around 400 hours, were made in an informal and formal manner. Formal observations refer to the episodes when I was present at formal product development meetings and studied the interactions of the respondents, e.g., between members of different partner companies bargaining over how to learn from particular experiences. Informal observations refer to my frequent participation in lunches, coffee brakes, etc., where, e.g., employees or partners to SPCS met and discussed their work in a less formalised manner. In the SPCS case both modes of observations were undertaken frequently; in the Broadvision case only informal observations during a conference in Boston between Broadvision, its partners, and its customers, was possible.

Documents. Documents concerned all forms of written information that were related to product development activities, particularly "demand specifications" that specified features of a new product and that hence reflected previous learning from experience, e.g., based on customer input. Documents also included the companies' policy manuals, company magazines, annual reports, and other written materials that were deemed important to understand the product development activities. Access to documents was without restrictions in the SPCS case.

Data analysis. Consistent with the definition of organisational learning as used here, I focused on human behavioural changes when analysing organisational learning.

In interviews, I concentrated on respondents' oral statements about their behaviours, e.g., by asking an SPCS employee to describe how a typical meeting with business partners

was undertaken. I assumed that behavioural rules, which individuals constantly carrying out in daily life, are stored in them in form of durable memory traces (Bandura, 1997). I reasoned in that regard that the simplest and most adequate way to understand what rules are being practised, and how these rules have changed over time, is to ask individuals to describe how they work. To organise the interviews, I used a general interview guide (Patton, 1990) that focused on work practices and related behaviours (see Appendix C).

In observations, I focused on what I myself could observe, e.g., in the actors' bargaining over different experiences when confronted to various situations. And in documents I concentrated on written statements about work-related behaviour, as, e.g., was found in SPCS' "handbook for employees" that stressed the need for employees to address customers in an "informal" way.

I made a rough categorisation between one the one hand 'incremental' behavioural changes, and on the other hand 'radical' behavioural changes. I assumed that exploitation and exploration are each other's behavioural opposites. Learning that generates exploitation from exploitation, or exploration from exploration, would in that regard refer to behavioural changes that constitute behaviour (Ashby, 1960), i.e., incremental behavioural changes. On the other hand, learning that generates exploitation from exploration, or exploration from exploitation would constitute changes from behaviour to behaviour, i.e., radical behavioural changes. Thus, I reasoned that "there are two different types of change: one that occurs within a given system which itself remains unchanged, and one whose occurrence changes the system itself" (Watzlawick et al, 1974: 10). Both behavioural changes were assumed to stem from experiential learning.

More specifically, I interpreted such common behaviours as refinement, routinisation, re-production, fine-tuning, modification, and sophistication of existing behaviour as exploitation. Further, I interpreted such behaviours as experimentation, novelty, risk-taking,

trialling, and innovation as exploration. When I recognised these and related behaviours in interviews, observations, and documents, I consequently categorised them as exploitation or as exploration. Of course, such an analysis couldn't be particularly precise and hinged to a large extent on my own interpretive framework, which, however, is unavoidable when conducting qualitative research. Nevertheless, such a way of categorising data has been central to earlier learning research on exploitation and exploration (see, e.g., March, 1991; Marengo, 1993).

Consistent with this framework, I regarded both exploitation and exploration as rule-like behaviour: sometimes product development projects were seen as exploiting by members behaving according to 'rules of exploitation', and sometimes projects were seen as exploring by members behaving according to 'rules of exploration'. Thus, highly experimenting activities were also assumed to be driven by rules, and rules were assumed to be produced and re-produced in ongoing product development projects.

When gathering the data, it became, however, also increasingly obvious to me that exploitation and exploration was not only of an 'ongoing' character, as people occasionally made fundamental behavioural changes, which I consequently interpreted as transformations between exploitation and exploration. For instance, sometimes SPCS' employees referred to them as having stopped refining a particular program and having entered a more experimenting phase in order to generate ideas for a completely new product that, e.g., could have been prompted through outside pressures from customers. On several occasions I could also note such radical behavioural changes between SPCS and partners, where the parties involved started in a highly explorative fashion that eventually turned very exploitative when entering into a concrete production phase. Such behavioural changes were clearly not of an ongoing more-of-the-same character. Such transformations between exploitation and

exploration revealed as radically changed organisational behaviour, became obvious to me when following the different product development projects over time (see Appendix A).

Moreover, I understood intraorganisational interaction as interaction that largely took place between formal members of either SPCS or Broadvision. I assumed in that respect that intraorganisational learning took place when these individuals produced exploitative or explorative rules for behaviour (Hedberg, 1981; Levitt and March, 1988). Interorganisational interaction was understood as interaction that largely happened between members of the different companies, e.g., between members of SPCS and their partners. I supposed that interorganisational learning occurred when these individuals managed to produce interorganisational exploitative or explorative rules (Hedberg and Holmqvist, 2001; Leblebici and Salancik, 1982).

Thus, intraorganisational learning was assumed to be the result of interaction between formal organisational members that were tied together by employment contracts, and interorganisational learning was assumed to be the result of learning taking place between individuals that were formal members in different organisations. To focus on the employment contract when discriminating 'organisational members' from other participants is certainly not without its problems given that an organisation's members in behavioural terms may include other participants than its formal employees (Cyert and March, 1992); but is consistent with how intra- and interorganisational interactions have commonly been conceptually separated from each other (see, e.g., Metcalfe, 1981; March and Simon, 1958).

Much learning was certainly of either an intraorganisational character, or of an interorganisational character. However, when SPCS, for instance, tried to make sense of what had been learnt jointly with partners and frame these learning perspectives according to its own particular experiences, I interpreted such activities as transformations between interorganisational learning to intraorganisational learning. Similarly, there were situations

when partners jointly translated intraorganisational experiences into a joint understanding, thus transforming and combining each party's idiosyncratic experiences into common behavioural rules, which I regarded as transformations from intraorganisational learning to interorganisational learning. As in the case of dynamics between exploitation and exploration, these transformations revealed themselves when following the product development projects over time that emphasised the interlacing of intra- and interorganisational rules.

The practical organising of the data involved categorising the findings into documents, one for each product development project. These documents contained three columns: interviews, observations, and documents. Each column was separated into the four learning processes that were the focus of the study. This enabled me both to understand behavioural changes in particular learning processes, and get an overview of the patterns of all learning processes. The documents were then compared to each other where I tried to understand what mechanisms generated dynamics between exploitation and exploration within and between organisations. I particularly focused on behaviour that I interpreted as involving radical behavioural changes. From the findings two major patterns emerged that I used as a basis for understanding how such dynamics came about (see the Discussion section).

Findings

The presentation of the findings will follow the conceptual framework as outlined previously by focusing on four different organisational learning processes connected to distinct phases of different product development activities. I will only concentrate on the case study of SPCS. As already said, the Broadvision case served as a back-up case that relied on fewer interviews and limited observations. Even though interesting data emerged from that case as well, it had primary confirmatory value to the findings of the SPCS case. The choice to exclude the data from the Broadvision case when reporting the findings also stems from the

limited space available here, and from an overall ambition to maintain clarity in the presentation of the findings, thus avoiding mixing two cases with each other.

The first learning process describes how SPCS' intraorganisational exploitation became the basis for interorganisational exploration with a number of partners in a joint product development project. The second learning process focuses on how some of SPCS' joint explorative learning between it and partners eventually generated independent intraorganisational exploitative activities. The third learning process concentrates on how joint exploitative behaviour between SPCS and some of its partners related to a specific project generated intraorganisational exploration within SPCS. And the fourth learning process describes how intraorganisational explorative behaviour within SPCS transformed into interorganisational exploitative behaviour between SPCS and some of its partners.

