Managing Distributed Knowledge Systems

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Abstract

The article argues that the growth of *de novo* knowledge-based organization depends on managing and coordinating increasingly growing and, therefore, distributed knowledge. Moreover, the growth in knowledge is often accompanied by an increasing organizational complexity, which is a result of integrating new people, building new units and adding activities to the existing organization. It is argued that knowledge is not a stable capacity that belongs to any actor alone, but that it is rather an ongoing social accomplishment, which is created and recreated as actors engage in mutual activities.

This paper contributes to the research on organizations as distributed knowledge systems by addressing two weaknesses of the social practice literature. Firstly, it downplays the importance of formal structure and organizational design and intervention efforts by key organizational members. Secondly, it does not explain how communities connect to the whole organization, but rather how they are disconnected from the governing canonical perspectives. In response to this we develop a conceptual model IKAR (denoting corporate and departmental identities, knowledge, activities and resources) and show how its dynamics shape the emerging collective practices within and between organizational departments. We present a case of a de novo knowledge intensive firm to illustrate the model, and conclude with a discussion of emerging implications.

Key words: distributed knowledge, identity, practice, resources, and org. construction

Suggested Track: Practice-based perspectives on knowledge and learning

Introduction

Organizational learning and Knowledge Management literature is full of, usually arbitrary, distinctions and typologies. Most notable among them are knowledge as content or asset and knowledge, or rather knowing as a process or practice. Both views, in one way or another, acknowledge the problems associated with uneven distribution of knowledge across and within organizations, barriers to the knowledge sharing and transfer, and propose solutions to overcome inertia in the knowledge flows among organizational units.

Broadly, we distinguish between two groups of scholars, who see organizations as distributed knowledge systems. One group of scholars associated with the situated learning and cognition school (Suchman, 1997; Lave and Wenger, 1991; Brown and Duguid, 1991; Tsoukas, 1996, Yanow, 2004) believes that organizations, by their very nature, consists of communities with a specialized knowledge, hence, organizations are best viewed as distributed knowledge systems. It is the uniqueness of social practices and shared narratives within work communities, which underlines the nature of distributed knowledge. Such practices are difficult to codify, and therefore to transfer.

On the other hand, building on behavioral theory of a firm (Cyert and March, 1963) and in particular on the concepts of routines, rules and procedures have developed transactive learning models (e.g. Kieser and Koch, 2002; Moreland, 1999, Argote, 1999). Transactive learning theorists acknowledge that organizational knowledge - usually stored in a form of routines and rules- is dispersed, but claims that aligning the rules and procedures in coherent manner can coordinate it. Learning takes place by developing, adapting and replacing rules and procedures. Hence, transactive perspective on distributed knowledge downplays the emergent, dynamic and contextual character of organizational learning.

This paper extends the view of organizations as distributed knowledge systems by addressing two major weaknesses of the existing literature. The literature on communities of practice stresses the non-canonical activities, and downplays the importance of formal structure and organizational design and intervention efforts by key organizational members. Also, this literature does not explain how communities connect to the whole organization, but rather how they are disconnected and misunderstood by the management, which relies on the canonical perspective and images of the organization.

This paper takes an inter-departmental view of the issue. Organizational knowledge becomes increasingly and necessarily distributed as organizations grow! This is by and

large overlooked by the literature, which at best focuses on organizations has having the distributed knowledge system at a certain time and the epistemic boundaries among organization units, but not how organizations become distributed knowledge systems, how such becoming is intimately connected and driven by organization growth, and how managing organization growth also implies managing and coordinating increasingly distributed organization knowledge.

We contribute to the discussion of the distributed nature of organizational knowledge in three ways. First, we identify limitations of the distributed systems argument and discuss the sources of the divisions along the four dimensions, which comprise our IKAR model. Secondly, we propose the ways of how the distributed knowledge should be managed. Thirdly, we connect the discussion of the distribute knowledge to the growth of a *de novo* firm, and finally we illustrate the model and our arguments with in-depth case study of de novo knowledge intensive firm.

The paper calls attention to the notion that knowledge intensive organizations are dependent on their capacity to work with the dualities and controversies that seem almost omnipresent to their activity. This capacity represents in an ability to unfold and absorb new meanings and transform them into effective activities that bring the organization forward. This, we have learnt, points towards the need for drawing a stronger link between micro-level activities and macro-level outcomes a link which is not as of yet well established in theory or in its practical application. This means that we know too little about the things that impede or drive the organization forward. In this pursuit a practice perspective has been employed that study technologies, skills, resources not as fixed objects, but as situated and social phenomena. This means that we need to look into what knowledge and learning does in organizational settings, rather than what it is in the form of its representations, and that we thus need to understand the process and context of knowledge production as a means to understanding competitive dynamics.

Distributed knowledge system

What does it mean when we argue that organizations are distributed knowledge systems, the view of an organization highlights a number of key organizational concerns:

- Decomposability and aligning efforts through coordinative linkages

- Structural organizational boundaries.

- Epistemic boundaries.

- The role of human action and its interaction with systems.

