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MODELING AND MEASURING
ORGANIZATIONAL RENEWAL CAPABILITY

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ABSTRACT

Globalization and new information technologies mean that organizations have to face world-wide competition in rapidly transforming, unpredictable environments, and thus the ability to constantly generate novel and improved products, services and processes has become quintessential for organizational success. Performance in turbulent environments is, above all, influenced by the organization's capability for renewal. Renewal capability consists of the ability of the organization to replicate, adapt, develop and change its assets, capabilities and strategies. An organization with a high renewal capability can sustain its current success factors while at the same time building new strengths for the future. This capability does not only mean that the organization is able to respond to today's challenges and to keep up with the changes in its environment, but also that it can act as a forerunner by creating innovations, both at the tactical and strategic levels of operation and thereby change the rules of the market.

However, even though it is widely agreed that the dynamic capability for continuous learning, development and renewal is a major source of competitive advantage, there is no widely shared view on how organizational renewal capability should be defined, and the field is characterized by a plethora of concepts and definitions. Furthermore, there is a lack of methods for systematically assessing organizational renewal capability. The dissertation aims to bridge these gaps in the existing research by constructing an integrative theoretical framework for organizational renewal capability and by presenting a method for modeling and measuring this capability.

The viability of the measurement tool is demonstrated in several contexts, and the framework is also applied to assess renewal in inter-organizational networks.

In this dissertation, organizational renewal capability is examined by drawing on three complimentary theoretical perspectives: knowledge management, strategic management and intellectual capital. The knowledge management perspective considers knowledge as inherently social and activity-based, and focuses on the organizational processes associated with its application and development. Within this framework, organizational renewal capability is understood as the capacity for flexible knowledge integration and creation. The strategic management perspective, on the other hand, approaches knowledge in organizations from the standpoint of its implications for the creation of competitive advantage. In this approach, organizational renewal is framed as the dynamic capability of firms. The intellectual capital perspective is focused on exploring how intangible assets can be measured, reported and communicated. From this vantage point, renewal capability is comprehended as the dynamic dimension of intellectual capital, which consists of the capability to maintain, modify and create knowledge assets. Each of the perspectives significantly contributes to the understanding of organizational renewal capability, and the integrative approach presented in this dissertation contributes to the individual perspectives as well as to the understanding of organizational renewal capability as a whole.

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2. Pöyhönen, A. & Smedlund, A. (2004). Assessing Intellectual Capital Creation in Regional Clusters. Journal of Intellectual Capital, 5, 3, pp. 351-365.

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1. Introduction

1.1 Background of the Study

The logic of doing business and creating value has changed fundamentally during the last decade. The marketplace has become global and increasingly turbulent, with innovations continually altering the business landscape. Information and communication technologies enable new kinds of relationships, and virtual network partnerships and organizations have become recurrent. Knowledge has taken the place of land, labor, and economic capital as the main source of corporate wealth creation and innovations have become the principal driver of competitiveness. (E.g. Drucker, 1993a; Drucker, 1993b; Castells, 1996; Quinn & Anderson, 1996; Quinn et al., 1997; Stewart, 1997.)

Globalization and new information technologies mean that businesses have to face world-wide competition in rapidly transforming, unpredictable environments, and thus the ability to constantly generate novel and improved products, services and processes has become quintessential for organizational success (e.g. Grant, 1996a; Teece et al., 1997). Winners in the global marketplace are those firms that can continuously renew themselves; this entails that they can proactively modify their goals and operations while at the same time sustaining their current success factors. Renewal capability does not only mean that an organization is able to respond to today's challenges and to keep up with the changes in its environment, but also that it can act as a forerunner by creating innovation, both at the tactical and strategic levels of operation and thereby change the rules of the market (Hamel & Prahalad, 1994; Hamel, 2000). The demand for constant renewal is not limited to firms: non-profit organizations as well as regions and nations face similar challenges.

The new and dynamic modes of competition, stemming from globalization, the development of new technologies and new forms of organizing, are no longer adequately explained by traditional organizational and managerial theories (e.g. Eisenhardt & Tabrizi, 1995; Sanchez, 1997; Sanchez & Heene, 1997). New

approaches, which recognize the complex and chaotic nature of today's business environments, are required for understanding and facilitating the creation of corporate competitive advantage. To examine renewal capability this dissertation draws mainly upon three relatively recent theoretical approaches: the knowledge-based view of the firm, the dynamic capability approach, and the intellectual capital approach.

Organizational renewal is a capability of an organization as a whole rather than a sum of the skills of its individual members. Organizational renewal capability is embedded in the collective knowledge (Spender, 1996a) and shared organizing principles of the firm (Kogut & Zander, 1992), and understanding it requires recognizing the special qualities of knowledge as opposed to other resources: its fundamentally inter-subjective and activity-related nature. Since knowledge efficiency requires specialization (Simon, 1991; Grant, 1996b; 2002), the key question then becomes how the firm can be made into an integrated and manageable whole, given that each member of the organization is likely to possess differing individual knowledge. Knowledge-based view of the firm responds to this question by conceptualizing firms as knowledge integration devices. Considerable advances have been made in the last decade in building and advancing this theory.

However, the existing theories tend to centralize constancy, continuity and coherence of collective knowledge, and overlook its transformative, provisional and contested aspects (cf. Blackler, 1995). In order to understand *what kind of organizing principles enable mastery of change and renewal* and what kind of management actions are needed to achieve them, the theories of collective knowledge must be extended. This dissertation attempts to bridge this research gap by using Ståhle's (Ståhle & Grönroos, 1999; 2000) system theoretical approach to knowledge integration to explain what kind of higher-order patterns of organizing lead to renewal in organizational knowledge base, operations, and strategies. In so doing, it also addresses the classical question of the relationship of efficiency and continuity with creativity and change. Drawing on the theory of autopoietic systems (Maturana & Varela, 1980) and 'postmodern' approaches to organizational change (e.g. Chia, 1995; 1997), it is argued that change is not something contradictory to collective knowledge and

organizing principles, but an inherent property of them, and that collective knowledge can be understood both as a platform for renewal activities and itself subject to change.

The dynamic capability approach to strategic management attempts to understand and conceptualize how companies appropriate returns from innovation and knowledge creation (Teece et al., 1997; Eisenhard & Martin, 2000). However, as there is a lot of mystery surrounding both the terminology and the phenomenon of dynamic capabilities, *conceptual clarification* is much needed (Winter, 2003, 991). The failure to define concepts clearly and to specify their inter-relationships is a problem for the knowledge-focused theory of the firm as a whole (Grant, 2002). This dissertation presents an integrative definition for renewal capability and also examines how this capability differs from other types of dynamic capabilities.

Furthermore, as the field of dynamic capabilities progresses, the need for systemizing the phenomenon into a quantitatively measurable form becomes increasingly pressing. However, as with all types of capabilities, most of the research so far has been based mainly on purely theoretical reasoning or case studies, and *quantitative objective methods for assessing and comparing firms' dynamic capabilities* are still lacking. The construction of such a method is likely to be a demanding task for which there are no simple solutions. Capabilities are based on collective knowledge and organizing principles, which are semi- or unconscious and to some extent effectively 'invisible' to the actors (e.g. Kogut & Zander, 1992; Spender, 1996a; 1996b). Capabilities become visible only through the forms of social practice in which they are embedded, and consequently the only manner in which they can be studied is by examining the relational patterns among the actors. It is suggested in this dissertation that these relational patterns, operationalized as knowledge environments (Ståhle & Grönroos, 1999; 2000; Ståhle et al. 2003), are a viable manner for modeling renewal processes and dynamic capabilities in firms. Furthermore, renewal capability can be operationalized as the collective capacity of the organization to create and maintain knowledge environments which are in line with its strategic intent.

As it is becoming evident that in turbulent market conditions, today's competitive position can erode rapidly, and core capabilities can turn into core rigidities (Leonard-Barton, 1992b), it is becoming increasingly important to develop tools for anticipating the future success of organizations. Executives and investors have for some time recognized the inadequacy of traditional economic and operational measures for steering and valuating knowledge-based organizations. These standard measures are designed to provide information on past achievements and present states and are suitable for offering guidance in static market situations. But for grasping the future potential of organizations in rapidly changing environments, new approaches to firm valuation need to be developed which focus on intangible resources and capabilities. The intellectual capital community has made significant advances in building models portraying the composition of intangible wealth of organizations as well as measurement frameworks for assessing the actualized, already existing intellectual capital (see e.g. Brooking, 1996; Stewart, 1997; Sullivan, 1998). This static aspect of intellectual capital, characterized mainly by intangible assets and human capital, is a relatively well-explored issue within the intellectual capital research community.

Nevertheless, most of the suggested ways of measuring intellectual capital seem to ignore its dynamic aspect: competitive advantage flows not from resources themselves but from the firm capabilities to leverage, develop, and transform them (e.g. Penrose, 1959; Kogut & Zander, 1992; Grant & Spender, 1996; Grant, 1996b). Furthermore, especially in fluctuating and rapidly changing environments, it is essential that a firm is able to constantly renew its strategies and operations, as emphasized by the dynamic capability approach (e.g. Teece et al., 2003). What is still lacking from the intellectual capital literature is a framework for grasping *the ways in which intellectual capital is created and maintained as a dynamic process*. It is argued in this dissertation that the renewal capability of a firm or a region determines its ability to create intangible resources. Most of the theories of intellectual capital treat organizational knowledge as a static package rather than as a dynamic capability for knowledgeable action and are only suitable for retrospective reasoning. To understand and develop the *future* potential of an organization or a region, it is

necessary to address the dynamic side of intellectual capital and examine the capability for producing and leveraging intellectual capital.

This capability is embedded in the collective knowledge and organizing principles of collaboration, and can only be assessed with non-financials methods based on a thorough understanding of the fundamentally social processes by which intellectual capital is created, maintained and changed within organizations. As Karl-Erik Sveiby noted in his opening speech of the 2004 International intellectual capital congress in Helsinki, "social phenomena are at the heart of intellectual capital, but the intellectual capital community has failed to create adequate measures for them". This dissertation presents a *method for modeling and measuring the dynamic intellectual capital of organizations*, which has been constructed based on the analysis of organizations as three-dimensional knowledge systems (Ståhle et al., 2003). The method is suitable for both external reporting and internal management of intellectual capital.

Inter-organizational networks and collaboration between organizations have become important and widely spread phenomena in the modern society. The sociologist Manuel Castells (1996) refers to the currently emerging societal structure as a network society, while the economists Shapiro and Varian (1998) state that we live in a network economy, where success is based on understanding the logic of relational networks and the ability to use them for creating value. The globalization of competition, advances in technology, and the increasing rapidity and nonlinearity of change have made it necessary for all types of organizations to engage in collaborative arrangements that complement their own core competencies (e.g. Powell et al., 1996; Inkpen, 1996). In a large part of industries, organizations nowadays use collaborative arrangements in all phases of the production process from research and development to manufacturing and marketing. In fact, collaboration has been called the metacapability of the 21st century (Miles et al., 2000). This poses new challenges and requirements for the management and the development of both organizations and regions. In the knowledge-based economy, the success of network arrangements depends essentially on the ability of its actors to employ, circulate, and create knowledge. However, the intellectual capital in regions and networks and the related

renewal processes are an underdeveloped theme in the existing literature. Therefore this dissertation also examines how intellectual capital creation can be modeled and assessed on this analytical level.

1.2 Research Objectives

Organizational renewal is a highly relevant issue from the viewpoint of several fields of research. There is no clearly defined research tradition or generally accepted theory for examining organizational renewal, and in the literature it has been discussed under a plethora of headings. [1] To blaze a trail in this conceptual jungle, in this dissertation the scientific works discussing organizational renewal are organized into three main perspectives: knowledge management perspective, strategic management perspective and intellectual capital perspective (Figure 1)[2]. Each of these perspectives focuses on a particular aspect of the phenomenon while leaving some other aspects of it unexplored. The nature of renewal capability is examined from each of these viewpoints, and finally, their interrelationships are discussed and an integrative summary is put forth.

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[1] For example, organizational change and development (e.g. Van de Ven & Poole, 1995; Dunphy, 1996; Weick & Quinn, 1999), organizational learning (e.g. Fiol & Lyles, 1985; Huber, 1991), innovation and innovativeness (e.g. Van de Ven, 1986; Tushman & Anerson, 1986; Schroeder et al., 1986; Kanter, 1988), knowledge creation (Nonaka, 1991; Nonaka & Takeuchi, 1995), continuous improvement (e.g. Bessant & Caffyn, 1997; Bessant & Francis, 1999), dynamic capabilities (Teece et al., 1997), combinative capabilities (Kogut & Zander, 1992), architectural competence (Henderson & Cockburn, 1995), continuous innovation (Boer & Gertsen, 2003), organizational agility (Bessant et al., 2002), organizational mindfulness (Weick & Sutcliffe, 2001), and flexibility (Volberda, 1996), just to mention few.

[2] It is possible to discern two additional approaches that discuss renewal capability: organizational learning and organizational change literatures. However, both of these literatures are internally fragmented and lack a unifying paradigm (Miner & Mezias, 1996; Dunphy, 1996) to the extent that there is no coherent line of argumentation regarding organizational renewal. Therefore these literatures are not indicated in this dissertation as distinct theoretical perspectives on renewal capability. Organizational learning literature is treated as a strand of the knowledge management perspective, and organizational change literature is used in knowledge management and strategic management perspectives. Moreover, some studies within the R&D management and new product development literatures can be considered relevant for understanding organizational renewal capability. However, these literatures are demarcated outside the bounds of this dissertation, because they focus only on one specific function of the organization and do not address organization-level issues.

Figure 1. The three perspectives on organizational renewal capability

The main contribution of the knowledge management perspective is the consideration of the inherently social and activity-based nature of knowledge in organizations and the organizational processes associated with its application and development. Within this perspective, organizational renewal capability is understood as flexible knowledge integration. The strategic management perspective, on the other hand, approaches knowledge in organizations from the standpoint of its implications for the creation of competitive advantage. In this approach, organizational renewal is framed as the dynamic capability of firms. The intellectual capital perspective is focused on exploring how intangible assets can be measured, reported and communicated. From this vantage point, renewal capability is comprehended as the dynamic dimension of intellectual capital. Each of the perspectives significantly contributes to the understanding of organizational renewal capability, and a coherent picture of this capability benefits from integrating elements from all of them. However, the research conducted in each individual tradition has not adequately made use of the works in the other traditions, and therefore an integrative approach has the potential to significantly benefit both the individual perspectives, as well as the understanding of organizational renewal capability as a whole. The framework used in this dissertation for examining renewal capability draws from all three perspectives and addresses gaps in the existing research within each of them.

The objective of this dissertation is to construct a theoretical framework for organizational renewal capability and to present a method for modeling and measuring this capability. Thereby the dissertation aims to contribute to three literatures: the knowledge-based view of the firm[3], the dynamic capability approach and the intellectual capital approach. This aim is achieved through addressing five more specific research questions.

In the editorial to the 1996 Strategic Management Journal special issue "Knowledge and the Firm", Schendel noted concerning competencies and capabilities that *"the literature has not defined these concepts very well, and it certainly has not learned much at all about their measurement or observation*, but they do seem to give insights to what we know about strategy and competitive advantage." (p. 3) [italics added]. In 2004, his words are still very relevant, as these concepts remain vague and overlapping, and there are few systematic tools for analyzing them (e.g. Grant, 2002; Teece, 2003; Winter, 2003). Especially noteworthy is the lack of quantitative measures.

To address the first concern, the conceptual confusion, this dissertation examines **how organizational renewal capability can be defined**. For putting forth a solid definition of renewal capability, it is mandatory to thoroughly study the nature of organizational renewal: what types of processes it consists of and what its most important characteristics are. This question is addressed in this dissertation by analyzing the different ways in which the phenomenon has been understood in previous studies. Based on a theoretical analysis, characteristics of continuously renewing organizations are examined and an integrative definition of organizational renewal capability is put forth.[4]

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[3] It should be noted that if the knowledge-based view of the firm is understood in a wide sense, i.e. to include all approaches that take the crucial importance of knowledge as their point of departure, then the dynamic capability and intellectual capital approaches can be seen as subtypes of the knowledge-based view. As a more restricted concept the knowledge-based view of the firm refers to those theories that examine organizations as locations for inter-subjective knowledge combination and creation processes (e.g. Kogut & Zander, 1992; Grant, 1996a; Spender, 1996b), which in this dissertation are mainly discussed under the heading of the knowledge management perspective.

[4] See especially Publication 1.

The focus of this dissertation is mainly on the level of organizations. But as inter-organizational collaboration has become increasingly commonplace and even necessary in most industries, it is important to examine renewal capability also on the level of regions and networks. It has even been argued that collaborative formations are one of the key areas where knowledge-based thinking has yet to make its mark (Grant, 2002). According to many authors, the capability for inter-organizational collaboration is especially important for knowledge-based development and innovations (e.g. Cohen & Levinthal, 1990; Kogut & Zander, 1995; Henderson & Cockburn, 1995; Powell et al., 1996). Thus it is important to generate knowledge on **how intellectual capital is created in inter-organizational arrangements**. This question is responded by examining renewal through knowledge combination and coordination processes in the context of regional collaboration that is conducted in different types of inter-organizational networks.[5]

Related with Schendel's (1996) second concern, it can be noted that even though considerable advances have been made in the last decade in building and advancing the knowledge-based view of the firm, what is still lacking to a large extent are quantitative objective measures for assessing and comparing firms as knowledge-based entities. To address this issue, the question of **operationalization of renewal capability** is tackled, and the criteria for viable measurement of the phenomenon are put forth based on the characteristics of organizational renewal capability.[6]

Fourth, this dissertation concentrates on exploring **how renewal capability can be modeled and measured**. This is not an easy task, as Spender and Grant (1996, 8) observe: "There is a growing realization that the variables which are most theoretically interesting are those which are least identifiable and measurable. A decade ago, the field of strategic management was confident that its measures had captured the principal phenomena. But as we have moved to the resource-based view, we have begun to sense that many interesting phenomena may be unmeasurable."

[5] See Publication 2.
[6] See especially Publication 4. Also Publications 1, 3 and 5 address this issue.

Indeed, most of the studies on organizational renewal are conducted with case methodology and do not even attempt to construct quantitative tools for capturing the phenomenon. Some solutions for measuring organizational renewal capability can be found in the works of the intellectual capital community. However, these measures do not address renewal as an organizational capability but rather through its assumed inputs or outputs, and thus are not viable for addressing the future potential of the organization.

In this dissertation, a systems-theory based approach for modeling and measuring renewal as an organizational capability is put forth and the measurement tool developed for this purpose, called the KM-factor®, is presented. It draws on a combination of ideas from the knowledge management perspective (inter-subjectivity and process-nature of knowledge in organizations, and the resulting need for combining individual knowledge bases through shared activity), strategic management perspective (renewal as a strategic direction-oriented process consisting of three types of change processes which have to be co-managed), and intellectual capital perspective (essentiality of measuring, reporting, and communicating the 'invisible wealth' of organizations). The method is demonstrated[7] in two ways. First, its suitability for modeling organizational behavior is demonstrated by explaining how it functions as a tool for modeling dynamic capabilities of firms.[8] Second, its applicability for measurement purposes and cross-company comparisons is demonstrated by applying the method to the measurement of dynamic intellectual capital.[9]

Finally, this study addresses the question of the **influence of organizational renewal capability on organizational performance**. The literature suggests that renewal capability should be a significant factor in influencing the future success of an organization. According to some authors, it is the main source of future competitive

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[7] The focus of this dissertation is on the *management* aspect of the measurement method, not on its mathematical aspect and statistical procedures. The analysis of the KM-factor® measurement is conducted with the systemic data analysis technique. Detailed mathematics of the method are reported in Ståhle et al., 2003.
[8] See Publication 3.
[9] See Publications 4 and 5.

advantage (e.g. Teece et al., 1997; Teece, 2003; Edvinsson, 2002). However, there are few empirical studies addressing this question. For exploring this issue, the relationship between renewal capability indices and economic key figures is examined in a small sample of firms.[10]

1.3 Outline of the Study

This dissertation consists of two parts. The first part includes an overview of the whole dissertation and a theoretical exploration into the three main perspectives from which organizational renewal has been approached in the existing literature. The second part consists of five publications.

In Chapter 1 of the first part, the background, objectives and outline of this study are presented. In Chapter 2, three perspectives for approaching organizational renewal are introduced. It is argued that the scientific works discussing organizational renewal can be organized into three main perspectives: knowledge management perspective, strategic management perspective, and intellectual capital perspective. Each of these perspectives focuses on a certain aspect of the phenomenon while leaving some other aspects of it unexplored. The nature of renewal capability is examined from each of these viewpoints. The task of this lengthy theoretical chapter is to construct a thorough foundation for the publications of the second part by demonstrating how the created model and measurement tool are related with the three theoretical perspectives and contribute to them. Next, the first part proceeds with a summary of the five publications in Chapter 3. Finally, Chapter 4 of the overview provides the conclusions and limitations of this study. The second part consists of five research publications which address the research objectives presented in Chapter 1.2. Table 1 presents a summary of the five publications.

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[10] See Publication 5.

	Publication 1	Publication 2	Publication 3	Publication 4	Publication 5
Title	Organizational Capability for Renewal: Combining Effective Maintenance, Incremental Development and Radical Innovation for Sustained Competitive Advantage	Assessing Intellectual Capital Creation in Regional Clusters	Towards Operational-ization of Dynamic Capabilities	Analyzing Dynamic Intellectual Capital	The Link Between a Company's Dynamic Intellectual Capital and Business Performance
Objective	To build a comprehensive framework for understanding organizational renewal capability.	To study how intellectual capital is created and maintained in regions as a dynamic process.	To propose a model for operationalizing dynamic capabilities.	To explore the measurement of organizational renewal and development in intellectual capital frameworks.	To study the connection of dynamic intellectual capital and business performance.
Main theoretical perspective	Organization theory, strategic management	Intellectual capital	Dynamic capability perspective	Intellectual capital	Intellectual capital
Research strategy	Theory development	Case study	Theory building, modeling	Methodological description and evaluation	Measurement
Main contri-bution	Provides an integrative definition of organizational renewal capability and examines its most important characteristics.	Provides a theoretical model for the dynamics of intellectual capital creation in inter-organizational networks.	Demonstrates how dynamic capabilities can be operationalized for modeling purposes.	Explains the characteristics of a quantitative measure for dynamic intellectual capital.	Examines the connection between organizational dynamic intellectual capital and key economic variables.

Table 1. Summary of the five publications

Two of the publications (Publications 1 and 4) are solely written by the present author, and three (Publications 2, 3 and 5) are co-authored. Table 2 summarizes the contributions of the authors in the co-authored publications.

Assessing intellectual capital creation in regional clusters	Towards operationalization of dynamic capabilities	The link between a company's dynamic intellectual capital and business performance
Abstract, Introduction (p. 351-352) / Pöyhönen	Abstract, Introduction (p. 1-2) / Pöyhönen	Abstract, Introduction (p. 1-3) / Pöyhönen
Intellectual capital creation in regional clusters (p. 352-354) / Pöyhönen	Dynamic capability view (p. 2-4) / Kyläheiko	Dynamic intellectual capital equals organizational renewal capability (p. 3-5) / Pöyhönen
Production network, Development Network, Innovation network, Summary of the network types (p. 354-358) / Pöyhönen and Smedlund	Measuring organizations' dynamic capability (p. 5-11) / Pöyhönen	KM-factor® – A tool for measuring dynamic IC (p. 6-11) / Pöyhönen
Methods (p. 358-359) / Pöyhönen	Analysis method (p. 11-12) / Pöyhönen and P. Ståhle	Relations between KM-factor® indexes and economic key figures (p. 11-17) / S. Ståhle and P. Ståhle
Results (p. 359-361) / Pöyhönen and Smedlund	Conclusion (p. 12-14) / Pöyhönen and P. Ståhle	Conclusion (p. 17-18) / Pöyhönen
Conclusion (p. 361-362) / Pöyhönen		

Table 2. Contributions of the authors in the co-authored publications

1.4 Research Strategy

Each of the publications in part two of the dissertation includes its own theoretical discussion and literature review focusing on each of the different, yet closely related research problems.

Publication 1 is fully theoretical in nature. Its purpose is to examine the treatment of renewal capability in various theoretical models and thereby to provide an integrative definition for the phenomenon and a solid basis for operationalizing it. Publication 2 is based on a case study of a regional cluster. In this study, the processes of intellectual capital creation among the organizations belonging to the cluster are analyzed qualitatively based on observation, interviews, and network mapping.

The three other publications, 3-5, are focused on the KM-factor® methodology for modeling and measuring renewal capability. Much of the earlier research on organizational renewal capability is either conceptual or conducted with the case

study methodology. Given that one of the main goals of this dissertation is to put forth a viable quantitative method for modeling and measuring renewal capability, each of these three publications concentrates on one main aspect of the KM-factor® tool. Publication 3 explains how the tool can be used for modeling purposes and presents the results of the measurements of twenty Finnish business organizations from the viewpoint of what the results reveal about the dynamic capabilities of these firms.

Publication 4 focuses on the KM-factor® as a method for measuring the dynamic intellectual capital of organizations. A state-of-the-art review of the methods for assessing dynamic intellectual capital is conducted, and the KM-factor® is assessed in light of two types of criteria: 1) sound measurement of intellectual capital put forth by Andriessen (2004a), and 2) organizational characteristics of renewal capability, drawn from the knowledge-based view of the firm and the dynamic capabilities literature. This publication also discusses the ability of the KM-factor® to function as a device for internal management.

Publication 5 addresses the issue of whether renewal capability influences the future financial performance of firms. This question is studied by relating the data from the KM-factor® measurements of eight SMEs to their economic key figures. Here, two approaches are used: First, direct correlations between the indices of the KM-factor® and economic key figures are examined. Second, based on internal correlations between a) the KM-factor® indices and b) key economic figures, clusters are formed from these two sets of data. Correlations are then traced between these two sets, the rationale being that correlations between individual indices vary over time, but correlations between clusters are more permanent and reliable indications of a relationship.

The development of the KM-factor® methodology (including the measurement process, analysis method, theoretical model, questionnaire and database) began in 1998. The idea for the method and its underlying conceptual framework were initiated by Pirjo Ståhle. In her doctoral dissertation, Ståhle (1998) examined systemic capacity for self-renewal on the level of work groups, and argued that system theoretical

studies can be arranged into three paradigms: mechanical, organic and dynamic. In 1999, she presented a model where organizations are described as consisting of three organizational knowledge environments that are based on the alternative system logics (Ståhle & Grönroos, 1999). The development and consulting work that Ståhle conducted in several organizations made it evident that practitioners, and among them especially managers and investors, considered renewal capability to be a highly relevant issue, but that tools for systematically understanding, assessing and developing this capability were lacking. The KM-factor® was developed in order to meet these needs.

In the KM-factor® method, organizational renewal capability is operationalized as the collective capacity of the organization to create and maintain knowledge environments which are in line with its strategic intent[11]. The mechanical, organic and dynamic knowledge environments are depicted through four factors (called "system constituents"): competence, information flow, relationships and management issues. The measurement data is gathered from a representative sample of organizational members with a web-based questionnaire that includes 82 items. There are two versions of the questionnaire, one for the personnel and other one for the management. Most of the questionnaire items concern respondents' views about the current situation and future goals in their work. Thereby information is gained of the present state as well as potential trends in the functional mode of the organization. In addition, the questionnaire contains items about job motivation, social networks and rewarding issues.[12] Table 3 presents the amount, response format and examples of the questionnaire items. In addition, the top management of the organization defines the strategic focus of the organization with a separate questionnaire.

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[11] See Publications 3, 4 and 5.

[12] The full questionnaire could not be included in this dissertation because of intellectual property protection issues. More examples of the questionnaire items can be found on the web page of the firm that owns the KM-factor®, businessXray Ltd (http://www.businessxray.com/kmf/). Also an example of the KM-factor® report of the results is provided on the web pages (http://www.businessxray.com/d-load/presentation.ppt).

Question type	Response format	Amount of items	Example(s)
Statement concerning the current situation	1-5 Likert scale (Anchored by "I entirely disagree / the claim does not describe my work at all" – "I entirely agree")	36	"I have to be able to react continually to entirely surprising challenges in my work." (competence / dynamic) "My supervisor actively supports my progress at work." (management / organic)
Statement concerning the goal situation	1-5 Likert scale (Anchored by "I entirely disagree / the claim does not describe my work at all" – "I entirely agree")	36	"I would like the operational chains and processes involved in my job to be much more clearly defined." (competence / mechanistic) "In my job I would need much more open information exchange with my colleagues." (information flow / organic)
Three statements concerning a system constituent (i.e. competence, information flow, relationships, management)	The respondent chooses one of three options	4	"I feel that I am working alone." (mechanistic relationships) "I have many good partners at work." (organic relationships) "I work in a broad network of experts that goes beyond organisational boundaries." (dynamic relationships)
Motivation level in current job	The respondent chooses one of seven options	1	1 = "I only work for the money." (extremely low job motivation) 7 = "I have an enjoyable, great job, which suits me almost perfectly." (extremely high job motivation)
Rewarding issues	The respondent chooses one of three options	2	"My salary is determined strictly according to the enterprise pay system." (mechanistic) "I am currently able to influence my own earnings." (organic) "Aside from the agreed salary, I am rewarded for the results of my work in a way that I find satisfactory." (dynamic)
Networking questions	Full name of 1-3 persons	3	Who in your enterprise inspires you most to develop new things? (dynamic)

Table 3. The structure of the KM-factor® questionnaire

The questionnaire data are analyzed to produce quantitative indices and graphs that describe the renewal capability of the organization. The analysis is conducted with the systemic data analysis technique developed mainly by Sten Ståhle, which concentrates on the coherence of the responses rather than their level. The strategic focus of the organization is used for selecting the appropriate comparison group of organizations from the KM-factor® databank. Detailed mathematics of the KM-factor® are

reported in Ståhle et al., 2003. It should be noted that as the author of this dissertation has not been responsible for constructing the statistical part of the method, and as the aim here is to addresses organizational and management issues rather than mathematical ones, the statistical operations of the KM-factor® are not explained in detail in this dissertation. However, the operationalization of renewal capability, collection of systemic data, and general principles of the data analysis are spelled out in Publications 3, 4 and 5.