Intraorganisational exploitation generating interorganisational exploration.

SPCS' customers have traditionally been owner-led companies with a few employees such as a bookstore, a small accounting firm, a restaurant, etc., and they have typically been interested to buy PC-programs that are simple to use and easy to understand and thus do not require any specialised competence.

SPCS had tried to address these customers' needs by learning from experience to produce PC-programs for "ordinary" users that were "easy to use" (CEO of SPCS). The general goal to produce "good programs for the people" (deputy CEO of SPCS) was in that regard continuously re-learned in daily work activities where employees were induced to learn to act informally towards each other across hierarchical levels and departments ("we do not want any strict hierarchy or any strict line of reporting" [Deputy CEO]); in formal training programs for the employees; in written documents (SPCS had a 'handbook' for employees named "SPCS Basic Ideas" that stressed the need to act in an "informal" and "ordinary" way

towards customers); and in customer communication (the company's customer magazine was named *You and the Computer – For Ordinary Users*).

This 'ordinary' approach had been a core idea of SPCS' that had been successfully exploited over the years, where SPCS continuously refined its skills in producing products for ordinary business users. SPCS even became Sweden's leading provider of administrative PC programs for small companies (which make up 98% of all companies in Sweden) that further strengthened the company's belief to continue to draw on its present skills.

The retrieved experiences that were exploited in producing such programs regulated much of SPCS' learning by providing some implicit and explicit basic rules of how to interpret different situations that were encountered, not at least in acting as a precedent upon learning from customer experiences. As one of SPCS' employees that was responsible for producing manuals to the programs said: "You know we try to write for Elsa, 65 years old, who takes care of the salary administration. We do not write for any systems designers (…) We work for the small corporations. It's in the back of your head". Exploitation of the dominant approach to address these customers generated further competence in this domain, continuously increasing the bond between experience and competence.

By time, however, SPCS came to understand that its traditional strategy was no longer as effective as it had been. SPCS had encountered problems in expanding its sales. SPCS' simple and easy-to-use programs seemed no longer as fitted to the needs of their customers as they had been previously. In various ways, e.g., through telephone calls and e-mails to SPCS, or by simply choosing the products of SPCS' main competitor Hogia instead, customers communicated that they required more sophisticated products to handle increasingly complex administrative operations. And contrary to the situation some years ago, customers nowadays had considerable experience in working with PC programs, which further increased their demands on technical feasibility rather than easy-to-use solutions.

This feedback conveyed to SPCS in the continuous customer interaction, made the company prone to consider entering new market domains. In so doing, it opened itself up to form an alliance with one of Sweden's major auditing firms at that time, KPMG, which SPCS believed possessed valuable experiences, not at least as many of SPCS' customers were customers to KPMG. KPMG, on the other hand, was at that time interested in buying new administrative programs for its internal operations and knew from its clients that SPCS was a reliable and competent company for producing such products. When SPCS proposed to KPMG to collaborate on producing a new accounting program for more specialised users than their traditional customers, KPMG became interested.

After a contract had been signed with KPMG a phase of intense bargaining with two of SPCS' other partners (P-Data and Jan-Erik Persson Advices) and KPMG followed. During this process different ideas were ventilated and discussed that enabled the parties to create some variety in their experiences by re-combing their individually held experiences into a joint understanding. Each party thus brought to the interaction its unique experiences, producing intense bargaining between them of how to produce a joint product. "Here we were in a process of a lot of compromising, there had to be…there were difficulties and challenges, all of those things involved" (Manager at SPCS). Difficulties of understanding each other's stakes and ideas were prevalent that stemmed from people coming from different organisational backgrounds.

By combining their experiences in ways that they were unable to do by individual efforts, the parties eventually, however, managed to produce some new and innovative ideas. It was concluded that the new program was to consist of a number of already existing SPCS programs, but that they should be tied together by an "integrating program" to be produced jointly by SPCS, KPMG, and two of SPCS' programming partners. "The idea was born that auditors [like KPMG] ought to have a tool that could have control of all their programs;

suddenly something started to grow, which resulted in a program, the client integrator. It hadn't previously existed on the market" (CEO of P-Data).

Such innovative results was said to be due to the different experiences involved in that particular interaction. "We have different perspectives, in this situation you get impressions from several channels than if you would have been in the same house and having been recruited by the same system" (Jan-Erik Persson, Partner). The interorganisational exploration occurred in that regard on the basis of intraorganisational exploited experiences. The 'newness' created in the interorganisation – that of focusing on more sophisticated customers – could only have been produced against the background of SPCS' traditionally exploited experiences that no longer defined a fully playable game. Concretely, exploration was 'made to happen' when SPCS' exploited experiences were combined in a joint bargaining. In that respect intraorganisational exploitation of SPCS (and partners) generated joint interorganisational explorative activities.

Interorganisational exploration generating intraorganisational exploitation.

Most of SPCS' interaction with its partners was directly related to product development activities, and most of the joint product development projects were initiated by so called "brainstorming" meetings between SPCS and partners. From previous experiential learning SPCS and partners had learnt that starting product development projects according to an explorative model was a good procedure to generate a host of ideas that could form the basis for the subsequent production process.

The initiative to such a meeting could come from anyone at SPCS or from one of the partners, depending on the nature of the issue. For example, programmers often triggered the others to initiate a revision of a program because of changes in technological requirements and thereby encouraged them to participate in a meeting. Experts pushed others to start

revisions of products for such reasons as changed legal requirements. Generally, the brainstorming meetings were characterised by a bandying of ideas to discuss something evoked by either SPCS or some of its partners.

These meetings between SPCS and the partners often forced them to continuously reflect upon their own taken-for-granted assumptions, thus contributing to a joint exploration. One of SPCS' managers thought in this respect that it was critical to work with "independent programmers (…) since much of what we say is coloured by how we are used to do things around here" and "if we would have our own programmers, where I told them how they should work, then the programs would never have reached a state of excellence. There wouldn't be any best-in-test."

However, an important drawback of the often highly experimenting behaviour between SPCS and partners was the frequent inability to enter into a production phase, where the jointly retrieved experiences from the interorganisational learning could be converted into exploitative behaviour of production and concentration on a limited range of tasks to be accomplished. The parties often became stuck in excessive explorative behaviour where different ideas were discussed and ventilated, but where no consensus was reached on how to go on to the next stage that would involve the formulation of a "demand specification" of features for the forthcoming product. The manager of the support department of SPCS explained this situation.

> There is a complication between the programmers and us. They are no pros on usability. This leads to a power struggle. We want a function that is practical and friendly to use. They want it as technically exciting as possible.

A typical response to frequent dead-locks of exploration was that SPCS (that typically left much of the experimenting to the partners) eventually decided on what lessons to draw for

each party and how to proceed with the product development. As the CEO of SPCS explained: “Each and one of them [the partners] surely have their own solution, but we decide”. In these cases, SPCS often stressed a division of labour between the parties, by demanding the programmers to concentrate on systems design and programming; the experts to focus on legal issues and other related aspects; and SPCS to pay attention to issues of customer usability.

Each party was thus left to make sense of the joint experiences produced between them according to their individually held perspectives as stemming from their particular intraorganisational experiences. In that regard some of the jointly explored experiences at the interorganisational level created the ground for intraorganisational exploitation of specific skills in the continued production process. This was, however, done in accordance with a demand specification based on the brainstorming that people of SPCS had written, stipulating what aspects to focus on for the new program.