Based on Hayek (1950), Tsoukas forwards his view of the organization as a distributed knowledge system, starting from the sentiment that a key organizational problem is the utilization of knowledge not given to anyone in its totality. He argues, "The organizational problem firms face is the utilization which is not, and cannot be, known by a single agent. Even more importantly, no single agent can fully specify in advance, what kind of practical knowledge is going to be relevant, when and where. Firms, therefore, are distributed knowledge systems in a strong sense: they are decentered systems, lacking an overseeing 'mind'. The knowledge they need to draw upon is inherently indeterminate and continually emerging; it is not self-contained." (Tsoukas 1996 p. 11)

Tsoukas argues that Economic theories of the firm and behavioral theory essentially treat organizational entities as black boxes that are bounded and fixed in time, and which can be described through their in- and output relations, which outsiders would be immediately capable of grasping. This also means that the management of these systems, can rely on the establishing of formal rules to control activities. However, these perspectives lack an appreciation of the fact that "…rational economic calculation does not – it cannot – take into account the factual knowledge of particular circumstances of time and space – such knowledge is essentially dispersed." (Tsoukas 1996 p. 12)

To paraphrase Håkansson & Snehota I. (1989), organizational entities are not islands in a sea of anonymous relations; they are distributed, but inherently interdependent in the production of efficient and effective results. This interplay can be explained through the concept of loose couplings, which Weick (1976 p. 3) defines loose couplings as a situation in which elements are responsive, but retain evidence of separateness and identity. Orton & Weick (1990) argue that the concept of loose couplings has been taken over by people who take a one-dimensional variable, something, which they try to avoid by emphasizing the dialectic nature of the concept. They refer to organizations as loosely coupled systems, which he presents as a dialectical conceptualization of organizations, which aims to combine the contradictory forces of connection and autonomy. Their dialectical interpretation of loose couplings juxtaposes both forces, simultaneously within the same system.

In support of this imagery of organizations, Tsoukas (1996) convincingly introduces us to the view of organizations as distributed knowledge systems, but does not go into a discussion of the practical realities of this notion. With this paper we will look into the process of working with and managing distributed knowledge. First we will explore the nature of distributed knowledge systems and secondly we will present a longitudinal case study that finally allows us to look into some implications to organizational design and managing of distributed knowledge systems.

Although organizational theory is far from a coherent body of work it does seem clear that organizations do not work as well oiled machines, but that they are filled with inherently diverse dialectics, conflicts and controversies. The view of distributed knowledge systems proposes that the organization is a community of more or less tightly coupled communities (Brown & Duguid 2001). When organizations are characterized by dialectics and controversies (e.g. order – disorder, routines – breakdowns) rather than by unity and instrumental order, then sensemaking activities become key to the ongoing organizational construction. Organizational activities are based on theories, which reflect our interpretations of the state of things and, therefore, reality enacted becomes a product of reality interpreted. In this sense organization is a multi-leveled body of theories and practices that describes who we are, how we do things, what the environment is like etc.. It constitutes a dynamic and complex field to be orchestrated, but which no single director can oversee or has full influence over.

The popular dictum of the knowledge management tradition "If only we knew what we know" does not seem to make sense, because if everyone did know everything the organization would certainly know much less. Yet knowing who knows what and establishing bridges between knowledge sources has become a key activity for successful performance. Organizational knowledge has a tacit dimension that management cannot control, which is firmly embedded in social practices. With an increased distribution of labor also follows an increased division of knowledge. Divisions create boundaries and boundary relations, which gives rise to a significant managerial task, of guiding, prioritizing and coordination. We know that there are several problems related to managing boundary relations, such as struggles for scarce resources, obligations, agreements about product hand-over, not-invented-here syndrome etc., but we need to develop means for managers to engage with these.

The empirical basis of the article builds on a longitudinal case study of a company's efforts to leverage distributed knowledge in order to create overall organizational development. The case explores a medium sized software company's effort to make new innovative and market driven products, while establishing an efficient operational system to drive these through. The article illustrates how the company failed in building an effective organizational network to utilize distributed knowledge, because it neglected or even tried to bypass an open dialogue of the "whats" and "hows" related to the practical enactment of the new organizational arrangements they were in the process of establishing. A key reason for this seems to be that they did not know how to work with the situated meanings and practices that were driving existing activities.

The case indicates that organizational development is tightly connected to the identities people develop for themselves and their images of the organization and its various systems. People continuously develop images about their environment and their own role in it. Based on which they enact the environment, which they are part. Hence people do not take their outset in the formal organization and its systems or concepts, but in the experiences they have from interacting with it. In response to this we propose that organizations apply dialectic management principles, which focuses attention on uncovering and mediating between identities, knowledge, activities and organizational resources. Organizations need to recognize that these elements are important means of production, they constitutes the frame within which people interpret the meaning of events and evaluate, own performance as well as that of others, a process through which they also determine the outcome of their mutual activities. These theories potentially bridges organizational goals and individual identities, but may indeed also lead to a loss of sense, confusion and non-productive activities, if they do not receive conceded attention.

The IKAR Model

To understand better a distributed nature of organizational knowledge and how it is related to the organizational growth, we develop an eclectic, but coherent model of organization, called IKAR. The four letters denote four key components of the organization and of its core units, namely *Identities*, *Knowledge*, *Activities* and *Resources*. The model focuses on the interactions and tensions between the organization and its departments, and between the different departments within the organization along the four dimensions. In this paper, we mainly limit ourselves to the organizational context, although the IKAR model allows

inter-organizational analysis too. The emphasis here is on the departmental level, which we feel is justified, for departments are social arenas where more abstract corporate strategies designed by the top management interact with daily work practices performed by departments' employees within the de novo, hence relatively small, firms.