The author of this dissertation has been involved in the development of the KM-factor® from the year 1999, first as a partaker in a practical development and consulting project at the chief knowledge office of a major Finnish telecommunications corporation, and then as an academic researcher. She has contributed to the conceptual and theoretical background of renewal capability, the development of the questionnaire and the measurement process of the KM-factor®, as well as conducted measurements and reported their results in organizations.

So far about 90 Finnish organizations, both for- and non-profit, have been measured with the KM-factor®. However, as both data collection and analysis method have undergone major changes during the six years of development, most of the measurements could not be used in the publications comprising this dissertation. The development work of the KM-factor® was conducted in close collaboration with several organizations. Customer feedback was gathered extensively, and the report of results, method, user interface and tool went through many stages of development based on customer needs. Important feedback about the viability and usefulness of the tool was acquired especially from human resource professionals and business analysts who collaborated in testing and developing the KM-factor®. However, even though this feedback was very useful from the viewpoint of practical development of the method, it was not formally documented. Because of this lack of data, the constructive approach (Kasanen et al., 1993) could not be used in this dissertation for demonstrating the viability of the KM-factor® method.

Nevertheless, the sheer number of the conducted measurements attests to the viability of the method. According to the constructive approach (e.g. Kasanen et al., 1991; Kasanen et al., 1993; Lukka, 2003), the validity of a managerial construct, such as the balanced scorecard (Kaplan & Norton, 1992) or the KM-factor®, should be assessed by market-based testing. Kasanen et al. (1993) distinguish three types of market tests:

- Weak market test: Has any manager responsible for the financial results of his or her business unit been willing to apply the construction in question in his or her actual decision making?

- Semi-strong market test: Has the construction become widely adopted by companies?

- Strong market test: Have the business units applying the construction systematically produced better financial results than those which are not using it?

According to Kasanen et al., (1993, 253) it is rare that tentative constructions pass even the weak market test. The wide adoption of the KM-factor® method demonstrates that it has clearly passed the weak market test and is getting close to passing the semi-strong market test as well.

2. Perspectives on Organizational Renewal Capability

2.1 The Knowledge Management Perspective on Organizational Renewal Capability

Knowledge management is a relatively novel approach to organizational issues that has gained popularity among both practitioners and researchers. It focuses on the crucial role of knowledge in different contexts from individual knowledge workers to organizations and macro-social entities, and aims to understand and improve organizational processes related to knowledge. According to Ståhle (2003), knowledge management in general refers to any practice where knowledge is consciously exchanged, created, distributed, and stored. Its objective is to help people and organizations to 1) find, share, and use information, 2) enhance knowledge creation, and 3) master renewal and innovativeness. As an emerging academic discipline, knowledge management is connected with knowledge-based theories of the firm which depart from other forms of organizational theory in that they explicitly take knowledge as their basis (e.g. Kogut & Zander, 1992; Grant, 1996b; Grant & Spender, 1996). This perspective on organizational renewal capability emphasizes the social and activity-based roots of organizational knowledge and focuses on the production of collective knowledge through patterns of interaction within organizations.

This chapter begins by addressing two meta-theoretical concerns about the nature of knowledge in organizations: its inter-subjective and activity-related nature. It is argued that collective knowledge and shared organizing principles comprise the most valuable type of knowledge from an organizational point of view. Several approaches to collective knowledge are reviewed and it is concluded that even though these studies present mindful accounts of the nature and construction of collective knowledge, they tend to centralize constancy, continuity, and coherence of collective knowledge and overlook its transformative, provisional, and contested aspects. In order to understand what kind of organizing principles enable mastery of change and renewal and what kind of management actions are needed to achieve them, the

theories of collective knowledge must be extended. Finally, it is demonstrated that organizational renewal can be divided into three main types: maintenance, incremental development, and radical innovation, and that each type of organizational renewal results from distinct relational patterns within the firm, which are forms of collective knowing.

2.1.1 Knowledge: Objective, Subjective or Inter-Subjective?

Traditional western science views knowledge views as objective, universally applicable and context-independent. The Socratic/Platonic definition of knowledge as a "justified true belief" has for long guided the understanding of what knowledge means. The view of knowledge as information whose validity has been established through empirical proof emphasizes that knowledge is something to be distinguished from opinion, speculation, beliefs, or other types of unproven information (Liebeskind, 1996).

The nature of knowledge as something objective was consistently questioned in the last half of the 20th century, most notably within the social and humanistic sciences. Following Wittgenstein, epistemologists began to view knowledge as theoretical statements whose meanings and practical implications depended on their use and their context of usage. In humanities, works of such philosophers as Derrida (e.g. 1985) and Foucault (e.g. 1980; 1998) became popular grounds for deconstructing the conventional assumptions in order to study the relations of knowledge and power, bring marginalized voices to the front, and to allow for the free play of meanings and intertextuality. In sociology of science, Berger and Luckmann (1994/1966) published their seminal work on the social construction of reality, which argued that what people call 'reality' is fundamentally socially conditioned, and therefore historically and culturally relative. In social psychology, social constructionist approaches (e.g. Gergen, 1985; Gergen & Shotter, 1989; Edwards & Potter, 1992) built on the ideas of multi-voicedness, inter-subjectivity and contextuality of knowledge and emphasized the discursively constructed nature of thinking, perceiving and identities. In sociology,

discussions of postmodern society and sociability emphasized their fluctuating, complex, and paradoxical nature (Bauman, 1996; Maffesoli, 1995).

In the field of business administration the objective conception of knowledge has been rejected as well - at least in its approach to its research targets, if not its own epistemology. However, the shift has not been based on the same premises as in social sciences and humanities. In business sciences the departure from the conception of knowledge as a justified true belief is typically made by reference to its *individual significance.* Whereas in traditional western epistemology, the significant distinction lies between knowledge (*eidos*) and mere beliefs or opinions (*doxa*) whose truth value has not been proven, the significant distinction in much of the current knowledge management literature lies between knowledge and information.

An important typology, characteristically cited in most of the knowledge management literature in the 1990s, focuses on the differences between data, information, and knowledge. For example Ståhle and Grönroos (1999; 2000) explain that data is a sequence of signs whereas information is data that is understood. In other words, for an illiterate person written text is mere data, whereas for someone who can read it is information. Knowledge, on the other hand, "is an active concept in the sense that it includes both information and an impact. The impact means that information has turned into human knowledge." (p. 49.) In a later book, Ståhle and Grönroos (2000, 31) define knowledge as information that "can be utilized and turned into action". Similarly, Nonaka and Takeuchi (1995, 58) define knowledge as "a dynamic human process of justifying personal belief toward the 'truth'". According to Nonaka and Takeuchi, both knowledge and information bear some meaning to the individual, but unlike information, knowledge is anchored in the beliefs and commitment of its holder, and related with action.

These definitions bring to the fore the fundamentally *human* nature of knowledge. They emphasize that knowledge does not exist apart from the knowing subject – as universal abstractions floating somewhere out there – but that knowledge is always

tied to a particular viewpoint and practical application. In other words, knowledge is essentially related to human action.

The data-information-knowledge-continuum served the knowledge management research community well during the 1990's, when the field as a whole was in a formative phase and it was important that it established its boundaries. In hindsight, it seems that the continuum was used especially to create an identity for knowledge management as a branch of management science and practice and to differentiate it from information technology-driven approaches. Following the logic of the continuum, the latter should actually be called information or data management rather than knowledge management.

However, there are two important problems that implicitly reside in the data-knowledge continuum. First, knowledge is defined in relation to its significance for the knowledgeable individual. No explicit reference is made to the context in which the knowledgeable individual is situated, and neither to the groups, communities and organizations in which the knowledge is supposed to be used, exchanged and augmented. Indeed, the typical conception of knowledge deriving from these characterizations is individualistic to the extreme.

A second related problem with the simplistic data-knowledge continuum is that it suggests that any piece of 'actionable information' is just as 'good' as the next piece of 'actionable information'. In other words, it offers no means for assessing the relative value of something once that something has been categorized as 'knowledge'. However, from practical experience it is obvious that some ways of understanding and behaving can prove more viable, useful, and profitable than others, be it in terms of their instrumental or intrinsic value. Indeed according to the continuum, a move in chess made by a trained monkey is based on knowledge that is of no lesser value than that of a master chess player. Furthermore, is rumor just as much knowledge as scientific research? Is a decision made leaning on stereotypes and heuristics as knowledgeable as is a thoroughly elaborated one? Based on the data-knowledge continuum, the answer is yes. Questions like these demonstrate that the continuum is

oversimplified. This kind of 'anything goes' attitude can hardly be the basis for scientific research in business contexts.

As the truth criteria of knowledge is erased from the data-knowledge continuum, it looks like there is no yardstick according to which the value of knowledge could be assessed, and there is no way to distinguish knowledge from misunderstanding, stereotypes and lucky guesses. The key point here is not to attempt to force a degree of objectivity on knowledge, i.e. to say that its truth value should be decided, but rather to suggest that without reference to the world outside the knowing subject, the viability or the usefulness of a cognition cannot be assessed. This is problematic if we are interested in purposive action, such as organizational activities.

Therefore, the data-knowledge continuum leaves knowledge an abstract and vague a term, to be used on individual discretion in whatever instance of cognitive activity (and even in the lack of it). Framing knowledge in these terms shifts the definition of knowledge to something completely subjective – and it is doubtful whether this is an improvement from the objectivity requirement imposed on knowledge by the traditional western epistemology.

Then, the question arises, how should knowledge be defined to be useful for understanding organizations? The answer lies in a view grounded in the humanistic and social scientific voices that have departed from the objectivistic epistemology mentioned in the beginning of this chapter. According to these views, knowledge is not objective, free-floating, abstract and universal; but neither is it subjective, residing solely in the minds of individuals as their personal experiences. Rather, knowledge is something that is constructed in the social practices of actors embedded in a particular social context.

It is proposed in this dissertation that the most fruitful approach to knowledge in the context of organizational research is to frame it as inter-subjective. As Spender (1996a, 64) argues, "knowledge is less about truth and reason and more about the practice of intervening knowledgeably and purposefully in the world". And to

intervene in the world one has to be able to communicate with others and to understand the particular context of activity. In this sense, knowledge exists essentially *between* and not within individuals. Individuals are always located in a social context, or as Marx put it, human beings are 'social animals' (Eskola, 1982). Even when we are alone our culture and communities influence us both from the outside and the inside, as internalized conceptions, mental models, attitudes and values. For example, according to the activity theoretical view, deriving from the works of Vygotsky (1982/1934), social precedes personal. Vygotsky studied the thinking processes of children and argued that the learning of language via social interaction precedes development of thinking. As language is the main tool of thinking, even personal cognition has social origins. This is not to say that knowledge would not exist on the personal level, but that even individually held knowledge has a fundamentally inter-subjective quality to it. On a metatheoretical level it is a question of rejecting methodological individualism and accepting that social phenomena are important, valuable and analyzable in their own right (cf. Durkheim, 1982/1895).

2.1.2 Knowledge as an Object and Knowing as an Activity

In the studies on knowledge in organizations, there are two main ways to understand the nature of knowledge. The first views knowledge as an object and the second views knowledge in terms of knowing activity (Spender, 1996a; Brown & Duguid, 1998; Nahapiet & Ghoshal, 1998; Orlikowski, 2002). The difference has profound implications for how knowledge is treated in the studies, and therefore it is essential to spell it out explicitly. This dissertation uses studies from both approaches in order to construct a holistic picture of renewal capability.

When knowledge is viewed as an object, it is assumed that knowledge is something that can be relatively easily identified, located, moved and traded, much like some sort of 'package', although an intangible one. Scholars in the fields of strategic management and intellectual capital tend to take this view of knowledge, where it is typically understood as an asset, a 'stock', or an owned property of an organization

(Bontis, 1999). To some extent the dynamic capability view of strategy (e.g. Teece et al., 1997) is an exception, as it focuses on how firms use their assets to create change rather than on the assets themselves (see chapter 2.2.3).

The second view argues that knowledge cannot be separated from practice and that rather than a static 'package', it should be viewed as a collective social practice enacted in a particular context. Consequently, instead of talking of knowledge, a more viable manner to approach knowledge in organizations would be to use the term *knowing* or *knowledgeable activity*, as these emphasize the necessary connection of knowledge with action (e.g. Blackler, 1995; Orlikowski, 2002).

The difference between these two views can be traced back to different ways of understanding Polanyi's (1966) distinction between tacit and explicit knowledge. There are two main interpretations of the distinction. The first one is consistent with the view of knowledge as an object. This view, propounded for example by Nonaka (1991; Nonaka & Takeuchi, 1995), portrays tacit and explicit knowledge as clearly distinguishable forms of knowledge: some knowledge is in explicit form, and some in tacit form, and a piece of knowledge can be clearly categorized to belong to either one of these types. Learning occurs via acquiring either tacit or explicit knowledge or both. It is assumed that even though it is difficult, it is still possible to converse tacit knowledge into explicit knowledge by externalization processes, such as the use of analogies and metaphors. Explicit knowledge is portrayed as an object that can be easily moved around and fit into different contexts. However, herein lies also the vulnerability of explicit knowledge assets: since they are context-independent, they are 'leaky', i.e. easily spreadable across organizational borders and into competitors' hands. This makes explicit knowledge assets imitable and non-rare – and thus an uncertain source of competitive advantage (e.g. Wernerfelt, 1984). Tacit knowledge, on the other hand, is embedded in the organization and therefore more safe from imitation. The problem with tacit knowledge from an asset view is that it is 'sticky', i.e. because of its context-bound nature it is hard to move and replicate even within the organization (e.g. Szulanski, 1996). Nevertheless, it can be a source of sustained competitive advantage, especially if routines can be forged which function as

mechanisms for copying the tacit knowledge efficiently across the firm (Nelson & Winter, 1982).

In the second interpretation, the distinction is not understood to portray two separate categories of knowledge, but rather two overlapping modes of knowing. This second interpretation is probably closer to the original intention of Polanyi. In fact, the name of his much referenced book is 'The Tacit Dimension', which underlines the notion that the term 'tacit' does not refer to a type of knowledge but to a quality of all knowledgeable activity. In this book Polanyi set out to examine why it is that we know more than we can tell. In other words, the assumption is that what we can tell is only a small fragment of what we know – and that what we cannot fully articulate is the tacit dimension, or 'tacit knowing'. It is this tacit knowing that imbues all data with meaning and the tacit dimension is irreducible from the act of knowing which, in turn, is always situated in a particular context. Explicit knowing is associated with conscious reasoning and demonstrated by verbal explanation, in the form of scientific theories, for example. Polanyi (1966) argued that examining this side of knowing does not sufficiently explain how knowledge develops, e.g. how theories are built, because the act of knowledge creation does not happen only by conscious, traceable, and communicable thinking processes. Thus there is another type of knowing that is partly unconscious and never fully articulable which he called tacit knowing. This dimension of knowing is demonstrated in skilled action and in non-conscious judgments, and cannot be separated from the activity in which it is demonstrated.

According to this second interpretation of Polanyi's work, there is always a tacit component in knowledge; i.e. purely explicit 'knowledge' is actually data, useless in itself without the tacit dimension. In this view, tacit and explicit knowledge are not opposites or separate categories but the tacit dimension is necessary for human knowing because without it all incoming cognition is mere meaningless data. Therefore the leaking of an explicit piece of knowledge (or rather data or information)

to a competing firm would not present a threat as long as no one in the competing firm would possess the tacit knowledge needed to understand this information.[13]

The knowing-view of organizational knowledge focuses on the social nature of meaning and practice, and emphasizes that all knowledge is rooted in the context of its development and use. This view is characteristic to those studies that in this dissertation are treated as part of the knowledge management perspective on renewal capability. In these studies, firms are typically seen as knowledge systems in action. For example, Blackler (1995) argues that rather than regarding *knowledge* as something that people or organizations *have* or possess, it is far more useful to analyze *knowing* as something that they *do* and to analyze the dynamics of the systems through which knowing is accomplished. Drawing on activity theory, Blackler describes knowing as

- mediated through language, technology, artifacts etc.,
- situated in a specific context,
- constructed and continuously developing,
- purposive and object-oriented,
- related with issues of power and conflict.

Similarly Spender (1996a) powerfully criticizes those who define organizational knowledge in a 'positivist way' as an object: "Economists' view of knowledge as a tradable asset misses much that is strategically important… A purely economic analysis might overlook those aspects of knowledge that seem to be inconsistent with an asset-based definition, with its implicit conservation or constancy in quantity." In other words, a purely asset-based analysis of knowledge is in danger of overlooking the significance of change, dynamics and social processes. Instead, Spender proposes that knowledge should be understood as a qualitative aspect of the organization as an activity system: "Ultimately, to know is to be able to take part in the process that makes that knowledge meaningful … it is the performance, especially in the face of

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[13] It should be noted, however, that some authors representing the second view (e.g. Spender, 1996a) do distinguish between tacit and explicit knowledge, or use some other related distinction, but they are mindful that without the tacit dimension needed to 'decode' explicit knowledge, it becomes incomprehensible.

unanticipated uncertainties and challenges, that is the true test of executive knowing." Therefore, knowledge should be conceived as "competent goal-oriented activity rather than as abstract 'knowledge about'" (p. 57), and firms should be viewed as systems of knowing activity rather instead of systems of abstract knowledge assets.

2.1.3 Collective Knowledge and Organizing Principles

Knowledge management literature is comprised of many typologies of knowledge, the most famous being Nonaka's interpretation of Polanyi's tacit – explicit distinction. However, for understanding the 'ontological position' of organizational renewal capability, a more refined distinction is needed. Spender's (1996a; 1996b) classification of types of knowledge is suited well for explaining the point of the issue. There are two main origins to this typology: James's (1950) distinction of "knowledge about" and "knowledge of acquaintance", which is reflected and refined in Polanyi's (1966) treatise of explicit and tacit knowledge; and Durkheim's (1982/1895; 1990/1893) idea of a "collective mind" as something distinct from individual consciousness and analyzable in its own right. The different types of knowledge according to Spender are shown in Table 4.

	Individual	Social
Explicit	Conscious	Objectified
Implicit	Automatic	Collective

Table 4. The different types of knowledge in organizations
(Spender, 1996a)

The two dimensions, explicit vs. implicit (tacit) and individual vs. social, are combined to distinguish four types of knowledge. Conscious knowledge consists of facts, concepts, and frameworks that the individual can store in memory and retrieve more or less at will. Automatic knowledge includes perceptions, mental models,

values, behavioral tendencies, kinesthetic and technical skills etc. that are un- or semi-conscious and difficult or impossible to access consciously. Objectified knowledge represents the shared corpus of codified knowledge. Collective knowledge consists of the knowledge that is embedded in the forms of social and organizational practice, residing in the tacit experiences and enactment of the collective. Individual actors may be unconscious of such knowledge, even though it is accessible and sustained through their interaction. (Spender, 1996a; 1996b.)

Kogut and Zander (1992) have presented a similar distinction where knowledge is divided to know-that, which they call information, and know-how (cf. Ryle, 1949). Know-that is associated with information, description, and declarative knowledge, while know-how is associated with procedural knowledge. Further, these knowledge types can be assessed on individual, group, organizational and network levels (see Table 5).

	Individual	Group	Organization	Network
Information	Facts	Who knows what	Profits, accounting data, formal and informal structure	Prices, whom to contact, who has what
Know-how	Skill of how to communicate, problem solving	Recipes of organizing such as Taylorist methods or craft production	Higher-order organizing principles of how to coordinate groups and transfer knowledge	How to cooperate, how to sell and buy

Table 5. Knowledge types on individual, group, organizational and network levels
(Kogut & Zander, 1992, 388)

Spender's (1996a; 1996b) typology of different types of knowledge can be related with how organizations create value from knowledge. Objectified knowledge, consisting of the codified knowledge of the firm, is 'leaky' and therefore in danger of

being imitated by competitors. It is this leakiness of knowledge that is the major concern in the resource-based view of strategy, and a firm's competitive advantage is seen to depend on its ability to prevent knowledge from flowing across its boundaries to competitors (e.g. Wernerfelt, 1984; see chapter 2.2.1).

Individual types of knowledge cannot either provide a sustainable source of competitive advantage for the firm. Recently it has become almost normative for companies to declare that the skills and knowledge of their employees constitute the main competitive asset of their organization. However, looking at Spender's (1996a; 1996b) typology, this view can be questioned as too simplified. First, there are problems concerning appropriability of individual knowledge. Neither type of individual knowledge, conscious or automatic, is possessed by the organization. Rather, they are stored in the individual employees and demonstrated in their activities. The knowledge of individuals cannot provide the basis for sustainable organizational profits, because individuals are transferable between firms; thus this knowledge is in danger of walking out of the company door, in the worst case to the welcoming arms of a competing company. In addition, rents generated by specialized knowledge of individuals are more likely to be appropriated by the individuals themselves than by the company (Grant, 1996a). Second, even if individual members of the organization are willing to pour all their knowledge out to the sole profit of their employer company, it is not self-evident that this is enough to produce the wanted results. Faced with the complex demands of today's businesses, there are few tasks that single individuals can accomplish on their own. Combining one's individual knowledge with that of others has become quintessential. (e.g. Guzzo, 1996; Nemeth, 1997; Leonard & Sensiper, 1998; Miles et al., 2000.)

Tsoukas (1996) takes up the issue of firm's knowledge base being dispersed in separate individuals and views firms as distributed knowledge systems where no single agent can know in advance what knowledge is needed, nor when or where it is needed. Therefore organizations are "decentered systems, lacking an overseeing 'mind'. The knowledge they need to draw upon is inherently indeterminate and continually emerging … At any point in time, a firm's knowledge is the indeterminate

outcome of individuals attempting to manage inevitable tensions between normative expectations, dispositions, and local contexts." (P. 11.) Tsoukas argues that the main problem that organizations face is how to use the widely dispersed individual knowledge and how to extend the span of utilization of resources in a way that exceeds the span of control of any one individual mind. This is clearly a question of coordination and patterning of social interaction.

Collective knowledge consists of patterns and modes of knowledge combinations between individuals, groups, units and organizations. According to Spender (1996a; 1996b), it is this type of knowledge that is strategically most important for the firm. This position is widely accepted throughout the knowledge management literature and it combines the processual and activity-based view of knowledge with recognition of its inter-subjective nature (see Chapters 2.1.1 and 2.1.2). For example, according to Kogut and Zander (1992) firms are essentially vehicles for combining knowledge, and the central competitive dimension is the efficient creation and transfer of knowledge within the organizational context. In their view, organizations are "social communities in which individual and social expertise is transformed into economically useful products and services by the application of a set of higher-order organizing principles. Firms exist because they provide a social community of voluntaristic action structured by organizing principles that are not reduceable to individuals." (P. 384.) Note that the higher-order organizing principles in the above quote equal patterns of collective knowing as defined by Spender (1996a; 1996b). In his later work, Spender (2002) uses the term 'common back-face knowledge' or 'integration knowledge', while Henderson and Clark (1990) talk about 'architectural knowledge', Grant (1996b; 2002) about 'common knowledge', and Nahapiet and Ghoshal (1998) about 'cognitive social capital' for addressing the same issue (see Table 6).

Concept	Definition	Author(s)
Organization-level know-how	Organizing principles by which people cooperate	Kogut & Zander, 1992
Collective knowledge	Knowledge that is embedded in the forms of social and organizational practice	Spender, 1996a; 1996b
Integration knowledge	Knowledge which integrates the evident elements of the organization (e.g. core competencies) into a coherent and workable whole	Spender, 2002
Common knowledge	Intersection of the individual knowledge sets that permits individuals to share and integrate elements of knowledge which are not common between them	Grant, 1996b; 2002
Architectural knowledge	Knowledge about the ways in which the components are integrated and linked together into a coherent whole	Henderson & Clark, 1990
Cognitive social capital	Resources providing shared representations, interpretations and systems of meaning among parties	Nahapiet & Ghoshal, 1998

Table 6. Conceptualizations of organization-level tacit knowledge

2.1.4 Social Interaction as the Basis of Collective Knowledge

Collective knowledge is the basis for organizational capabilities. Capabilities are complex productive abilities that depend upon the firm's ability to integrate knowledge (e.g. Grant, 1996a; 1996b). They rest in the organizing principles by which relationships (among individuals, groups, and organizations) are structured (e.g. Kogut & Zander, 1992) and are embedded in the tacit knowledge and practices of the organization.

The notions of collective knowledge and higher-order organizing principles connote that for a firm to be knowledgeable, it is not enough that its individual employees are

skilled and educated. The most crucial issue is how the employees work together, how their tasks interrelate and how their individual knowledges are integrated to produce value for the company. The scattered, uncoordinated insights of individual organizational members are not enough to produce competitive advantage; in order to produce sustainable value, they must be combined into a synergistic whole. This does not mean a mechanistic aggregation or synthesis of individual knowledges. The pattern and mechanisms of integration of knowledge cannot be reduced to the level of individual actions, but have to be analyzed in their own right. Thus it could be said that the whole is something else than a sum of its parts.[14]

Orton and Weick (1990, 216-217) argue, "When researchers define organizations as monolithic corporate actors, they overemphasize order and underemphasize elements; when researchers define organizations as mere aggregates of individuals, they overemphasize elements and underemphasize order." In other words, it is not enough to treat the organization as an aggregate or the simple sum of the individuals operating within its boundaries. But it would be as misleading to erase the individual inputs all together and to talk about the firm as a completely unified anthropomorphic whole. The solution lies in the middle ground: looking at the social interaction which engages the individuals and constitutes the organization. This means examining the patterns of relationships, how they are coordinated, how knowledge is integrated and combined in activities of the organization.

Many scholars emphasize the importance of the inter-personal level to understanding knowledge in organizations. For example, Cohen & Levinthal (1990) note that absorptive capacity, i.e. the firm's ability to value, assimilate and apply new knowledge, does not reside in any single individual but in the links between the individual capabilities. Similarly Nelson and Winter (1982, 63) argue that "the possession of technical 'knowledge' is an attribute of the firm as a whole, as an organized entity, and is not reducible to what any single individual knows, or even to

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[14] It would perhaps be naïve and exceedingly idealistic to believe that the whole is more than a sum of its parts, because this would mean that the organization could leverage every single bit of knowledge embodied and embrained (see Blackler, 1995) in its employees - which would be impossible and also quite unnecessary, as not all knowledge is useful – as well as add something to that body of knowledge.

any simple aggregation of the various competencies and capabilities of all the various individuals, equipments and installations of the firm". According to Spender (1996a), also Penrose (1959) viewed collective knowledge as a core factor explaining the growth of firms. She argued that growth of the firm was based on surplus capabilities that were located at the system level and could not be evaluated in terms of, or as the sum of, the participants' capabilities. Finally, Brown and Duguid (1998, 98) reason that "the productive side of organizational tension, drawing on the experience of people throughout an organization, produces knowledge that requires systemic, not individual explanation".

These views demonstrate the importance of viewing organizational renewal capability also as a social phenomenon, which belongs to the sphere of collective knowing, rather than as an outcome of atomistic activities of isolated individuals (as assumed by individualistic approaches to knowledge) or as a result of certain type of inputs to some monolithic 'black box' of an organization (as assumed by approaches that objectify knowledge). It is argued throughout this dissertation that organizational renewal capability is rooted in the collective knowledge, or rather collective knowing, of the organization, and that collective knowing is demonstrated in the relational patterns within the organization. The key to grasping an organization's renewal capability lies in understanding its organizing principles, i.e. its collective knowledge concerning the division of labor and related patterns of social interaction.

Even though in this dissertation organizational renewal capability is defined as a collective capacity of the organization, this does not mean that the organization would be thought of as an internally homogenous whole, possessing a presence of its own irrespective of its members. In contrast, it is argued that organizational capability for renewal is constantly re-produced by the ongoing interrelated activities of the organizational members. Consequently, understanding renewal capability requires analyzing the interactive webs of activity and relational patterns within the organization.

2.1.5 Previous Research on Collective Knowledge and Organizing Principles

Kogut and Zander (1992, 396) suggest "focusing on organizing principles as the primary unit of analysis for understanding the variation in firm performance and growth". This plea, made over a decade ago, has been taken up by surprisingly few researchers. The studies addressing collective knowledge and organizing principles can be roughly divided in two categories. On the one hand there are studies that address the question "*what* is collective knowledge like?", on the other hand there are studies focusing on the question "*how* is knowledge combined in order to achieve collective knowledge?". Both types of studies seem to centralize coherence, constancy, and continuity of collective knowledge, and tend not to discuss the contradictory and transformative elements therein. The focus is on those aspects of shared principles which enable codification and replication.

The first group of studies is interested in understanding the nature, characteristics, and composite elements of collective knowledge. For example, Kogut and Zander (1992) observe that the reason why higher-order principles are needed is that they facilitate the integration of the whole organization. They argue that "for a firm to grow, it must develop organizing principles and a widely-held and shared code by which to orchestrate large numbers of people, and potentially, varied functions" (p. 390). Thus the function of collective knowledge is to integrate the knowledges scattered around the organization into a synergistic whole. In their later work, Kogut and Zander (1995) emphasize the creation of a shared identity which functions as a basis for coordination, communication and learning.

Spender (2002) discusses the crucial role of an integrated 'organizational sense of self' in knowledge integration. The organizational sense of self is the basis on which 'common back face knowledge' of the firm is constructed. This knowledge "is both visceral and the platform for everything else. It lies deep and brings together, in contextualized thought and action, all the other types of knowledge that are judged relevant – for it is the source of such judgments." (P. 158.) Shared organizational context comprising common mental models, systems of meaning and interpretations

has also been conceptualized as the cognitive dimension of social capital which is assumed to facilitate the actions and combination of knowledge of individuals within a particular social structure (Nahapiet & Ghoshal, 1998; Lesser, 2000; Cohen & Prusak, 2001). The issue of organizational culture (e.g. Schein, 1985; Hofstede, 1991) is also relevant for understanding the context of collaboration, even though this strand of research is rarely drawn upon in knowledge management studies.

These accounts emphasize that there must be a common core to the organization and a shared direction toward which the organizational members strive, and that these are produced by the interactions of the members of the organization. In other words, organizational members construct the organizational context which then influences their cognition and action. Of course, this approach is one formulation of the social psychological or inter-subjective stance in the classical debate of social sciences about which is primary: individual or social. The view taken here implies that on the one hand, individuals are parts of their social communities and acquire their identities from the particular socio-historical contexts, and all activities are inevitably socially embedded. On the other hand, societies could not sustain without individuals who carry the on culture. And at the same time that individuals are influenced by their cultures and societies, they are themselves regenerating them. (E.g. Giddens, 1984; Ross & Nisbett, 1991.)