The changed behaviour from exploration to exploitation was in that regard triggered by some anomalies experienced with too much explorative behaviour. This insight created the basic conditions for the concomitant exploitative activities. The intraorganisational exploitation could thus only be understood as against the background of dissatisfaction with excessive interorganisational exploration.

Interorganisational exploitation generating intraorganisational exploration.

SPCS had worked with several of its partners for many years, such as Elicon and P-Data. As in the case of the intraorganisation of SPCS, the interorganisation of SPCS had in that respect learnt some behaviour based on experience that was continuously re-produced and refined and that served as a useful template for much of the ongoing joint product development activities. As one of SPCS’ employees explained:

> The co-operation with the partners has developed so that you have become friends. I have learnt how they want it, and have adapted to that. We have learnt several things together. For example, we have jointly created a bug-report system. What we learn together can be beneficial for the next project. Today, we know each other much better. We know how we react. We have built a routine by ourselves. (…) Everyone learns what it takes, e.g., testing time for the program (…) The co-operation has become much easier with time. I have learnt much of what P-Data wants and I don't need to ask so many questions any longer.

Indeed, much of SPCS and partners' joint operation was today of an exploitative character, where a learnt behaviour was merely reproduced that had proven to be successful based on experience. However, when SPCS experienced a steady decline in its sales that was thought to be the result of their programs no longer being as attractive to customers as before, this cast a shadow of the way the partner collaboration operated as well in terms of generating new ideas. Much of the learnt rules and routines revolved around the traditional focus of producing PC-programs for "ordinary users" demands. As much as this was at the heart of SPCS' own way of acting, it was fundamental to the interorganisation as well.

The experience of mismatch between the activities of SPCS' interorganisation, and the results achieved on the market blocked in that regard the ongoing flow of activity and gave rise to thought among SPCS' members, and this was further triggered by the new partner KPMG entering the interorganisational collaboration. SPCS became increasingly convinced that its previous successful joint exploitation with partners of programs for small companies, for "ordinary users", was about to reach a dead end. This was a direct challenge to SPCS' fundamental behaviour that had successfully been learnt over the years and that was SPCS' main source of experience.

When experiencing anomalies with the present *joint* behaviour with partners that sustained a focus on particular programs, SPCS became increasingly receptive to what requirements were needed for much more sophisticated programs instead. It was in that regard natural to turn to KPMG that possessed such knowledge. "We listen a lot to what KPMG has to say. They have niche-knowledge" (Employee at SPCS). By imposing its experiences on SPCS, and by SPCS to some extent accepting KPMG's authority, KPMG was in that regard able to partly reframe SPCS' habitual way of behaving based on its strong exploitation of its previous experiences. It consequently learned differently than earlier. The strategy of producing programs for "ordinary users" was to be combined with a strategy to create products for much more demanding and skilled customers, such as auditors. Through its interaction, KPMG managed to create variety in SPCS' internal experiences of who its customer was: it triggered SPCS to interpret its experiences more richly.

Credit for this intraorganisational exploration should not be given to SPCS but to KPMG, in that KPMG was the more powerful force in the interaction with SPCS. Moreover, this generation of intraorganisational exploration could only have been created against the background of the traditional interorganisational exploitation of particular interorganisational rules that SPCS believed had encountered some problems. As a result, the traditional *inter*organisational exploitative learning between SPCS and partners generated in this case an *intra*organisational explorative learning process within SPCS.

Intraorganisational exploration generating interorganisational exploitation.

All product development processes of SPCS were said to be "based on knowledge and information of customers' real needs and demands" (SPCS Prospect, 1997: 11). SPCS' "support department" continuously assembled such information. Customers phoned, faxed or e-mailed information to the support department with complaints or propositions of

improvements of existing products. Members of the support department entered this information into documents. This information was then discussed at formal meetings with members of the "department of development", who were directly responsible for the product development.

Through past learning activities related to particular practices, the two departments had learnt their own intradepartmental rules and routines for handling their daily work and had thus developed partly different understandings of how to experience customer feedback. This, of course, is not a rare phenomenon in any organisation. Different groups within organisations, such as marketers, sellers, researchers, etc., are distinguished from one another in that they continuously produce and re-produce some particular norms, routines, standard operating procedures, and other organisational rules related to their specific activities. These particular rules create some intraorganisational heterogeneity in learning from experience.

Based on each department's unique experiences that were continuously exploited, this situation created much intraorganisational exploration through intense bargaining and negotiating over how to jointly experience customer feedback. As witnessed by the manager of the support department:

> There are two types of data from customers: bugs and suggestions for improvements. These are put together in a document and are evaluated by the persons that give support on that particular program. Then these data are transferred to a meeting with the department of development. They try to impose their view on the material; what is a bug and what is not a bug (…) We have one view on the priority ordering and they have another (Manager of SPCS' support department).

The advantage of such differences in experience was the need for each department to reflect upon its tacitly held beliefs, adding to a joint trialling and experimenting from different

standpoints and perspectives. However, the parties often became stuck in endless bargaining that led nowhere, as members of the different departments couldn't agree on how to draw lessons from the customer experiences that could be converted into concrete project plans. Their continuous testing of ideas, or challenges of each other's respective approaches created no returns in form of decisions of how to move the project forward, which eventually generated some frustration and dissatisfaction. "The communication between us and the department of development could work better when analysing customer data" (Manager of support department). Such behavioural circles of exploration prompted eventually SPCS to contact some of their programming and experts partners to help them draw the 'correct' lessons from the customer experience. After all, the business partners were the players that were to produce the programs.

Overall, partners did not think that SPCS was very competent at understanding critical information from customers. As the CEO of Elicon, one of the partner companies put it: "Those who work at the department of development [of SPCS] are not competent to lead or control the production of PC programs. They lack technical ground. We are technicians; we are different", which he argued made them better at understanding what experiences should be learned from and what should be ignored. This was partly confirmed by one of SPCS' employees who said "If we have a customer complaint A, and a customer complaint B, well then we can't sit and say that A will take one hour to fix and B will take three days. They [partners] have to explain to us how long time it will take, and then we'll have to make an agreement on how to proceed from there".

Thus, from an initial process of intraorganisational exploration between SPCS' departments, the learning transformed into a process of joint exploitation with partners by focusing on particular customer experiences to be used in the production process. The previous explorative activities were in no way de-coupled to the following exploitative phase

of the product development project. Instead, they were the building blocks of the exploitation, both by providing a set of experiences that programmers could focus their attention on, and by them becoming so excessive that exploitation was the only feasible option.

Closing remarks

The above presentation of findings has followed the framework as outlined in the previous sections in order to organise the data and to highlight the paper's focus on transformations between exploitation and exploration within and between organisations. The four learning processes as accounted for here were, however, part of more extensive learning processes that followed the development of the product development projects. One of the product development projects, for instance, involved a sequence of ongoing intraorganisational exploitation that transformed into a period of ongoing intraorganisational exploration. Eventually this process generated interorganisational exploitation that transformed into interorganisational exploration, which finally generated intraorganisational exploitation (the "S3" sequence, see Appendix A)

Such complete 'sequences' of learning are certainly of great interest as they respect the whole progress of a product development project. However, given the space available here and the ambition to give particular attention to transformations between exploitation and exploration within and between organisations, I choose not to propose such an account of the data as well. What the complete learning sequences of product development activities suggest, however, is (1) that each product development process involved a sequence of exploitative and explorative intra- and interorganisational learning; and (2) that SPCS simultaneously through various ongoing product development projects were engaged both in exploitative and explorative learning, both within its own legal framework and together with partners, and customers.