The length of the paper does not allow us to provide detailed discussion and numerous sources of the inspiration from which we draw in developing the model, but clearly the IKAR model aims to connect some of the theory of firm thinking especially Resource (RBV) and Knowledge based (KBV) views (Wernerfelt, 1984; Spender, 1995; Kogut and Zander, 1993) with a more micro-organizational dynamics research, especially, practice perspective on organizational learning (Brown and Duguid, 1991; Wenger, 1998) and, finally, growing literature on the organizational identification (Albert and Whetten, 1985; Dutton, 1991; Kogut and Zander, 1996). We believe that insights from these areas can be integrated into a coherent model, which allows us to see organizations and organizational units as complex bundles of identities, knowledge, activities and resources. Such a conception avoids some problems inherent in the RBV and KBV, by reaching deeper into organizational processes and going beyond concepts of resources, knowledge or capabilities. On the other hand, the model relates work practices and communities to a more organizational-level issues such as strategic allocation of resources and activities, top management support and attention to specific departments, which undoubtedly shapes, enables or / and inhibits practices and work communities within departments.

In the light of the IKAR model, we see the firm as consisting of four core elements:

1. A firm is a bundle of identities and images, which shape its strategic direction of development and interaction within organization and in its network.

2. A firm is a bundle of knowledge, which a platform for its competitive advantage and product portfolio.

3. A firm is a set of activities within a broader value chain.

4. A firm is a bundle of resources, which enable organizational knowledge to be applied to the key organizational activities, guided by organizational identities.

We believe the model and such focus is particularly appropriate to the fast growing *de novo* firms and SMEs, since building new departments or similar units in such organizations offers a dynamic social context where strategic design and emergent practices interact and are transformed into each other. The IKAR model may be less applicable to large organizations, since departmental level would reflect the top management perspective and be too detached from the (inter-) community level dynamics.
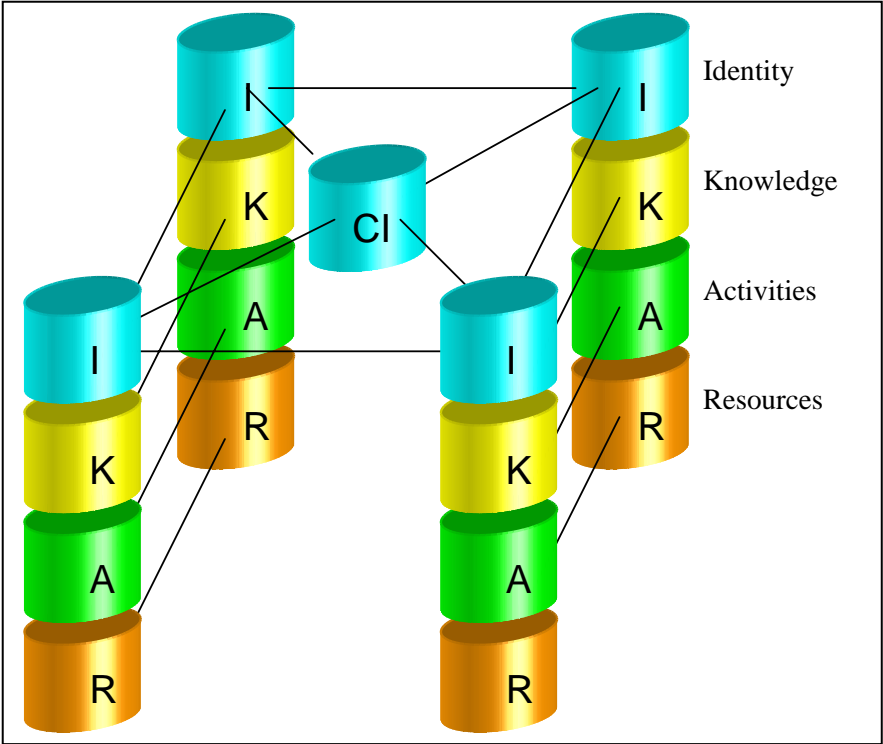

Figure 1 – The IKAR framework

Identity. Popularity and importance of the identity concept in the organizational learning and knowledge literature has been growing, but it was mainly used in a fragment manner. Within the of social practice perspective, building of identity within a work community has been seen as major step towards access of community knowledge and legitimization of the participation within the community activities. However, while very powerful and insightful, identity concept in this case is narrowly applied to a small micro-organization context. Specifically, identity concept is not linked to the identification processes in other organizational communities and large units. Within the theory of a firm, Fiol (1991, 2001) and Kogut and Zander (1996) have made the most important contributions so far.

Instead, we propose to view organizations as a collection of identities and to see organizational development and growth of a firm as driven by the interplay between dominant identities in a firm and its inter-organizational context (Håkansson and Snehota, 1989). Hence, departmental and community identities can divide and unite at the same time, and play a central role in building a social closure and islands within organizations, which hinder the necessary collaboration in the organization.

Knowledge. There has been much discussion on the importance of complementarity of knowledge as well as its redundancy. "Thought worlds" (Dougerthy, 1992, original reference goes back to 1978), epistemic communities (Knorr-Cetina, 1999), communities of knowing (Boland and, 1995, Organization Science).

The major barrier is when communities or organizational units are not aware of the organizational paradigm or theory, *naïve division*. And instead, they maximize and pursue their own interests; this is a division in terms framing actions in relation to other groups and organization as such. The second division occurs when competencies possessed and practices performed by organizational unit do not meet or even overlap with the competencies and practices of other units. This is the case of *unintended or involuntary division* or barrier. Because competence development takes time, sometimes it is very difficult to close these competence gaps. Usually, this leads to frustrations among the employees because they cannot perform their work, as they would like to.