The second group of studies addressing the organization-wide organizing principles focuses on more specific mechanisms of coordination and knowledge combination. Knowledge integration is examined in terms of activities and processes that support it. Grant (1996a) notes that understanding the organizational processes through which knowledge is integrated is an underdeveloped area of research where much remains to be done both on the empirical and the theoretical level.

Nonaka and Takeuchi's (1995) SECI-spiral is the most widely disseminated model that explains how individual tacit knowledge contributes to knowledge creation of the whole firm. They portray this occurring through a sequence of knowledge conversions where tacit knowledge of individuals is transmitted to a wider audience by being

externalized into explicit knowledge, and then internalized back into tacit knowledge. However, the model has been criticized for being fundamentally individualistic. For example Spender (1996b) argues that the theory does not in fact deal with how knowledge is transformed from individual to social level, but rather how individuals transmit information to each other in different forms. In other words, the SECI-model consists of conversions from conscious to automatic knowledge and back, and is suited only for explaining how individuals learn each others' individual knowledge, not how knowledge is transformed into a social level. The fundamental fallacy in the model is that it equates organizational knowledge with the knowledge of individuals, and thereby avoids ever discussing the shared organizing principles of the firm.

Secondly, the SECI-model (Nonaka, 1991; Nonaka & Takeuchi, 1995) is more representative of learning rather than of producing new knowledge. This is because its starting point is the tacit knowledge that *already exists* within individual minds, which is then shared with others in tacit form in the socialization phase, and converted into explicit form in the externalisation phase. Thus, ironically, there is no space in Nonaka and Takeuchi's knowledge creation spiral where genuinely new, *not pre-existing knowledge*, for example in the form of radical, discontinuous innovations, could emerge. In other words, the SECI-spiral is a model of how the members of an organization learn from each other and refine their existing knowledge but is not adequate for understanding radical organizational changes and innovations. The model can also be criticized for painting too uniform a picture of knowledge creation, because it portrays knowledge creation to be based on mutual understanding and adaptation. However, it has been well established by other researchers that *conflict* among diverse viewpoints is necessary for the emergence of new ideas (e.g. Kanter, 1988; West, 1990, 314; Nemeth, 1997). This conflict- and critique-driven nature of knowledge creation is effectively ignored in the SECI-spiral.

The main strand of literature examining how collective knowledge is acquired is that of organizational learning. However, this literature is characterized by several fundamental fragmentations and lacks a unified paradigm. First, the literature on organizational learning is characterized by a split between two opposing views of

what or who learns, the individualistic view and the organizational view (Miner & Mezias, 1996). Herbert Simon (1991, 176) represents the individualistic view as he argues that "all organizational learning takes place inside human heads; an organization learns only in two ways: a) by the learning of its members or b) by ingesting new members who have knowledge the organization didn't previously have". However, as it is well known that organizations do not change simply by employee turnover this cannot be a sufficient characterization of how organizations learn (Kogut & Zander, 1992). On the other side there are such views as the 'learning organization' school that see organizations as learning agents in their own right (e.g. Senge, 1990). This approach has been criticized because it tends to assume that an organization should learn things as a whole, meaning that everyone in the firm should know all of the same things (e.g. Grant, 1996b). Since human beings are subject to cognitive limits, i.e. there is only so much one person can know, learn and remember, this requirement would naturally greatly diminish the scope of the organization's total stock of knowledge. Explaining how collective knowledge is developed seems to require a middle ground view, which does not treat the organization as one unitary whole nor reduce learning to take place solely within individual minds, but looks at how collective knowledge develops through the interactions of organizational members and units. For example the theories of Ghoshal and Gratton (2002) and Grant (1996b; 2002) seem to be more mindful of this issue, as they explicitly focus on the platforms for knowledge combination.

Second, in their extensive reviews of the organizational learning literature, both Fiol and Lyles (1985) and Huber (1991) have noted that the literature actually covers two distinct concepts: cognitive learning and behavioral learning. Connected with individual and social levels, these can be attributed to Spender's (1996a; 1996b) typology of four types of knowledge. According to Spender (1996a), each knowledge type implies a different learning and memory process. For example objectified knowledge emphasizes memory: libraries, data banks, standard operating procedures etc., but devalues learning: "[T]here is no knowledge development here. Learning would mean only the processes of storage and retrieval, of adding to the library, creating indexes, and withdrawing the books. The knowledge stored comes from

elsewhere." (P. 71.) In contrast, learning at the collective level is "the outcome of the interplay between the conscious and automatic types of knowledge, and between the individual and collective types of knowledge as they interact through the social processes of the collective, such as teamwork" (p. 71). In other words, Spender is suggesting that the development of individual types of knowledge contribute to the development of collective knowledge. The main flow is between individuals' conscious knowledge and collective knowledge. However, Spender presents no more specific account of why this is the case and how the interaction takes place.

Even though the function of collective knowledge is to integrate the knowledges scattered around the organization into a synergistic whole, it is important to note that shared principles of cooperation and knowledge combination do not equal complete homogeneity and similarity across individuals. They are questions of shared organizational know-how, procedural knowledge or back-face knowledge, rather than similar know-that, declarative knowledge or front-face knowledge (Ryle, 1949; Kogut & Zander, 1992; Spender, 2002). Ghoshal and Gratton (2002) underline that organizational cohesion does not have to mean homogeneity, and present horizontal integration as a solution to the need for balancing increasing organizational complexity, size and diversification with cohesion. They suggest that companies successful in achieving cohesion without hierarchy are implementing four kinds of horizontal integration mechanisms:

- Operational integration through standardized technological infrastructure,
- Intellectual integration through shared knowledge base,
- Social integration through collective bonds of performance,
- Emotional integration through shared identity and meaning.

Ghoshal and Gratton suggest that individual and subunit autonomy co-evolve with horizontal integration in a dynamic process. Whereas vertical integration smothers bottom-up initiatives, horizontal integration creates a reinforcing process where both autonomy and integration flourish. Even though Ghoshal and Gratton do not make this link, a similar idea to that of horizontal integration is found in the literature on loosely coupled organizational structures. Loose coupling implies simultaneous

existence within a system of distinctiveness of the parts and responsiveness of the whole (Orton & Weick, 1990). In other words, loosely coupled systems are coherent wholes but yet not completely homogeneous.

Also Grant (1996b; 2002) emphasizes that combining knowledge across the firm does not require cross-learning of know-that between members of the organization. In fact, according to Grant (1996b; 2002) knowledge integration precludes the need for cross-learning. Based on Simon's principle of bounded rationality, learning what other organizational members know would lead to overlapping know-that and skills and be a waste of resources; it is more useful if each individual has their own area of expertise. In other words, the idea is not that each employee should learn to know all that the other employees know, but rather in the ideal situation, each individual has his/her specialized area of expertise, which can be integrated with others' expertise without everybody having to learn all that which is combined. Here collective knowledge and shared modes of cooperation and communication function as platforms that increase efficiency of integration. As Grant (1996b, 114) explains: "If Grant and Spender wish to write a joint paper together, efficiency is maximized not by Grant learning everything that Spender knows (and vice versa), but by establishing a mode of interaction such that Grant's knowledge of economics is integrated with Spender's knowledge of philosophy, psychology and technology, while minimizing the time spent transferring knowledge between them."

Grant (1996b; 2002) has proposed four mechanisms by which knowledge is integrated in firms. First, the use of rules and directives provides a means by which tacit knowledge can be converted into readily comprehensible explicit knowledge that can then be used by others in the firm. Second, efficiency in knowledge integration can be improved if production activities are organized in a time-patterned sequence so that each contributor can do his or her part of the task independently of others. The third mechanism is routines, which are manners for organizing even complex patterns of interaction requiring simultaneous performance of many individuals. Maximizing the use of rules, sequencing and routines increases efficiency by minimizing the need for communication and cross-learning. The fourth integration mechanism in Grant's typology is group problem solving and decision making, which is meant to be used

for tasks that are more unusual, complex or important, and therefore require more intense interaction.

2.1.6 Collective Knowledge and Change

The studies reviewed in the previous chapter are mostly focused on explaining constancy, continuity and coherence of collective knowledge. The picture painted by these accounts is curiously stable. One cannot help to wonder whether this is the whole truth: what about the transformative, provisional and contested aspects of collective knowledge? Is there nothing more to organizational know-how than the provision of a shared mental platform that enables codification and replication? Are there no internal discrepancies in collective knowledge? How are collective knowledge and organizing principles related with change? How do they themselves change, or do they ever? These kinds of issues are largely left unaddressed by the previous research.

There is surely more to collective knowledge and organizational capabilities residing in it than replication and re-creation of the existing ways of conduct and maintenance of constancy. Especially in rapidly changing environments, firms need to continuously modify and change their products, services, operations and strategies (e.g. Hamel, 1998a; Teece et al., 1997; Brown & Eisenhardt, 1998). Generation of new knowledge and innovation on all levels of the firm has become increasingly essential for a growing number of companies and this trend is argued to intensify (Hamel & Prahalad, 1994). If replication and maintenance are not enough, then what kind of requirements does this pose for collective knowledge and organizing principles?

Some authors within the knowledge management perspective do recognize that in turbulent conditions, sustaining competitive advantage crucially depends on the capability of the firm to create new innovative combinations from existing knowledge and to benefit from new knowledge from external sources and learning. For example,

Grant (1996a, 382) observes that "while integration across a wide scope of specialist knowledge is important in sustaining competitive advantage, hypercompetitive conditions ultimately result in all positions of competitive advantage being eroded by imitative or innovative competition. Hence, maintaining superior performance ultimately requires the continual renewal of competitive advantages through innovation and the development of new capabilities." He proposes that the key to achieving continual renewal is *flexible knowledge integration*, which encompasses two dimensions: a) extending existing capabilities to encompass new knowledge, and b) reconfiguring existing knowledge into new types of capabilities. The creation of new knowledge is accentuated also in Kogut and Zander's (1992) concept of 'combinative capability', i.e. capability of the firm to exploit its existing knowledge and the unexplored potential of the technology to generate new applications from existing knowledge. Similarly, Henderson and Cockburn (1995) talk about 'architectural competence', "the ability to use component competencies [local abilities and knowledge that are fundamental to day-to-day problem-solving], to integrate them effectively and to develop fresh component competencies as they are required" (p. 65). However, even though these researchers do recognize that firms need capabilities for mastering change, they fail to propose what kind of organizing principles would enable such mastery and offer little guidance as to the management actions needed to achieve such capabilities.

Clearly, firms need organizing principles which can support not only exploitation of existing knowledge, but also exploration (March, 1991), i.e. construction of new knowledge, capabilities, and strategies. However, the authors in the knowledge management perspective have so far concentrated mostly on the exploitation part. This is clearly a gap in the existing theory and research. This dissertation attempts to bridge this gap by using system theoretical approach to knowledge integration to explain *what kind of higher-order patterns of organizing lead to renewal in organizational knowledge base, operations and strategies*. Use of the concept renewal capability rather than some other more established concept is meant to demarcate the explicit focus on change and production of new knowledge.

Organizational renewal implies change. However, change is not a unidimensional concept. The literature on organizational change includes many different typologies of change. For example, different types of change as well as theories of change have been distinguished based on

- magnitude of change (such as incremental versus radical change, e.g. Tushman & Anderson, 1986)

- process of change (e.g. evolutionary, dialectical, life cycle, teleological, see Van de Ven & Poole, 1995)

- rhythm of change (episodic versus continuous change, Weick & Quinn, 1999)

- intentionality of change (planned versus emergent change, e.g. Brown & Eisenhardt, 1997)

- unit of change (individual, group, strategic business unit, organization, network etc.)

- perception of change (threath, opportunity, or an intrinsic aspect of management, Kilduff & Dougherty, 2000)

The important point for the purposes of the current discussion is that there are a multitude of perspectives and many different types of change. Consequently a model of organizational renewal has to recognize and cover several types of change if it is to present a holistic description of this phenomenon. Types of organizational renewal can be categorized by constructing a matrix where the two types of organizational level knowledge (Kogut & Zander, 1992; Spender, 1996a; 1996b; 2002) are related with magnitude of change (see Figure 2).

	Organizational know-that	
	Replicated	Changed
Replicated **Organizational know-how**	Maintenance	Incremental development
Changed	Radical innovation	

Figure 2. A framework for classifying organizational renewal types

Maintenance type of renewal consists of replication of organizational-level know-that and know-how across the firm. It implies changes only in individual skills and knowledge. For example, as new organizational members are socialized to the ways of the firm, their individual knowledge is altered, but organizational-level know-that and know-how remain unchanged. The main goal is to sustain the current operational mode of the organization in a maximally efficient manner. Maintenance type of renewal is similar to knowledge application (Spender, 1992), exploitation (March, 1991) knowledge use (Henderson & Cockburn, 1995), and operational flexibility (Volberda, 1996), and it is on this aspect of organizational renewal that most of the literature on collective knowledge is focused.

Incremental development type of renewal is characterized by changes in social level know-that in addition to changes in individual know-that and know-how. The organization's collective stock of knowledge is increased by building on the existing capabilities and extending them by cross-learning and by assimilating new information from external sources. Incremental development is related with firm's ability to make subtle changes and improvements on its existing knowledge, while leaving collective know-how unquestioned. It is analogous to single-loop learning

(Argyris & Schön, 1979), incremental innovation (e.g. Tushman & Anderson, 1986), modular innovation (Henderson & Clark, 1990), competence-enhancing change (Abernathy & Clark, 1985), adaptive maneuvering capacity (Volberda, 1996) and continuous improvement (e.g. Bessant & Caffyn, 1997).

Radical innovation type of renewal is characterized by changes on organizational know-how. This type of renewal alters the underlying paradigms or operating principles of the firm. Organizational know-that, in contrast, may be replicated or upturned. In the first case, it is a question of re-interpreting the existing elements into a new constellation, as in an architectural innovation (Henderson & Clarke, 1990). In the second case, the firm experiences a dramatic change in both content and combination of its competencies, for example through a merger. In addition to the literature on radical innovation (e.g. Tushman & Anderson, 1986), this renewal type is related with the notions of transformational change (Nutt & Backoff, 1993), competence destroying change (Abernathy & Clark, 1985), double loop learning (Argyris & Schön, 1979), strategic flexibility (Volberda, 1996), and strategic innovation (Hamel, 1998b).

Important as it is, the creation of new organizational-level knowledge and especially new organizational know-how is portrayed in the literature as difficult, slow and costly. Grant (1996a) notes that flexible knowledge integration presents a 'formidable challenge' to management. According to him, the ease of extending existing capabilities with new knowledge depends on whether this new knowledge is explicit or tacit. Integration of explicit knowledge is relatively easy, but as tacit knowledge is embedded in its local context, acquiring it is likely to be problematic. The second dimension of renewal in his model, reconfiguration of existing knowledge through new patterns of interaction, is even more complex, even though he recognizes that it may be the most important source of competitive advantage. Kogut and Zander (1995) note that as identity, which in their view is the main source of coordination and discoursive practices in the firm, is subject to requirements of consistency, it tends to rule out potentially interesting avenues for innovation and creativity. Henderson and Clark (1990) observe that architectural or collective knowledge is a potential source

of stagnation in firms. As this knowledge is embedded in the structure and processes of organizations, it is to large extent 'invisible', taken for granted and rarely questioned. Thus, as well as a source of core capabilities, it can be a potential source of core rigidities (Leonard-Barton, 1992b). Also the treatment of Spender (2002) of collective knowledge in terms of coherent organizational sense of self emphasizes the stable and constant aspect of collective knowledge. Similarly, Levinthal and March (1993) discuss the tendency of organizations to limit their search options to fit the prevailing frameworks and exploitation to smother exploration, while Nelson and Winter (1982) underline regular and predictable routines as repositories of a firm's shared knowledge, and Argyris and Schön (1979) note the difficulty of double-loop learning that alters the basic underlying paradigms of the organization.

However, even though difficult, instances of exploration, double-loop learning and flexible integration are known to happen. How, then, do they come about? What kind of shared operating principles enable them to happen? To explore these questions, this dissertation draws upon theories which offer an alternative approach to organizational change, namely theory of autopoietic systems and 'postmodern' approaches to organizational change (cf. Chia, 1995; 1997). Both these approaches view change as an inherent and pervasive feature of organizational life and conceptualize organizational functioning and coordination through the lenses of continuous renewal and re-creation. They also share a common position that organizational change is produced from within, as it is the interrelated activities and interpretations of the organizational members that constitute the organization. In addition, these two strands of theories assume that regeneration and change are necessary features of all organizations, not only of firms in especially turbulent conditions – in fact, it is assumed that without continuous self-generation, the organization does not stay together but dissolves. In other words self-renewal is an intrinsic aspect of organizational functioning. Through the looking glass of these two strands of research, change is not something contradictory to collective knowledge and organizing principles but an inherent property of them.

In the model of organizational renewal put forth in this dissertation, it is assumed in accordance with the theory of autopoietic systems (Maturana & Varela, 1980) that organizations have to continuously reproduce and re-create themselves and their boundaries. The term 'autopoiesis' is derived from Greek words 'auto' (self) and 'poiesis' (production), and signifies self-production. Maturana (1980, 30) explains that an autopoietic system is "a closed network of productions of the *components* that recursively, through their interactions, *realize the network that produces them and constitute its boundaries* by realizing the surface of cleavage that separate it as a composite unity in the space in which they exist" [italics added]. For example, scientists reproduce the scientific community of practice by their scientific activities; but at the same time it is this very community that gives the individuals their identities as scientists and validates them. In other words, the elements of the autopoietic system continuously regenerate the system, and the nature of the system is revealed in the interaction between its elements.

Autopoietic systems are paradoxically both open and closed: they do exchange energy and information with the environment, so in this sense they are operationally open. However, they can be characterized as organizationally closed because they are autonomous in reproducing themselves, meaning that they control their own boundaries and all the incoming matter is translated in relation to the system core. Applied to organizations, this means that they are open in relation to information, but closed in relation to knowledge: organizations get information from their environment, but this information is turned into knowledge only by means of interpreting it, and this interpretation always happens by reference to the organizational sense of self (Vicari & Troilo, 1998). Maula (1999; 2000) calls these two processes the sensory function and the memory function of the firm. The memory function of the firm refers to the self-referential nature of organizational activities, while the sensory function addresses the requirement for constant development. Maula's model explicitly addresses the dilemma between organizational openness and exploration on the one hand, and closure and effectiveness on the other.

Another important point of reference of the renewal model are the 'postmodern' approaches to organizational change, which view change as an ongoing and inherent property of organizational life, rather than as a rare massive scale occurrence (e.g. Orlikowski, 1996; 2002; Weick, 1998; Tsoukas & Chia, 2002). These studies conceptualize organizations as entities constituted by change, in an ongoing process of 'becoming'. They point the way for understanding organizations as continuously self-renewing entities of human activity, as patterns that arise from interrelated actions of organizational members.

Tsoukas and Chia (2002) argue that traditional approaches to organizational change have been dominated by assumptions that have centralized stability, routine and order, and as a result have reified organizational change and treated it as something exceptional rather than natural. They elaborate on the double meaning of organization(s) as an act of organizing and as a context for emerging human action: "*Organizations* are sites of continuously changing human action, and *organization* is the making of form, the patterned unfolding of human action. Organization in the form of institutionalized categories is an input into human action, while in the form of emerging pattern it is an outcome of it; organization aims at stemming change but in the process of doing so it is generated by it." (P. 577.) As long as organizational theory views change in terms of order and control, it is unequipped to understand creativity and innovation (Weick, 1998). Consequently, it has been suggested that change should be treated as the *normal condition* of organizational life (Tsoukas and Chia, 2002), and that organization "is at best a *tendency* and never a *state*" (Linstead, 2002, 105). Weick (1998) proposes that improvisation, i.e. reworking and reenacting existing materials and designs (whether organizational routines or jazz compositions) in relation to unanticipated ideas and conditions encountered in the moment, may be a part of the infrastructure in all organizing and that structure, control and authority in organizations are, in fact, built up by constant improvisational processes. In line with the theory of autopoietic systems, this approach assumes that how organizations respond to exogenous events is endogenously conditioned, i.e. it depends on the firm's self-understanding (Tsoukas & Chia, 2002).

The double meaning of organizations referred to above (Tsoukas and Chia, 2002) brings up an important issue: also the organizing principles are characterized by a similar double nature. On one hand, the shared manners of knowledge integration form the inter-subjective frameworks for the activities of organizational members and regulate and constrain their behavior; and on the other, the organizing principles are constantly re-produced by the interrelated activities of organizational members and are potentially open for change. Consequently a model of organizational renewal has to recognize and deal with this *double nature of collective knowledge as both a platform for renewal activities and itself subject to change*.

2.1.7 Renewing Organizations as Three-Dimensional Knowledge Systems

Organizational renewal capability is rooted in the collective knowledge of the organization. The three types of organizational renewal come about through the constant interactions among organizational members. Specifically, it is argued that different types of organizational renewal result from distinct relational patterns within the firm. Renewal capability of an organization depends upon crating a strategically wise combination of the organizing principles by which people cooperate.

This dissertation draws mainly upon Ståhle's (Ståhle & Grönroos, 1999; 2000) model of organizational knowledge environments for examining how organizing principles of firms are associated with change. In this model organizations are conceptualized through system theoretical lenses. The main characteristic of system theories is that they concentrate on the connections between the elements of the system rather than the attributes of the elements per se, which means that they offer a suitable basis for approaching organizations as knowledge integration devices, constituted by interactions between their members. This type of approach is compatible with the ideas of knowledge as inter-subjective and activity-based (see Chapters 2.1.1 and 2.1.2).

The systemic movement at large does not adhere to a uniform, integrated grand theory, but rather consists of a wide spectrum of theories and concepts formulated by scientists from diverse disciplines. The systemic view has been used to describe a large variety of phenomena ranging from thermodynamics to human behavior. Accordingly, even the definitions as to what consists a system tend to vary a great deal depending on the point of departure of the given author. (Ståhle 1998, Luhmann, 1995; Black, 2000.) Based on this lack of coherence in systems-based views, Ståhle (1998) discerned three underlying paradigms of systems thinking, which she labels mechanistic, organic, and dynamic. All the paradigms address systems, but their starting points and foci are distinctly different, and consequently, each of them depicts systems from a different perspective. For example, from the viewpoint of mechanistic tradition, systems are orderly and regularly functioning, while within the dynamic paradigm they are portrayed as self-organizing and self-referential. Table 7 summarizes the main characteristics of the three paradigms.

The first paradigm of systemic thought can be characterized as mechanical, linear, and deterministic. It focuses on universal laws, principles and regularities, and stresses predictability and preservation. Systems are perceived as closed, determined to maintain stability by reducing and minimizing all interaction with the environment. The type of research conducted within the realm of this paradigm is intended to explain and define natural laws and principles and to predict events conforming to the formulated theories. Systems are perceived as being self-contained entities and no weight is put on the environment in which they exist. Ultimately, this perspective results in a theory that considers *systems as machines that operate according to predetermined laws and aims to predict and control their functioning*. (Ståhle, 1998.)

Paradigm Characteristic	Mechanistic	Organic	Dynamic
➤ **Theoretical origins**	Newton, classical physics	Von Bertalanffy's General Systems Theory	Chaos and complexity research, self-organizing and autopoietic systems
➤ **Research focus**	Principles, laws, regularities, predictions	Feedback processes, relationships and interactions with environment	Spontaneous organization, continuous self-production and self-induced change
➤ **Operative interest**	Predicting, controlling, preserving	Steering, sustaining	Opening up for natural evolvement, evolution and innovation
System			
➤ **Type**	Closed, static, deterministic	Open, equifinal	Uncontrollable, emerging, self-organizing, self-producing
➤ **Main function**	Efficient rule-like functioning, linear	Self-regulation, striving for stability and equilibrium, linear or cyclic	Continuous self-renewal and self-production, non-linear
➤ **State**	Static, permanent, sustaining	Near equilibrium	Far-from equilibrium
Environment			
➤ **Role**	Non-existent	Causal chain of events that effects the system	Created by the system's self-reference
➤ **Boundary**	Closed	Open	Open and/or closed
➤ **Relationship**	Systems as self-contained wholes	Adaptation to environment; open interchange with environment, inputs and outputs explained by feedback loops, interdependence	System must maintain a distinct identity and be self-productive; Systemic capacity for change is greater than environment's capacity for change
Change			
➤ **Role**	Catastrophe	Momentary disturbance	Necessity
➤ **Source**	No change	Environment, adaptation to environment	Entropy, fluctuations, continuous process of self-production
➤ **Pace**	Slow	Moderate, continuous	Sudden, bifurcative
➤ **Means of knowledge creation**	Exploitation of existing knowledge	Information from environment is processed internally into knowledge	Self-referential interpretation of data from environment / within the system, iteration of weak signals

Table 7. The paradigms of systemic thought
(Cf. Ståhle, 1998)

The second paradigm considers systems as organic, open and in constant interaction with their environment. Its focuses on upholding an unsettled and uncertain stability by regulating it and hindering it from declining into total disorder through steering and controlled interactions with the environment and other systems. As such it allows for change through evolution[15], as opposed to rules and regularities, and instead of

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[15] Evolution in contrast to revolution (cf. Brown & Eisenhardt, 1998)

total forecasting and controlling it produces continuous development. This paradigm is ultimately based on the Second Law of Thermodynamics, which states that when systems are left to themselves, their internal dynamics are bound to become disordered, and to drift towards irreversible decay. For this reason, open systems are dependent upon their feedback with environment for stability, which, in this view, equals survival. The world is perceived as consisting of various systems, which are in constantly interaction with each other and which coexist both within one another and in parallel. To maintain themselves, systems must exchange energy, information or matter with their environment and keep the *feedback processes* (*input, throughput, output*) ceaselessly active. Thus, within the organic paradigm, the *relationships and interactions of systems with their environment* are emphasized, and internal regulation and adaptation to both internal and external changes are regarded as crucial. (Ståhle, 1998.)

The third and the most recently emerged paradigm focuses on the non-linear and unpredictable behavior of systems, rather than on controlled growth, and on internal dynamics and self-induced change instead of adaptation to the environment via feedback processes. Its main focus is on how systems utilize extreme instability, chaos and unmanageable complexity in order to gain *dynamic stability*. According to this view, systems take advantage of sensitive non-linear interactions and co-working resonances between the system as a whole and its sub-systems. As a net result, the system gains dynamic stability on the level of the system as a whole, which is based on continuous and fluctuating instability, or chaos, on all or part of its sub-system levels. This systemic paradigm, often labeled as the 'science of chaos' or 'complexity research', draws mainly from four sources: 1) the chaos theory, 2) self-organizing systems, 3) complexity research and 4) autopoietic systems. The dynamic paradigm reveals the extreme complexity of systems and the significance of a chaotic, non-equilibrium state. It emphasizes the *capacity of systems for spontaneous renewal and ability for self-induced change*. (Ståhle, 1998.)

Many scholars have traced the development of systems thinking in a manner that overlaps with Ståhle's (1998) three-fold distinction. For example, in their classic work

Burns and Stalker (1961) classified organizational systems as either mechanistic or organic. Some other divisions distinguish between the mechanistic and dynamic views, while neglecting the organic open systems tradition (e.g. Tetenbaum, 1998; Black, 2000). Yet others assimilate the dynamic paradigm with the organic one (e.g. Sanchez, 1997). Some authors categorize system theories according to a logic that differs from Ståhle's (1998); for example Morel and Ramanujam (1999) label self-organization and complex adaptive systems as paradigms within the complex systems theory. Interestingly, the three-fold division coincides with the historical three-stage model of the development of science. Prigogine and Stengers (1984) state that the first stage of science focuses on steady or equilibrium states. The second stage begins with the recognition of periodic fluctuation, i.e. the operation of oscillations whereby systems move in and out of (but still remain near to) a state of equilibrium. The third stage is the exploration of states of extreme instability, so-called chaos, where true rather than only quasi- or illusory system transformation may occur.

The three-fold division into mechanistic, organic and dynamic system paradigms (Ståhle, 1998) categorizes the field based on an analysis of the chronological development of the myriad strands and applications of systems theory and research. However, it is important to note that the differences between these three approaches are far from clear-cut, and they may be seen as existing along a continuum. In addition, none of the paradigms are internally unidimensional or completely consistent. Nevertheless, this division is a suitable framework for categorizing relatively comprehensively the concepts and explanations that have guided the scientific work on systems, and thereby it provides a robust basis for the construction of a systemic theory that comprises the significant facets of business organizations.

