ORGANIZATIONAL FORMS AND KNOWLEDGE MANAGEMENT:

ONE SIZE FITS ALL?

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1   Introduction

1.1   Organizational change for sustainable competitive advantage: significance and complexity

Business and consumer markets are becoming increasingly competitive and complex due to macro economic trends such as globalization, off-shoring and deregulation. Consequently, the need for senior executives to create and maintain competitive advantage for their firms is greater than ever. Equally, in the provision of public services, politicians and the public are becoming far more demanding regarding the quality and efficiency of services delivered. Therefore, there is little doubt that senior executives in the private and public sectors are under significant pressure to continuously formulate the right organizational strategy, allowing the organization to deliver its objectives and meet stakeholders' expectations.

Traditional text-book responses suggest that executives need to focus on developing strategies that enable the organization to respond to changes in the external environment. The debate on which basis organizations should develop their strategy continues unabated (see Porter (1980); Barney (1991)). We argue that the development of an appropriate strategy is a necessary but in itself insufficient condition for a firm's on-going prosperity. We assert that in order to achieve the objectives set, meet stakeholders' needs and maintain sustained prosperity a strategy must be translated into a coherent logic that coordinates the

myriad of activities, i.e. the actions, practices and routines, that take place in different parts of the organization. This involves developing and implementing organizational structures, processes and relationships that support the strategy. Furthermore, it involves attracting, allocating and managing the necessary resources, for example, people, finance, information, knowledge and technology, which enable and support the strategy. In essence, senior executives are required to manage changes to the firm's organizational form, i.e. the overall logic that shapes a firm's strategy, structure, processes and management routines into an effective whole (Miles et al. (1997)), where these are inappropriate for dealing effectively with the forces and opportunities in the business environment.

In many organizations, the activities performed to create products and/or services that are of value to one or more of the organization's stakeholders cross multiple functional, organizational and, increasingly, geographical boundaries. Consequently, organizational changes span the people, processes, technological, departmental and geographical boundaries of the organization and are likely to touch a focal organization's suppliers, customers, strategic partners and other third parties. Thus, initiatives that bring about changes to the organization's form are highly complex in nature.

The purpose of this paper is to examine organizational forms and their relationship with the management of knowledge creation. Our interest in this conceptual area arises from the implicit assumption in much of the extant literature that the same approach to the management of knowledge creation can be utilized in the same manner in different organizational forms. We elucidate our argument by integrating, for the first time, the frameworks of Miles and Snow (1978) and Nonaka (1994). As we will discuss later, we selected these two frameworks because they have stood up to rigorous academic tests and

continue to be used widely (Alavi and Leidner (2001); Conant, Mokwa and Varadarajan (1990); Hambrick (1982, 2003); Sambamurthy and Subramani (2005); Zajac and Shortell (1989)). We framed our study to address the following research questions:

- What generic organizational forms populate the business landscape and what are their characteristic features?

- What are the modes of knowledge creation?

- Which approach to knowledge management forms the best alignment with each generic organizational form?

1.2   Deficiencies in the approaches for managing change initiatives

Scholars such as Beer and Nohria (2000) and Strebel (1996)) have pointed out that both public and private sector organizations have a poor track record in successfully managing complex change initiatives. Empirical evidence suggests that more than 60% of change initiatives fail to deliver the anticipated benefits (Kotter (1995); Strebel (1996)). The reasons that underpin the failure of complex change initiatives are predominantly managerial rather than technical in nature (Davenport, De Long and Beer (1998)). This suggests that the processes, methods and frameworks executives and consultants have traditionally utilised to manage complex change initiatives may no longer be achieving the anticipated outcomes or may be even creating additional problems elsewhere in the organization and value-creation chain (Williams and Parr (2004)). The literature and our experience with organizations in both the private and public sectors lead us to believe that this is for two key reasons. First, activities performed to deliver a valuable product or service cross many functional and other boundaries and hence, the requirements for and impacts of change initiatives affect most if

not the entire value-creation chain. Therefore, when functional or 'point' solutions are implemented, i.e. following traditional approaches, they have unintended consequences in adjacent functional silos and beyond. Such affects are exacerbated when several of such initiatives are being implemented simultaneously, as is typically the case in mid- and large-sized organizations which can have several concurrent major programmes that are made up of hundreds of projects and sub-projects. Second, many organizational forms are geared towards supporting business in times of stability with a limited capability to respond to changes in the business environment. Therefore, when the pace and scale of change increases, these organizational forms restrict the organization's ability to respond effectively (Miles and Snow (1978)).