Discussion

Fundamental to the standard idea that organisations often learn as exploitation or exploration is that learning insulates organisations from the full complexity of any experience (Kolb, 1984; Miller, 1994). From experiential learning, organisations create some understandings of their experiences that are 'good enough', which are an internal representation of the situations encountered to which they seek to adapt (Bandura, 1997; Kolb, 1984). This process of simplification is typically combined with a process of specialisation (Janis and Mann, 1977; Tversky and Kahneman, 1982).

Organisations hereby tend to confirm their beliefs about their experiences. Each new situation is confronted through logic of appropriateness: organisations do not approach situations *tabula rasa,* but draw on past competence. And it's such retrieved portions of the past that have a controlling effect on what organisations experience. In that regard most situations are largely enacted through organisations experiencing them through their learnt organisational lenses (Hedberg, 1981; Starbuck, 1976). An organisation eventually becomes 'closed' insofar that it only experiences what is in accordance with its history. As Weick (1979: 239) put it: "Organisations can and do act like closed systems (…) Organisational attentiveness to one's own past experience can continue unpunished for surprisingly long periods of time".

Consequently, an organisation that has learnt to exploit tends to refine its competence in exploitation, that generates further exploitation; and an organisation that has learnt to explore tends to refine its competence in exploration, that generates further exploration. Experiential learning typically creates a closed organisational system of either exploitation or exploration within or between organisations.

Paradoxically, however, in the self-referential mode of behaviour this closure is a form of broadening possible experiences, and as a result, exploitation can become a cause of exploration, and exploration can become a cause of exploitation. Only by having learnt exploitative or explorative rules that were continuously reproduced could SPCS' intra- or interorganisation *with precision* know what it should expect, and thus recognise when something had gone wrong, as, e.g., in the case of SPCS excessively exploiting the idea of "ordinary users".

Thus, only by SPCS having created a distinct behaviour in form of exploitation could the alternative of exploration become obvious for it, and for its environment. Likewise, only by having created a specific behaviour of exploration could the alternative of exploitation become obvious. There was in this respect no contradiction between rule-like behaviour of either exploitation or exploration and fundamentally new behaviour through transformations between exploitation and exploration. Novelty in form of exploration was not born *de novo* but emerged from exploitative behaviour. Likewise, novelty in form of exploitation emerged from explorative behaviour.

An important way in which the rule functioning of the exploitative intra- or interorganisation of SPCS contributed to the emergence of exploration was that valuable reflection was provoked in the form of anomalies relating to prevailing exploitation, e.g., when SPCS started reflecting on the traditional way of working with partners that resulted in particular programs for a particular market segment. Exploration presupposed in that way exploitation. Similarly, the rule functioning of the explorative intra- or interorganisation of SPCS contributed to the generation of exploitation by the production of questions that arouse in form of puzzles relating to prevailing exploration, as, e.g., SPCS experienced with the excessive bargaining in brainstorming meetings that prompted SPCS to take the lead and unilaterally deduce from such interactions what experiences to focus on. Exploration

generated in that regard exploitation. Problems that warranted radically changed behaviour appeared only against the background of a prevailing behaviour of either exploitation or exploration. The closure to the full complexity of any experience created by exploitative or explorative learning contributed in that regard not to further experiential closeness, but to experiential openness.

The findings suggested in this respect that a main mechanism that generated transformations between exploitation and exploration was *dissatisfaction* with ongoing behaviour of either exploitation or exploration. Dissatisfaction revealed through radically altered behaviour with exploitation typically generated exploration, and dissatisfaction with exploration typically generated exploitation that, e.g., was the case with SPCS' dissatisfaction with its departments' excessive exploration when interpreting their experiences of customer feedback.

Dissatisfaction arouse when performance was below aspiration levels, as in the case of SPCS experiencing decline in its sales that was seen as a result of customers wanting more complex products. Dissatisfaction also arouse with too explorative behaviour that led nowhere in some of the bargaining between SPCS and partners that prompted SPCS to call for an end to the experimenting, and in that regard transforming the learning process into exploitative behaviour. These two different disappointing results could only be experienced against the background of either ongoing exploitative or explorative behaviour. Thus, the generation of problems were not produced in a vacuum but on the basis of previous experiences.

A problem with this argument is, however, that organisations' aspiration levels tend to gradually change over time as a result of learning from experience. When performance improves, then its aspirations improve, and when performance declines, then its aspirations decline (Lant, 1992). This suggests that organisations would have problems to question their

own basic experiential rules upon which they base their present activities and thus to 'detect' problems that may warrant radical behavioural changes.

Consistent with this, any radical changes in SPCS' intra- or interorganisations' behaviour, e.g., from exploration to exploitation, was channelled from 'challenges' of a sufficiently strong group of organisational members or non-members, whose behaviour was only very loosely coupled to the dominant behaviour in question and that were not closely tied to the learning processes that had created the underlying experiences.

In SPCS' case of learning an exploitative phase of focusing on "ordinary users needs" to an explorative phase of learning to appreciate other customers as well, such challenges came from customers interacting with SPCS that implicitly and explicitly suggested that new products were needed, and from the new partner KPMG that was able to fundamentally re-frame some of SPCS' experiences. Likewise, it was SPCS' business partners that made SPCS aware that it had problems at learning the correct lessons from customer experience, thus ending an essentially fruitless internal explorative behaviour.

Organisational learning revolves around bargaining between different organisational players that pose different demands on an organisation, such as in SPCS' case formal employees, business partners, and customers. The inexorable presence of incompletely coupled behaviours in organisations sustain in this respect latent or overt differences in how to experience joint situations and constantly challenge the re-production of an ongoing dominant behaviour, whether it is of an exploitative or of an explorative character. Distinct behaviour can thus be rejected and challenged by organisational players identifying problems with the prevailing approach.

SPCS' customers, for instance, were certainly members of the ongoing bargaining-learning process that for many years had sustained a focus of exploiting particular experiences related to "ordinary users' needs". For different reasons, their preferences had, however,

slowly shifted and now they posed different demands on SPCS that was a direct challenge to the traditional way of acting. They experienced the same situations as SPCS in a fundamentally different way. Likewise, KPMG that was a new formal member of the interorganisation of SPCS experienced many situations in a different manner than SPCS and its old partners, and in that regard posed strains on the traditional rule-like behaviour.

For SPCS' intra- and interorganisations, 'external' players thus had a central role to play in bringing about learning from experience in a radically different way by producing dissatisfaction with a traditional behaviour. By convincing organisational members that their ongoing activities were inadequate, a ground for learning new experiences was created. The intra- and interorganisations adapted in that way to pressures as exerted by an 'external' environment that challenged their respective learnt behaviour. But such challenges could only be generated from already learnt particular behaviour of either exploitation or exploration. It was these behaviours that appeared problematic and that were the focus for the sense of dissatisfaction. Without SPCS' intra- or interorganisations having learnt specific exploitative or explorative behaviours, they would never have understood what was problematic and needed to be changed as triggered by the environment. In that regard established behaviour of, for instance, exploration, only disappeared when new behaviour in form of exploitation could displace it, but such learning naturally required the existence of explorative behaviour. To exploit, exploration was needed; to explore, exploitation was needed. The two were deeply interlaced through negative feedback dynamics between experience and competence.

The other issue that I wish to discuss is related to dynamics between intra- and interorganisational learning. The empirical findings showed that there were particular learning processes for each level. The intraorganisation of SPCS had learnt some behavioural rules that were not fully consistent with the learning of the interorganisation of SPCS. As well as an organisation may know more (Argyris and Schön, 1996) or less (Hedberg, 1981) than its

individual members, an interorganisational collaboration through its retrieved rules that have been learned from experience may know more or less than its members, i.e., single organisations.