The *political division* is the case when units or communities fully understand their own role and the organizational paradigm and possess the necessary competences to link to the other units, but they consciously maintain the division.

Activities. Within its value chain, the firm performs one or several value-adding activities. Furthermore, within organizations, these activities are distributed across different departments and other organizational units. While top management allocates major importance to the organizational units following at least, to some extent, a *design* logic, these activities are performed through emergent social practices. For example, Orr's technicians provide maintenance of the copy machines, the activity, which is allocated by the top management; hence there is an obvious design element. However, as (Orr 1996) shows in his accounts, it is performed by relying on social practices and collective story telling by members of work communities. However, corporations become increasingly aware of the importance of such an illusive knowledge that narratives definitely are and,

therefore, hire professional sociologists and anthropologist to study their own organizations and to help facilitate and, some extent, even direct the development of collective story telling.

Resources. While the importance of resources has never been more obvious as in recent development of the theory of firm literature, especially, the RBV and the KBV; surprisingly, the strategic role of resources distributed within organizations has not captured much attention among organizational learning. Resources are however critical for many reasons, and several of them will be discuss below. The resources possessed or sought within organization are central to development of organization identity and the identity and images of organizational units, and they are source of power within the organization. This is a direct implication of the resource dependence argument made by (Pfeffer & Salancik 1978) 25 years ago. Secondly, resources - that an organization possess in its totality- and distribution of resources across units supports or inhibits certain organizational activities. Finally, it has been argued that there is a dynamic interaction between resources, knowledge and identity of a firm, as organizational practice develops around the existing resources. On the other hand, the existing knowledge limits and enables the utilization of the existing resources. Finally, identity of a firm suggests what a firm is, in what environment it should compete and on what combinations of resources and knowledge to build its strategy. However, to our knowledge, this logic has not been applied yet to a more intra-organizational context.

Three Kinds of linkages and complementarities among the IKAR elements. The figure illustrating the IKAR model does not show all the linkages, but clearly in our conception several three kinds of linkages exist. First, there is a *vertical linkage*: where Corporate Identity (CI), in a partly reciprocal manner, is connected to the identities of the departments and, consequently, to the resources allocated, knowledge developed and activities performed by these departments. Secondly, there are *horizontal linkages* among identities, knowledge, activities and resources of the organizational departments. Thirdly, there are horizontal linkages of these four elements - both departmental and corporate – into a wider for example, business (Håkansson and Snehota, 1989) and societal context (Zukin and Di Maggio, 1991)

CASE – Distributed Communities at Alpha A/S

The Case Setting

The case concerns a medium sized IT company, in this paper called Alpha, which was followed through daily participation by one of the authors during a period of seven months. The company produced software products for navigating in complex information systems. It was established in 1996 and had nearly 100 employees when it went bankrupt in the summer of 2001. This came as a chock to most, which is illustrated by the fact that 4 new employees were scheduled to start in the weeks following.

Hitherto, Alpha had had no problems in convincing potential investors and other stakeholders of its potential, and as such it had lived of its ability to come up with and sell new ideas to investors, although it had been able to show many concrete results. It was perceived as one of the central success stories in the region. It had managed to position itself in a "greenhouse" where it had to a great extent was sheltered from the competitive environment, which would give it sufficient space and time to develop innovative solutions. The company was riding the "dotcom" wave, which in many ways characterized its values and self-conception.

The company had primarily focused on the development of a technological platform, which, it was believed, would secure them a strong position in the market. However, in this process there was much confusion as to what position the company should focus on and how it should do it. This platform was highly future oriented and was presented to employees in highly abstract terms, whereas very few concrete opportunities had been identified. In practice this had led to what could be termed a drifting organizational focus, which at the task level caused continuous changes in the priorities of work as well as changes to the platform. Yet according to the management this drifting focus was a normal consequence of maneuvering in uncharted waters. However, two parallel contextual changes altered this. First of all the "dotcom" bubble was bursting globally and secondly the company slowly but surely approached a stage in its lifecycle, where the performative demands from internal as well as external stakeholders increased. These new demands started to rotate around such terms as 100% completion of products, maintenance, service and last but surely not least economic surplus. This highlighted the need to establish professional practices, which became a dominant force as Alpha approached what could be called a "new reality".

The general logic in the company was that of an urgent need to grow and to establish an organization for market introduction of its technologies. The company prepared for this by

hiring about 20 new employees every year, with all sorts of backgrounds to fill in the gaps in the emerging functional structure. In the fall of 2000 the company had nearly 80 employees and suffered severely from a lack of physical space while it at the same time began to experience some problems with communication and co-ordination of it many and diverse activities.

From the conception of the company management was personified in the owner and founder of the company, and he took care of both strategic and operational management of the company. Professionally he had limited managerial experience, but had some very firm ideas about how to run his company, which we shall return to. He had limited experience in the field; he had his background in trade and had no formal technical skills. In 1996 he, however, started the company based on the firm belief that there had to be a great potential in developing internet technologies. He convinced a group of 6 young enthusiastic engineers to join him and raised start-up capital from various sources. Four years later he realized that he needed support in running and legitimizing the company, so he established three main forums from which he drew his support in directing the company. The first was the board of directors, the other an advisory board, consisting of a university based advisor and a business advisor, and thirdly a development group setting the priorities for organizational activities. These groups if was hoped would bring a strong focus to the company and allow it to utilize the abstract opportunities represented in its technological platform.