1.3   Succeeding with knowledge management initiatives

We argue that succeeding with complex organizational change initiatives requires the integration of the tools, techniques, languages, frameworks and implementation methods of the domains affected by these initiatives:

- Change management

- Knowledge management

- Process management

- Project management

We undertook an exploratory survey of the literature which suggested that very little trans-disciplinary research has been conducted across these areas. Therefore, we carried out a rigorous and systematic meta-review of the literature (Tranfield, Denyer and Smart (2003)) to

gain a coherent understanding of the interplay between change, knowledge, process, and project management in the context of complex organizational change initiatives. This meta-review revealed, amongst other things, that there appears to be a third reason change initiatives fail, in particular when these initiatives concern the implementation of knowledge management strategies in organizations. Although the knowledge management literature recognises that knowledge management strategies must follow competitive strategies for companies to develop sustainable competitive advantages through utilisation of their unique knowledge assets (Hansen, Nohria and Tierney (1999); Teece (2000)), it provides no frameworks for effectively aligning appropriate knowledge management models with organizations' strategies, structures and processes, i.e. organizational forms. Without such alignment frameworks, organizations risk adopting a knowledge management strategy which is inappropriate for their organizational form and, subsequently, fail to realise the anticipated benefits of knowledge management (Davenport, De Long and Beers (1998); Hansen, Nohria and Tierney (1999)). Furthermore, the knowledge management strategies typically described in the literature are all very similar in nature, creating the perception that a standardised knowledge management approach with universal applicability exists (Davenport, De Long and Beers (1998); Paik and Choi (2005); Soo et al. (2002)). The validity of this perception is, however, arguable as it would imply that each organization operates and competes in the same way. Reality and disciplines like strategic management and organizational theory (Miles and Snow (1978)) quickly provide empirical proof that this is not the case. Therefore, we argue in this paper that a company's knowledge management initiatives, and specifically its approach to managing the creation of knowledge, must be closely aligned with its organizational form. We anticipate that this perspective will enable organizations to reap the anticipated benefits from knowledge management. We propose a framework which puts the

knowledge management models of Nonaka (1994) in context in relation to the strategic typology of Miles and Snow (1978).

1.3   Overview of paper

Our paper is organised as follows. In the next section we will discuss the Miles and Snow strategic typology and argue that each generic organizational form requires a different approach to the management of knowledge creation in order to develop and maintain a sustainable competitive advantage. In the third section we will discuss Nonaka's dynamic theory of organizational knowledge creation and critically compare this with the static knowledge management approaches typically detailed in the literature for maintaining a competitive advantage in a continuously changing business environment. In the fourth section we will combine the organizational design framework of Miles and Snow (1978) with the knowledge spiral of Nonaka (1994) and discuss the significance of selecting the appropriate approach for managing the creation of knowledge in a particular organizational form for achieving sustainable competitive advantage. We provide some conclusions from our analysis and recommendations for further research.

2   Miles and Snow's strategic typology

2.1   The evolution of organizational forms

Most organizations engage in a regular review of their core purpose, i.e. questioning, verifying and redefining the manner in which they interact with their environment (Miles and Snow (1978)). Effective organizations are those that excel at this market alignment task

whilst ineffective organizations are those that fail at identifying and maintaining a viable market for their product and/or service offerings. Furthermore, most organizations engage in an on-going process of reviewing, modifying and refining the architecture of their structures of roles and responsibilities, business processes and systems in support of the organization's market strategy. Efficient organisations are capable of aligning their structures, processes and systems with their market strategy, but inefficient organisations struggle with this alignment task. Miles and Snow (1978) called this entire process *the Adaptive Cycle*, using the organization's dynamic management of its products and markets as the underlying dimension. In essence, this dynamic organizational process of adjusting internal interdependencies to changes in the market environment is the driving force behind the evolution of the company's organizational form over time.

According to Miles and Snow (1978), organizational adaptation is concerned with finding complementary sets of solutions to the following three interlinked problems:

- The entrepreneurial problem
- The operations problem, and
- The business administration problem.

The *entrepreneurial problem* is about turning an innovative insight into a concrete definition of a product or service offering as well as the market or market segment at which this offering is targeted. The solution to this problem takes shape when management agrees on the choice of market(s) it wants the company to compete in, its orientation towards the market, i.e. the desired market perception of the brand (e.g., low-cost leader, exclusivity, or innovative product design), and decides to allocate scarce resources to the implementation of

its market strategy. Following the development of this solution, further entrepreneurial activities will be concerned with monitoring events in the marketplace and management of the company's product portfolio.