For example, the interorganisation of SPCS had produced routines for producing PC-programs that were reproduced by SPCS and partners. These routines were peculiar to the interorganisation. The intraorganisation of SPCS or P-Data did not 'know' how to produce these programs independently: they were instead peculiar to certain product development activities related to the interorganisational collaboration. Likewise, the intraorganisations of the respective partners were more experienced in different matters than their joint interorganisation, such as, for example, programming companies' wide array of programming skills that were not fully used in the interorganisational collaboration. Both P-Data and Elicon had other partners than SPCS, thus drawing on partly different experiences in those projects.

In addition to the unique learning of each learning entity, the findings also indicated several processes of 'interlevel' learning, where intraorganisational rules of either exploitation or exploration affected interorganisational rules of either exploitation or exploration, or vice versa. For instance, much exploration for SPCS as an organisation took place as a combination of intraorganisational exploited rules within a setting of collaborating partners. Similarly, much exploitation for SPCS' interorganisation was the result of intraorganisational exploration.

One primary mechanism seemed to be at hand when producing transformations between intra- and interorganisational learning in the case: *translation* of experiences as retained in behavioural rules. Intraorganisational rules produced by intraorganisational experiential learning were translated in a social bargaining into interorganisational rules that affected the interorganisational learning. When SPCS started collaborating with two old partners and KPMG, each party did not merely 'combine' their experiences like a puzzle. In the

interorganisational bargaining, each party had to articulate hunches and intuitions that typically stemmed from their tacit idiosyncratic way of behaving and thus translating it into the other party's language.

As witnessed by one of SPCS' employees in her collaboration with programming partners: "I have changed my language so that they shall be able to follow me (…) For example, when I write specifications, I am very conscious about not using words that are difficult to understand". SPCS' intraorganisational rules of addressing customers, e.g., had to be translated to partners' language in order for them to be able to grasp SPCS' ambitions, which is due to learning's associative character. The need for translating level-specific experiences stressed the important observation that interorganisational learning did not 'automatically' produce intraorganisational learning, or vice versa, but that there were an intermediate learning process involved, linking the two learning levels.

As a result, often learning between SPCS and its partners did not fully affect learning within each of them, maintaining loose coupling between the different learning levels. This was the case of the learning process of interorganisational exploration generating intraorganisational exploitation. Only limited experiences from the interorganisational learning was internalised by SPCS that made sense of them according to its already established organisational rules. The interorganisational rules needed thus to be merged with some of SPCS' basic rules through processes of translating the interorganisational experiences to the intraorganisational experiences.

The lessons learned from the interorganisational collaboration risked in that respect to be substantially 'watered down' during a phase of accommodating interorganisational rules to existing organisational rules, reducing the potential for an overall organisational exploration or exploitation. At the same time this internalising process was necessary. Outside sources of experience needed to be translated into the existing organisational experience structure before

any eventual behavioural changes could come about. Likewise, a reverse process of translating intraorganisational experiences to interorganisational experiences was of equal importance.

Translating experiences between the learning levels required both transparency and receptivity. Transparency refers to the willingness to share experiences with each other (Hamel, 1991; Larsson et al., 1998), as did e.g., KPMG versus SPCS, and programmers versus expert partners, and typically in an informal and trust-based manner. Efforts of translating individually held experiences as retrieved both in tacit and explicit organisational rules were basically accomplished by working closely together, rather than through any independent efforts. Receptivity refers to the absorptive ability (Cohen and Levinthal, 1990; Hamel, 1991) of the organisation to other organisations' experiences. Clearly, receptivity was enhanced by frequent interaction between SPCS and partners that enabled them to build a 'mutual language' by jointly translating idiosyncratic experiences.

Partners and SPCS had indeed improved their understanding of each other's ideas, hunches, and intuitions through such interactions. Moreover, the number of misunderstandings and the need to explain and clarify different standpoints had been substantially reduced. Having engaged in a great number of partner interactions, SPCS had enhanced its ability to think in programmers and experts' terms, by combining organisation-specific rules to that of the rules of programmers, resulting in radical behavioural changes. Conversely, programmers had learnt more about SPCS' way of experiencing the same situations, which created an environment of much exploration between the parties.

Conclusions

In the standard conversation on organisational learning there has been much attention to the need for organisations to attend to both exploitation and exploration (see, e.g., Crossan et

al, 1999; Hedberg et al, 1976; March, 1991; Marengo, 1993). Less attention has, however, been devoted to empirically examining how this is accomplished in real organisations, which has been the focus of this paper. Moreover, there have also been some efforts to emphasise the interlacing of intra- and interorganisational learning (Argote and Ophir, 2002; Bierly and Hämäläinen, 1995; Ingram, 2002). But fewer efforts have been devoted to address how this intertwining takes place in real organisations that has also been an issue of attention here.

Thus, what has overall been lacking in the literature are systematic empirical investigations of how the linking of intra- and interorganisational exploitation and exploration take place in real organisations, which would potentially add some important insights to the conceptual and empirical understanding of organisational learning.

Of course, the findings as reported here are very limited in terms of generalisability, but they nevertheless confirm earlier organisational learning research that organisations often learn *as* exploitation or exploration either within or between organisations. The 'lock-in-through-learning-effect' made SPCS' intra- or interorganisations prone to sustain focus, generating competence traps of either exploitation or exploration. However, the findings also suggested that such outcomes of learning should not necessarily be regarded as 'traps'; but rather as necessary generators for occasional behavioural changes of a more fundamental kind.

Without an ongoing generation of exploitative behaviour, exploration would not occur. Similarly, without an ongoing generation of explorative behaviour, exploitation would not take place. Such dynamics were, in addition, not restricted to either intra- or interorganisational learning processes, but involved dynamics between these learning processes. The main contribution of this paper to the organisational learning literature is in this respect a framework of how intra- and interorganisational exploitation and exploration are intertwined.

Needless to say, this framework requires further empirical testing particularly based on case studies given the necessity to understand human interaction for analysing organisational learning. Organisational learning research has often focused on product development, which appears to be a fruitful area of attention, but this does not exclude other avenues of research, of course. The dynamics between exploitation and exploration may be particularly intense in major organisational transformations through leadership shifts that could be of interest to study. New organisational leaders are often recruited due to dissatisfaction with the existing organisational behaviour and may in that regard expose the organisation to 'learning shocks' in order to challenge old truths and beliefs.

Similarly, the dynamics of intra- and interorganisational learning may be important when studying particular organisational players' interaction with external actors, such as business partners and customers. Such 'boundary spanners' may be key players in translation processes of organisational experiences as retained in rules, routines, and standard operating procedures, either from the intraorganisational level to the interorganisational level, or vice versa.

Even though the intertwining of exploitation and exploration within and between organisations should be relevant to most organised activity, I believe that the framework as discussed here may be particularly useful for the study of two contemporary phenomena that have gained increasing attention among students of organisations: virtual organisations and mergers and acquisitions.

First, many modern organisations are increasingly described as 'virtual organisations' (Cooper and Rousseau, 1999; Hale and Whitlam, 1997). Conceptually, these organisations have been described as a set of heterogeneous organisations that are centred around a core organisation, acting as an entrepreneur that pools various competencies and resources to create joint activities (Jarillo, 1988). By stressing the idea of a core organisation, the literature

has emphasised a need for understanding these organisations as inescapably interwoven in complex arrays of partnership relations.