In her subsequent work Ståhle (Ståhle & Grönroos, 1999; 2000) has applied the idea of three systemic models to organizations[16]. In this framework, organizations are portrayed as knowledge systems, encompassing three kinds of *knowledge environments,* namely mechanistic, organic, and dynamic. Knowledge environments

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[16] It should be noted that the scientific dimension of the Ståhle & Grönroos (1999; 2000) model of knowledge environments is based purely on system theories; they do not make any reference to management or organization science literatures.

are equivalent to the shared organizing principles (Kogut & Zander, 1992) or collective knowledge of the firm (Spender, 1996a; 1996b). They can be understood as the platforms where knowledge integration (Grant, 1996b; 2002) takes place or as 'information transaction spaces' (Huizing & Bowman, 2002). It should be noted that even though the three knowledge environments are based on the chronological development of systems thinking in general (see Ståhle, 1998), it is *not* assumed that organizations would evolve in this order. In fact, the model of organizations as three-dimensional knowledge systems suggests that every organization is a *combination* of mechanistic, organic and dynamic features. The main emphasis of the organization can oscillate between the three knowledge environments in any order, and there is no reason to presume that organizations should progress from mechanistic through organic to dynamic functional mode.
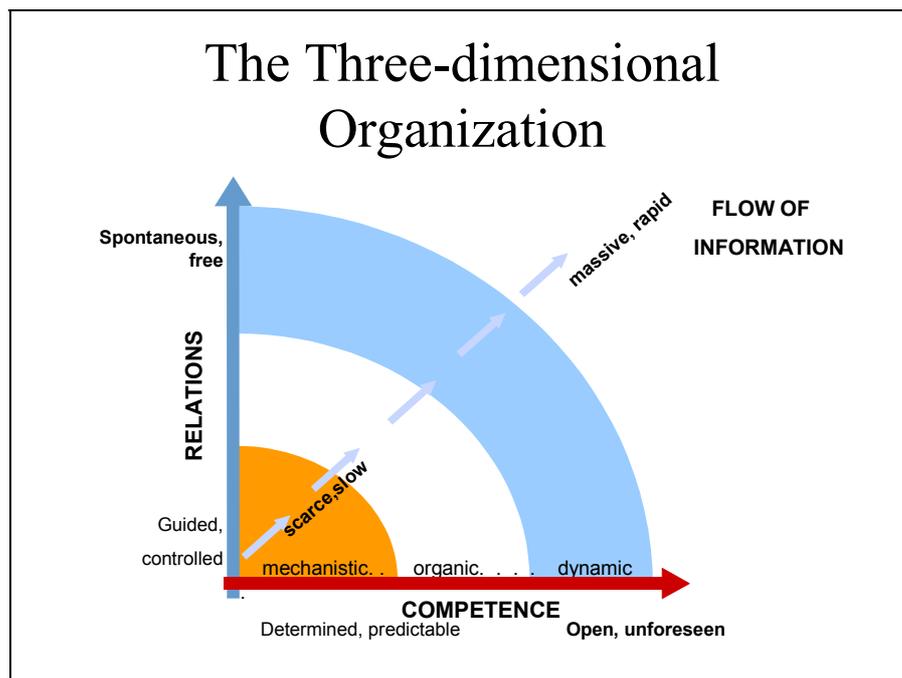
Figure 3. Organization as a three-dimensional knowledge system
(Based on Ståhle & Grönroos, 2000)

In Ståhle's (Ståhle & Grönroos, 1999; 2000) model, organizations are described by distinguishing the qualities of the *system constituents* in each knowledge environment

(see Figure 3). Four main factors that constitute an organization and define it as a system are its *relationships, information flows, know-how and power structures (*demonstrated and formed by *management).* The theoretical foundation of the systemic analysis of organizations is largely based on the combination of systemic characteristics with the three system classes. Their significance can be characterized as follows:

1. A system is constituted and demonstrated by its *relationships*, not only by the elements of which it is made up. The weaker the relationships are, the weaker the organization is as a system. Data on the features of the relationships reveals the principle of how the system is organized. The relationships in different types of systems are formed and maintained in a different manner.

2. All the changes in the system are caused by *exchange of information*. Relationships form channels for *information flows* within a system. In a systemic sense, information is also the only source for the maintenance and renewal of a system. The focus is not the content of information but the flow of it. Information, however valuable it potentially would be, is without value until it is linked to activity.

3. Organizations are purposeful and goal-oriented systems, in which information needs to be exchanged and enriched by its members. In social systems, the value of the exchanged information is always linked to its meaning (Luhmann, 1995), which in business organizations is connected with the organization's primary task and chosen strategy. Even if information was widely exchanged and thus the organization had great potential for change, without proper and strategy-linked *know-how, capabilities* and *competencies,* the flexibility would be without any value.

4. Systems are always *hierarchical* and composed of several degrees of sub-systems which cooperate with each other. The steering and regulating forces in a system might come from anywhere on the continuum ranging from mechanistic regulations to the principles of dynamic self-organization. In real-life organizations these functions are set up and represented by *management*. Thus, data concerning an organization's management functions act as a source for systemic data.

Table 8 presents a summary of the three knowledge environments and their defining characteristics.

Knowledge environments	Mechanical	Organic	Dynamic
Objective	Permanent efficiency	Gradual development	Continuous innovation
Knowledge	Defined, explicit	Experiential, hidden, tacit	Intuitive, potential
Relations	Determined by the organizational hierarchy	Reciprocal, seeking consensus	Spontaneous, networked
Information flow	One-way	Multi-way	Chaotic
Management tool	Orders from management	Dialogue, agreed working methods, self-assessment	Networking skills, visions
Leadership method	Direct use of power	Delegation of power	Relinquishing power

Table 8. The three knowledge environments
(Based on Ståhle & Grönroos, 2000)

The mechanistic knowledge environment (Ståhle & Grönroos, 1999; 2000) is the platform for maintenance type of renewal and production of stability and reliable quality. From the mechanistic viewpoint, organizations are seen as ordered, regularly functioning, machine-like entities. They are directed from the top of the organizational hierarchy, and the function of top management is to control and ensure that the organizational machinery functions as effectively as possible according to predetermined objectives. The organizational hierarchy determines the patterns of the relationships within the organization, and information flows are typically one-way and top-down. The essential type of knowledge is defined and explicit. The most important characteristics of organizations are unanimity, predictability, continuity and manageability. For example, Taylor's scientific management and Weber's bureaucracy adhere to this view. The most evident contemporary examples of highly mechanistic organizations are crisis organizations such as fire departments, hospitals and the army, which are required to operate quickly and routinely according to perfectly controlled action chains – very much like programmed machines.

The mechanistic and organic knowledge environments can be connected with Grant's (1996b; 2002) theory[17] of knowledge integration mechanisms.[18] Use of rules, sequencing and routines for integrating knowledge (Grant, 1996b; 2002) increases effectiveness of maintenance type of renewal conducted in the mechanistic knowledge environment. This implies that the significant knowledge is mostly in explicit form, as this enables its fast transfer and wide reach. The requirements for personal communication are also minimized, as the more standardized a given task is, the less interdependence it requires. Codified knowledge enables centralized decision-making because as well as being easily transferred from one location to another, it can also be aggregated at a single location Grant, 1996; 2002). Thus hierarchical authority structure supports maintenance type of renewal.

The organic knowledge environment (Ståhle & Grönroos, 1999; 2000) produces incremental development type of renewal. When applied to organizations, the organic paradigm stresses their communicative and dialogical nature. Instead of drawing parallels between organizations and machines, this view compares them with living organisms. Organizations are seen as being organic and open systems that depend on constant interaction. Attention is drawn to information flows into the organization (input), to the processing of information inside the organization (throughput) and to the information that comes out of the organization (output). Change is managed by controlling these flows – in other words the organization is kept simultaneously in a state of constant movement and constant equilibrium. As living, complex systems, organizations require a different kind of management from mechanistic organizations. Steering the organization is about delegating power, creating feedback systems and ensuring continuous two-way communication throughout the organization and not about authoritarian control. The valued type of knowledge is experiential, hidden and tacit, which can only be shared in real-time social interaction. Thus, it is highly important to establish reciprocal relationships and frequent opportunities for

[17] See Publication 4 for a matrix connecting Ståhle's and Grant's ideas.
[18] Ståhle (Ståhle & Grönroos, 1999; 2000) has arrived at similar conclusions about the characteristics of competence, relationships, information flows and management in the mechanistic and organic knowledge environments as Grant (1996b; 2002), but she presents her model in a practitioner-oriented form and does not argue the issues in relation to relevant management science or organization science literature.

interaction throughout the organization. From the organic point of view, the overall operative interest lies in sustaining managed growth and adaptation to the environment, as well as producing customizing ability. Quality management programs are a good example of organic functioning with a view to controlled development, as their objective is to ensure both sufficient stability and predictability together with continuous managed growth and development.

The fourth mechanism in Grant's (1996b; 2002) typology, group problem solving and decision making, depicts the mode of knowledge integration in organic knowledge environment. According to Grant, these techniques are suited for tasks where the division of labor is based on task interdependence: the more interdependent people are in performing a task, the more they need to communicate in order to achieve coordination. In addition, joint problem solving and decision making are useful in tasks that are unusual, complex or important. These types of tasks require integration of tacit knowledge, and therefore fairly intensive interaction and communication is needed. In situations where the relevant knowledge is in tacit form, decision making cannot be centralized, but the power has to be delegated to where the tacit knowledge is located, and hence empowerment is in order.

The dynamic knowledge environment (Ståhle & Grönroos, 1999; 2000) is the platform where radical renewals are produced. The dynamic view depicts organizations as hectic, even chaotic entities, which have to cope continuously with uncertain, sudden and contradictory demands emerging both from within the firm as well as from the outside environment. Organizations are seen as dynamic, constantly changing networks with fuzzy boundaries. Relations and dependencies are very complex; a small change may have a great impact. In order to succeed, top management has to support continuous change instead of relying on supervision and control. Here, to support does not mean to control change but, rather, to have the ability to take risks as well as have a strong will and the capability to quickly adapt and cooperate under sudden contingencies. Decisions often have to be made on the basis of weak signals as well as intuitive, potential or self-transcending knowledge (Scharmer, 2000; 2001), where a fast, rich and often chaotic flow of information via

internal and external networks plays a major role. The operations aim at creating innovations and are inherently risky since it is impossible to control or predict either innovations or changes in the competitive environment. The organizational system is a spontaneous, fast-reacting, high-tempo and even chaotic entity. Chaos, however, does not refer to total disorder: there is a relationship between disorder and order – the key to profiting from the dynamic qualities of an organization is the ability of chaos to organize itself (cf. Prigogine & Stengers, 1984).

Grant's (1996b; 2002) treatment of knowledge integration mechanisms does not cover a mechanism directly suited to dynamic knowledge environment and production of radical renewal. While discussing the fourth knowledge integration mechanism, the group problem solving and decision making, he observes that such *consensus decision making* is costly given the difficulties in communicating tacit knowledge (Grant, 1996b, 115; 2002, 139). This reveals that for Grant, the main goal of this mechanism is achieving a consensus. However, consensus-oriented group processes are likely to preclude innovation. It is well established in social psychological studies of work group interaction that innovation or the creation of novel and useful ideas requires discrepant viewpoints and even a certain degree of intragroup conflict. For example according to minority influence research tradition, intragroup conflict is a necessary precondition for innovation and innovations are produced when a minority of a group's members succeed in inducing the majority to accept their views by acting in a coherent, persistent and confident manner (Moscovici et al., 1969; Mugny, 1982).

More recently, it has been argued that minority opinions are beneficial for innovation not because of their better quality or higher truth-value compared with the majority opinion, but because of the thought processes that exposure to dissenting views stimulates. Exposure to different views leads individuals to search for more information on the issue, to think more unconventionally and more divergently, i.e. to consider the issue from various perspectives. That is, minority dissent improves complex thinking, problem solving and creativity. (Nemeth, 1997; Nemeth & Owens, 1996.) Consensus-aimed decision making can at worst lead to group think phenomenon (Janis, 1982) where the strive for interpersonal harmony leads to

excessive conformity and overrides the aim for high-quality results. Therefore, Grant's list of knowledge integration mechanisms needs to be extended with an account of innovative team work, if it is to cover also the creation of radical renewal and not only maintenance and incremental development in organizations firms.

It is noteworthy that the model of organizations as three-dimensional knowledge systems (Ståhle & Grönroos, 1999; 2000) stresses that every organization is likely to include all three types of knowledge environments and consequently every organization needs each type of renewal to some extent. Therefore, any organization can be seen as a three-dimensional system where the mechanical, organic and dynamic features all have their own roles and tasks in providing competitiveness. The optimal combination of the three facets, in turn, depends on the organization's strategy: strategy should dictate how much relative weight is put on each mode of knowledge integration[19].

In this sense, organizational renewal capability can be conceptualized as capacity for managing the paradox between maintenance, continuous renewal, and radical change (cf. Lewis, 2000). Paradox in this context arises from the opposing tendencies and demands embedded in the various knowledge environments co-existing within the organization. Recently several researchers have emphasized the importance of recognition and management of paradoxical features within organizations. Leana and Barry (2000, 753) argue that some level of tension between stability and change is an inevitable part of organizational life, and that this tension should therefore be made visible in organizational models and research. Also Eisenhardt (2000, 703) acknowledges this tension and states that "[p]aradox is the simultaneous existence of two inconsistent states, such as between innovation and efficiency, collaboration and control, or new and old. Rather than compromising between the two in some sort of Goldilocks fantasy, vibrant organizations, groups, and individuals change by simultaneously holding the two states. This duality of coexisting tensions creates an edge of chaos, not a bland halfway point between one extreme and the other. The management of this duality hinges on exploring the tension in a creative way that

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[19] This idea is more fully discussed in Chapter 2.2.

captures both extremes, thereby capitalizing on the inherent pluralism within the duality."

Management of paradox is embedded, more or less explicitly, in many theories of organizational change and renewal. For example, the idea that purposeful change and productive creativity require a certain degree of cohesion but still some room for variation has been well established in research on group-level innovation (Tjosvold, 1985; West, 1990; Nemeth, 1997; Anderson & West, 1998). Volberda (1996) views organizational flexibility as arising from a balance between stability and change. Contrary to most of the definitions of organizational flexibility that view flexibility as the antithesis of stability, he argues that if flexibility is to have value it must be combined with stability. Similarly, Weick (1998) conceptualizes improvisation as solving the paradox between precomposed and spontaneous in action. Also Maula's (1999; 2000) model of organizations as autopoietic entities addresses the paradox between organizational openness and closure. Finally, Brown and Eisenhardt (1997; 1998) argue that organizations that succeed in continuous renewal are able to solve two types of paradoxes, or to balance on two 'edges', namely to create semistructures across an edge of chaos, and to create links across the edge of time.

This dissertation can be seen as an exploration into the inherent tension between constancy and change, coherence and diversity, and maintenance and innovation in organizations. Organizational capability for continuous change and renewal is viewed in terms of navigating the firm in a coherent manner, so that it can purposefully execute stabilizing routines, continuous incremental developments, as well as more radical and disruptive changes. Consistent with the idea of paradox as something that includes seemingly contradictory elements contained within the same whole, the theory of organizations as three-dimensional knowledge systems states that every organization includes both mechanical, organic and dynamic features, and that the interplay of the three seemingly opposing knowledge environments make up the intellectual capital creating dynamics of the organization. It is suggested that all of these three processes are at the heart of knowledge-based functioning of organizations (and larger entities such as inter-organizational networks as Publication 5 in the

second part of this dissertation demonstrates). However, the decisive factor in how these processes translate to competitive success is the extent to which they are managed and coordinated in a coherent manner across the organization.

2.2 The Strategic Management Perspective on Organizational Renewal Capability

The key question of strategic management concerns how competitive advantage of firms is achieved and sustained. When organizational renewal is approached from this perspective, the essential issue is how organizational renewal capability contributes to competitive heterogeneity among firms.

The strategic management literature of the last decades can be distinguished into several distinct approaches, each of which implies a different view of the significance and nature of renewal capability. On the whole the importance of the issue has augmented recently, prompted both by the changes in the market environment as well as the emergence of novel theoretical approaches to business strategy. Several scholars have noted that understanding and conceptualizing how companies appropriate returns from innovation and knowledge creation has become one of the main criteria for the advancement of strategic management (e.g. Grant, 1996b; Von Krogh & Grand, 2002; Kyläheiko, 2002).

In this chapter, the various approaches of strategic management are first briefly reviewed to present the basis on which the interest in organizational capability for change, development and renewal has sprung in the strategy literature. Then the chapter concentrates on the strand of strategic literature most closely connected with organizational renewal: the dynamic capability approach. Finally, the similarities and differences between dynamic capabilities and organizational renewal capability are discussed.

2.2.1 Toward a Knowledge-Based Strategy Theory

In the early 1980s the field of strategic management was dominated by the *competitive forces approach* initiated by Porter (1980). This approach is based on the

structure-conduct-performance paradigm of the industrial organization and focuses on acquiring monopoly rents through the selection of attractive industry and market segment, and the manipulation of market structure in order to create privileged product market positions. Successful strategic management thus consists of placing the firm in such a market position that monopoly power is sustained and negotiating power of rivals is diminished. As this approach concentrates on where the firm competes rather than how it competes, it has also been called the structural or the external approach. The view is essentially static as it assumes constancy of market structures and does not consider intra-firm factors but treats firms as black boxes. Consequently, it has little to offer for the understanding of renewal capability. The only way in which renewal capability could be comprehended within this framework would be to see it as correct strategic choices concerning strategic positioning (Kyläheiko, 2002, 24).

In contrast to the Porterian approach that concentrates on market structure and relative position as sources of rent, other recent approaches to strategic management take an opposing view and assume that rents flow from the internal structure of assets within the firm. This latter view is called the *resource-based view* of the firm. In fact, there seems to be some disagreement concerning whether all strategic theories making the assumption that rents accrue mainly from intra-firm differences should be classified under the resource-based view (e.g. Schendel, 1996), or whether for example the dynamic capability view and the knowledge-based view of the firm constitute distinctive strands of research on their own (e.g. Teece et al., 1997; Von Krogh & Grand, 2002). In any case, the difference with the external approach to strategy is apparent, as within the other perspective(s) the view is shifted to intra-firm characteristics.

The resource-based view conceptualizes firms as bundles of resources. Competitive success is based on Ricardian rents, which result from scarcity. The main determinants of firm performance are firm-specific assets and capabilities. An important factor in sustaining competitive advantage is the existence of isolating mechanisms for protecting the assets from the imitation of rivals.

The resource-based view of the firm is usually traced back to the works of Edith Penrose. In her book "The Theory of the Growth of the Firm" (1959) she approached firms as repositories of knowledge. She viewed experience, management skills and technological know-how as the sources of success and emphasized the importance of knowledge and experience accumulated within the firm. She also distinguished between managerial skills to maintain the business routines and entrepreneurial skills associated with flexibility and innovation, and noted that the more uncertain the future of a company, the more important the latter skills are. Penrose is also credited as being the predecessor of the knowledge-based and dynamic capability approaches to strategy (to be discussed later in this chapter), as she underlined that what explains performance differences between firms are not resources themselves but how the firms are able to use the resources in production of services.

The resource-based view of strategy proper was crafted decades later, beginning in the early 1980s with the contributions of Wernerfelt (1984) and Rumelt (1984) where they argued that scarce resources are the main sources of performance differences. Wernerfelt (1984) pointed out that if resources leak to rivals, competitive advantage will erode and thus a key issue is building 'resource position barriers' that inhibit this from happening. Rumelt (1984) remarked that the ability to create causal ambiguity is an important precursor of firm success. In other words, firms should inhibit competitors from identifying which of the resources are those that create added value. Barney (1991) advanced the theory by defining the attributes that characterize strategic resources: these should be valuable, rare, inimitable and nonsubstitutable. Further, he noted that imitation is inhibited if the resources are generated by a cumulative learning process, which is based on collective tacit knowledge. According to the reviews by Kyläheiko (2002) and Von Krogh and Grand (2002), in recent years the research on the resource-based theory has concentrated mainly on identifying resources, characterizing what makes them valuable and presenting new isolating mechanisms.

The resource-based view is widely disseminated these days but several weaknesses have been identified in it. First, in its traditional form, it is quite static, as the resources are taken as given and their generation and development is not examined. Therefore the resource-based view has little to offer for understanding renewal capability (Kyläheiko, 2002). Second, the approach has been criticized for tautological argumentation, because in empirical research the success of firms is explained by resources which are studied by identifying resources of successful firms. The difficulty in assessing the value of resources is related for example with the interconnectedness of resources (Kogut & Zander, 1992), which implies that some assets create value only when connected with other assets. Finally, according to Von Krogh and Grand (2002), the resource-based view overemphasizes firms' capability for imitative learning and is consequently lead to incorrectly infer that differences in firm structures, procedures, and behaviors will disappear over time, except for certain procedures that are protected by specific property rights regulations and measurement costs. This stance can be rebutted by bringing up the path-dependent and historical nature of an organizations resources and capabilities.

This is exactly what the third major view, the *evolutionary approach* to strategic management emphasizes. According to Nelson and Winter (1982, 175), "a particular firm at a particular time is a repository for quite specific range of productive knowledge, a range that often involves idiosyncratic features that distinguish it even from superficially similar firms in the same line(s) of business". This idiosyncratic knowledge of firms is stored as regular and predictable behavioral patterns, called routines, which Nelson and Winter equate with the biological analogy of genes. In contrast to the competitive force and resource-based approaches to strategy, the evolutionary theory views the creation of new ideas from the technological and organizational routines to be the key to competitive advantage, i.e. the rents are Schumpeterian.

Following Schumpeterian theorizing, evolutionary theory views innovation as recombination of elements that already exist: new routines and competencies are created by combining existing knowledge and routines in new ways. Von Krogh and

Grand (2002) note that this means that evolutionary theory can adequately cover incremental adaptation processes, but that proactive, revolutionary and disruptive innovation, competence building, and knowledge creation fall outside of the evolutionary framework. This limitation implies that in order to understand renewal capability, additional theoretical tools are needed which enable the treatment of radically new ideas and changes.

For overcoming the limitations of the competitive forces, resource-based and evolutionary approaches to strategy, a novel type of approach has been created: the *knowledge-based view* of the firm. This view considers the firm as a repository of knowledge resources and capabilities and is intimately linked with the knowledge management perspective on organizational renewal. Performance differences between organizations are thought to accrue due to their different stocks of knowledge and their differing capabilities in using and developing knowledge.

According to Grant (2002), the knowledge-based view is still in an emerging state and is more a set of ideas about the existence and nature of the firm that emphasize the role of knowledge than a theory in any formal sense. At the foundation of the knowledge-based view are the following observations about the role of knowledge in production and creation of value (Grant, 1996b; 2002; Kogut & Zander, 1992):

1) Knowledge is the critical input in production and the primary source of value.
2) There are different types of knowledge, which differ in terms of their transferability: explicit knowledge can be articulated and easily communicated, whereas tacit knowledge is revealed through its application and thus its transfer is slow, costly and uncertain.
3) Knowledge is used and created by human beings who are subject to Simon's principle of bounded rationality. This means that in order to be efficient in knowledge application and creation, individuals need to specialize.
4) Producing a good or a service typically requires the application of many types of knowledge.

5) Different types of knowledge vary in their potential for aggregation. Efficiency for knowledge aggregation is enhanced to the extent that knowledge is explicit, and diminished to the extent that it is tacit.

6) Knowledge is subject to unique problems of appropriability. Tacit knowledge can only be appropriated through its application to productive activity. Explicit knowledge is a public good and can therefore be sold without losing it, and the mere act of marketing it makes it available to potential buyers.

7) Knowledge is subject to economies of scale (due to replicability of knowledge) and scope (due to extensibility of knowledge), and knowledge-based industries can experience increasing returns.

Some authors consider the knowledge-based view merely as an extension of the resource-based view of the firm and regard the main difference between the two to be that the former focuses on knowledge, competencies and capabilities as the main sources of competitive advantage instead of other types of resources (e.g. Liebeskind, 1996). Other authors assert that there is a greater qualitative difference between the two and criticize the resource-based view more powerfully. Spender (1996b), for example, argues that by concentrating on the acquisition and protection of resources, the resource-based view underestimates the importance of how these resources are utilized and coordinated within the firm. He states that coordinating capacity is the essence of the firm and the main source of rent, and that to fully grasp it, the knowledge-based view of the firm requires a "new view of the firm as a dynamic, evolving, quasi-autonomous system of knowledge production and application" (p. 59). However, building such a theory will not be easy, as it requires going "beyond the concepts which our positivist training offers us" (p. 59).

In summary, it can be argued that among the studies identifying themselves with the knowledge-based view, those works that emphasize the significance of knowledge resources are closer to the 'traditional' resource-based view of the firm, and also the normative view of intellectual capital (to be discussed in Chapter 2.3). These studies do not deal with organizational change and development, and therefore are not useful for examining renewal capability. In contrast, those works that focus not on the

knowledge resources per se but on the ways in which they are utilized, maintained and created, are concerned with renewal-related issues. These studies can be seen as a further departure from the resource based view in the conceptual topography of strategic management, and are more interested in building a new paradigm for understanding organizations. The main theories contributing to this organizationally informed form of the knowledge-based view of the firm have been reviewed in Chapter 2.1 under the heading of knowledge management perspective.

It should be noted that the strand of research focusing on dynamic capabilities (to be dealt with in Chapter 2.2.3) is not synonymous with the knowledge-based view. Although the knowledge-based view and the dynamic capability approach share similar research interests, and even conclusions about the phenomena they study, these two tend to present themselves as somewhat unconnected strands of research: in the seminal texts of the dynamic capability approach the authors do not identify as followers of knowledge-based view, but rather trace the development of their ideas back to resource-based view and evolutionary theories (see Teece et al., 1997; Eisenhardt & Martin, 2000). Table 9 summarizes the salient features of the strategic management approaches and their contribution for understanding renewal capability.

	Competitive Forces Approach	Resource-based View	Evolutionary Theory	Knowledge-Based View	Dynamic Capability Approach
How competitive advantage is achieved	Acquiring monopoly power; product differentiation; focusing	Accumulating organization-specific rare resources and capabilities	Utilization and development of technological and organizational routines	Creation of new combinations from the technological and organizational routines and capabilities within and between organizations	Inimitable and non-substitutable organizational capabilities for reconfiguring existing capabilities and creating new ones
Type of rents	Monopoly rents	Ricardian rents	Schumpeterian rents	Schumpeterian rents	Schumpeterian rents
Tool for sustaining competitive advantage	Entry deterrence	Isolating mechanisms	Search routines	Isolating mechanisms and continuous development of capabilities	Continuous change and development of routines
Source of performance differences	Market structure and competitor positioning	Differences in resource bases and isolating mechanisms	Differences in routines across firms	Differences in resource bases and capabilities in knowledge creation, transfer and integration	Differences in inimitable and non-substitutable organizational capabilities
Represen-tative authors	Porter, 1980	Wernerfelt, 1984; Rumerlt, 1984; Barney, 1991	Nelson & Winter, 1982	Kogut & Zander, 1992; Grant, 1996b	Teece, Pisano & Shuen, 1997; Eisenhardt & Martin, 2000
View of renewal capability	The only renewal required is short-run capacity for strategic reorientation.	Resources are treated as given and immutable, and therefore renewal is not an issue.	Operating routines enable renewal through partial replication, while search routines enable renewal through changing the operating routines.	The capability to apply, integrate and create explicit and tacit knowledge is essential.	The ability to reconfigure existing capabilities and to create new ones is essential.

Table 9. Summary of the main approaches to strategy research.
(Cf. Teece, et al., 1997; Kyläheiko, 2002; Von Krogh & Grand, 2002)

2.2.2 Competencies and Capabilities

Strategic management literature has identified a multitude of different competencies and capabilities that act as sources of competitive advantage. For example Winter (2000, 983) observes that "there is a rather thick terminological haze over the landscape where 'capability' lies". Both concepts, competencies and capabilities, emphasize 'behavioral' aspects of strategy, namely 'how' a company competes rather than 'where' it competes (Nonaka & Takeuchi, 1995, 47). In addition, they are concerned with organizational rather than individual skills. In the following section a selection of these studies is reviewed in order to construct a basis for understanding the discussion on organizational capabilities as sources of competitive advantage. Then the view is shifted to a special class of capabilities, especially relevant for understanding renewal capability: dynamic capabilities.

In their influential article in Harvard Business Review in 1990, Prahalad and Hamel stated, "the real sources of advantage are to be found in management's ability to consolidate corporatewide technologies and production skills into competencies that empower individual businesses to adapt quickly to changing opportunities" (p. 81). They term these competencies 'core competencies' and define them as "the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies" (p. 82). A core competence provides potential access to a wide variety of markets, makes a significant contribution to the perceived customer benefits of the end product, and is difficult for competitors to imitate. Concerning the last criterion, it is interesting to note that Prahalad and Hamel emphasize that even though a rival might acquire some of the technologies that comprise the core competence, what is more difficult to imitate is "the more or less comprehensive pattern of internal coordination and learning" (p.84). Indeed, the creation of a core competence as "a complex harmonization of individual technologies and production skills" (p. 84) seems to hinge on organizational capability for knowledge integration (e.g. Grant, 1996b), although this point is not explicitly discussed by Prahalad and Hamel.

However, even though the goal of core competencies is to enable quick adaptation, they do not seem to be very dynamic: Prahalad and Hamel (1990) do not discuss how companies build their core competencies, but treat them as if they already existed all along. Second, no knowledge is provided of whether and how core competencies evolve and change. Finally, it seems easy to identify something as a core competence once a certain bundle of skills has proved profitable, but the model does not tell how to know in advance which competence is a 'core' competence and which is not. Thus the framework is suitable for identifying, or rather classifying existing skills or processes as core competencies or non-core competencies, but it does not offer much help in understanding how such competencies can be created and developed.

Stalk, Evans and Schulman (1992) talk about a new logic of competition, namely the 'capability-based competition', where capabilities as the key to success in turbulent environments. They argue that competition has transformed from a 'war of position' into a 'war of movement', where success is based on quick response to changing customer needs and anticipation of future trends, and the essence of strategy lies in understanding the dynamics of firm behavior. Stalk et al. define capability as "a set of business processes strategically understood" (p. 62). In a somewhat tautological manner, they propose that capabilities are rooted in business processes and organizational practices, and that capabilities become strategic only when they are connected with real customer needs. Even though Hamel and Prahalad (1992) argue that the distinction between competencies and capabilities is purely semantic, Stalk. et al. note that whereas core competence is a propensity of a single company, capabilities arise from a broader base and focus on business processes encompassing the entire value chain. The very same critiques that were made on previous paragraph towards Prahalad and Hamel's (1990) conceptualization of core competencies can be directed towards Stalk et al.'s view of capabilities. Both are an insufficient basis for understanding organizational renewal capability, as they are silent on the issues of change and development, even though improving these qualities is their explicitly stated goal.

A more sophisticated an attempt to define capabilities was made in the early 90s by Amit and Schoemaker (1993). In an article examining organizational rent as a accruing from both industry and firm-level factors, they contrast resources and capabilities as sources of strategic assets. In this view, resources are the stock of available factors that are owned or controlled by the firm, which are converted into final products or services. They are available from external sources and tradable. Capabilities, in contrast, refer to "a firm's capacity to deploy resources, usually in combination, using organizational processes, to effect a desired end. They are information-based, tangible or intangible processes that are firm-specific and are developed over time through complex interactions among the firm's resources. They can abstractly be thought of as 'intermediate goods' generated by the firm to provide enhanced productivity of its resources, as well as strategic flexibility and protection for its final product or service. Unlike resources, capabilities are based on developing, carrying and exchanging information through the firm's human capital." (Amit & Schoemaker, 1993, 35.) This view of capabilities is a step to a more dynamic direction, as the authors connect it to managerial decision-making in conditions of uncertainty, complexity and intraorganizational conflicts.