Alpha was coming from and still maintained a strong development tradition everything it was doing and had been doing was undergoing constant development. The core belief was that the company should and could produce the world's best solutions. Although it in practice was more than difficult to live up to this ambition, as nothing as of yet was completely finished, management continuously confirmed this belief by creating success stories. These success stories were produced in interaction with customers, investors and by small bench marking exercises and sometimes seemed to be of an unconvincing nature. They however served to justify work and cost incurred and therefore helped to legitimize staff as well as management.

The belief in "pursuing the best" had both advantages and disadvantages. On the one hand, it served as a strong motivator to staff, who felt special and felt that they had the chance to achieve some of their personal ambitions. One employee said: "*Here I have the*

chance to be part of something great, I am not going to let this opportunity pass me by".
On the other hand, this belief proved to be a trap, as projects became ongoing activities, which were difficult to stop, because there was always room for improvement from a technical point of view, whereas added consumer value was rarely a major concern. One top manager noted, "*this whole company is development oriented. Even Sales are more occupied with what will come next than with selling what they have to offer now*". Staff was always chasing new projects and as priorities seemed to shift continuously, it was very difficult to finish ongoing projects.

At this point management realized that there was a need to develop towards a more professional organization as it was termed. This was initiated through a range of different initiatives. First it was decided that there was a need for a new organizational structure, which introduced a layer of middle management (Figure 1) and aimed to build an effective delivery system. Second it was decided to establish a process improvement team consisting of a middle manager, a secretary and a researcher. The team reported to a steering group, consisting of top management and an external consultant. Although the company had already taken steps in this direction, as it had worked with the Capability Maturity Model (a software development and improvement approach) since 1999. Yet it had by its own account failed to integrate these practices effectively. This case will have these two transitions as its point of departure and they will be discussed in conjunction.

Figure 2. Alpha's new organizational structure

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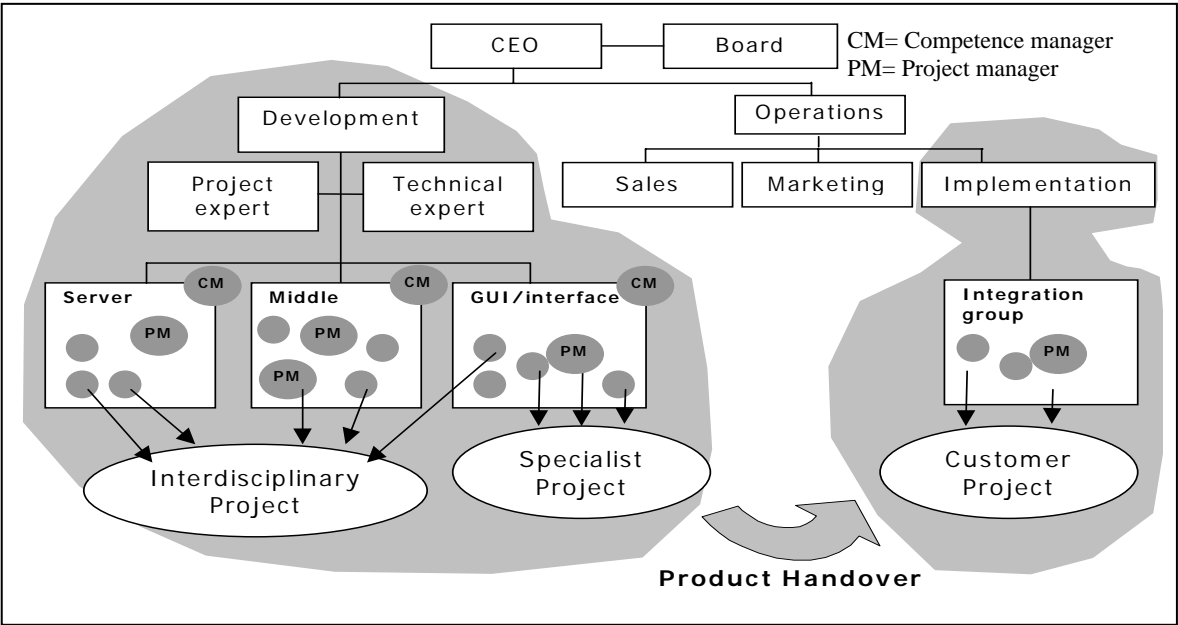
The Process of Reorganizing and its Structural Measures

Due to rapid growth in staff and increasingly complex task structure, it became difficult for the small management group to oversee all activities. With the growth of the company a larger diversity in terms of functions and types of people had been introduced. To illustrate this some sociologists had been hired to work with the nature of knowledge and the role of technology while at the same time the sales and administrative functions were under development. Hence whereas Alpha used to be a highly integrated entity it slowly became a multifaceted working environment. This started to put heavy strains on the culture and the shared understanding of what the company was doing. The management group discussed these issues during an external two-day seminar. The conclusion was that there was a need for co-ordination and communication as well as an increased awareness of the mutual dependencies between and across various functions and activities. It was decided to restructure the company and to divide Alpha into two major departments, development and operations. The main reason for doing this was an experienced pressure to establish an effective sales and operations system, which could take care of the customer interface that was starting to cause major frustrations for developers. The interaction between the two was envisioned as a trapdoor that would open and close whenever a new product was available. This, however, later proved to be impossible to execute in practice, as there in effect was a continuous conflict about when a product was finished and how and by whom it should be serviced when it had been handed over. Often it also proved to be difficult for sales to understand the products, which meant that developers often had to hand carry the products to the customer.