They constitute in this regard a group of actors working closely to attain some purpose, however, without a formal and centralised organisation or staff for inclusive decision making. Nevertheless, they share much traits of a traditional intraorganisation in that they to some extent are more or less permanently controlled by a core organisation. Not only are they composed of intraorganisations with semi-interdependent operative functions; they also comprise a separate formal organisation that exclusively handles what can be seen as the managerial function.

Thus, these organisations can be thought of as *hybrids* of intra- and interorganisations in that they are "simultaneously a single organisational arrangement and a product of sovereign organisations [and thus] simultaneously address relations among and within organisations". (Borys and Jemison, 1989: 235). Such an approach obviously further complicates both the notion of the organisation, and the process of conceptualising organisational learning, but it also opens up a potentially fruitful perspective on understanding organisational learning: as simultaneous processes of intra- and interorganisational experiential learning of exploitation and exploration.

Second, another potentially interesting area of attention given the framework as discussed here could be mergers and acquisitions (M&A) – a field of research that has grown steadily during the past decades, which is much due to the importance of this phenomenon for individual employees, single business organisations, industries, and whole nations (Larsson & Finkelstein, 1999). In M&A's two or more separate organisations' respective intraorganisational learning processes of either exploitation or exploration need to be merged into joint interorganisational learning that eventually should emanate in future intraorganisational learning of the new organisation.

Such dynamics between intra- and interorganisational learning would potentially highlight such learning issues as the transformation of experience in form of intraorganisational routines, goals, standard operating procedures, rules, etc., and the establishment through joint learning from experience of new joint routines, rules, and goals between the combining organisations. M&A would in that respect serve as an interesting case for the further development of the organisational learning literature into a synthesised framework that takes into account the dynamics of both intra- and interorganisational learning. The well-known complexities of both intraorganisational learning and interorganisational learning would need mutual attention, emphasising both individual differences and similarities between them in order to fully understand the complexity of learning processes that are both intra- and interorganisational.

References

Appleyard, M. (1996), "How Does Knowledge Flow? Interfirm Patterns in the Semiconductor Industry", *Strategic Management Journal,* 17, pp 137-154.

Argote, L., and R. Ophir (2002), "Intraorganisational learning.", J. A. C. Baum (Ed.), *The Blackwell Companion to Organizations*, Oxford: Blackwell Business, pp 181-207.

Argyris, C. (1996), "Unrecognized Defenses of Scholars: Impact on Theory and Research", *Organization Science,* 7, pp 79-87.

Argyris, C. and D. A, Schön (1996), *Organisational Learning II*, Reading, MA: Addison-Wesley Publishing Company.

Arthur, W. B. (1989), "Competing Technologies, Increasing Returns, and Lock-In by Historical Events", *The Economic Journal,* 99, pp 116-131.

Ashby, W. R. (1960), *Design for a Brain.* London: Chapman & Hall.

Bandura, A. (1997), *Self-efficacy: The Exercise of Control,* New York: W. H. Freeman.

Bierly, P. E. and T. Hämäläinen (1995), "Organisational Learning and Strategy," *Scandinavian Journal of Management,* 11, pp 209-224.

Borys, B. and D. B. Jemison D. B. (1989), "Hybrid Arrangements as Strategic Alliances: Theoretical Issues in Organizational Combinations", *Academy of Management Review*, 14, pp 234-249.

Brown, J. S. and P. Duguid (2001), "Knowledge and Organisation: A Social-Practice Perspective", *Organization Science,* 12, pp 198-213.

Brown, S. L. and K. M. Eisenhardt (1997), "The Art of Continuous Change: Linking Complexity Theory and Time-paced Evolution in Relentlessly Shifting Organisations," *Administrative Science Quarterly,* 42, pp 1-34.

Brunsson, N. (1985), *The Irrational Organization*, Chichester: John Wiley & Sons.

Carley, K. M. (1999), "Learning Within and Among Organisations," A. S. Miner and P. Andersson (Eds.), *Advances in Strategic Management,* 16, pp 33-53.

Child, J. (2001), " Learning Through Strategic Alliances", M. Dierkes, A. Berthoin Antal, J. Child and I. Nonaka (Eds.), *Handbook of Organisational Learning and Knowledge,* Oxford: Oxford University Press, pp 657-680.

Child, John and Sally J. Heavens (2001), "The Social Construction of Organizations and its Implications for Organizational Learning", M. Dierkes, A. Berthoin Antal, J. Child, I. Nonaka (Eds.), Oxford: Oxford University Press, pp 308-326.

Cohen, W. M. and Levinthal, D. (1990), "Absorptive Capacity: A New Perspective on Learning and Innovation," *Adminstrative Science Quarterly,* 35, pp 128-152.

Cooper, C. L. and D. M. Rousseau (1999) (Eds.), *Trends in Organizational Behavior: The Virtual Organization,* vol. 6, Chichester: John Wiley & Sons.

Crossan, M., H. Lane and R. White (1999), "An Organisational Learning Framework: From Intuition to Institution," *Academy of Management Review,* 24, pp 522-537.

Cyert, R. M. and J. G. March (1992), *A Behavioral Theory of the Firm*, 2nd ed., Cambridge, MA: Blackwell.

Dierkes, M., A. Berthoin Antal; J. Child and I. Nonaka (2001) (Eds.), *Handbook of Organizational Learning and Knowledge,* Oxford: Oxford University Press.

Dodgson, M. (1993), "Organisational Learning: A Review of Some Literatures", *Organization Studies,* 14, pp 375-394.

Edmondson, A. C. (1999), "Psychological Safety and Learning Behaviour in Work Teams", *Administrative Science Quarterly,* 44, pp 350-383.

Edmondson, A. C., R. M. Bohmer, G. P. Pisano (2001), "Disrupted routines: Team learning and new technology implementation," *Administrative Science Quarterly*, 46, pp 685-716.

Eisenhardt, K. M. (1989), “Building Theories from Case Study Research”, *Academy of Management Review,* 14, pp 532-550.

Feldman, M. S. (2000), ”Organisational Routines as a Source of Continuous Change,” *Organisation Science,* 11, pp 611-629.

Fiol, C. M. and M. A. Lyles (1985), ”Organisational Learning,” *Academy of Management Review*, 10, pp 803-813.

Freeman, C. (1991), “Networks of Innovators: A Synthesis of Research Issues,” *Research Policy*, 20, pp 499-415.

Galunic, D. C. and S. Rodan (1998), “Resource Recombinations in the Firm: Knowledge Structures and the Potential for Schumpeterian Innovation”, *Strategic Management Journal,* 19, pp 1193-1201.

Hale, R. and P. Whitlam (1997), *Towards the Virtual Organization.* McGraw Hill, London.

Hamel, G. (1991), “Competition for Competence and Interorganisational learning Within International Strategic Alliances,” *Strategic Management Journal*, 12, pp 83-103.

Hansen, M. “The Search-Transfer Problem: The Role of Weak Ties in Sharing Knowledge across Organization Subunits”, *Administrative Science Quarterly,* 44, pp 82-111.

Hedberg, B. (1981), ”How Organisations Learn and Unlearn,” P. C. Nystrom, and W. H. Starbuck (Eds.), *Handbook of Organisational Design*, Oxford: Oxford University Press, pp 3-27.

Hedberg, B. and M. Holmqvist (2001) “Learning in Imaginary Organisations,” M. Dierkes, A. Berthoin Antal, J. Child, I. Nonaka (Eds.), Oxford: Oxford University Press, pp 733-752.

Hedberg, B. and S. Jönsson (1978), ”Designing Semi-Confusing Information System for Organizations in Changing Environments”, *Accounting, Organizations, and Society,* 3, pp 47-64.