Another treatment of organizational capabilities comes from Leonard-Barton (1992a; 1992b; 1995). She talks about 'core capabilities' of organizations, which are capabilities that constitute a competitive advantage for the firm, have been built up over time, and cannot be easily imitated. A core capability consists of four interlocking dimensions, namely 1) employees' knowledge and skills, 2) physical and technical systems of the organization, 3) managerial systems, and 4) values. According to Leonard-Barton, core capabilities differ from core competencies in that core competencies, as defined by Prahalad and Hamel (1990) include only the knowledge base of the organization, whereas core capabilities also include the managerial and technical systems for exploiting the competencies (Leonard-Barton, 1995, 271, note 30). The difference between Leonard-Barton's and Stalk et al.'s (1992) definition of the term 'capability' is that the latter do not include the reservoirs of skills and knowledge (competencies) and reward systems in their definition. In

other words, core capabilities as defined by Leonard-Barton seem to include both the core competencies and capabilities.

In addition, the concept of core capabilities, as Leonard-Barton uses it, is a step in significantly more dynamic direction: Leonard-Barton strongly emphasizes that core capabilities are not static but constantly regenerated with new ideas, and constitute an "ever-flowing source of corporate renewal" (1995, 3), and are embedded in the knowledge-building activities of the organization. She also discusses the danger inherently residing in every core capability: if the unimpeded flow of critical knowledge is inhibited, the core capability may turn into a core rigidity (Leonard-Barton, 1992b).

2.2.3 The Dynamic Capability Approach

The concept in the strategic management literature that comes the closest to organizational renewal capability is that of dynamic capability. The dynamic capability approach focuses on understanding the sources and processes leading to competitive advantage during conditions of rapid change. In the seminal text of this approach, Teece, Pisano and Shuen (1997, 509) argue, "strategic theory is replete with analyses of firm-level strategies for sustaining and safeguarding extant competitive advantage, but has performed less well with respect to assisting in the understanding of how and why certain firms build competitive advantage in regimes of rapid change." From this quote it is evident that compared with the knowledge-based view of the firm, the dynamic capability approach has a different critique on the resource-based view of the firm. The crux from dynamic capability point of view is that the resource-based view has not adequately explained how and why certain firms have competitive advantage in situations of rapid and unpredictable change.

Teece et al. (1997) note that the resource-based strategy of accumulating valuable assets and guarding them with an aggressive intellectual property stance is often not enough to support a significant competitive advantage. Instead, "winners in the global

marketplace have been firms that can demonstrate timely responsiveness and rapid and flexible product innovation, coupled with the management capability to effectively coordinate and redeploy internal and external competencies" (p. 515). Teece (2003) equates resources and competencies with a firm's operational capabilities, whereas dynamic capabilities relate to the firm's ability to carry out change. He states, "If a firm possesses resources/competencies but lacks dynamic capabilities, it has a chance to make a competitive return, but it cannot make a supra competitive return. It may earn Ricardian (quasi) rents when demand increases for its output, but such quasi rents will be competed away. It cannot earn Schumpeterian rents (because it is not innovative). Nor is it likely to be able to earn monopoly (Porterian) rents since these require exclusive behavior or strategic manipulation." (Pp.6-7.) In consequence, the dynamic capabilities by which firms "integrate, build, and reconfigure internal and external competencies to address rapidly changing environments" (Teece et al., 1997, 516) become the source of sustained competitive advantage.

As noted above, the dynamic capability approach does not identify with the knowledge-based view of the firm, but presents itself as a distinct strand of strategic management research that builds on and extends the resource-based view and evolutionary approach to strategy. Teece et al. (1997) and Eisenhardt and Martin (2000) note that the approach also draws on research from fields which have been viewed as outside the traditional boundaries of strategy research, such as R&D management, new product development, organizational learning and manufacturing. Nevertheless, the dynamic capability view and the knowledge-based view share similar concerns. Both are interested in change, dynamics of knowledge use, and capabilities. For example, Teece et al. (1997) note that it is possible to have a large stock of valuable assets, but still not have many useful capabilities, and that "firm capabilities need to be understood not in terms of balance sheet items but mainly in terms of organizational structures and managerial processes, which support productive activity" (p. 518). This clearly echoes the emphasis that the knowledge-based view puts to examining not so much what the organization possesses in terms of assets but what it can do with these assets. As observed earlier, the more 'organizationally

informed' strand of knowledge-based view of strategy which is also interested in organizational capabilities draws from the knowledge management perspective, which has been extensively reviewed in Chapter 2.1. Further, dynamic capabilities have been directly equated with combinative capabilities (Kogut & Zander, 1992) and architectural competencies (Henderson & Cockburn, 1995)   discussed in Chapter 2.1, indicating an intimate link between the strategic management and the knowledge management perspectives on renewal capability.

Eisenhardt and Martin (2000) see dynamic capabilities as analogous to best practices and exhibiting substantial commonalities across firms. They extend the concept of dynamic capabilities to include "the organizational and strategic routines by which firms achieve new resource configurations" (p. 1107). In this view dynamic capabilities consist of specific strategic and organizational processes that create value for firms within dynamic markets by manipulating resources into new value-creating strategies, such as product development, forging alliances and strategic decision-making. In 2003, Teece (2003, 14) noted that "to date most of the literature appears to define a firm's dynamic capabilities almost entirely in terms of change routines or routines designing to renovate routines". This is quite understandable given the rooting of the dynamic capability approach in evolutionary economics. However, Teece himself criticizes this development and argues that it may in fact be the entrepreneurial skills for creating new combinations and innovative solutions that are a far more important source of dynamic capabilities than routines.

Zollo and Winter (2002) have furthered the theory of dynamic capabilities by investigating the mechanisms by which organizational capabilities are developed. They suggest that dynamic capabilities develop through the coevolution of three learning mechanisms: experience accumulation, knowledge articulation, and knowledge codification. The effectiveness of each mechanism is proposed to be contingent on environmental conditions, organizational features and characteristics of the learning task. Eisenhardt and Martin (2000), on the other hand, postulate that the evolution of dynamic capabilities is contingent on the dynamism of the market

environment, so that in moderately dynamic markets it is guided by variation, while in high-velocity markets it is guided by selection.

2.2.4 Dynamic Capabilities and Renewal Capability: Points of Convergence and Divergence

The above discussion on dynamic capabilities has brought up many of the fundamental features associated with organizational renewal capability as it is defined and dealt with in this dissertation. Therefore, the question can be posed as to why to use the concept 'renewal capability' instead of simply talking about dynamic capabilities?

There are three main reasons for this choice. First, even though the treatment of dynamic capabilities in the literature exhibits many commonalities with the model of renewal capability put forth in this dissertation, there are also several noteworthy differences. These are addressed in the rest of this chapter. Second, as the dynamic capabilities approach is still in an emergent state, there is considerable confusion concerning the very basic nature of dynamic capabilities themselves, as well as the processes and consequences associated with them. Some of the varying views are brought up in the following discussion. Third, because of the novelty of the approach, it does offer many interesting openings but does not provide enough definite solutions for grounding a relatively comprehensive account of organizational renewal solely on them. For example, Ferdinand et al. (2004) criticize dynamic capability literature from an organizational learning point of view for 'black boxing' learning and knowledge. They argue that dynamic capability proponents confuse knowledge with information, and are thereby lead to treat knowledge uncritically as a 'thing' or a commodity and to neglect the fundamentally socially constructed nature of knowledge. However, knowledge is best considered as a collective, socially generated resource and it is necessary to understand the social dynamics of the knowledge processes in order to understand the reconfiguration of competencies and routines.

This important point demonstrates a key limit of the dynamic capability approach as the sole basis for understanding organizational renewal capability. It is the strong conviction of the author of this dissertation that strategic management in itself does not provide all the necessary analytical tools for understanding this important phenomenon. Therefore it has to be supplemented by the other two perspectives: knowledge management and intellectual capital. The perspective labeled knowledge management addresses Ferdinand et al.'s (2004) concerns and includes those theories which help in understanding the social and interactional basis of renewal. On the other hand, as measurement is an important issue both from the viewpoint of scientific research and practical management, this side of renewal capability is dealt with within the intellectual capital perspective in Chapter 2.3.

Renewal capability is a higher-order dynamic capability

As it is possible to discern a myriad of different capabilities and spans of application within even a single organization, Grant (1996a) suggests that capabilities can be presented along a hierarchical architecture. In this architecture capabilities are arranged from those that require the least amount of integration to those that require the most integration. At the base of the hierarchy is the specialized knowledge of individual organizational members, followed by task-specific capabilities, broader functional capabilities (e.g. human resource management capability, marketing and sales capability), and finally wide-ranging cross-functional capabilities (e.g. customer support capability, quality management capability).

Then, where do dynamic capabilities fit within this hierarchy? On the one hand, if the view of Eisenhardt and Martin (2000) is followed and dynamic capabilities are seen as specific strategic and organizational processes along functional lines, then they might be located in the upper ladders of Grant's hierarchy. On the other hand, if we depart from Winter's (2003) definition of dynamic capabilities as "those capabilities that operate to extend, modify or create ordinary capabilities", it is possible to understand dynamic capabilities as higher-order or *meta-capabilities*, which are located outside of

Grant's (1996a) hierarchy. Collis (1994) presents an interesting related idea that organizational capabilities are always vulnerable to being superseded by a 'better', higher-order capability. In other words he implies that there are higher-order capabilities which guide the functioning of the lower-order capabilities. So depending on the definition of dynamic capabilities, they can be understood either as lower-order or as higher-order capabilities. This is also noted by Zollo and Winter (2002, 340) when they remark that "dynamic capabilities arise from learning; they constitute the firm's systematic methods for modifying operating routines. To the extent that the learning mechanisms are themselves systematic, they could be regarded as 'second-order' dynamic capabilities."

Here a distinction can be made between dynamic capabilities and renewal capability: renewal capability is always a meta-level capability, or alternatively, a higher-order dynamic capability. In fact, the underlying mechanism behind the jump from one rung of capability (e.g. effective product innovation) to a higher rung (e.g. capability to develop product innovation) implied by Collis (1994) lies in the renewal processes of the firm. Organizational renewal capability is a meta-capability in the sense that it concerns general principles of organizational change instead of any specific organizational function or operational process.

Dynamic capabilities and renewal capability consist of numerous ways to change

It is noteworthy that in many of the accounts of dynamic capabilities the authors discern several different forms of dynamic capabilities. For example, according to Eisenhardt and Martin (2000), some dynamic capabilities integrate resources, while some focus on reconfiguration of resources, and some are related to the gain and release of resources. Also Teece (2003) presents several types of dynamic capabilities, rooted in different origins. He argues that each source of dynamic capabilities can be an independent basis of competitive advantage in its own right. First, some dynamic capabilities are rooted in routinized processes, for example learning routines and change routines. These types of dynamic capabilities are consistent with Eisenhardt

and Martin's (2000) approach. More specific examples of such routinized processes include product development routines, technology and knowledge transfer routines and quality control routines. The second source of dynamic capabilities lies in intrapreneurship and entrepreneurship. This type of dynamic capabilities concern the ability to sense emergent market and technological opportunities, as well as to seize these opportunities by making new combinations, i.e. innovating. Third, dynamic capabilities can be rooted in external orchestration of assets through for example alliancing, joint ventures, and vertical integration decisions. In a pioneering empirical study of the influence of dynamic capabilities on performance, Henderson and Cockburn (1995) argue that there are two forms of dynamic capabilities (called 'architectural competence' in their research) that are especially important sources of enduring competitive advantage in pharmaceutical industry: the ability to integrate knowledge flexibly across disciplinary and therapeutic class boundaries within the organization, and the ability to access new knowledge from outside the organizational boundaries.

As Winter (2003) expresses the issue, *dynamic capability is actually a category of numerous different ways to change*. This obviously connects with the discussion above pointing that dynamic capabilities, depending on how they are defined, can be understood as a higher-order construct. This view of dynamic capabilities as a meta-capability consisting of many types of change processes, rather than as a monolithic and specific unitary capacity, is consistent with the model of renewal capability as consisting of three types of renewal: maintenance, incremental development and radical innovation (see Chapter 2.1.6 and Publication 1).

The contingent nature of dynamic capabilities and renewal capability

Even though the original goal of the dynamic capability approach was expressly to understand competitive advantage in turbulent environments, this contextual limitation has recently blurred and lost its significance. Zollo and Winter (2002) argue that as firms do integrate, build, and reconfigure their competencies even in

environments subjects to lower rates of change, there is no need to restrict the concept of dynamic capabilities as something that only applies in rapidly changing environments. This amplification extends the territory of dynamic capabilities to organizations in all types of environments.

This opens the stage for a discussion of whether the nature of dynamic capabilities is contingent on the rate of environmental change. According to Eisenhardt and Martin (2000) this is the case. They state that the effective patterns of dynamic capabilities are contingent on the dynamism of the market environment: "When markets are moderately dynamic such that change occurs in the context of stable industry structure, dynamic capabilities resemble the traditional conception of routines. That is, they are complicated, detailed, analytic processes that rely extensively on existing knowledge and linear execution to produce predictable outcomes. In contrast, in high-velocity markets where industry structure is blurring, dynamic capabilities take on a different character. They are simple, experiential, unstable processes that rely on quickly created new knowledge and iterative execution to produce adaptive, but unpredictable outcomes." (P. 1106.)

Implicitly, this also means that an organization can have the wrong variety or the wrong amount of dynamic capabilities if it finds itself in an environment where it cannot use them. As dynamic capabilities typically involve long-term commitments to specialized resources and associated costs, they must be exercised to be economically sound: "To have a dynamic capability and find no occasion for change is merely to carry a cost burden. On the other hand, an aggressive search for such occasions may also be a mistake. Attempting too much change can impose additional costs when the frequent disruption of the underlying capability outweighs the competitive value of the novelty achieved." (Winter, 2003, 993.) The same idea is embedded also in the framework of renewal capability, as it assumes that different organizations are likely to profit from different types of renewal processes. More of a given type of renewal is not always a good thing. For example, exercising the radical type of renewal does not bring competitive advantage to a firm that is located in a stable business environment and whose basic task is efficient production.

This view that effective pattern of dynamic capabilities varies with market dynamism is another point of convergence between renewal capability and dynamic capabilities. The three-dimensional model of renewal capability assumes that the more turbulent the market environment of the firm is, the more it should put emphasis on the radical type of renewal, created in the dynamic knowledge environment (Ståhle & Grönroos, 1999; 2000; Ståhle et al., 2003) of the firm. Conversely, the more stable the environment, the more important the maintenance type of renewal is expected to be. In addition to Eisenhardt and Martin (2000), this rationale draws on Volberda's (1996) model of different types of organizational flexibilities suited for different environments. Table 10 presents the connections between the characteristics of the renewal types and market pace.

	Maintenance	Incremental development	Radical innovation
Market definition	Static and predictable	Predictable change	Unpredictable change
Ideal type of organization	Production-oriented organization	Customer service organization	Innovative, R&D-driven organization
Ultimate goal	Constant quality and effectiveness	Adaptive and managed development	Radical renewal and change
Operational focus	Distribution, production, fixed product lines	Tailoring and development of service concepts	Innovative, radical renewal and/or growth
Examples of Strategic issues	-Building flawlessly functioning systems -Maximizing the cost- and time-efficiency of systems	-Quick reaction to customer needs and feedback -Constant and systematic development of new services	-Continuous innovation -Quick reaction to changes in the market -Support for creativity, risk-taking and experimentation

Table 10. Ideal types of organizational renewal in different market environments

However, the table above is a simplification of the issue that masks an important difference between the theoretical models. The difference between the approaches is that whereas Eisenhardt and Martin (2000) and Volberda (1996) view the selection of the suitable dynamic capabilities or flexible forms as an either-or issue, the approach to renewal capability sees it in terms of both-and-logic. The classification of Eisenhardt and Martin (2000) is clear-cut and simple: there are two alternatives, and assessment of market dynamism should be the basis on which to ground the decision which one of them to choose (either as an explanation for performance differences or as a management approach to be implemented). Similarly, in Volberda's (1996) model there is one ideal organizational form for coping with each kind of environment: rigid form for low competition, planned form for moderate competition, and flexible form for hypercompetition. Although Volberda[20] lightly touches upon the idea that there might be several types of forms within the same organization (p. 372), he seems convinced that mostly the organization adheres to one type of form at a time.

In contrast, the model of organizational renewal capability assumes that in most of organizations, there are all three types of renewal processes going on, created in the three knowledge environments. They might be functionally separated so that the marketing unit, for example, is operating in a predominately organic manner, or the production function in a predominately mechanistic way, but when the organization is viewed as a whole, it is expected that one can find characteristics of all three knowledge environments. In other words, it is not a question of either-or but both-and logic. As Weick (1998, 551) notes, "there is currently abundance of conceptual dichotomies that tempt analysts to choose between things like control and innovation, exploitation and exploration, routine and non-routine, automatic and controlled, when *the issue in most organizations is one of proportion and simultaneity rather than choice*" [italics added].

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[20] It should be noted that the constituent elements of Volberda's (1996) organizational forms are largely analogous with the characteristics of knowledge environments in the Ståhle and Grönroos (1999; 2000) model.

As has been stated several times, organizational renewal capability depends on the extent to which the firm can *balance* the three renewal processes in a manner consistent with its strategic intent and external demands. In this sense, renewal capability can be understood as *'meta-flexibility'* (Volberda, 1996) of the firm to solve the paradox between dynamic capabilities, organizational design issues and environmental influences. Ideally, the basis for deciding how to balance the renewal types should be the knowledge strategy of the firm (see e.g. Bierly & Daly, 2002; Von Krogh et al., 2001), but it should be noted that most organizations do not have a consciously crafted strategy addressing knowledge creation and intellectual capital. It is argued that the essential question of strategic management of renewal capability is the creation of a strategically wise balance between the renewal types. This implies that managing renewal capability requires a double integration (see Figure 4). On the first level it requires integrating and combining the knowledge of the individual employees and thereby building efficiently functioning knowledge environments, as discussed in Chapter 2.1. Second, it requires integrating the knowledge environments into a coherent whole on the level of the whole organization, so that the firm is functioning in such a manner that supports its strategy.
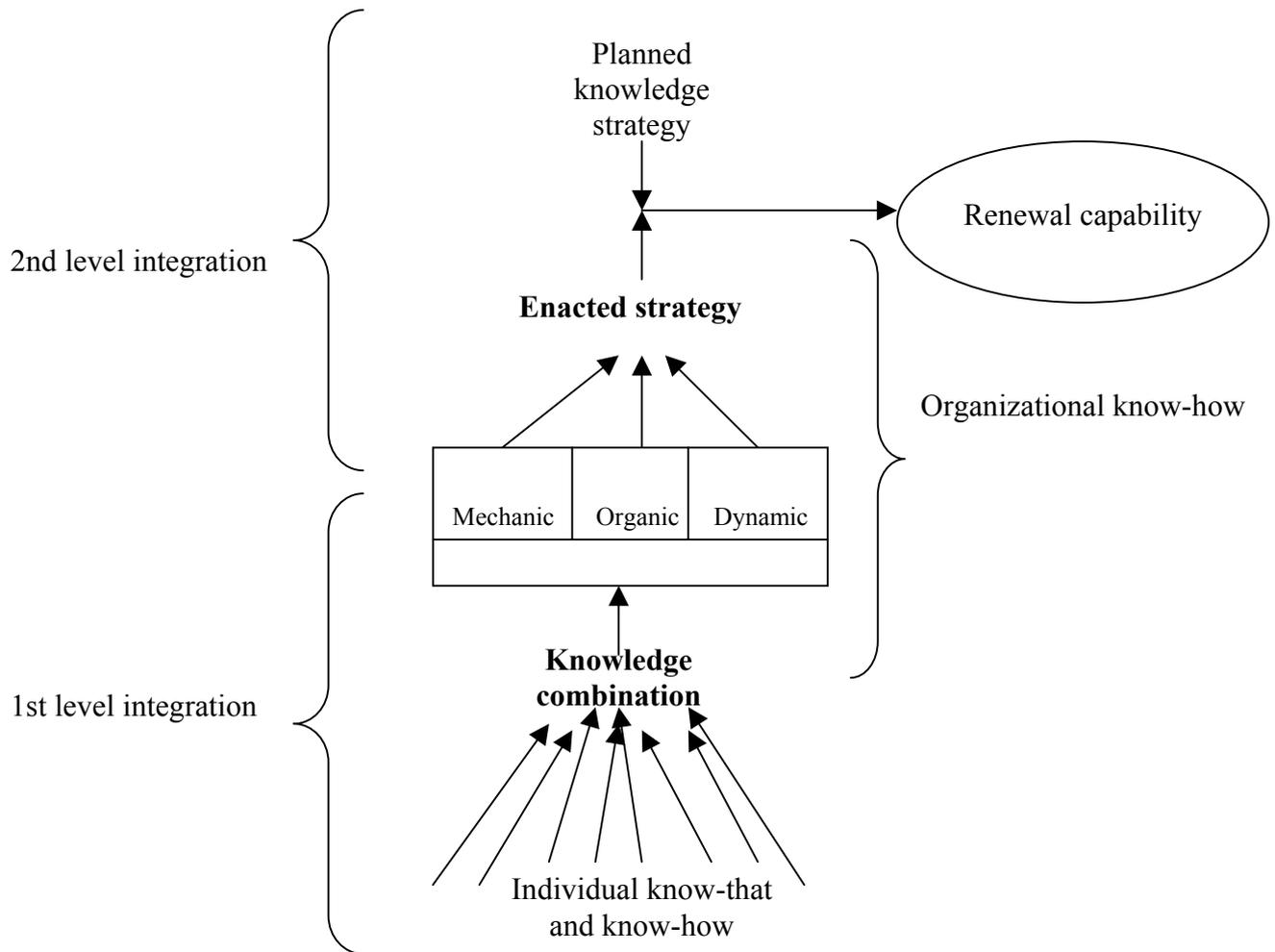
Figure 4. Renewal capability as double integration

Are dynamic capabilities confined to top management?

A notable difference between the dynamic capability approach and the model of renewal capability is that the dynamic capability approach puts more emphasis on the role of top management, whereas in the renewal capability outlook, the contribution of the middle management and employees is also regarded as crucial. In fact, this dissemblance also characterizes a more general divergence between the three perspectives adopted in this dissertation: while the strategic management perspective tends to assume the standpoint of top management, sometimes to leading to underestimation of the other organizational actors, the knowledge management

perspective is more mindful of the grassroots level, as is the intellectual capital perspective in its accentuation of human capital.

Illustrative of the 'top management bias' in the dynamic capability literature are Teece's (2003, 10) words: "dynamic capabilities reside with the firm's top management team". Also other related views in the strategic management literature share this focus on the upper rungs of the organizational hierarchy as the source of organizational capabilities, whether labeled dynamic or not. For example, Prahalad and Hamel (1990) and Stalk et al. (1992) stress that the process of identifying and building core competencies or capabilities is mainly a top-down process. Stalk et al. (1992, 65) even argue, "top-down change process has the paradoxical result of driving business decision making down to those directly participating in key processes [i.e., the staff] … This leads to a high measure of operational flexibility and an almost reflex-like responsiveness to external change." However, it is left unclear how exactly a process where the CEO oversees the change process and makes final decisions based on proposals presented by teams lead by top line managers drives the decision making to the employees.

Renewal capability as seen in this dissertation is a capability of the organization as a whole. It is build up by the activities in all levels of the organizational hierarchy, rooted in the everyday activities of employees as well as managers. As Von Krogh and Grand (2002, 174) put it, "every relationship in the firm should be viewed as carrying the potential for knowledge creation".

How dynamic are dynamic capabilities?

As various scholars interested in dynamic capabilities conceptualize them in different manners, the literature includes several views concerning the extent to which these capabilities are based on ordered and linear, versus creative and iterative processes. Paradoxically, it seems that some of the studies emphasize what could be called the non-dynamic facet of dynamic capabilities, that is if dynamic is understood in the

sense of Ståhle and Grönroos (1999; 2000) as the entropic, iterative and far-from-equilibrium functioning of the knowledge system of the organization.

Notably Winter and his collaborators view dynamic capabilities mainly in terms of routines. Even though dynamic capabilities are based on search routines (Nelson & Winter, 1982; Zollo & Winter, 2002) that concern producing variation and change in the operating routines, it can be questioned whether this conceptualization of dynamic capabilities is too static. Zollo and Winter (2002, 340) define a dynamic capability to be "a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness". Here the terms "learned, stable and systematic" emphasize the structured and persistent nature of dynamic capabilities. It is underlined that "an organization that adapts in a creative but disjointed way to a succession of crises is not exercising a dynamic capability" (p. 340).

In a related paper, Winter (2003, 991) argues that an organizational capability, whether dynamic or not, is "a high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organization's management a set of decision options for producing significant outputs of a particular type". In this definition routine refers to behavior that is learned, highly patterned, repetitious, or quasi-repetitious and founded in part in tacit knowledge. Winter also underlines that specificity of objectives is a part of organizational capability; brilliant inspiration is not a routine, and there is no such thing as general-purpose routine. He notes that even though dynamic capabilities consist of several different ways to change, not all change is based on dynamic capabilities. According to Winter, ad hoc problem solving is not a dynamic capability, because it is not routine, there is no clear pattern and it is not repetitious.

In both of the above definitions, non-routinized acts of creativity and spontaneous problem solving are sharply distinguished from dynamic capabilities. However, not all researchers agree with this position. Eisenhardt and Martin's (2000) argument that effective dynamic capabilities exhibit different characteristics in different market

environments is related with this issue. These authors note that in turbulent environments, effective dynamic capabilities are *not* routine, linear and predictable, but rather experiential, unstable and unpredictable. So even though Eisenhardt and Martin view dynamic capabilities mainly in terms of routines, they recognize that in high-velocity environments, a more improvised and iterative operational mode is needed.

Also Teece (2003) argues that even though most of the literature on dynamic capabilities views them only in terms of routines, dynamic capabilities through innovative combinations by intra- and entrepreneurial action may be "perhaps a more important source of dynamic capabilities than routines" (p. 14). It seems like Teece (2003) is attempting to bestow some of the dynamism back into dynamic capabilities – after all, it was the ability of organizations to change, reconfigure and recompose their knowledge that the concept was originally crafted to capture.

Compared with these different conceptualizations of dynamic capabilities, it can be noted that a similar discussion surrounds organizational renewal, if even more implicitly, as the concept is not widely used even though studies addressing some side of the phenomenon abound. For example, Weick and Sutcliffe (2001) view renewal mainly in terms of maintaining stability of organizational functioning through creating routinized responses to unexpected challenges, while Leonard-Barton (1995) concentrates on how constant renewal is achieved through knowledge-creating activities and innovation (see Publication 1 for a more detailed analysis). The model of organizational renewal capability put forth in this dissertation integrates these two and other approaches by proposing that organizational renewal consists of three relatively distinct types of change processes: maintenance, incremental development and radical innovation. Another related issue is the difference between renewal as a phenomenon and renewal as a *capability*. Organizational renewal might happen as a random event, as a result of a haphazard lucky guess or by coincidence; but organizational capability for renewal requires in addition an element of constancy and intentionality.

2.3 The Intellectual Capital Perspective on Organizational Renewal Capability

As knowledge has become the primary driver of competitive advantage in the contemporary economy, new approaches for the assessment and valuation of firms are needed which recognize the knowledge-based aspects of value creation. The intellectual capital movement aims to tackle this challenge and construct methods for describing, measuring, reporting and valuating intangibles in organizations, regions, networks and nations. The frameworks created within the intellectual capital community provide classifications for intangibles that go beyond the resource-competence-capability distinction and enable examining intellectual wealth from a comprehensive perspective.

However, in the previous research intellectual capital has mainly been conceptualized as a static asset rather than a dynamic capability. Consequently, the current measures of intellectual capital are inadequate for examining collective knowledge and organizing principles of organizations, and thereby also for capturing their renewal capability. Even though the significance of the dynamic and collective aspect of intellectual capital is recognized in some theories of intellectual capital, this insight has not been transmitted into the related operationalizations. It is suggested that the measurement of renewal capability has to be based on an understanding of the organizational qualities of renewal. In the end of the chapter the general criteria for capturing renewal capability drawn from studies reviewed in knowledge management and strategic management perspectives (Chapters 2.1 and 2.2; see also Publications 1 and 4) are laid down.

2.3.1 Intellectual Capital: The Hidden Foundation of Value Creation

It has been argued that the logic of doing business and creating value has changed fundamentally. Knowledge has taken the place of land, labor and economic capital as the main source of corporate wealth creation, and intellectual capital has become the principal driver of competitiveness. The marketplace is global and increasingly

turbulent, with innovations altering the business landscape every so often. Information and communication technologies enable new kinds of relationships, and virtual network partnerships and organizations are becoming recurrent. (E.g. Drucker, 1993a; Drucker, 1993b; Castells, 1996; Quinn & Anderson, 1996; Quinn et al., 1997; Stewart, 1997.)

Peter Drucker (e.g. 1993a; 1993b; 1997; 1999) argues that the fact that knowledge has become the main economic resource will fundamentally change the structure of society. Drucker uses the term post-capitalist to portray the uprising society, but in addition, the concepts of information or knowledge society and network society have been used in recent macro-sociological discussions to depict the societal changes that have sprung from the changes in the meaning and importance of knowledge (see e.g. Castells, 1996). These changes will entail new social, economical, and political dynamics and challenges.

Companies that make profits by converting knowledge into value are called knowledge companies (Sullivan, 1999). The success of a knowledge organization depends on its ability to gather and create information and knowledge, to share it and integrate it into the existing organizational knowledge and to apply it in a profitable manner. While financial capital and other resources can also be important resources for knowledge organizations, their primary resources are intangible. Information-based and service organizations are the most obvious examples of knowledge organizations, but as all forms of business are gradually becoming more knowledge-intensive, virtually all companies can be considered to be knowledge organizations. Knowledge workers, i.e. highly educated employees who apply theoretical and analytical knowledge to developing new products, services, processes or procedures, are the fastest growing segment of the workforce in developed countries (Castells, 1996; Campion et al., 1996; Janz et al., 1997; Drucker, 1999).