The development department was reorganized based on the product architecture; the hope was that this would build an effective development system based on clear lines of authority and task responsibility. This included the establishing of three competence groups based on the modules in the software development, the server layer, the middle layer and the user interface layer, respectively. The groups were constructed on the basis of intentions such as improving the uptake of new employees, establishing a learning and problem solving community and developing a middle management system. The groups were very different and used different modes of organizing.

The server layer was a small and integrated group and mainly consisted of established

members of staff, most of whom held shares in the company. They all had long educational backgrounds and were generally highly respected and appraised for their efforts and personal sacrifices. They represented the history of the company and to a large extend the dominant logic of the company. They worked with a high degree of autonomy; although one of the members had been appointed project manager people more or less ran their own projects. This group was considered as the research and development section of the company and after the reorganization they were relocated to an office in another part of the town, officially due to the obvious lack of physical space at head quarters, but also to give them sufficient space and latitude in their work. The middle layer on the other hand consisted mainly of relatively new members of staff, with short to medium long educational backgrounds. This group was led by two established members of staff, who had been appointed project managers recently. The group was seen as the finishers who should make developments functional to the customer and did so to a large extend by developing application frameworks. This group clearly looked up to the people in the server group and hoped to become part of it. The user interface level was thought of as a support function to the two other layers, they produced layouts and graphics.

The server group was drawn on for many things in the company, they represented the main technical expertise and had the primary authority in developing core technologies as well as setting the frames of this, they had historical access to the core technologies and only they could perform many of the technology related tasks needed in connection with application, problem-solving and adaptation. Most of the newcomers (in the middle layer) complained that they did not have enough work and that they felt rather stressed by this fact, because they could see that the established actors were more than fully booked, and therefore felt that they were not able to make a contribution. Newcomers were activated through small insignificant projects meant for them to learn about the technologies and methods of the company. However, most of these projects never amounted to anything and they were often abandoned at a relatively early stage. The newcomers were never integrated in the core processes and therefore remained peripheral participants although a structure had been established which had integration as its main purpose. As a consequence people got stressed because there was not enough work.

The server group mainly got their inputs from a well-developed connection to university, with which the company had several formal and informal activities. This presented the company with a range of abstract opportunities, which a few core people were dedicated

to exploring. The image of the customer was highly underdeveloped in the company. Few people were able to express clearly the possible uses of technologies and even sales did not know whom to contact or what opportunities they could present to the customer. The customers voice was practically non-existing, core people made clear that they knew exactly what the customer needed and that the customer would not be able to express their needs any how, so there was no need to ask. The connection between the Development and the Sales department was weak and there were no efforts to change this. Development saw Sales as a service unite, which should search out the opportunities that the technology presented them with, something which Sales time and time again proved incapable of doing due to their limited understanding of the technologies. Sales on the other hand expected Development to supply them with more or less pre-packaged solutions, from which they could develop their key selling points.

The main discourse of the company stipulated collaboration, openness and connectivity, but reality proved something else. The groups only seemed to work on paper. In real life they seemed to be empty shells, and their only function seemed to be that a clearer line of authority had been established. Although this still was a constant source of confusion as most of the projects were cross-functional and therefore involved several managers. The organization seemed to forget that communities take some effort to establish and was in particular unaware of the interface problems between layers in the software development process that the new structure had created. This came as a surprise to everyone who thought that problems had been taken care of with the structural measures taken, yet it was realized that something had to be done.

Management soon became aware of the problems and initiated a range of structural measures to deal with them. The main initiative was the construction of a project office, which initiated process improvement initiatives to establish what was termed professional practices in projects. This included a range of different tools and methods that should help project groups overcome some of the co-ordination and communication problems. Project review meetings took place on a weekly basis as did meetings in the so-called development group, which consisted of senior and middle management, a group of 6 people, which was meant to focus and direct development activities. An Intranet and other forms of ICT were used intensively as a communications platform. Each project had its own homepage, which was used mainly by project members as a work and documentation platform, but was also meant to keep others informed about developments. The latter was,

however, never realized in practice, people argued that they had more than enough work in keeping track of own activities, and that the documentation anyway was too difficult to relate to as an outsider. And finally a development plan was written up with demand specifications for each project. Yet the process improvement group soon had to realize that staff members mainly saw these initiatives as needless administrative overhead and generally failed to see how the initiatives would help them in their daily work. Despite the nice plans they still experienced a chaotic working day with lots of new issues to grasp and new priorities for their work.

Conflicting managerial perspectives were apparent in the company. Two different perspectives clashed; one was based around the charismatic leader and founder of the company and advocated a flexible organization, the other around the operational side of the company, which was advocating steps towards a professional organization. This conflict was further intensified, when the owner decided to strengthen operations by employing a new managing director, while retreating to a developmental role himself. This new managing director had a lot of experience with running and maturing IT companies and seemed ideally suited for the future challenges. A large group of the staff welcomed this change, as they saw it as an opportunity for achieving a more focused effort. Another group, and in particular the core developers, saw him as a threat to the continuation of their development effort. After a few months the owner decided that this new manager was not the right person, the reason being that the company and its technology platform were still not mature enough to undergo the kind of market orientation that the new director was envisioning. This move was made, although it had been made clear by several observers and investors that new management was an important element of their continuing support.