Hedberg, B., P. C. Nystrom, and W. H. Starbuck (1976), ”Camping on Seesaws: Prescriptions for a Self-Designing Organisation,” *Administrative Science Quarterly,* 21, pp 41-65.

Herriott, S. R., D. Levinthal and J. G. March (1985), “Learning From Experience in Organisations,” *The American Economic Review* 75, pp 298-302.

Hippel, E. von (1988), *The Sources of Innovation,* New York: Oxford University Press.

Holmqvist, M. (1999), “Learning in imaginary Organisations: Creating Interorganisational Knowledge,” *Journal of Organizational Change Management,* 12, pp 419-438.

Huber, G. P. (1991), “Organisational Learning: the Contributing Processes and the Literatures,” *Organisation Science*, 2, pp 88-115.

Ingram, P. (2002) “Interorganizational learning.” J. A. C. Baum (Ed.), *The Blackwell Companion to Organizations*, Oxford: Blackwell Business, pp 642-663.

Inkpen, A. C. (1996), “Creating Knowledge through Collaboration”, *California Management Review,* 39, pp 123-140.

Janis, I. J. & Mann, L. (1977), *Decision Making*, New York: The Free Press.

Jarillo, J. C. (1988), ”On Strategic Networks”, *Strategic Management Journal*, 9, pp 31-41.

Kieser, A., N. Beck and R Tainio (2001), “Rules and Organisational Learning: The Behavioural Theory Approach”, M. Dierkes, A. Berthoin Antal, J. Child and I. Nonaka (Eds.), *Handbook of Organisational Learning and Knowledge,* Oxford: Oxford University Press, 598-623.

Kim, D. H. (1993), ”The Link Between Individual and Organisational Learning,” *Sloan Management Review,* Fall, pp 37-50.

Kochan, T. A. (1975), ”Determinants of the Power Boundary Units in an Interorganisational Bargaining Relation,” *Administrative Science Quarterly*, 20, pp 434-452.

Kolb, D. A. (1984), *Experiential Learning,* Englewood Cliffs: Prentice Hall.

Kuhn, T. S. (1996), *The Structure of Scientific Revolutions,* 3rd ed., Chicago: The Chicago University Press.

Kuwada, K. (1998), "Strategic Learning: The Continuous Side of Discontinuous Strategic Change," *Organization Science,* 9, pp 719-736.

Lane, P. J. and M. Lubatkin (1998), "Relative Absorptive Capacity and Interorganisational Learning," *Strategic Management Journal,* 19, pp 461-477.

Lant, T. K. (1992), "Aspiration Level Adaptation: An Empirical Exploration", *Management Science,* 38, pp 623-644.

Lant, T. K. and S. J. Mezias (1996), "An Organisational Learning Model of Convergence and Reorientation," M. D. Cohen and L. S. Sproull (Eds.), *Organisational Learning,* London: Sage, pp 267-301.

Larsson, R. and S. Finkelstein (1999), "Integrating Strategic, Organisational, and Human Resource Perspectives on Mergers and Acquisitions: A Case Survey of Synergy Realization", *Organization Science,* 10, pp 1-26.

Larsson, R., L. Bengtsson, K. Henriksson, K. and J. Sparks (1998), "The Interorganisational Learning Dilemma: Collective Knowledge Development in Strategic Alliances," *Organization Science*, 9, pp 285-305.

Lave, J. and E. Wenger (1991), *Situated Learning. Legitimate Peripheral Participation,* Cambridge: Cambridge University Press.

Leblebici, H. and G. R. Salancik (1982) "Stability in Interorganizational Exchanges: Rulemaking Processes of the Chicago Board of Trade", *Administrative Science Quarterly,* 27, pp 227-242.

Leonard-Barton, D. (1997), "Core Capabilities and Core Rigidities: A Paradox in Managing New Product Development", M. L. Tushman and P. Anderson (Eds.), *Managing Strategic Innovation and Change,* Oxford: Oxford University Press, pp 255-270.

Levinthal, D. A. and J. G. March (1993), "The Myopia of Learning," *Strategic Management Journal,* 14, pp 95-112.

Levitt, B. and J. G. March (1988), "Organisational Learning," *Annual Review of Sociology,* 14, pp 319-340.

Liebeskind, J. P., A. L. Oliver, L. Zucker, and M. Brewer (1996), "Social Networks, Learning, and Flexibility: Sourcing Scientific Knowledge in New Biotechnology Firms," *Organisation Studies,* 7, pp 428-441.

Lyles, M. A. (1988), "Learning Among Joint Venture Sophisticated Firms," *Management International Review,* Special Issue, pp 85-98.

Maier, G. W., C. Prange, L. von Rosensteil (2001), "Psychological perspectives of organisational learning", M. Dierkes, A. Berthoin Antal, J. Child, I. Nonaka (Eds.), Oxford: Oxford University Press, pp 14-34.

March, J. G. (1981), "Decision Making Perspective," A. H. Van de Ven and W. F. Joyce (Eds.), *Perspectives on Organisation Design and Behavior*, New York: John Wiley and Sons, pp 205-248.

March, J. G. (1991), "Exploration and Exploitation in Organisational Learning," *Organization Science,* 2, pp 71-87.

March, J. G. (1999), *The Pursuit of Organisational Intelligence,* Oxford: Blackwell Business.

March, J. G. and H. A. Simon (1958), *Organisations,* New York: John Wiley and Sons.

March, J. G. and J. P. Olsen, J. P. (1979), (Eds.), *Ambiguity and Choice in Organisations,* 2nd ed., Bergen: Universitetsforlaget.

March, J. G., M. Schulz and X. Zhou (2000), *The Dynamics of Rules,* Stanford, CA: Stanford University Press.

Marengo, L. (1993), "Knowledge Distribution and Coordination in Organisations: On Some Social Aspects of the Exploitation *vs.* Exploration Trade-Off," *Revue Internationale de Systémique*, 7, pp 553-571.

Metcalfe, L. (1981), "Designing Precarious Partnerships," P. C. Nystrom and W. H. Starbuck (Eds.), *Handbook of Organisational Design*, Oxford: Oxford University Press, pp 503-530.

Miller, D. (1994), "What Happens after Success: The Perils of Excellence," *Journal of Management Studies,* 31, pp 326-358.

Miner, A. S. and P. Andersson (1999), "Industry and Population-Level Learning: Organisational, Interorganisational, and Collective Learning Processes," In: A. S. Miner and P. Andersson (Eds.), *Advances in Strategic Management,* 16, pp 1-30.

Miner, A. S. and S. J. Mezias (1996), "Ugly Duckling No More: Pasts and Futures of Organisational Learning Research", *Organization Science,* 7, pp 88-99.

Miner, A. S., P. Bassof, and C. Moorman, (2001), "Organisational Improvisation and Learning: A Field Study", *Administrative Science Quarterly,* 46, pp 304-337.

Nelson, R. R. and S. G. Winter (1982), *An Evolutionary Theory of Economic Change*. Cambridge, MA: Belknap Press of Harvard University.

Nooteboom, B. (1999), "The Dynamic Efficiency of Networks", A. Grandori (Ed.), Interfirm Networks. Organisation and Industrial Competitiveness, New York: Routledge, pp 91-119.

Orr, J. (1996), Talking about Machines: An Ethnography of a Modern Job, Ithaca, N.Y.: ILR Press.

Patton, M. Q. (1990), *Qualitative Evaluation and Research Methods,* 2nd, ed., London: Sage.

Powell, W. W and K. W. Koput and L. Smith-Doerr L. (1996) ”Interorganisational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology,” *Administrative Science Quarterly*, 41, pp 116-145.