When a solution for the entrepreneurial problem has been developed, the market strategy must be implemented at the operational level. The *operations problem* is about turning the solution for the entrepreneurial problem into a concrete business operation. This concerns not only the design of appropriate business processes for transforming inputs into value-added outputs and distributing them to the target market but also the information, knowledge, communication and control infrastructures to ensure efficient operation of business processes.

To support the market strategy and business operations, solutions need to be found for the business administration problem. The *business administration problem* is about creating a management system that both supports the current market strategy and business operations as well as sustains the company's ability to adapt to changes in the future. Therefore, this phase is concerned with the development of an administrative system, i.e. the organizational structure, roles and responsibilities, and routines for both managing current activities effectively as well as ensuring that the organization maintains its ability to innovate. Obviously, the solution to this problem will have significant consequences for the power balances, culture and attitudes created within the organization, which can act both as enablers or barriers to change (Miles and Snow (1978)).

Through empirical research Miles and Snow recognized the existence of four generic or "ideal" organizational forms, which they typified as *Defenders, Prospectors, Analyzers and Reactors* (Miles and Snow (1978)). As will be discussed in detail in subsequent sections, each

of these types perceives the dynamics of the marketplace differently, relates to it in a unique way, and has a unique set of solutions for aligning its processes and structures with its market strategy. Many scholars have confirmed, with further empirical data, over the past 30 years (e.g., Conant et al. (1990); Hambrick (1982, 2003); Parnell and Wright (1993)) that, firstly, *Defender*, *Prospector* and *Analyzer* organizations exist in many different industry sectors and, secondly, have economically viable organizational forms whereas *Reactors* do not due to their misalignments of market strategy, operations and administration. Furthermore, these scholars have confirmed that these types are not restricted to small-, medium- or large-sized organizations in the private sector but are also found in non-profit organizations (Miles and Snow (1978); Conant et al. (1990)).

2.2   *Defender*

Defenders are organizations that deliberately choose a narrow market domain for their limited portfolio of products and/or services, thereby creating the conditions for a stable organizational form. Within this narrow domain *Defenders* defend their market position by either offering highly competitive priced products and/or services or ones of superior quality. Furthermore, *Defenders* tend to perceive developments in their niche market as stable, thereby allowing them to disregard developments outside their market domain and direct most of their efforts and investments towards improving their operational domain. Consequently, top managers in this type of organization tend to be highly expert in their domain, enabling them to develop and continuously improve a highly cost-efficient business process. As a result, their set of solutions to the business administration problem is characterised by strict control and bureaucratic mechanisms in order to ensure sustained efficiency. Although this is an economically viable strategy in stable or predictable industries,

major shifts in their niche market can threaten the *Defender* organization's survival. Figure 1 summarizes these and other *Defender* characteristics.

Figure 1

2.3   Prospector

Prospector organizations are in many respects the polar opposite of *Defender* organizations; although both types have in common a consistent set of solutions to the three organizational adaptation problems. In contrast to *Defenders*, however, top management of *Prospector* organizations perceive their market environment as constantly changing. Therefore, Prospectors either have or develop core capabilities of finding and exploiting new market opportunities by offering pioneering products and/or services. Consequently, *Prospectors* are more concerned with maintaining their innovator image in the marketplace than serving existing markets as efficiently as possible. On the other hand, working as efficiently as possible is the *Defenders'* core capability. *Prospectors* tend to monitor a wide range of trends and events in the marketplace, enabling them to remain at the forefront of new product and market developments. Due to this entrepreneurial solution, the *Prospector*'s solution to the operations problem is characterized by a high degree of flexibility in its business processes, which is achieved by low degrees of routinization, standardization and mechanisation, and a highly knowledgeable and entrepreneurial workforce. Therefore, a *Prospector*'s set of solutions to the business administration problem is characterised by a self-organizing structure, creative, culturally diverse, and supportive work environment, availability and access to resources necessary for new product development, and a reward system that favours R&D and marketing. These and other *Prospector* characteristics are summarized in Figure 2.