An argument that often came up in the discussion was the complexity of the work and the environmental uncertainty that the company continuously faced and which made it impossible to plan more than 14 days ahead. "*We need to keep our options open and be able to act according to the contingencies we meet*", senior management argued. To the staff this often looked like a bad excuse for not taking the time to manage. Staff continuously looked for a logic to guide them through their work but continuously found that priorities had changed and often experienced that their work had been wasted effort, or that it did not live up to the requirements of modules produced by other project groups. This search for logic rendered the creation of a development plan. The plan aimed to deal with the problem of the interface between the three layers in the development process and

in particular sought to create some level of certainty and order in the development department. Yet it was soon realized that neither management nor staff were about to change their ad hoc based working methods. Priorities continued to shift as decision makers met in the hallways at lunch etc., rather than in the formal meetings that had been set up to deal with planning. In fact staff had even invented a word "binary management" to describe management commitment and attention at Alpha, which was experienced as either 110% or 0%. The management group carried the image that staff would like strong and ever visible management that was able to guide them through all the trouble they had. Soon this, however, developed into a relation based on fear, because the perceived distance between the management group and staff increased as the company grew while management kept doing what they had always done – solving problems.

Alpha never really managed to establish an effective organizational network. Only weeks before it went bankrupt the company managed to generate an integrative focus with the help of an international consultant house. This process of establishing this focus was held in a closed circle of key people, it never involved staff beyond demanding their support once the concept had been established. At this point management tried to mobilize actors in the quest for actualizing this, by establishing a much clearer picture of mutual activity and making people work closely together. Thus going back to a much more integrated view of production – it was all too late, unfortunately.

Case Analysis:

We illustrate the Model by presenting the case history in a chronological manner, which is broken down into two major stages of the development. For each stage, we analyze the case using the IKAR model. We clearly see that the interplay between distributed domains of identity, knowledge/competence, activities, resources play a central role in the construction of the organization. This does not necessarily leave us with a picture of the organization as an integrated entity, but indeed as a distributed knowledge system.

Period 1996-1999

Identity: The founder strongly believed in the internet as something big and what will shape the future. He wanted to create an exceptional company, which would compete with the largest MNEs such as Yahoo. He believed in trying to out-run the market and being ahead of the market, i.e. of what customers want *now*. He constructed an identity based on virtues which were ambitious, foresighted and development oriented company and build

close relations with universities. Hence identity-building activities mainly took place in relation to the universities and investors. Also, organizational identification was important, and in general employees strongly identified themselves with the company and believed in this future.

Knowledge: Knowledge was dominated by the technical orientation represented in the belief in the future of the Internet (the dominant logic), especially, in the Internet platform solutions; this shaped the activities and the identity of the company. Based on this rather loose logic as a guiding framework, the owner focused on acquiring technical expertise and hired a group of IT engineers, who fondly shared the optimism of the founder. Knowledge links were mainly related to the university and research institutions.

Activities: Initially activities were mainly directed at the development of the technology platform, and secondly raising funds for the development of the company. This involved extensive efforts to promoting the corporate identity (especially selling the future) in relation to financial investors, but also to future staff. Strengthening cooperation with universities and looking for more ideas and to strengthen development.

Resource: The owner put his own funds, but also managed to raise some external funding. Resources were scarce and staff were well aware that they would need to put in an extra effort to make things happen, and did so.

Conclusion: In the early stage of the company growth, the company had a rather coherent identity and shared vision among the founders and the core group of developers, and it managed to connect to environments that supported this view of reality.

Period 1999 – 2001

Identity: The growth of the company and the experience of a complex task environment lead to increased levels of differentiation, and further to the need for more elaborate social practices and understandings to link the organization. As a result, it became increasingly important to ask: who are we, where are we heading, where do we want to go and how is that communicated through our actions? An increased market and operation awareness was introduced and staff was employed to fill in this role, but it was only supported by parts of the organization, while especially the development section of the company did not see this as essentially connected to their work.

Knowledge: Knowledge was increasingly dispersed in the new structure and the case

clearly illustrates how this blocked a meaningful dialogue about mutual activities as well as the interface between lines of activity. Opportunities were always presented in abstract terms, which made the connection to everyday practices difficult indeed. With everyone presenting abstract opportunities to the company, there seemed to be too little concrete matter from which to direct activities. Priorities constantly shifted and project groups were often told to drop everything they were doing in order to put their full attention into something new, while other groups that were dependent on the module were put on hold until the first project group could resume their work. In effect, deadlines were still exceeded by many lengths and the intention of seamlessly linking different streams of activity was not realized.

Alpha did display a strong sense of identity in spite of its diverse groupings and the obvious distribution of knowledge, which had its foundation in a profound technology fascination, this, however, also proved to be an ultimate means of division in the company. The company had managed to establish a strong image of the company, which also seemed to become a key problem to its growth, due to a disproportionate focus on development and the belief in abundant resources.

Activities: Generally there was a strong sense of helping each other, and a sense of pride in doing so. The problem, however, seemed to be knowing what others were doing and figuring out what implications this had on one's own work. The lack of understanding between interdependent units was emphasized by a gap in competence and by a task structure, which did not facilitate collaboration, but possibly more a competitive stance. This often meant that groups had to make several versions of the same module to fit the specifications of a product and this was not discovered until the product had been handed over to the next level. In other words, there was a constant flow of problems on the interface between modules of the software product, produced by misunderstandings between groups.

Resources: Resources had been raised an provided an ample and solid platform for market introduction, and all stakeholders now expected that it would just be a matter of time before it was realized. Ample resources were allocated to the building of new organizational functions, but they were never given an active role in the development of the company. This was exemplified by the dominant logic "If you would just get on with your work, we will take care of our business". While resources were allocated for this new

focus, access to the organizational network was never granted, and were, therefore, parallel systems emerged which had limited means of collaboration.