As the ways of creating value have changed, the measurement and valuation of companies need to change as well. A novel academic approach, namely the intellectual capital (IC) movement, has been developed in order to understand the

nature and value of intangible qualities and properties, which are the foundation of the productive capacity of knowledge-based organizations. The goal is to improve the internal management, external reporting and address requirements arising from statutory provision, administrative ruling and regulatory authorities (Andriessen, 2004a; 2004b). The movement is fairly new and dispersed, and views of the nature and composition of intellectual capital tend to vary from one author to another. One definition of intellectual capital is that it consists of knowledge that can be converted into value (Sullivan, 1999). According to another definition, intellectual capital consists of an organization's capability to transform its intangible assets, expertise and renewal capability into economic value (Ståhle & Grönroos, 1999, 50).

Intellectual capital is intimately linked with strategy. Roos et al. (1998) suggest that the theoretical roots of IC lie in two streams of thought: the strategic school, which studied the creation and use of knowledge for enhancing the value of the organization and the measurement school, which aimed at constructing reporting mechanisms that enable non-financial, qualitative items to be used along with traditional financial data (see Figure 5). IC is a useful concept for setting corporate goals and strategies (Robinson & Kleiner, 1996). Moreover, IC reports and statements function as communication tools for presenting and maintaining the corporate vision and strategy (Bukh et al., 1999). Sullivan (1998) states that in order to extract value from IC, it has to be strongly linked with the strategic objectives of the company. IC should be internally aligned with the company's vision and strategy to ensure that the organization's IC is focused on achieving the right goal. Also, the choice of IC indicators should be guided by the long-term strategy of the company; one should measure what is strategically important (e.g. Stewart, 1997; Bontis et al., 1999).
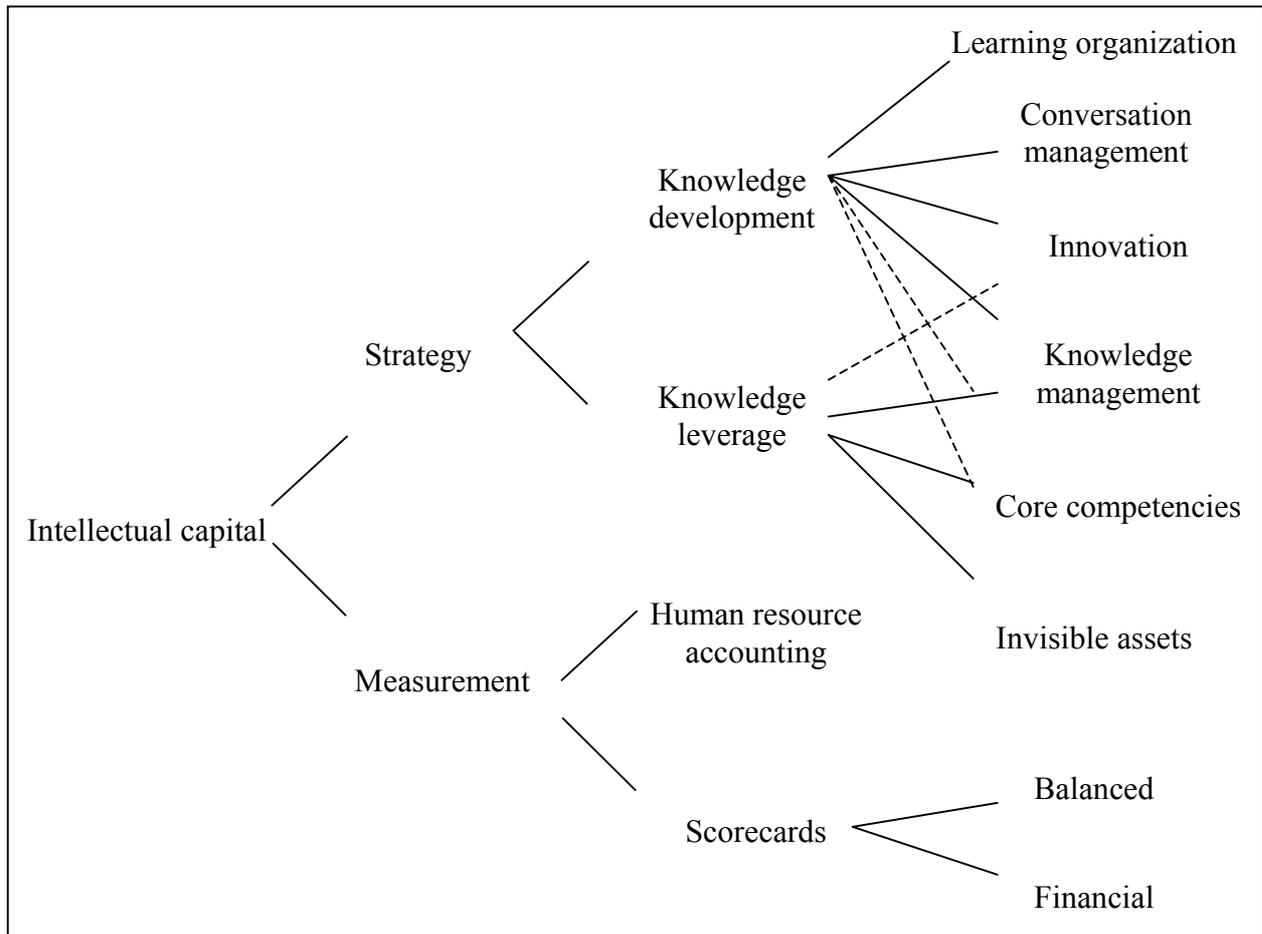
Figure 5. Conceptual roots of intellectual capital
(Roos et al., 1998, 15)

The intellectual capital movement attempts to overcome the limitations of conventional indicators that are used to explain, measure and manage organizational performance. Specifically, its critique is aimed mainly at three intertwined issues in performance measurement and management of organizations: 1) the extensive reliance on traditional accounting-based indicators, 2) the orientation towards the past instead of the future, and 3) the neglect of non-financial information.

An often-made critique towards traditional accounting-based measures is the commonplace substantial difference between companies' book and market values, which indicates that there are key assets that are not recognized in the balance sheets.

The IC school argues that these differences arise from the intangible properties and qualities of organizations, which cannot be measured by the tools constructed by the traditional accounting practice. (E.g. Sveiby & Risling, 1987; Brennan & Connell, 2000.) Traditional accounting-based measures, which depict an organization's physical and financial capital, do not enable the identification and measurement of intangibles in the organization, and therefore, new kinds of indicators need to be developed (e.g. Atkinson & Waterhouse, 1997; Bukh et al., 1999; Petty & Guthrie, 2000; Brennan & Connell, 2000; OECD, 2000). Furthermore, the current balance sheet fails to consider what counts as important for companies, and does not help management in deciding on future actions (Bukh et al., 1999). In addition, the existing financial reporting system has limitations from the viewpoint of the capital markets and other shareholders; as intangible investments and know-how become more important, conventional reporting leaves the average investor at a disadvantage compared with knowledge insiders and outsiders who have 'private' access to inside information (Stewart, 1997; Petty & Guthrie, 2000).

Yet another important drawback of conventional accounting-based indicators is that they are past-oriented - they show changes in performance only after it is too late to influence the situation (e.g. Sveiby, 1997; Edvinsson & Malone, 1997; Andriessen, 2004a). In contrast, monitoring the dynamic intellectual qualities and properties of a firm enables the rapid re-steering and more realistic evaluation of the available alternatives. The IC scholars argue that the quantitative balance sheet analysis can, at best, provide historical information on how things have been and what should have been done. It cannot, by any means, by itself provide reliable knowledge on what the decisive success factors will be in the future, especially in knowledge-intensive businesses, which are increasingly characterized by rapid changes and nonlinearity. Rather than study stories of past success, the view should be shifted to factors that will influence a company's future potential. Moreover, as the future truly is uncertain and no one can predict which specific competencies and resources are the ones that will emerge to rule in a given business area, the success factors cannot be content-specific, but will have to relate to the qualities and processes by which a company masters transformations and survival in complex dynamic environments.

In the age of knowledge economy, human knowledge is what creates revenue. Thus, in order to measure the ability to create revenue, one has to measure things that deal directly with human knowledge, and these are undeniably non-financial in nature. For example, Sveiby (2001) states that "Human knowledge has very little to do with money, and very few people handle money. If the notion of people as revenue creators is reasonably correct, we therefore have to come closer to 'the source' of their knowledge if we wish to measure it more accurately… This is why I argue that non-financial indicators probably are superior to financial ones." Atkinson and Waterhouse (1997) note that financial performance measures derive from accounting systems that were designed to enable comparison across firms and over time, but not to communicate decision-relevant information to people inside the organization, and thus non-financial measures are more suitable for improving internal management of firms. Non-financial measures also have an important role in assisting in the steering and management of organizations. Therefore, financial measures should be complemented with non-financial measures, especially at the strategic level of the firm (Sveiby, 1997; 1998; Kaplan & Norton, 1992; 2001a; 2001b).

Attempts to understand and conceptualize intellectual capital have yielded many intellectual frameworks (e.g. Brooking, 1996; Edvinsson & Malone, 1997; Sveiby, 1997; Stewart, 1997; Roos et al., 1998; Sullivan, 1998; Ståhle & Grönroos, 2000; OECD, 2000) all of which divide IC into several components (see Table 11). In recent years, an increasing number of scholars have started to propagate a view that IC is constructed of three parts: human, structural and relational capital (e.g. MERITUM guidelines, 2002). However, the field is far from being consolidated and one can hardly say that there is a general agreement as to the structure of intellectual capital (Bontis et al., 1999). Not surprisingly, the measurement models based on these different frameworks lack a mutual basis. This diversity of the IC models and measures has, unfortunately, led to a situation in which inter-company benchmarking and comparison is difficult if not impossible, and the interpretation of various IC reports is problematic. (Bontis et al., 1999; Brennan & Connell, 2000; Petty & Guthrie, 2000.) This problem is worsened by the fact that practically all scholars in

the field agree that as every firm has its unique knowledge base and strategy, there can be no universal measure for IC that would be suited to all kinds of companies. However, even though the *importance* of any given IC indicator depends on firm-specific factors, it seems plausible that some parts of IC, such as the renewal capability, can and should be evaluated with measures that can be applied, compared and generalized across a variety of companies. This dissertation presents such a unifying theoretical and empirical model for organizational renewal capability[21].

Developer(s)	Main components of intellectual capital
Sveiby (1997)	Competence of personnel Internal structure External structure
Stewart (1997)	Human capital Structural capital Customer capital
Roos et al. (1998)	Human capital Structural capital
Brooking (1996)	Market assets Human centered assets Infrastructure assets Intellectual property assets
Edvinsson & Malone (1997)	Financial focus Customer focus Human focus Process focus Renewal and development focus
Sullivan (1998)	Human capital Intellectual assets
Ståhle & Grönroos (2000)	Intangible assets Organizational competence Organizational renewal
OECD (2000)	Human capital Organizational capital

Table 11. Classifications of intellectual capital

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[21] Naturally, inter-company comparison and benchmarking is meaningful only to a certain extent. For example, the IC indices of a small-scale ICT startup would hardly benefit a machine factory or vice versa. This is why the KM-factor® indices that depict the organization's renewal capability are formed with respect to a reference group of strategically similar organizations.

2.3.2 Intellectual Capital as a Static Asset and as a Dynamic Capability

Intellectual capital can be approached from two different perspectives. On the one hand, it can be seen as a static asset or a 'stock' of the firm; on the other, it can be framed as a dynamic capability or a 'flow'. Both approaches have their application fields and limitations, and for a comprehensive assessment of the IC of a system (be it an organization, network, region or nation), a multifaceted approach is needed which includes both aspects. If the focus is the system's capacity for learning, development and mastery of change, it is necessary to adopt the capability approach to intellectual capital.

Most of the literature on intellectual capital conceptualizes intellectual capital as a static asset or a 'stock' (Bontis, 1999). When intellectual capital is viewed as a 'stock', it is assumed that it is something that can be relatively easily identified, located, moved and traded, much like some sort of a 'package', be it an intangible one. When IC is framed in this manner, it is typically understood to be a possession or owned property of the organization, and manifested for example as patents, trademarks, business applications and brands (e.g. Brooking, 1996; Stewart, 1997; Gu & Lev, 2001). To the extent that the intangible assets are codified and explicit, they have to be protected from competitors to inhibit imitation. Apart from this, intangible assets are portrayed as something that can be managed in a similar manner as any other resources.

This tendency to treat knowledge as an object is also evident when IC scholars address human capital, structural capital and relational capital, which could potentially be framed also in another manner. For example, in Sveiby's (1997) IC framework the suggested measures for human capital (which in his model is called competence) consist of such items as the level of education, value added per professional, and average age of the employees in professional positions. Edvinsson and Malone (1997) propose measuring structural capital (in their model called the process focus) with for example the number of laptops per employee, the number of contracts filed without errors, and the ratio of administrative expenses to total

revenues. From these examples it is evident that even those aspects of intellectual capital that are directly related to human beings and processes are conceptualized as static and clear-cut 'packages'. According to Bontis (1999), this reflects the fact that the background of the majority of IC researchers is in finance and accounting.

This type of approach is in sharp contrast to that proposed by representatives of the knowledge-based view of the firm and the dynamic capability approach. If firms are viewed as "systems of knowing activity rather than systems of abstract knowledge assets" (Spender, 1996a, 57), then their intellectual capital needs to be conceptualized from a radically different point of view, since a purely asset-based analysis of knowledge cannot deal with change, dynamics and social processes. As Maula (2000, 158) notes, "the mere measurement does not tell how knowledge really 'works' in a company, and how the value of IC could be increased. Therefore, a more profound understanding of the underlying knowledge processes is needed." The alternative type of approach can be labeled the capability approach. In this approach, knowledge is understood as emerging from the ongoing interactions between the organizational members, and the focus is not on the intangible assets per se but on the capabilities to leverage, develop and change them. Table 12 presents a comparison of the asset and capability approaches to intellectual capital.

As the capability approach to IC is practically non-existent in the IC literature, it is in order to explain why it should be used to complement the asset approach[22]. Drawing from the knowledge management and strategic management literatures, three fundamental interrelated limitations in the asset approach can be pointed out which make it insufficient for capturing all the aspects of intellectual capital that are important for value creation.

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[22] There are several good measures and indices for measuring intellectual capital from the asset perspective, which can be found in other studies and reports. For example Andriessen (2004a) reviews 25 measurement models extensively and presents his own suggestion.

	Asset approach	Capability approach
Knowledge understood as	Static asset, stock	Emergent and socially constructed process
Essential form of knowledge	Explicit, know-that	Tacit, potential, know-how
Main interest	Identification and valuation of existing intangibles	Capability to use, develop and modify intangibles
Theoretical focus on	Investments, intellectual property rights, human capital, structural capital, relational capital	Abilities of firms to apply and develop knowledge
Managerial focus on	Leveraging the existing assets	Creating and developing capabilities
Roots in	Economics and accounting	Organization science and strategic management
Measurement focus on	Existing statistical data of individuals, structures and outcomes	People and social processes
Quantification of objects of measurement	Easy	Difficult

Table 12. Asset and capability approaches to intellectual capital

First, the asset approach is incapable of grasping the collective or social-level tacit knowledge. This is a serious limitation since collective knowledge is valuable, rare, inimitable and non-substitutable, and therefore strategically the most important type of knowledge (e.g. Spender, 1996a; Bollinger & Smith, 2001); for example, while innovations can be copied, innovativeness cannot. In fact, examining the asset-centered IC measurement items in conjunction with the knowledge typology of Kogut and Zander (1992, 388) reveals that the asset approach focuses only on information or know-that, but does not cover know-how on any analytical level (Table 13). As the asset approach to IC uses only 'what', 'who' and 'how much' questions, it can only grasp aspects of know-that. For example, two typical items for measuring human capital are employee turnover and education level (e.g. Edvinsson & Malone, 1997; Sveiby, 1997). Both of these are clearly related to information, either on individual, group or organization level depending on the scope of aggregation of the data. Similarly, measuring relational capital with the number of customers, number of customers lost or satisfied customer index (e.g. Edvinsson & Malone, 1997; Sveiby,

1997) addresses information or know-that, but does not examine know-how. As collective knowledge and organizing principles are grounded on semi-conscious or unconscious knowledge, they are not obvious and easily discerned but to some extent 'invisible' to the actors (e.g. Kogut & Zander, 1992; Spender, 1996a; 1996b). This kind of knowledge becomes visible only through the forms of social practice in which it is embedded, and consequently the only manner in which it can be studied is by examining the relational patterns among the actors.

	Individual	Group	Organization	Network
Information	Facts	Who knows what	Profits, accounting data, formal and informal structure	Prices, whom to contact, who has what
Know-how	Skill of how to communicate, problem solving	Recipes of organizing such as Taylorist methods or craft production	Higher-order organizing principles of how to coordinate groups and transfer knowledge	How to cooperate, how to sell and buy

Table 13. Knowledge types on individual, group, organizational and network levels
(Kogut & Zander, 1992, 388)

Second, the asset approach is interested only in identifying and valuating intangible resources, but does not examine how these resources are actually used to create value for the firm. The dynamic capability approach and the knowledge-based view of the firm underline that competitive advantage flows not from resources themselves but from the firm capabilities to leverage, develop and transform them (e.g. Penrose, 1959; Kogut & Zander, 1992; Grant & Spender, 1996; Grant, 1996b). The capabilities of firms are embedded in shared tacit knowledge, which is demonstrated in activities and relational patterns. The asset approach simply cannot deal with capabilities, as it neglects the social and activity-based nature of knowledge. Therefore, it cannot address how intellectual capital is maintained and created – only what the stock of

intellectual capital is at the moment of data gathering. This shortcoming of the asset approach is especially paradoxical since one of the main critiques of the IC movement toward the traditional methods of firm valuation is that these are too retrospective and should be replaced or complemented with methods that are more forward-looking (e.g. Sveiby, 1997; Edvinsson & Malone, 1997). Especially for understanding the ability of firms to survive in fluctuating conditions as well as for examining their future potential, it is necessary to examine intellectual capital with a capability approach.

Finally, the third major limitation of the asset approach is that it is fundamentally individualistic. The notions of collective knowledge and higher-order organizing principles (Kogut & Zander, 1992; Spender, 1996b) connote that for a firm to be knowledgeable, it is not enough that its individual employees are skilled and educated. The key issue is how the employees work together, how their tasks interrelate and how their individual knowledges are integrated to produce value for the company (Grant, 1996; 2002; Brown & Duguid, 1998). However, the asset-based measures are incapable of addressing interaction and dynamics. A related issue is that IC literature typically emphasizes human capital as the most significant aspect of intellectual capital (e.g. Bontis, 1998; Bontis, 1999; Stewart, 1997; Sveiby, 1997). The measures of human capital look at the qualities of individual employees, such as age, level of education or organizational tenure. Some methods for IC measurement do contain more sophisticated items, such as intellectual agility (Roos et al., 1998) or the motivation index (Roos et al., 1998; Edvinsson & Malone, 1997). However, the crucial aspect of what an organization knows and can do "is not reducible to what any single individual knows, or even to any simple aggregation of the various competencies and capabilities of all the various individuals, equipments and installations of the firm" (Nelson & Winter, 1982, 63). Therefore, the pattern and mechanisms of intellectual capital leverage and creation cannot be reduced to the level of individual actions, but have to be analyzed in their own right as capabilities formed by social interaction and knowledge flows, as enabled by the capability approach.

2.3.3 Asset-Based Measures of Renewal Capability

The capacity for producing and leveraging intellectual capital is the key to achieving competitive advantage in the ever more intensive turbulent global business environment (e.g. Teece et al., 1997; Eisenhardt & Martin, 2000). Nevertheless, most of the suggested ways of measuring IC seem to ignore the dynamic aspect of the IC equation: in order for a company to survive in fluctuating and rapidly changing environments, it is essential that it have the capacity to constantly renew its strategies and operations. The static dimension of intellectual capital, characterized mainly by intangible assets and human capital, is a relatively well-explored issue within the IC research community. What is still missing is a thorough understanding of the fundamentally social processes by which intellectual capital is created, maintained and changed within organizations.

However, there seems to be an emerging trend of interest in this *dynamic* dimension of IC and perhaps a divide between the more accounting-oriented IC scholars and dissenting voices from those who favor a more organizationally-informed approach to intellectual capital. This trend is revealed in the spreading understanding that knowledge is a fundamentally human issue which is mostly leveraged, shared and developed in the context of social interaction. 'Soft' intangible factors like trust, communication, organizational climate, and culture are beginning to be recognized as influential drivers of 'hard' outcomes. For example, in the opening speech of the International IC congress in Helsinki in September 2004, Karl-Erik Sveiby emphasized that the main challenge in IC measurement is that social phenomena, which are at the heart of IC are 'impossible to measure', and that so far the IC community has failed to create adequate measures for them. As a whole, this development is making the legacies of organization theory and social sciences increasingly important for the exploration of intellectual capital. For example, Sveiby (Sveiby & Simons, 2002) has recently studied the collaborative climate of knowledge organizations, and Edvinsson (2002) strongly emphasizes the importance of creative dialogue and knowledge sharing for IC development. There appears to be an emerging understanding that knowledge-based value cannot be achieved by merely improving

the technological infrastructure or hoarding static intangible assets that are available to everyone; the most important issue seems to be how the organization actually operates as a relational and dynamic system, and thereby learns and develops.

Some IC models (Edvinsson & Malone, 1997; Sveiby, 1997; Roos et al., 1998) do recognize the importance of renewal capability at the theoretical level. However, in these models, there is an unfortunate gap between the theoretical accounts and associated measures: whereas the measurement frameworks associate renewal with the dynamic, social and future-oriented nature of knowledge in organizations, the operationalization of this dimension of IC is conducted according to the asset approach, and consequently static, atomistic and retrospective measures are used. For example, Edvinsson and Malone (1997) argue that the company's renewal capability determines how well it can respond to radical changes in the market. They also state that renewal and development indices lie at the opposite pole of financial indicators: the latter focus on the past performance of the organizations, while the former are future-oriented and attempt to establish "what the company is doing now to best prepare itself to grasp future opportunities" (p. 111). In the IC-index model by Roos, Roos, Dragonetti and Edvinsson (1998), IC consists of human capital and structural capital. Structural capital includes a category called the renewal and development value, which is "the intangible side of anything and everything that can generate value in the future, through an improvement of financial and intellectual capital," (p. 51). Also, Sveiby (1997) explicitly discusses organizational renewal. His IC model consists of an external and internal structure and the competence of the personnel. Each of these parts can be measured using three indicators, one of which is growth and renewal.

The way in which the dynamical aspect of IC has been operationalized calls for improvement, as the indicators used so far do not directly address the dynamics of knowledge creation and leverage (see Table 14). Edvinsson and Malone (1997) admit that this is an unexplored area of IC and propose the use of multitude of indices, because "the more measurements, the more likely one is to find the handful that prove decisive in capturing a useful perspective on the organization's future opportunities"

(p. 121). Among their handful are R&D investments, shares of training and development hours and customer-related data such as customer purchases/year. In the model by Roos et al. (1998), the renewal and development value is calculated from indices such as the percentage of business from new products, new patents filed, and training efforts. The measures for growth and renewal of competence, suggested in Sveiby's (1997) model, include the number of years in the profession, training and education costs and turnover. The growth and renewal of internal structure, measured from support staff, includes such measures as investments in the internal structure and information processing systems and sales per support person.

Developed by	Edvinsson and Malone (1997)	Roos, Roos, Dragonetti & Edvinsson (1998)	Sveiby (1997)
Framework	Skandia Navigator	IC-Index	Intangible Asset Monitor
IC components	Financial focus Customer focus Human focus Process focus Renewal and development focus	Human capital Structural capital	Competence of personnel (1) Internal structure (2) External structure (3)
Location of renewal in the model	Renewal and development focus	Structural capital is divided into a) relationships b) organization c) growth and renewal	Each component can be measured with indicators for a) growth and renewal b) efficiency c) stability
Examples of suggested measures for renewal	-Share of employees under age 40 -Direct communications to customer/year - Investments on development of new markets -Value of corporate communication networks	-Percentage of business from new products -Training efforts -Renewal expenses/operating expenses -New patents filed	-Level of education -Turnover -Training costs (1) -Investment in the internal structure -Values and attitude measurements (2) -Profitability per customer (3)

Table 14. The measurement of organizational renewal in three IC models

Are these measures suitable for assessing the dynamic dimension of IC? It seems that *rather than addressing organizational renewal capability, they focus on its proxies and outcomes*. No matter how educated and competent the personnel is, the firm may still be poor in intellectual capital if it lacks the ability to combine subjective knowledge into the inter-subjective knowledge system of the firm (Brown & Duguid, 1998). Likewise, no matter how much financial capital has been spent on information systems and communications networks, these systems will be of little help in demonstrating how able the company is to renew itself and, thus, for indicating the company's future potential, if knowledge is not circulated via these systems in a manner appropriate for the firm's strategy (Cohen & Prusak, 2001). Further, the number of patents and new products indicate the outcomes of renewal processes but do not tell much about the processes themselves (McElroy, 2002). The renewal indicators of the above frameworks are constructed based on an implicit view of intellectual capital as a static asset. This underlying assumption precludes them from being able to address renewal as a capability, and thus they are able to grasp only auxiliary variables rather than actual constituent elements of the ability of the organization to replenish constantly its knowledge base, operations and strategies.

2.3.4 The Criteria for Measurement of Organizational Renewal Capability

The measurement of renewal capability is an underdeveloped issue in the existing literature. Even though renewal capability is a widely discussed feature in contemporary organizations, there have been scarce attempts to measure it in a comprehensive manner: most of the scholars concentrate on theory building and the methodological emphasis is on qualitative case studies, rather than on the construction of quantitative measures and indices. This kind of approach provides rich descriptions of renewing organizations and well-grounded accounts of their characteristics, which aid in improving the management and development of organizations. However, it is also important to be able to quantify renewal capability. As organizations and their stakeholders are becoming increasingly interested in the intellectual capital of

organizations, it is necessary to find ways to communicate, compare and benchmark organizations' knowledge-related capabilities.

Organizational capabilities that lack clear and predictable cause-and-effect relationships with other variables are in danger of being overlooked in management because their assessment and measurement is so demanding. Sanchez and Heene (1996) note that as the definition and measurement of complex higher-level system elements is more difficult than the measurement of simple cause-and-effect relationships many managers tend to focus on measuring only the latter. For example, it is easier to determine whether current operations are functioning efficiently than it is to assess the appropriateness of the organizational structure or strategic focus. This can result in what Sanchez (2002, 13) calls 'micro-management', i.e. focusing on lower-order control loops without realizing the full systemic potential of the organization. In connection with knowledge and capabilities of firms, this means that often the indices used for measuring e.g. intellectual capital of the firm deal with the competencies and skills of the average individual employee, or with the current operational work processes, rather than with more complex organization-level attributes. Consequently, these measures do not help in mastering change and renewal on the level of the whole organization.

This problem is illustrated by the measures of organizational renewal suggested in some frameworks of intellectual capital reviewed in the previous chapter. Most of the measures employ relatively easily available numeric data, and depict either inputs or outputs to the knowledge processes of the firm (inputs include e.g. human capital factors such as educational level; outputs include e.g. patents and brands). However, even though the developed intellectual capital indices are suitable for measuring stocks of knowledge assets, they are inadequate for capturing the flows of knowledge in organizations. In summary, the renewal measures in the most widely disseminated intellectual capital frameworks (Edvinsson & Malone, 1997; Sveiby, 1997; Roos et al., 1998) exceedingly adhere to the very same accounting-based logic that they typically criticize (sic!), and are rather poorly informed by organizational theories on the issue. Perhaps a closer integration with the theoretical models and empirical

findings of the renewal and knowledge processes in organizations could improve the validity of the renewal indices in intellectual capital measurement models.

The measurement of renewal capability should be based on a theoretically grounded interpretation of the phenomenon of renewal in organizations. Based on the knowledge management and strategic management perspectives, the essential characteristics of renewal capability are that it is pro-active, knowledge-based, dynamic, future-oriented, social, systemic, multi-dimensional and strategic (see also Publications 1 and 4). Each of these characteristics poses requirements for its measurement.

First, as renewal capability deals with pro-active change, the measure should examine intra-firm assets and capabilities. Second, as it is a knowledge-based phenomenon, a sound measure of renewal capability should be based on an understanding of knowledge processes and intangibles in organizations. Third, renewal is demonstrated in knowledgeable action. This implies that it is not so important to assess the intangible assets per se as it is to look at the flows and creation dynamics of these assets and the actual functional modes within the organization. In other words, to measure renewal capability, it is not enough to examine what the organization possesses (e.g. IPRs, IT systems), nor what the competencies and characteristics of the individual members of the organization are, as is currently done in some intellectual capital frameworks referred to above. However, even though renewal capability is more like a characteristic than a property of the organization, with an appropriate tool it could be quantified and thereby included even in the balance sheet of the organization[23]

Further, as renewal capability also represents the ability of the organization to satisfy customer needs in the future, a sound measure should be able to anticipate future success. Fifth, organizational renewal is embedded and created in social processes, and thus, its measurement should acknowledge the importance of communication and

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[23] For example, in the balanced scorecard (Kaplan & Norton, 1992) its obvious place is under the heading of learning and growth perspective.

social interaction of the organizational members. Sixth, renewal capability is a collective characteristic of the organization as a whole. As such, it must be measured in a manner which examines the organization as a knowledge system, formed by interrelated activities of its constituents, composing a more or less coherent whole. There are significant methodological challenges in applying systems thinking to the measurement of organizations, the most serious one being the inadequacy of the most widely employed statistical techniques to capture the complexity of system theoretical models. Consequently, new solutions for quantitative analysis need to be developed which are sensitive to the systemic propensities of organizational phenomena, and which treat interrelatedness and coherence as more important features of the response data than their absolute level or average. The KM-factor® measurement tool developed by Ståhle and colleagues employs a novel analysis method constructed along these principles (see Ståhle, Ståhle & Pöyhönen, 2003).

Seventh, as renewal capability is a multi-dimensional concept consisting of three types of renewal activities, from the replication of existing routines to the creation of totally new capabilities, this should be reflected in its measurement. Finally, the extent to which the organization needs the various types of renewal depends on its strategy. Thus, renewal capability is a strategy-related issue. This means that the measure of renewal capability should include the recognition of various strategic foci and the implications of these to the optimal combination of maintenance, development, and radical types of renewal within the organization.