Schultz, M. (2002), “Organizational learning.” J. A. C. Baum (Ed.), *The Blackwell Companion to Organizations*, Oxford: Blackwell Business, pp 415-441.

Simon, H. A. (1985), “What We Know About the Creative Process”, R. L Kuhn (Ed.), *Frontiers in Creative and Innovative Management,* Cambridge, MA: Ballinger Publishing Co, pp 3-22.

Starbuck, W. H. (1976), “Organizations and Their Environments”, M. D. Dunette (Ed.), *Handbook of Industrial and Organizational Psychology,* Chicago: Rand McNally College Publishing Co, pp 1069-1123.

Starbuck, W. H., A. Greve, B. Hedberg. (1978), “Responding to Crisis”, C. F. Smart and W. T. Stanbury (Eds.), *Studies on Crisis Management,* Montreal: Butterworth & Co, pp 111-137.

Tushman, M. L. and C. A. O’Reilly (1996), ”Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change”, *California Management Review,* 38, pp 8-30.

Tversky, A. and D. Kahneman (1982) (Eds.), *Judgment Under Uncertainty : Heuristics and Biases,* New York: Cambridge University Press.

Twigg, D. (1996), “Inter-firm Product Development: A Review of Coordination Mechanisms”, *Research paper no. 217,* Warwick: Warwick Business School.

Utterback, J. M. (1994), *Mastering the Dynamics of Innovation: How Companies can Seize Opportunities in the Face of Technological Change,* Boston, MA: Harvard Business School Press.

Watzlawick, P., J. H., Weakland, R. Fisch (1974), *Change. Principles of Problem Formulation and Problem Resolution.* New York: W. W. Norton & Co.

Weick, K. E. (1991), "The Nontraditional Quality of Organisational Learning", *Organization Science,* 2, pp 116-124.

Weick, K. E. (1979), *The Social Psychology of Organising,* 2nd ed., New York: McGraw Hill.

Weick, K. E. (1995), *Sensemaking in Organisations,* London: Sage.

Weick, K. E. and F. Westley (1996), "Organisational Learning: Affirming an Oxymoron," S. R. Clegg, C. Hardy and W. R. Nord (Eds.), *Handbook of Organisation Studies,* London: Sage, pp 440-458.

Zhou, X. (1993), "The Dynamics of Organisational Rules," *American Journal of Sociology,* 5, pp 1134-1166.

Appendix A: Product Development Projects.

In all, four product development projects in the SPCS case and three projects in the Broadvision case were followed. The SPCS projects were: (S1) The Client Integrator Project that developed a program for integrating several of SPCS' already existing programs during two years. The project consisted of members of SPCS, two programming partners, and one expert partner. The project was followed from its start to final completion; (S2) The Tax Program Project, named 'SPCS Tax', which was an already existing program that was further developed during one year between SPCS, one programming partner and one expert partner. The project was followed during one year; (S3) The Integrated Auditing Program Project, which was a project that gathered three programming partners, two expert partners, one major customer that also acted as an expert partner, and SPCS. This project was studied from its start but not to its completion; and (S4) The Administration Program Project, also called 'SPCS Administration', where SPCS, one programming partner and one expert partner aimed to fundamentally revise an already existing program. This project was studied during two years.

Regarding Broadvision, the following projects during shorter time periods of some months were studied: (B1) A Technology Partner Project that aimed to further develop Broadvision's main software, the so-called "one-to-one" product together with one technology partner; (B2) A Value Added Reseller Project consisting of a close collaboration with a telecoms expert company in order to adapt some of Broadvision's products to the requirements of the telecoms market; and (B3) A Systems Integrator Partner Project, where one of Broadvision's products was adapted to the needs of a specific customer in collaboration with a partner and the customer.

Appendix B: Interviews

Case Study of Scandinavian PC Systems

SPCS
Magnus Ahlmgren, manager education department, 1998-01-29
Inger Axelsson, project leader, responsible of handbooks, 1998-02-03, 1998-08-28
Anna Berggren, project leader, 1998-08-27
Karin Berggren, manager department for product development, 1998-01-26, 1998-04-01, 1998-08-28
Rolf Dahlberg, deputy CEO, 1998-01-26, 1998-01-30
Annika Ekdahl, personnel assistant, 1998-01-30
Bo Gunnarsson, manager market communications, 1998-01-27, 1998-08-28
Bengt Gustavsson, manager department of distribution, 1998-02-02
Mats Hellbring, manager testing department, 1998-01-29
Chris Jangelöv, manager support department, 1998-01-29, 1998-08-27
Lars Johansson, 1998-02-02, 1998-08-27
Susanna Lindqvist, 1998-01-28, 1998-08-27
Kristina Martinsson, 1998-01-27, 1998-08-28
Kerstin Rydén, project leader, 1998-08-28
Christina Strand, project leader, 1998-01-27, 1998-04-01, 1998-08-27
Kristina Wadhed, internal consultant, 1998-08-28
Jan Älmeby, CEO, 1997-06-12, 1998-01-26, 1998-02-03, 1998-08-28
Nicklas Örnblom, project leader, 1998-01-29, 1998-08-27

Elicon Data AB
Per Eliasson, CEO, 1998-03-02, 1998-04-01,
Hans Kicknell, 1998-03-02, 1998-04-01,
Göran Thorberg, 1998-03-02
Ola Wicksell, 1998-03-03

P-Data AB
Thomas Frising, 1998-04-17
Ulf Persson, 1998-04-17
Håkan Runquist, CEO, 1998-04-17

Anders Andersson Ekonomi AB
Anders Andersson, 1998-04-24

Jan-Erik Persson Råd AB
Jan-Erik Persson, 1998-05-29

Others
Stefan Andersson, manager KPMG, 1998-04-15
Lars Fredell, partner, editor of the company magazine, 1998-01-27
Mikael Johansson, manager KPMG Växjö, 1998-02-02

Case Study of Broadvision

Clark Catelain, vice president, 991105
Pehong Chen, CEO, 990604
Thierry Costa, senior manager, 990510
Eric Golin, vice president, chief technology officer, 990511
Jim Harter, senior manager, 990511
Wyatt Leung, senior manager, 990525
Samir Mehta, senior manager, 990510, 990517
Gino Padua, senior manager, 990525
Jon Peppler, vice president, 990601
Bernd Rutzmoser, senior manager, 990510
Eric Schillig, senior manager, 990604
Perry Thorndyke, vice president, business development, 990610
Roque Versace, senior manager, 990518
Wayne Yamamoto, senior manager, 990517

Appendix C: Some Examples of Interview Guides

Interviews of employees of SPCS from January to February 1998:

1. Could you describe the internal organisation of SPCS?
2. How do you work? Alone or in teams?
3. How is a new product developed?
4. How does the department of development operate?
5. Could you describe how you work with your partners?
6. What do you expect from your partners?
7. How is a typical meeting with partners undertaken?

Interviews with employees of Elicon during March 1998:

1. What is your relation to SPCS?
2. How has it developed over time?
3. Please describe how you develop the programs together with SPCS and your other partners.
4. What is your competence?
5. What skills and knowledge can you impart to others?
6. Who generally leads the project teams?

Interviews with members of Broadvision during May 1999:

1. How is Broadvision organised?
2. What is your competence?
3. Describe your products.
4. How is a product developed from idea to its release?
5. What actors are active in that process? Customers? Partners?
6. Could you describe your partnerships? Why do you co-operate?
7. In what phase do partners first enter a project? To produce the basic one-to-one product, or to further empower it according to the needs of a certain customer?
8. Are there any rules for interaction? How did they become established?
9. How do you choose your partners?