Conclusion: The Company was no longer able to maintain the image of an integrated entity. In practice, members felt that they belonged to parts of the organization, rather than to the organization as a whole, and they identified strongly with this part and its view of the overall organization. In particular, this was obvious in the relationship between the server group and the rest of the organization. This group was convinced of its own abilities and did not really believe that anyone else could make a significant contribution. Although co-ordination seemed vital due to the interconnections between deliveries, this was seldom taken seriously or thought to be much simpler than it proved to be in practice. Although there was plenty of specifications and meetings there was plenty of room for local interpretation to grow, while they provided limited room for communication in the new modularized structure, and thus provided very little to support for actors to establish a common platform for their activities.

Conclusion

WHAT CAN MANAGEMENT DO WITH THE IKAR MODEL? We suggest that management ought to base their interventions on an appreciation for the dynamic interaction presented in the IKAR model. We have presented change by its emerging properties, in which managers can intervene by trying change to the reframing of identifies or influence the dynamics of the multiple identities in development. It can restructure the competence base by moving, hiring, training and firing people. It can allocate different activities and resources to different units. Also, it can provide additional resources for specific activities or competence development or cut existing resources, and in such a way affect the continuously transforming architecture of the distributed knowledge. Yet it also tell us that if the interplay between the models interplay is disturbed or becomes incoherent, this will give rise to serious tensions and unintended consequences in the organizational network. Hence in spite of resources being committed to Operations and formal communications emphasizing its value, the section never became a legitimate participant in the organizational network, but remained peripheral and disconnected.

A central aim of this paper has been not to reduce the concept of distributed knowledge to a one-dimensional variable, where we look for a simple mechanism to connect and control distributed knowledge assets. Rather we aim to look into the dialectic nature of the

concept to unveil how organizations can start to work with distribution of knowledge as a fact of everyday life as well as how it can work with the contradictions, dilemmas and controversies that this may give rise to. It is evident from the case that organizational structures precede understandings of how to make it work. It seems that we in theory as well as practice miss the frame for making the connection between agency and structure. Hence in making organizational change happen we seem to miss the appreciation of:

- o Participants in the change process and their role in it.

- o Practices around the change process.

- o The meaning of change to participants, particular groups, organization and environment.

We have aimed to build this appreciation by introducing the IKAR framework as a means of getting into the dialectic nature of organizational construction. On the basis of this model we have learnt that human agency plays a crucial role in knowing how to get things done in the organization. We can learn from this paper that human agency grants importance to organizational systems. Actors enact and socially sustain system. The system is dependent on human agency to exist. If actors do not continue to believe in and enact the system as it is, it cannot sustain its present form.

The analysis has illustrated how core frame setters have a huge responsibility in shaping the organization; they represent and endorse dominant logics in the company. The cases clearly show that management is one such frame setter, and also supports the idea that it is a key scarce resource (Penrose 1959). Managers present abstract theories, controlling logics and opportunities about mutual activities and thus represent elements of an overseeing mind. We have, however, seen how this is rarely exercised, and when it is people in the organization fail to transform these abstract elements to concrete interlinked activities. It is, however, not only managers, who should be considered to be frame setters; different people take on the role as frame setters within particular communities in the company. To be effective change efforts must take their outset in these different domains in the company, because it is only by engaging with the frame that they can begin to have an effect on practice and the basic understandings underlying these.

We have seen how organizational arrangements become so interlinked that they allow only compatible changes. Over time, employees develop routines, take on certain values

(we are the best) and develop a sense of competence around knowing how to get work done within the system. These issues contribute to a sense of stability and over time to a notion of a common history, which is reinforced, by mutual stories, social dynamics, heroes, practices and standards. These frames are an important source of competitive advantage as longs as the organization's enacted strategy is in line with its internal/external reality, but once it is not this frame potentially becomes a liability. The analysis has shown us that both too much and too little frame setting is a problem; too much stiffens the organization and too little leads to undirected activities, which lack an appropriate fit to the organization.

Future oriented organizations are characterized by a certain opportunity space for its members to enact, no one know exactly what knowledge will be required of future situations. This means that people enact this opportunity space with outset in their identities, images of the organization, competencies and the resources allocated. Competing in dynamic settings characterized by multi-vocality and ambiguity raises the demand for communicative capacities. Organizations need to engage with the different voices and make sure that they are processed and linked internally. To do this, the organization depend on its level of requisite variety, meaning the larger the variety of actions available to system, the larger the variety of inputs it is able to perceive. Whether it is indeed capable of absorbing these inputs is something else, as this depend on a capacity to link multiple voices and transform them into appropriate streams of activity.

The study has found that while organizations may indeed be knowledge intensive this does not necessarily imply that they are capable of learning as organizations. It effectively shows that putting knowledge to an effective and efficient use fails due to a predominant bounded sociality, which makes it difficult for the organization to work as an effective entity in times of disruptive change. The organizational efficiency potential rests in its near decomposable nature; the decomposable principle introduces not only the division of labor, but also, as we have seen, distributed interpretative capacities. This leaves a need for linking diverse lines of activity; we have seen how this linkage cannot be created through instrumental means, but that the company relies on establishing a communicative capacity. We suggest that practitioners need to develop an appreciation for the dynamics of organizational knowledge networks to understand their constructive role in organizations. Managers need this understanding, to achieve desired end-goals within the organizational network.

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