The KM-factor® method for measuring organizational renewal capability has been designed to fit these criteria. The KM-factor® measures renewal capability, i.e. dynamic intellectual capital, based on the interpretation of organizations as dynamic knowledge systems (Ståhle & Grönroos, 2000; Ståhle et al., 2003). In this view, the firm is examined as consisting of three interrelated knowledge environments that form a basis for knowledge creation: The *mechanistic* environment represents value creation from standardized operating models and processes. The *organic* environment is the platform for mutual learning and incremental development. The *dynamic* environment is the sphere where spontaneous information flow and potential

knowledge is cultivated into innovations. There are four main constituents in any organizational system: knowledge, information flow, relationships, and management. By analyzing these constituents, the different knowledge environments of the organization can be modeled.[24]

First, the tool models organizations as three-dimensional knowledge systems and shows how mechanical, organic and dynamic features are emphasized in its current functional mode and goals, and whether these are congruent with the knowledge strategy of the organization. Second, the tool measures renewal capability based on two main indices, called power to change and strategic competence. Power to change represents the general ability of the organization to function in systemic environments, and strategic competence represents the ability of the organization to prioritize the different environments. The focus of the measurement is not on the individual responses or averages but on how the views of the respondents relate to each other and, on the other hand, to the strategic focus of the organization. The results of the measurement are presented both in quantitative indices as well as graphic illustrations. Thus, the tool is suited both for internal development purposes as well as for external communication. It can also be used as an aid in firm valuation, as a strategic steering tool and in assessing the future potential of the organization. The KM-factor® method is explained and demonstrated more thoroughly in the Publications 3, 4, and 5.

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[24] For a thorough explanation of the system theoretical roots, see Ståhle, 1998 and for the method, see Ståhle et al., 2003

3. Summary of the Publications

3.1 Organizational Capability for Renewal: Combining Effective Maintenance, Incremental Development and Radical Innovation for Sustained Competitive Advantage

Organizational ability for continuous self-induced innovation, learning and development has emerged as a popular topic in recent management science literature. However, there is no widely shared view on how organizational renewal should be defined, what it consists of and how it can be facilitated. This publication aims at producing an integrative definition of organizational renewal capability and examines its most important characteristics. First, five theoretical models of continuously renewing organizations[25] are reviewed extensively in order to provide a holistic understanding of the capability for renewal from various viewpoints.[26] Then, based on a comparison of nine theories of organizational renewal, a synthesizing definition for renewal capability is put forth and its most important characteristics are discussed.

Based on the reviewed literature, it is argued that organizational renewal capability is a three-dimensional phenomenon, consisting of three analytically distinct types of knowledge processes: 1) effective standardization, replication, implementation and maintenance of the existing knowledge base and operations, 2) continuous incremental development of it, and 3) the production of radically new knowledge and innovations. Furthermore, each type of renewal requires distinct operational and management processes, and thus the question of prioritization among them is essential. Therefore, renewal as an organizational capability is defined both by the ability of the organization to implement the spectrum of knowledge processes from the replication of existing knowledge and competencies to quantum-leap innovations,

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[25] Nonaka's theories on knowledge creation in organizations; Leonard-Barton's accounts of continuously renewing organizations; Weick's construct of the renewal type of organizational learning and associated processes of organizational mindfulness; Eisenhardt's strategic approach to continuous organizational change; and Ståhle's system theoretical interpretation of self-renewal in organizations.

[26] These five frameworks were chosen for a comprehensive review because of their ability to illustrate organizational renewal from complementary viewpoints.

and by whether the three processes are balanced in a manner that is consistent with the long-term strategic intent or vision of the organization as well as the external demands posed by its environment. The most important characteristics of renewal capability, brought up in all of the reviewed theoretical models, are that it is pro-active, knowledge-based, dynamic, future-oriented, social, systemic, strategic, and multi-dimensional by nature. Any operationalization of renewal capability should respect these characteristics.

3.2 Assessing Intellectual Capital Creation in Regional Clusters

Most of the research on intellectual capital has focused on individual companies rather than on more macro-level units such as inter-organizational networks, regions or nations. Furthermore, even though there are several theories about the composition of intellectual capital, as well as measurement frameworks for quantitatively assessing the actualized, already existing intellectual capital, there is relatively little knowledge about *the ways in which intellectual capital is created and maintained as a dynamic process*. Most of the theories of intellectual capital treat organizational knowledge as a static package rather than a dynamic capability for knowledgeable action. However, in order to understand and develop the *future* potential of an organization or a region, it is necessary to look at the ways in which intellectual capital is created. This publication constructs a model of intellectual capital creation within regions, and demonstrates how this model can be used in assessing and developing regional intellectual capital. In the approach put forth, intellectual capital is viewed as an ongoing, emergent process, and the focus is not on the intangible assets per se, but on the capability to leverage, develop and change them.

The publication examines regional clusters as dynamic knowledge-based systems. Based on the literature and the empirical case, it is argued that regional clusters can be perceived as consisting of three types of networks, namely production, development and innovation networks. Each network type is apt for creating a certain type of knowledge-based competitive advantage, and has its own operational logic and

effectiveness criteria. Furthermore, it is claimed that in order to implement, develop and innovate intellectual resources effectively, a regional cluster has to include all types of networks. Thus, intellectual capital creation encompasses the whole spectrum of knowledge processes from the replication of existing knowledge and competencies to quantum-leap innovations. Consequently, in order to maximize its potential for intellectual capital creation and leverage, a regional cluster must be able to combine such various features as exploration and exploitation, effectiveness and innovation, routine and non-routine. The construct of this publication of the three manners of intellectual capital creation in inter-organizational networks is an attempt to model an important phenomenon that has been a neglected topic of research. Naturally, the model has to be applied to a number of cases in order to prove its viability in other regional clusters and inter-organizational networks.

3.3 Towards Operationalization of Dynamic Capabilities

In the global economy the traditional sources of competitive advantage, such as access to natural resources and the exploitation of economies of scale or monopoly power, are eroding at the same time as knowledge market imperfections are gaining more importance as sources of sustainable innovation profits. New earning logic boils down to creating and possessing valuable, hard to imitate, difficult to replicate, rare, and non-substitutable intangible resources and capabilities, and most importantly, dynamic capabilities necessary for orchestrating and reconfiguring them effectively.

However, even though the dynamic capability approach addresses relevant issues and is capable of tackling some of the theoretical issues brought up by changes in the logic of economy, its concepts have been defined in a less than clear manner and have been found very difficult to operationalize. This publication examines the issue of operationalizing dynamic capabilities by introducing a new approach that is based on both dynamic capabilities and organization's *systemic efficiency*.

From this viewpoint, dynamic capabilities can be conceptualized as the collective capacity of an organization to replicate, adapt, reform, gather, and innovate its knowledge base (i.e. assets and capabilities) in a manner consistent with its strategy. Based on this argument, a novel approach to assessing dynamic capabilities is presented in this publication, which enables connecting the theoretical concepts of dynamic capability approach with their measurable empirical counterparts as to the state and the art of organizations' internal structures and their articulated firm strategies. In this approach, organizations are modeled as three-dimensional knowledge systems, formed by relationships which function as channels for the flow of information and competencies/capabilities, and controlled by the management function. The crux of the systemic interpretation of dynamic capabilities is summed up in the following arguments:

- Systemic efficiency is always needed for organizations' dynamic capability.
- Systemic efficiency guarantees the organization's capability a) to function as a system in general, and b) to guide its functions coherently according to a chosen strategy.
- Systemic efficiency can be analyzed by a system-based questionnaire and its system-based mathematical analyses.

In summary, the KM-factor® assessment method presented in this publication allows for a strategy-based quantitative analysis of dynamic capabilities either as replication, continuous development or as radical innovations. The overall dynamic capability level of the firm is argued to be contingent on the consistency of the firm's knowledge-based capabilities with its strategic objectives.

3.4 Analyzing Dynamic Intellectual Capital

Intellectual capital can be approached from two different perspectives: as a 'stock' or 'flow'. While most of the literature employs the first perspective, this publication argues for the importance of the second type of view. It is argued that theoretical

models which conceptualize intellectual capital as a static asset rather than a dynamic capability are inadequate for examining collective knowledge and organizing principles of firms, and thereby also for capturing their renewal capability. In order to fully understand the intellectual capital of an organization, it is necessary to grasp not only the existing intangible assets, but also the organization's dynamic capability to leverage, develop and change these assets, i.e., its renewal capability.

Even though the significance of the dynamic and collective aspect of intellectual capital is recognized in some theories of intellectual capital, this insight has not been transmitted to the related measures. A state-of-the-art review of the methods for assessing dynamic intellectual capital is conducted, and it is concluded that while the measurement frameworks associate renewal with the dynamic, social and future-oriented nature of knowledge in organizations, the phenomenon is still operationalized in a static, individualistic and retrospective manner. Therefore the development of quantitative measures for organizational renewal capability presents an important and acute challenge for research.

The KM-factor® method is presented as a more viable alternative for analyzing dynamic intellectual capital. The publication discusses the theoretical background and methodology of the KM-factor® and provides examples of the KM-factor® report of results. Finally, the KM-factor® method is assessed in light of two types of criteria: 1) sound measurement of intellectual capital in general, and 2) organizational characteristics of renewal capability, drawn from the knowledge-based view of the firm and the dynamic capabilities literature.

3.5 The Link Between a Company's Dynamic Intellectual Capital and Business Performance

The Intellectual Capital School was crafted to provide more relevant measures for intangibles. However, what is still lacking is a framework for grasping the dynamic processes by which intellectual capital is maintained and created, and tools for

assessing these processes in a way that would enable the anticipation of the firms' *future* development.

To bridge this gap in existing research, a theoretical model for renewal capability, i.e. the dynamic dimension of intellectual capital, is presented. The roots of this model are in systems theories, especially the newest forms of it, but it is also conceptually close to the knowledge-based theory of the firm and the dynamic capability approach. It is argued that renewal capability

1. is always based on the organization's overall ability to deal with information, knowledge and innovation;
2. can be operationalized and defined by organizational ability to create and maintain different knowledge environments in line with the firm's strategic intent; and
3. can be measured in a way that is relevant from the perspective of management and company value.

The KM-factor®™ tool is introduced which measures renewal capability through two main indices, strategic capability and power to change. Strategic capability consists of factors that deal with the ability of the organization as a whole to perceive the current situation and weak signals, to set clear and coherent objectives, and to achieve the objectives through collaboration. Power to change includes factors by which the organization achieves and maintains change and renewal: the motivation level, innovation potential, commitment, ambition and social networks within the organization. The methodology of the tool is further illustrated.

The publication addresses the issue of whether renewal capability influences the future financial performance of firms by relating the data from KM-factor® measurements of eight SMEs to their economic key figures. Here, two approaches are used: First direct correlations between the indices of the KM-factor® and economic key figures were examined. Second, based on internal correlations between a) the KM-factor® indices, and b) key economic figures, clusters are formed from these two sets of data. Then correlations are traced between these two sets, the rationale being

that correlations between individual indices vary over time, but correlations between clusters are more permanent and reliable indications of a relationship.

Based on the results renewal capability seems to improve the future performance of firms. It seems that the widely spread view of renewal capability significantly influencing organizational success is tenable. Naturally, the sample of eight firms is not large enough to draw definite conclusions, so a future research attempt will be made to examine the connections of dynamic IC and organizations' success in a larger sample. The findings point to the direction that dynamic IC is a useful concept for external valuation of the firm, and the KM-factor® has the potential to be a viable tool for doing this.

4. Conclusions

4.1 Theoretical Contributions

The objective of this dissertation was to increase knowledge about organizational renewal capability and to present a method to be used in modeling and measuring it. Renewal capability has emerged as an important topic of research in several fields of science. This dissertation drew on three main bodies of literature for approaching this phenomenon which were labeled knowledge management, strategic management and intellectual capital perspectives[27].

It was argued that each of these approaches illuminates certain aspects of organizational renewal capability, but that none of them is sufficient in itself to fully explain the phenomenon. Therefore, the approach used in this dissertation consisted of an integration of all three perspectives. The adoption of various theoretical approaches to explain renewal capability can be considered an important contribution of the dissertation. In addition, this study addressed research gaps in each of the perspectives and thereby contributes to discussions within all of them. An important tool in bridging the research gaps was to draw on the other two approaches. Table 15 presents a summary of the characteristics of the three main perspectives on organizational renewal capability.

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[27] The three-fold division of the main theoretical perspectives on renewal capability is admittedly rough, because the three perspectives are by no means clearly lineated schools of thought with impermeable boundaries. The fields of knowledge management, strategic management and intellectual capital are still in an emergent stage, relatively open to new ideas, and have a strong cross-disciplinary inclination. Therefore, the way in which their boundaries and main foci have been identified in this dissertation can surely be contested. In addition, assigning studies to these categories is not clear-cut, and some authors (notably Spender, Grant and Teece) have contributed to theory development within more than one perspective. Acknowledging these limitations, I still wanted to include this typology here, as it helped in positioning the dissertation as well as in demonstrating the existing approaches to organizational renewal and the communication gaps between them.

	Knowledge Management	Strategic Management	Intellectual Capital
Characteristics of the perspective	Emphasis on understanding knowledge as a dynamic social process	Emphasis on understanding the causes of competitive advantage	Emphasis on the measurement and reporting of intangibles
Research focus on	Characteristics of social relationships connecting the actors and collective knowledge embedded in them	Unique abilities of firms to reshape and reconfigure assets and to carry out change	Investments, intellectual property rights, human capital, structural capital, relational capital
Main background sciences	Organization science, social psychology	Strategy, management science, economics	Accounting, finance
Representative authors	Brown & Duguid, 1991; Kogut & Zander, 1992; Spender, 1996a; Grant, 1996b	Nelson & Winter, 1982; Teece et al., 1997; Eisenhardt & Martin, 2000	Sveiby, 1997; Edvinsson & Malone, 1997; Roos et al., 1998
Organizational renewal understood as	Process of using, developing and creating knowledge	Capability that produces competitive advantage	Static asset to be measured
Main contribution for understanding renewal capability	Understanding the inherently social and activity-based nature of knowledge in organizations; theories of different knowledge types and the processes associated with them	Understanding the economic and strategic significance of resources, competencies and capabilities; tools for analyzing the different value creation logics	Understanding the value of intangibles and how they can be measured, reported and communicated internally and externally; frameworks for understanding how the different types of intangible assets are related to one another
Key question from the viewpoint of organizational renewal capability	How renewal capability is created, i.e. how to achieve flexible knowledge integration?	How to create competitive advantage by means of renewal, i.e. how to achieve a strategically optimal combination of renewal types?	How to measure and report the dynamic aspect of intellectual capital?
Main problem of the perspective from the viewpoint of organizational renewal capability	Neglect of transformative, provisional and contested aspect of knowledge	Conceptual imprecision and lack of measures	Static and individualistic nature of theoretical frameworks and measures
What the KM-factor® offers to this approach	Visualization of the current organizing principles of the firm and their future trends, assessment of organizational connectivity and cohesion	Tool for strategic steering and decision-making, quantitative and cross-firm comparable indices and graphs for objective assessment of dynamic capabilities	Quantitative indices and graphs of dynamic intellectual capital that can be integrated with other measures and narratives of intellectual capital

Table 15. The three perspectives on organizational renewal capability

Each of these perspectives focuses on a particular aspect of the phenomenon while leaving some other aspects of it unexplored. The knowledge management perspective considers knowledge as inherently social and activity-based, and focuses on the organizational processes associated with its application and development. Within this perspective, organizational renewal capability is understood as the capacity for flexible knowledge integration. The strategic management perspective, on the other hand, approaches knowledge in organizations from the standpoint of its implications for the creation of competitive advantage. In this approach, organizational renewal is framed as the dynamic capability of firms. The intellectual capital perspective is focused on exploring how intangible assets can be measured, reported and communicated. From this vantage point, renewal capability is comprehended as the dynamic dimension of intellectual capital. Next, contributions of this dissertation to each individual perspective are addressed, and then more general contributions are laid down.

Contributions to the Knowledge Management Perspective

The main problem of using the knowledge management perspective for examining renewal capability is that while it provides theoretically grounded accounts of the creation of coherence and shared organizing principles in organizations, it tends to centralize stability and maintenance of the status quo and neglect the transformative, provisional and contested aspects of knowledge. In order to understand what kind of organizing principles enable the mastery of change and renewal and what kind of management actions are needed to achieve them, the theories in this perspective need to be extended. The dynamic capability perspective emphasizes the reconfiguration and change of organizational resources and capabilities, and offers therefore an important extension that also enables understanding how organizational level know-that and know-how themselves can be renewed. The system-based model of knowledge environments (Ståhle & Grönroos, 1999; 2000) explains how patterns of knowledge integration lead to different types of renewal in organizations, and is a

suitable theory for bridging the theories of collective knowledge with dynamic capabilities.

The knowledge management perspective addresses the inter-social and activity-based roots of organizational knowledge on a rather general level. The studies in this perspective are mostly based on theoretical reasoning or case study methodology, and tend to neglect inter-firm differences. In other words, they address knowledge in organizations either on a very general or a very specific level, but do not explicitly address the different requirements of various firms. They also tend to overlook the impact of the market environment and the firm-specific resources and strategies. The strategic management perspective in general can profit the knowledge management perspective as it includes tools and frameworks for analyzing market positions and strategies of firms. The model of renewal capability presented in this dissertation considers the business strategy of the firm as the yardstick for determining the optimal combination of renewal types.

Moreover, the knowledge management perspective does not consider the measurement and reporting aspect of organizational renewal capability. The frameworks and methods for addressing knowledge resources and capabilities developed within the intellectual capital community could prove useful for improving the management and development of collective knowledge. The KM-factor® measurement visualizes the current organizing principles of the firm and their future trends, both for employees and the management, and assesses organizational connectivity and cohesion. Thereby, it can be used as a tool for developing the organizational capabilities for flexible knowledge integration.

Contributions to the Strategic Management Perspective

The strategic management perspective on organizational renewal capability focuses on the role of dynamic capabilities in causing performance differences between firms. As this approach is still in an emergent state, there is considerable confusion even

regarding the very basic nature of dynamic capabilities themselves, not to mention the processes and consequences associated with them. This dissertation offered one interpretation of dynamic capabilities and also explicitly laid down its similarities and differences with the other interpretations. Also, the relationship of dynamic capabilities with other types of intangible assets of organizations is not very well clarified in the literature. The intellectual capital perspective can benefit the dynamic capability approach by providing classifications for intangibles that go beyond the resource-competence-capability distinction and enable examining intellectual wealth from a comprehensive perspective.

The dynamic capability approach does not by itself provide all the necessary analytical tools for constructing a comprehensive account of organizational renewal capability, but has to be supplemented by the knowledge management perspective for understanding its social and interactional bases. Without the explicit recognition of the socially constructed nature of knowledge, the dynamic capability approach is in danger of confusing knowledge with information, and thereby treating knowledge uncritically as a 'thing' or a commodity – as for example when information hoarding from external sources to intra-firm databases or acquiring new information technology is equated with knowledge development and learning. However, knowledge is best considered as a collective, socially generated resource and it is necessary to understand the social dynamics of the knowledge processes in order to understand the reconfiguration of competencies and routines. The renewal model put forth in this dissertation examines dynamic capabilities from the viewpoint of relational patterns in firms.

Theories of dynamic capabilities also tend to forget the role of the employees below the level of top management in producing change. The knowledge management perspective with its organization-wide outlook to knowledge integration serves to remind that also the 'grassroots matter', especially as highly educated knowledge workers are the best experts of their own field and cannot be managed with conventional top-down methods. Therefore the employee level should also be

included in the analysis of dynamic capabilities, as is done in the method presented in this dissertation.

The assessment of dynamic capabilities is a problematic issue. On one hand, there are debates about the firm-specificity of these capabilities, and on the other, even if it is accepted that dynamic capabilities exhibit commonalities across firms, their operationalization seems difficult and has been attempted by few. To tackle operationalization and measurement of dynamic capabilities, this dissertation draws upon intellectual capital perspective, which focuses on how the intangible wealth of organizations can be measured, visualized and communicated to both intra-firm and external parties. The constructed method for measuring renewal capability, the KM-factor®, can be used either for objective assessment of dynamic capabilities or as a tool for strategic steering and decision-making.

Contributions to the Intellectual Capital Perspective

The intellectual capital perspective aims to provide tools for the assessment and valuation of firms which recognize the role of knowledge-based aspects of value creation. However, intellectual capital has mainly been conceptualized as a static asset rather than a dynamic capability. Consequently, the current measures of intellectual capital are inadequate for examining collective knowledge and organizing principles of firms, and thereby also for capturing their renewal capability. In order to model and measure renewal capability viably, intellectual capital literature has to recognize the capability aspect of intellectual capital more fully. The framework presented in this dissertation is suited for examining the dynamic aspect of intellectual capital. The analytical approach is applicable to the level of regions and inter-organizational networks[28] as well as single organizations. The measurement tool KM-factor® produces quantitative indices and graphs of dynamic intellectual capital that can be integrated with other measures and narratives of intellectual capital.

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[28] See Publication 2

As emphasized earlier, theories of the knowledge management perspective illuminate the social and activity-based nature of knowledge. Of the three perspectives, only this one is mindful of the difference between information and knowledge. Intellectual capital frameworks tend to treat for example information technology systems, databases and patents as if they were equivalent to human knowledge and understanding. Without the knowledge management perspective, the intellectual capital models are in danger of losing sight of the fundamentally human, inter-subjective and actionable nature of knowledge and reducing knowledge in organizations to bits and pieces of information. Furthermore, as the capabilities of firms are embedded in shared tacit knowledge, which is demonstrated in their activities and relational patterns, the asset approach to intellectual capital simply cannot deal with them, because it conceptualizes IC as fundamentally static and individualistic.

A purely asset-based approach to intellectual capital cannot address how intellectual capital is maintained and created – only what the stock of intellectual capital is at the moment of data gathering. This shortcoming of the asset approach to capture knowledge is especially paradoxical since one of the main critiques of the intellectual capital movement toward the traditional methods of firm valuation is that these are too retrospective and should be replaced or complemented with methods that are more forward-looking. The dynamic capability literature emphasizes the essentiality of a future-oriented outlook on firm activities, and is therefore an important extension to the theoretical toolbox of intellectual capital scholars.

Contributions to the Knowledge-Based View of the Firm in General

The three perspectives can all be understood to belong to the knowledge-based view of the firm, if this concept is understood in a wide manner, i.e. to include all approaches that explicitly focus on examining knowledge and its importance in

organizations[29]. Therefore in addition to contributing to the individual perspectives, this dissertation can also be perceived to add to the knowledge-based view of the firm more generally.

Spender and Grant (1996, 9) note that "the knowledge-based theory of the firm is a paradigmatic gateway, the point in the evolution of our field where we abandon the older concept of a theory as a blueprint for creating the firm, and move towards a more agricultural notion of management as the intervention in and husbandry of the natural knowledge-creating processes of both individuals and collectives, be they societies as they create and are reconstituted by their culture, or firms as they create and are reconstituted by their creations." However, as of yet, the promise of the knowledge-based theory of the firm has not been fully reclaimed: according to for example Grant (2002), the knowledge-based view is still in an emerging state and is more a set of ideas about the existence and nature of the firm that emphasize the role of knowledge than a theory in any formal sense. Von Krogh and Grand (2002) posit five conditions that the knowledge-based view of the firm should satisfy in order to achieve the status of a real theory as well as to be managerially useful:

1) The theory needs a concept of knowledge that can explain the origin of new knowledge.
2) The theory needs a concept of knowledge creation as an ongoing activity that is a source of rent in its own right.
3) The theory needs to identify the necessary and sufficient conditions for 'corporate coherence'.
4) The theory needs a comprehensive concept of change.
5) The theory must establish a link between managerially led initiatives and competitive advantage.

Given that one of the aims of this dissertation is to advance the knowledge-based theory of the firm, some of the requirements for the development of this theory posited above merit closer examination. In the following, the four last requirements

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[29] As a more restricted concept, the knowledge-based view of the firm refers to those theories that in this dissertation are mainly discussed under the heading of the knowledge management perspective.

are scrutinized in relation to how the model of organizational renewal capability as a dynamic and systemic propensity and the related KM-factor® method put forth in this dissertation fit with these requirements and thereby contribute to the development of the knowledge-based theory of the firm.

First, concerning the second condition that the theory needs to view knowledge creation as an ongoing activity that is a source of rent in its own right, Von Krogh and Grand (2002) suggest that as knowledge has a highly distributed and fragmented character, *connectivity* is the key in shaping knowledge creation as well as the robustness of new knowledge being processed by the firm. According to them, the firm must be understood as a network of agents, sources, and users of knowledge, relationships among these, and knowledge-creation activities. Consequently, competitive advantage is based on the firm's ability to establish strong relationships among previously unconnected agents to create new knowledge. This view relates directly to the model of organizational knowledge environments as platforms for knowledge integration, based on the interplay of individuals, their knowledge, relationships, knowledge flows and steering mechanisms within the firm. On the whole, the view of the firm as a dynamic knowledge system emphasizes connectivity: the knowledge environments are formed by the interrelated activities of organizational actors, and knowledge is understood as valuable only when it is in movement. The framework created for examining renewal and intellectual capital creation in regional clusters extends this mindset and helps to understand renewal processes in contexts of inter-organizational collaboration.

Next, the third condition, identifying the necessary and sufficient conditions for 'corporate *coherence*', means that the theory has to look beyond the simplistic view of the firm as a collage of resources, processes and competencies, and focus on the underlying dynamics of establishing coherence in patterns of firm activity and development. Again, the model put forth in this dissertation is consistent with the view. The model of firms as consisting of three knowledge environments, formed by distinct interaction patterns, enables understanding how these dynamics are forged and maintained. In addition, by examining the coherence of the individual perceptions

of the functional modes and goals, the KM-factor® measurement tool enables the assessment of the capability of the firm for creating corporate coherence. In the context of organizational renewal, coherence refers to two levels of analysis: on the first level, it implies the need for shared organizing principles among individuals so that they share a mutual strategic direction; on the second level, coherence is achieved by the strategically sound balancing of the knowledge environments and the associated renewal types.

The fourth requirement asserts that the theory must be able to provide a *comprehensive concept of change* that covers both revolutionary and evolutionary changes. Further, it must "link the level of change affecting the firm to the creation of coherence in the firm" (Von Krogh & Grand, 2002, 172). In other words, the concept of change should be such that it encompasses both the preservation of stability and continuity, while allowing different types of changes. The model of organizational renewal as a three-dimensional phenomenon, consisting of maintenance, incremental and radical types of renewal is such a construct.

The last requirement in Von Krogh and Grand's (2002) list is that the knowledge-based theory of the firm must establish a link between managerially led initiatives and competitive advantage. According to them, management in this context necessarily concerns the management of the *conditions* which enable the creation of knowledge, since managing knowledge per se is impossible due to its experientially-based and inherently tacit nature. Concerning this requirement, it can be noted that the knowledge environments can be understood as platforms where knowledge is applied and created, and creating and supporting them in the organization is a way of managing the enabling conditions of knowledge creation.

Finally, another contribution of this dissertation is that it extends Ståhle's model of organizations as three-dimensional systems (Ståhle & Grönroos, 1999; 2000) to the direction of a scientifically argued theory. Ståhle's model of mechanical, organic and dynamic knowledge environments is widely used in the national context of Finland in both research and practical development in such various fields as adult education,

business administration and regional development. The model is based on implementing the idea of three distinct system paradigms to organizations. Ståhle (1998) discerned the three paradigms in her doctoral dissertation based on an extensive review of system theoretical works in all fields of science. The focus was not on system theoretical interpretations of organizations, even though such models were also reviewed. The application of the general systemic principles to organizations was conducted in Ståhle and Grönroos (1999; 2000) without references to relevant organization and management science literatures. In other words, the construction was a managerial and practical model rather than a scientifically argued theory. Before the publications of this dissertation, the application of the general systemic principles of the three types of general systems logics has not been argued in systematic connection with other theories of business administration. This dissertation connected Ståhle's model to relevant scientific discussions and demonstrated where it converges and where it diverges from other related theories.

4.2 Limitations of the Study and Suggestions for Future Research

This final section of the first part of the dissertation discusses some of the limitations of the study and points directions for future research.

This dissertation argued that renewal capability can be quantified and that Ståhle's (Ståhle & Grönroos, 1999; 2000) model of organizations as three-dimensional knowledge systems offers a suitable basis for operationalizing this phenomenon. However, in business sciences, processes and dynamics are usually studied with a qualitative case study approach, and one can question whether it is possible to capture organizational renewal capability with cross-sectional survey methods such as the KM-factor®. For example, Spender (1996b) argues that case study approach is the only viable manner for examining organizations as systems of knowing activity, and indeed, most of the existing empirical literature on renewal capability is based on case studies. A quantitative approach inevitably simplifies issues and is incapable of capturing the local idiosyncrasies of phenomena. It is important to note that even

though the KM-factor® can reveal the typical features of the knowledge processes within the organization, their developmental trends, as well as the relations of these with the value creation strategy of the organization, it cannot track the sequence of longitudinal change processes or provide information on the context-specific features of renewal in the given organization.

The research strategy of this dissertation was limited by the small amount of empirical data in use. Even though the KM-factor® measurement has been conducted in over 90 Finnish organizations, the method has gone through so many changes during the six years of its development that most of the data had become unsuitable for the purposes of this dissertation. In addition, a bulk of the measurements was not accessible for research purposes because of confidentiality reasons. Because of the lack of suitable data, this dissertation was restricted to merely demonstrating the method and its analytical background rather than veritably validating it.

In the early stages of crafting this dissertation, three main options were assessed for validating the KM-factor® method: the constructive approach, statistical examination of the relations of the KM-factor® indices and other measures of renewal, and longitudinal case studies. However, none of these could be used because appropriate data could not be obtained. The latter two options offer important routes for future research.

The first option would have been to use the constructive approach (see Kasanen et al., 1991; 1993; Lukka, 2003). This approach is suited for research problems that have an acute practical background, such as the development of a tool for assessing, developing and reporting the renewal capability of organizations. In this approach, a managerial construct is proven valid if a manager responsible for the financial results of his or her business unit has been willing to apply the construction in question. As the KM-factor® measurement has been conducted in over 90 organizations, it has been validated to some extent according to the constructive logic. However, the constructive approach requires careful reporting of the developmental stages of the produced new construct. Even though the KM-factor® method was created in close

collaboration with the measured organizations and business analysts, no formal documentation was gathered during the first years of development. Therefore it was not possible to conduct the validation of the method properly with the constructive approach.

The second option for validating the method more solidly would be to examine the relations between the KM-factor® indices and some other measures of renewal. This type of study will be conducted in future once more data is acquired. In this case, the other measures of renewal will function as criteria variables against which the ability of the KM-factor® to adequately capture renewal capability is assessed. The other measures of renewal could represent the outcomes of renewal, such as the indices used in some of the intellectual capital measurement frameworks (see Chapter 2.3 and Publication 4). As KM-factor® addresses renewal capability, it in fact assesses the organization's *potential* for renewal, while the outcomes indicate actualized renewal. Unfortunately, for this dissertation it was not possible to obtain both types of data (KM-factor results and 'objective' renewal data). [30]

Finally, the third option for properly validating the KM-factor® method would be to conduct thorough longitudinal case studies in several organizations and relate these with their KM-factor® results. In fact, at the moment several such studies are being conducted by undergraduate students in Lappeenranta University of Technology under the supervision of Pirjo Ståhle and the author of this dissertation.

There are several restrictions and developmental needs in the KM-factor®. Some of them are methodological while others are more practical in nature. The methodological problems relate mainly to four issues. First, the systemic data analysis technique used in the KM-factor® has been developed by Sten Ståhle especially for measuring the systemic efficiency of organizations. The mathematical logic of this

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[30] Publication 5 does examine the relations of KM-factor® renewal indices and economic performance of organizations, and demonstrates that there is a connection between them. This can be interpreted to demonstrate that the KM-factor® method possesses external validity, i.e. it does measure qualities which relate to financial renewal and the future performance of an organization. However, since the measurement results of only eight organizations were used in Publication 5, the obtained proof is preliminary.

analysis is different from the generally used statistical methods. The viability of the statistical operations of the KM-factor® should be put under inspection among a mathematical audience. Because the analysis technique is novel and complex, it cannot be explained by reference to widely known statistical techniques, and is difficult to spell out in a simple manner. This makes the analysis somewhat 'invisible'. Second, the development of the KM-factor® would benefit from explaining the quantitative renewal indices more specifically in relation to both theory and empirical evidence. The indices have emerged from the non-random behavior of systemic data in the examined organizations, but how and why the specific indicators were formed and chosen is not totally clear. Third, there is room for improvement in some parts of the KM-factor® questionnaire[31]. For example, there are several psychometrically validated scales for addressing motivation, but these are not taken advantage of in the questionnaire. In fact, the items used for measuring motivation level are not based on any theory of motivation. Furthermore, the questionnaire items depicting organic and dynamic knowledge environments seem to be to some extent overlapping and confounded. Finally, the systemic data analysis technique requires that data is obtained from at least 16 respondents, or otherwise the renewal indices cannot be calculated. This makes the method unusable in organizations with less than 16.

The KM-factor® method is subject to the following practical limitations. On the one hand, it does not provide as specific and contextualized information as a qualitative case study would. Because the KM-factor® is designed to provide information that is comparable across organizations, it does not concentrate on the functional or operational substance of the organization, but on the general relational patterns and knowledge environments. Therefore it does not provide specific advice on how to develop renewal capability. The specific context of improvement has to be located and negotiated by the organization members themselves. On the other hand, because the KM-factor® requires data collection from a representative sample of

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[31] The full KM-factor® questionnaire could not be attached to this dissertation because of intellectual property protection issues. Examples of the questionnaire items can be found on the web page of the firm that owns the KM-factor®, businessXray Ltd (http://www.businessxray.com/kmf/).

organizational members and a specialized data analysis, it is more time-consuming and labor-intensive than the methods for assessing renewal capability found in the intellectual capital literature (see Chapter 2.3). These other methods typically use data that can be provided by a single person in the organization or that is produced as a by-product of the standard performance measures of the organization. Because of the data collection and analysis requirements, the integration of the KM-factor® measurement into the general measurement system of the organization is not unproblematic. In addition, the KM-factor® report of results contains so much information that in most cases the organizational members need expert help in interpreting the results when the measurement is used for the first time.

Nevertheless, even in spite of the aforementioned limitations, the KM-factor® offers a promising route for modeling and measuring renewal capability. The main future development needs of the path of research on organizational renewal capability opened up by this dissertation are:

- Acquiring more KM-factor® measurement data and examining it in conjunction with other intellectual capital measures and financial data
- Connecting KM-factor® measurements with rich qualitative case studies
- A more thorough conceptualization of knowledge strategies of firms and the connection of these to renewal capability
- A longitudinal examination of how firms change their organizing principles, i.e. how the balance between the knowledge environments varies across time

References

Abernathy, W. & Clark, K. (1985). Innovation: Mapping the winds of creative destruction. Research Policy, 14, 3-22.

Amit, R. & Schoemaker, P. (1993). Strategic assets and organizational rent. Strategic Management Journal, 14, 1, 33-46.

Anderson, N. R. & West, M. A. (1998). Measuring climate for work group innovation: development and validation of the team climate inventory. Journal of Organizational Behavior, 19, 235-258.

Andriessen, D. (2004a). Making sense of intellectual capital. Designing a method for the valuation of intangibles. Elsevier, Oxford.

Andriessen, D. (2004b). IC valuation and measurement: Classifying the state of the art. Journal of Intellectual Capital, 5, 2, 230-242.

Argyris, C. & Schön, D. (1978). Organizational learning. A theory of action perspective. Addison-Wesley, Reading.

Atkinson, A. A. & Waterhouse, J. H. (1997). A stakeholder approach to strategic performance measurement. Sloan Management Review, 38, 3, 25-38.

Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17, 99-120.

Bauman, Z. (1996). Postmodernin lumo. Vastapaino, Tampere.

Berger, P. & Luckmann, T. (1994). Todellisuuden sosiaalinen rakentuminen. Gaudeamus, Helsinki. [Original: The social construction of reality, 1966.]

Bessant, J. & Caffyn, S. (1997). High-involvement innovation through continuous improvement. International Journal of Technology Management, 14, 1, 7-28.

Bessant, J. & Francis, D. (1999). Developing strategic continuous improvement capability. International Journal of Operations and Production Management, 19, 11, 1106-1119.

Bessant, J., Knowles, D., Briffa, G. & Francis, D. (2002). Developing the agile enterprise. International Journal of Technology Management, 24, 5/6, 484-498.

Bierly, P. & Daly, P. (2002). Aligning human resource management practices and knowledge strategies: A theoretical framework. In N. Bontis & C. Wei Choo (Eds.), Strategic management of intellectual capital and organizational knowledge. Oxford University Press, New York.

Black, J. A. (2000). Fermenting change. Capitalizing on the inherent change found in dynamic non-linear (or complex) systems. Journal of Organizational Change, 13, 6, 520-525.

Blackler, F. (1995). Knowledge, knowledge work and Organizations: An overview and interpretation. Organization Studies, 16, 6, 1021-1046.

Boer, H. & Gertsen, F. (2003). From continuous improvement to continuous innovation: A (retro) (per)spective. International Journal of Technology Management, 26, 8, 805-827.

Bollinger, A. S. & Smith, R. D. (2001). Managing organizational knowledge as a strategic asset. Journal of Knowledge Management, 5, 1, 8-18.

Bontis, N. (1999). Managing organizational knowledge by diagnosing intellectual capital: Framing and advancing the state of the field. International Journal of Technology Management, 18, 5-8, 433-462.

Bontis, N., Dragonetti, N., Jacobsen, K. & Roos, G. (1999). The knowledge toolbox: A review of the tools available to measure and manage intangible resources. European Management Journal, 17, 4, 391-402.

Brennan, N. & Connell, B. (2000). Intellectual capital: current issues and policy implications. Journal of Intellectual Capital, 1, 3, 206-240.

Brooking, A. (1996). Intellectual capital. International Thomson Business Press, New York.

Brown, J. & Duguid, P. (1998). Organizing knowledge. California Management Review, 40, 3, 90-111.

Brown, S. & Eisenhardt, K. (1997). The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. Administrative Science Quarterly, 42, 1, 1-35.

Brown, S. & Eisenhardt, K. (1998). Competing on the edge. Strategy as structured chaos. Harvard Business School Press, Boston.

Bukh, P., Larsen, H. & Mouritsen, J. (1999). Developing intellectual capital statements: Lessons from 23 Danish firms. Paper presented at the OECD International Symposium Measuring and Reporting Intellectual Capital: Experiences, Issues, and Prospects. 9-11 June, Amsterdam, Netherlands. Available at: http://www.oecd.org/dsti/sti/industry/indcomp/act/ams-conf/Technical-meeting/denmark.pdf.

Burns, T. R. & Stalker, G. M. (1961). The management of innovation. Tavistock, London.

Campion, M. A., Papper, E. M. & Medsker, G. J. (1996). Relations between work team characteristics and effectiveness: A replication and extension. Personnel Psychology, 49, 2, 429-440.

Castells, M. (1996). The rise of the network society. Blackwell, Oxford.

Chia, R. (1995). From modern to postmodern organizational analysis. Organization Studies, 16, 4, 579-604.

Chia, R. (1997). Essai: Thirty years on: From organizational structures to the organization of thought. Organization Studies, 18, 4, 685-707.

Cohen, D. & Prusak, L. (2001). In good company: How social capital makes organizations work. Harvard Business School Press, Boston.

Cohen, W. & Levinthal, D. (1990). Absorptive capacity: A new perspective on learning and innovation. Administrative Science Quarterly, 35, 1, 128-152.

Collis, D. (1994). Research note: How valuable are organizational capabilities? Strategic Management Journal, 15, 143-152.

Derrida, J. (1985). La différance. Synteesi, 3, 14-31.

Drucker, P. F. (1993a). The rise of the knowledge society. Wilson Quarterly, 17, 2, 52-70.

Drucker, P. F. (1993b). The post-capitalist world. Toward a knowledge-based society. Current, 350, 4-10.

Drucker, P. F. (1997). The future that has already happened. Harvard Business Review, 75, 5, 20-23.

Drucker, P. F. (1999). Knowledge-worker productivity: The biggest challenge. California Management Review, 41, 2, 79-95.

Dunphy, D. (1996). Organizational change in corporate settings. Human Relations, 49, 5, 541-552.

Durkheim, E. (1982). Sosiologian metodisäännöt. Tammi, Helsinki. [Original: Règles de la méthode sociologique, 1895.]

Durkheim, E. (1990). Sosiaalisesta työnjaosta. Gaudeamus, Helsinki. [Original: De la division du travail social étude sur l'organisation des sociétés supérieures, 1893.]

Edvinsson, L. (2002). Corporate longitude. Book House Publishing, Stockholm.

Edvinsson, L. & Malone, M. (1997). Intellectual capital: Realising your company's true value by finding its hidden brainpower. Harper Collins, New York.

Edwards, D. & Potter, J. (1992). Discursive psychology. Sage, London.

Eisenhardt, K. (2000). Paradox, spirals, ambivalence: The new language of change and pluralism. Academy of Management Review, 25, 4, 703-706.

Eisenhardt, K. & Tabrizi, B. (1995). Accelerating adaptive processes: product innovation in the global computer industry. Administrative Science Quarterly, 40, 84-110.

Eisenhardt, K. and Martin, J. (2000), Dynamic capabilities: What are they? Strategic Management Journal, 21, 1105-1121.

Eskola, A. (1982). Vuorovaikutus, muutos, merkitys. Tammi, Helsinki.

Ferdinand, J., Graca, M, Antonacopoulou, E. & Easterby-Smith, M. (2004). Dynamic capability: Tracking the cevelopment of a concept. In the proceedings of Organizational Learning, Knowledge and Capabilities 2004. 2-3 April, 2004, Innsbruck, Austria.

Fiol, M. & Lyles, M. (1985). Organizational learning. Academy of Management Review, 10, 4, 803-814.

Foucault, M. (1980). Tarkkailla ja rangaista. Otava, Helsinki.

Foucault, M. (1998). Seksuaalisuuden historia. Gaudeamus, Helsinki.

Gergen, K. (1985). The social constructionist movement in modern psychology. American Psychologist, 40, 266-275.

Gergen, K. & Shotter, J. (1989). Texts of identity. Sage, London.

Ghoshal, S. & Gratton, L. (2002). Integrating the enterprise. Sloan Management Review, Fall 2002, 31-38.

Giddens, A. (1984) The constitution of society. Outline of the theory of structuration. Polity Press, Cambridge.

Grant, R. (1996a). Prospering in dynamically-competitive environments: Organizational capability as knowledge integration. Organization Science, 7, 4, 375-387.

Grant, R. (1996b). Toward a knowledge-based theory of the firm. Strategic Management Journal, 17, 109-122.

Grant, R. (2002). The knowledge-based view of the firm. In N. Bontis & C. Wei Choo (Eds.), Strategic management of intellectual capital and organizational knowledge. Oxford University Press, New York.

Guzzo, R. A. (1996). Fundamental considerations about work groups. In M. A. West (Ed.): Handbook of work group psychology. London, Wiley.

Hamel, G. (1998a). The challenge today: Changing the rules of the game. Business Strategy Review, 9, 2, 19-27.

Hamel, G. (1998b). Strategy innovation and the quest for value. Sloan Management Review, 39, 2, 78-86.

Hamel, G. & Prahalad, C. (1992). Capabilities-based competition. Harvard Business Review, 70, 3, 164-167.

Hamel, G. & Prahalad, C. (1994). Competing for the future. Harvard Business School Press, Boston.

Henderson, R. & Clark, K. (1990). Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. Administrative Science Quarterly, 35, 9-30.

Henderson, R. & Cockburn, I. (1995). Measuring competence? Exploring firm effects in pharmaceutical research. Strategic Management Journal, 15, 63-84.

Hofstede, G. (1991). Cultures and organizations: Software of the mind. McGraw-Hill, London.

Huber, G. (1991). Organizational learning: The contributing processes and the literatures. Organization Science, 2, 1, 88-116.

Huizing, A. & Bowman, W. (2002). Knowledge and learning, markets and organizations: Managing the information transaction space. In N. Bontis & C. Wei Choo (Eds.), Strategic management of intellectual capital and organizational knowledge. Oxford University Press, New York.

Inkpen, A. (1996). Creating knowledge through collaboration. California Management Review, 39, 1, 123-140.

James, W. (1950). The principles of psychology. Dover Publications, New York.

Janis, I. (1982). Groupthink: Psychological studies of policy decisions and fiascos. Houghton Mifflin, Boston.

Janz, B. D., Colquitt, J. A. & Noe, R. A. (1997). Knowledge worker team effectiveness: The role of autonomy, interdependence, team development, and contextual support variables. Personnel Psychology, 50, 4.

Kanter, R. (1998). When a thousand flowers bloom: Structural, collective and social conditions for innovation in organization. In B. Staw & L. Cummings (Eds.): Research in organizational behavior, vol. 10, 169-211. JAI Press, Greenwich.

Kaplan, R. S. & Norton, D. P. (1992). The balanced scorecard - measures that drive performance. Harvard Business Review, 70, 1, 71-79.

Kaplan, R. S. & Norton, D. P. (2001a). Transforming the balanced scorecard from performance measurement to strategic management: Part 1. Accounting Horizons, 15, 1, 87-105.

Kaplan, R. S. & Norton, D. P. (2001b). Transforming the balanced scorecard from performance measurement to strategic management: Part 2. Accounting Horizons, 15, 2, 147-161.

Kasanen, E., Lukka, K. & Siitonen, A. (1991). Konstruktiivinen tutkimusote liiketaloustieteessä. Liiketaloudellinen Aikakauskirja, 3, 301-329.

Kasanen, E., Lukka, K. & Siitonen, A. (1993). The constructive approach in management accounting research. Journal of Management Accounting Research, Fall 1993, 243-264.

Kilduff, M. & Dougherty, D. (2000). Change and development in a pluralistic world: The view from the classics. Academy of Management Review, 25, 4, 777-782.

Kogut, B. & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. Organization Science, 3, 3, 383-397.

Kogut, B. & Zander, U. (1995). What firms do? Coordination, identity and learning. Organization Science, 7, 5, 502-518.

Kyläheiko, K. (2002). Kohti dynaamista strategianäkemystä. In P. Ståhle, K. Kyläheiko, J. Sandström & V. Virkkunen, Epävarmuus hallintaan – Yrityksen uudistumiskyky ja vaihtoehdot. WSOY, Helsinki.

Leana, C. & Barry, B. (2000). Stability and change as simultaneous experiences in organizational life. Academy of Management Review, 25, 4, 753-759.

Leonard, D. & Sensiper, S. (1998). The role of tacit knowledge in group innovation. California Management Review, 40, 3, 112-132.

Leonard-Barton, D. (1992a). The factory as a learning laboratory. Sloan Management Review, Fall, 23-38.

Leonard-Barton, D. (1992b). Core capabilities and core rigidities: A paradox in managing new product development. Strategic Management Journal, 13, 111-125.

Leonard-Barton, D. (1995). Wellsprings of knowledge. Building and sustaining the sources of innovation. Harvard Business School Press, Boston, MA.

Lesser, E. (2000). Leveraging social capital in organizations. In E. Lesser (Ed.), Knowledge and social capital: Foundations and applications. Butterworth-Heinemann, Boston.

Levinthal, D. & March, J. (1993). The myopia of learning. Strategic Management Journal, 14, 95-112.

Lewis, M. (2000). Exploring paradox: Toward a more comprehensive guide. Academy of Management Review, 25, 4, 760-776.

Liebeskind, J. (1996). Knowledge, strategy and the theory of the firm. Strategic Management Journal, 17, 93-107.

Linstead, S. (2002). Organization as reply: Henri Bergson and casual organization theory. Organization, 9, 1, 95-112.

Luhmann, N. (1995). Social systems. Stanford University Press, Stanford.

Lukka, K. (2003). Konstruktiivinen tutkimusote. Available at: www.metodix.com/showres.dll/fi/metodit/methods/metodiartikkelit/const_research_app/.

Maffesoli, Michel (1995). The time of the tribes. The decline of individualism in mass society. Sage, London.

March, J. (1991). Exploration and exploitation in organizational learning. Organization Science, 2, 1, 71-87.

Maturana, H. R. (1980). Autopoiesis: Reproduction, heredity and evolution. In M. Zeleny (Ed.), Autopoiesis, dissipative structures, and spontaneous social orders. Westview Press, Boulder.

Maturana, H. R., & Varela, F. J. (1980). Autopoiesis: The organization of the living 1973. In H. R. Maturana, & F. J. Varela, (1980), Autopoiesis and cognition: The realization of the living. Reidel, Dordrecht.

Maula, M. (1999). Multinational companies as learning and evolving systems. A multiple case-study of knowledge-intensive service companies. An application of autopoiesis theory. Doctoral dissertation. Helsinki School of Economics and Business Administration, A-154.

Maula, M. (2000). The senses and memory of a firm – implications of autopoiesis theory for knowledge management. Journal of Knowledge Management, 4, 2, 157-161.

MERITUM Project (2002). Guidelines for managing and reporting on intangibles. Madrid.

Miles, R., Snow, C. and Miles, G. (2000). The Future.org. Long Range Planning, 33, 300-321.

Miner, A. & Mezias, S. (1996). Ugly duckling no more: Pasts and futures of organizational learning research. Organization Science, 7, 1, 88-99.

Morel, B. & Ramanujam, R. (1999). Through the looking glass of complexity: The dynamics of organizations as adaptive and evolving systems. Organization Science, 10, 3, 278-294.

Moscovici, S., Lage, E. & Naffrechoux, M. (1969). Influence of a consistent minority on the responses of a majority in a colour perception task. Sociometry, 32, 365-379.

Mugny, G. (1982). The power of minorities. Academic Press, London.

Nahapiet, J. & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. Academy of Management Review, 23, 2, 242-266.

Nelson, R. & Winter, S. (1982). An evolutionary theory of economic change. Harvard University Press, Cambridge.

Nemeth, C. (1997). Managing innovation: When less is more. California Management Review, 40, 1, 59-74.

Nemeth, C. & Owens, P. (1996). Making work groups more effective: The value of minority dissent. In M. A. West (Ed.): Handbook of work group psychology. Wiley, London.

Nonaka, I. (1991). The knowledge-creating company. Harvard Business Review, Nov-Dec, 2-9.

Nonaka, I & Takeuchi, H. (1995). The knowledge-creating company. Oxford University Press, New York.

Nutt, P. & Backoff, R. (1993). Transforming public organizations with strategic management and strategic leadership. Journal of Management, 19, 2, 299-347.

Organization for Economic Co-operation and Development (OECD) (2000). Chairman's conclusions. International symposium Measuring and Reporting Intellectual Capital: Experiences, Issues, and Prospects. 9-11 June, Amsterdam, Netherlands. Available at: http://www.oecd.org//dsti/sti/industry/indcomp/act/ams-conf/conclusions.htm.

Orlikowski, W. (1996). Improvising organizational transformation over time: A situated change perspective. Information Systems Research, 7, 63-92.

Orlikowski, W. (2002). Knowing in practice: Enacting a collective capability in distributed organizing. Organization Science, 13, 3, 249-273.

Orton, D. & Weick, K. (1990). Loosely coupled systems: A reconceptualization. Academy of Management Review, 15, 2, 203-223.

Penrose, E. (1959). The theory of the growth of the firm. Oxford University Press, Oxford.

Petty, R. & Guthrie, J. (2000). Intellectual capital literature review: Measurement, reporting and management. Journal of Intellectual Capital, 1, 2, 155-176.

Polanyi, M. (1966). The tacit dimension. Routledge, London.

Porter, M. (1980). Competitive strategy. Free Press, New York.

Powell, W., Koput, K. and Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. Administrative Science Quarterly, 41, 116-145.

Prahalad, C. & Hamel, G. (1990). The core competence of the corporation. Harvard Business Review, May-June, 79-91.

Prigogine, I. & Stengers, I. (1984). Order out of chaos: Man's dialogue with nature. Freeman, New York.

Quinn, J. & Anderson, P. (1996). Managing professional intellect: Making the most of the best. Harvard Business Review, 74, 2, 71-81.

Quinn, J., Baruch, J. & Zien, K. (1997). Innovation explosion. Using intellect and software to revolutionize growth strategies. Free Press, New York.

Robinson, G. & Kleiner, B. H. (1996). How to measure an organization's intellectual capital. Managerial Auditing Journal, 11, 8, 36-39.

Ross, L. & Nisbett, R. (1991). The person and the situation: Perspectives of social psychology. McGraw-Hill, New York.

Roos, J., Roos, G., Dragonetti, N. C. & Edvinsson, L. (1998). Intellectual capital: Navigating in the new business landscape. New York University Press, New York.

Rumelt (1984). Towards a strategic theory of the firm. In R. Lamb (Ed.), Competitive strategic management. Prentice-Hall, Englewood Cliffs.

Ryle, G. (1949). The concept of mind. Hutchinson, London.

Sanchez, R. (1997). Strategic management at the point of inflection: Systems, complexity and competence theory. Long Range Planning, 30, 6, 939-946.

Sanchez, R. & Heene, A. (1997). Reinventing strategic management: New theory and practice for competence-based competition. European Management Journal, 15, 303-317.

Scharmer, O. (2000). Presencing: learning from the future as it emerges. On the tacit dimension of leading revolutionary change. Presentation in Conference on Knowledge and Innovation. 25-26 May, Helsinki, Finland.

Scharmer, O. (2001). Self-transcending knowledge: sensing and organizing around emerging opportunities. Journal of Knowledge Management, 5, 2, 137-151.

Schein, E. (1985). Organizational culture and leadership. Jossey-Bass, San Francisco.

Schendel, D. (1996). Editor's introduction to the 1996 winter special issue: Knowledge and the firm. Strategic Management Journal, 17, 1-4.

Schroeder, R., Van de Ven, A., Scudder, G. & Polley, D. (1986). Managing innovation and change processes: Findings from the Minnesota Innovation Research Program. Agribusiness, 2, 4, 501-523.

Senge, P. (1990). The fifth discipline: The art and practice of the learning organization. Century Business, London.

Shapiro, C. and Varian, H. (1998). Information rules: A strategic guide to the network economy. Harvard Business School Press, Boston.

Simon, H. (1991). Bounded rationality and organizational learning. Organization Science, 2, 125-134.

Spender, J.-C. (1994). Organizational knowledge, collective practice and Penrose rents. International Business Review, 3, 353-367.

Spender, J.-C. (1996a). Organizational knowledge, learning and memory: Three concepts in search of a theory. Journal of Organizational Change, 9, 1, 63-78.

Spender, J.-C. (1996b). Making knowledge the basis of a dynamic theory of the firm. Strategic Management Journal, 17, 45-62.

Spender, J.-C. (2002). Knowledge, uncertainty, and an emergency theory of the firm. In N. Bontis & C. Wei Choo (Eds.), Strategic management of intellectual capital and organizational knowledge. Oxford University Press, New York.

Spender, J.-C. & Grant, R. (1996). Knowledge and the firm: An overview. Strategic Management Journal, 17, 5-9.

Stalk, G., Evans, P. & Shulman, L. (1992). Competing on capabilities: The new rules of corporate strategy. Harvard Business Review, March-April, 57-69.

Stewart, T. A. (1997). Intellectual capital: The new wealth of organizations. Doubleday, New York.

Ståhle, P. (1998). Supporting a system's capacity for self-renewal. Yliopistopaino, Helsinki.

Ståhle, P. (2003). Lecture in the Graduate School of Intellectual Capital and Knowledge Management. 20 September, Tampere University of Technology, Finland.

Ståhle, P. & Grönroos, M. (1999). Knowledge management – Tietopääoma yrityksen kilpailutekijänä. WSOY, Porvoo.

Ståhle, P. & Grönroos, M. (2000). Dynamic intellectual capital. Knowledge management in theory and practice. WSOY, Porvoo.

Ståhle, P., Ståhle, S. & Pöyhönen, A. (2003). Analyzing dynamic intellectual capital: System-based theory and application. Acta Universitatis Lappeenrantaensis, 152. Lappeenranta University of Technology.

Sullivan, P. H. (1998). Profiting from intellectual capital - Extracting value from innovation. Wiley, New York

Sullivan, P. H. (1999). Profiting from intellectual capital. Journal of Knowledge Management, 3, 2, 132-143.

Sveiby, K. E. (1997). The new organizational wealth: Managing and measuring knowledge-based assets. Berret-Koehler, San Francisco.

Sveiby, K. E. (2001). Balanced scorecard and the intangible assets monitor – a comparison. Available at: http://www.sveiby.com.au/articles/BSCandIAM.html.

Sveiby, K. E. & Risling, A. (1987). Tietoyrityksen johtaminen – Vuosisadan haaste? Weilin-Göös, Espoo.

Sveiby, K. E. & Simons, R. (2002). Collaborative climate and effectiveness of knowledge work – An empirical study. Journal of Knowledge Management, 6, 5, 420-433.

Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. Strategic Management Journal, 17, 27-44.

Teece, D. (2003). Explicating dynamic capabilities: Asset selection, coordination, and entrepreneurship in strategic management theory. An unpublished manuscript.

Teece, D., Pisano, G. and Shuen, A. (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18, 509-533.

Tetenbaum, T. J. (1998). Shifting paradigms: From Newton to chaos. Organizational Dynamics, 26, 4, 21-33.

Tjosvold, D. (1985). Implications of controversy research on management. Journal of Management, 11, 21-37.

Tsoukas, H. (1996). The firm as a distributed knowledge system: A constructionist approach. Strategic Management Journal, 17, 11-25.

Tsoukas, H. & Chia, R. (2002). On organizational becoming: Rethinking organizational change. Organization Science, 13, 5, 567-582.

Tushman, M. & Anderson, P. (1986). Technological discontinuities and organizational environments. Administrative Science Quarterly, 31, 439-465.

Van de Ven, A. (1986). Central problems in the management of innovation. Management Science, 32, 5, 590-607.

Van de Ven, A. & Poole, M. (1995). Explaining development and change in organizations. Academy of Management Review, 20, 3, 510-540.

Vicari, S. & Troilo, G. (1998). Errors and learning in organizations. In G. Von Krogh, J. Roos & D. Kleine (Eds.), Knowing in firms. Sage, London.

Volberda, H. (1996). Toward the flexible form: How to remain vital in hypercompetitive environments. Organization Science, 7, 4, 359-374.

Von Krogh, G., Nonaka, I. & Aben, M. (2001). Making the most of your company's knowledge: A strategic framework. Long Range Planning, 34, 421-439.

Von Krogh, G. & Grand, S. (2002). From economic theory toward a knowledge-based theory of the firm: Conceptual building blocks. In N. Bontis & C. Wei Choo (Eds.), strategic management of intellectual capital and organizational knowledge. Oxford University Press, New York.

Vygotsky, L. (1982). Ajattelu ja kieli. Weilin-Göös, Helsinki. [Original Mislenie i Rez, 1934.]

Weick, K. (1998). Improvisation as a mindset for organizational analysis. Organization Science, 9, 5, 543-555.

Weick, K. & Quinn, R. (1999). Organizational change and development. Annual Review of Psychology, 50, 361-386.

Weick, K. & Sutcliffe, K. (2001). Managing the unexpected. Assuring high performance in an age of complexity. Wiley, San Francisco.

Wernerfelt, B. (1984). A resource-based view of the firm. Strategic Management Journal, 5, 171-180.

West, M. A. (1990). The social psychology of innovation in groups. In M.A. West & J.L. Farr (Eds.): Innovation and creativity at work. Psychological and organizational strategies. Wiley, Chichester.

West, M. A. & Farr, J. L. (1990). Innovation at work. In M.A. West & J.L. Farr (Eds.): Innovation and creativity at work. Psychological and organizational strategies. Wiley, Chichester.

Winter, S. (2000). The Satisficing principle in capability learning. Strategic Management Journal, 21, 981-996.

Winter, S. (2003). Understanding dynamic capabilities. Strategic Management Journal, 24, 991-995.

Zollo, M & Winter, S. (2002). Deliberate learning and the evolution of dynamic capabilities. Organization Science, 13, 3, 339-351.