Figure 2

2.4   Analyzer

As is evident from the preceding two sections, *Defender* and *Prospector* organizations can be positioned at the extreme ends of a continuum of economically viable and sustainable business strategies. Organizations that reside in the middle of this continuum are a hybrid form of *Defender* and *Prospector* organizations and are called *Analyzers* in the Miles and Snow typology. By combining the strengths of the *Defender*, carving out and defending a niche in the market, with those of the *Prospector*, locating and exploiting new product and market opportunities, *Analyzers* attempt to minimize risk and maximize the opportunity for profit. However, in contrast to *Prospectors*, *Analyzers* tend to be more cautious and selective in their approach to entering new markets with pioneering products; *Analyzers* typically follow a "second to market but better" approach. The dual market focus of the *Analyzer*, a stable portfolio of products for efficiently serving existing markets and a changing portfolio of new products for new markets, makes this strategy potentially difficult to implement due to the opposing operational and administrative requirements. Miles and Snow (1978) argued that these problems could be solved by adopting a matrix structure combined with a blend of *Defender* and *Prospector* characteristics (see Figure 3). However, as evidenced by practice and scholars (see e.g., Benner and Tushman (2003); O'Reilly and Tushman (2004); Tushman and O'Reilly (1996)) managing and initiating change within matrix organizations is complex, in particular due to the inertia inherent in the *Defender* characteristics of the organization. Therefore, practitioners and scholars have been experimenting with different organizational forms to find more suitable ways in which companies can succeed with both protecting their

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traditional business and developing innovative products and markets. For example, O'Reilly and Tushman (2004) describe how companies experimented with cross-functional teams as well as those who utilized entrepreneurial teams that operated outside the established organization and management hierarchy. According to their research, organizations adopting these practices typically failed to achieve their goals whereas companies that opted for creating two structurally independent business units, each having its own business processes, organizational structures, culture and management systems typically succeeded in their attempts to effectively manage evolutionary and revolutionary change.

Figure 3

2.5   Reactor

Defenders, Analyzers and *Prospectors* all perceive change in their business environment differently and, therefore, have distinctly different organizational forms to effectively interact with and adapt to their environments. In spite of these differences, these three types have a consistent set of solutions to the entrepreneurial, operations, and business administration problems in common, which makes their activities economically viable. Events, however, can affect these response mechanisms, making them inconsistent and unstable, thereby threatening the organization's performance and, ultimately, its survival. For example, top management might fail to properly convey the organization's strategy to its employees, leading to inappropriate organizational change initiatives or inaction; management might develop an unsuitable structure and processes to fit the market strategy; or, management might hold on too long to the current organizational form whilst there is overwhelming evidence that major changes are taking place in the business environment. In these and other

cases that lead to inappropriate responses to environmental change, poor performance, or where there is a reluctance to change, the organization evolves into a *Reactor*. The *Reactor* strategy is, as Miles and Snow (1978) state, a "residual" strategy that arises when *Defender*, *Analyzer* or *Prospector* strategies are improperly implemented.

3 Nonaka's models for managing knowledge creation

3.1 Organizational creation of knowledge

Knowledge, and in particular the creation of knowledge, plays an increasingly important role in sustaining the competitive advantage of organizations in the new economy (see e.g., Birkinshaw and Sheehan (2002); Davenport et al. (1998); Hansen et al. (1999); Miles et al. (1997); Teece (2000)) and, consequently, their effective management. Before the latter can be addressed, however, it is paramount to have a profound understanding of how knowledge is created within an organizational context and the essential conditions for this process to take place.

Nonaka (1988) argues that at the level of the individual *autonomy*, i.e. the freedom to combine thinking and action at one's own discretion, is the critical condition necessary for initiating the process of information creation. Given a sufficient degree of autonomy, the individual is able to combine a wide range of observations in the external environment with extant knowledge and experiences, recognize the new and unknown, and develop innovative insights. The knowledge that underpins this information creation process is what Polanyi (1966) calls *tacit knowledge*; knowledge that is difficult to formalize and communicate, and which is deeply rooted in action, commitment, and involvement in a specific context. Nonaka

(1994) expands this philosophical concept in a more practical direction by including "mental models" such as schemata, paradigms, beliefs, and viewpoints that provide different perspectives for perceiving and defining the world. Although mental models can be articulated, they can not be exchanged with the same ease as *codified knowledge*; knowledge that can be expressed in a formal, systematic language and encoded in media such as documents, manuals, standard operating procedures, and blueprints.

The next phase of knowledge creation concerns the transformation of the individual's innovative insights, tacit knowledge, into a new point of view shared by others, new tacit knowledge, in order to start the process of realizing the insight. Nonaka (1994) calls such processes *knowledge conversions*, which at this stage best takes place at group level through *socialization* (see Figure 4). Nonaka (1988) argues that, therefore, a further critical condition for enabling organizational knowledge creation is the opportunity for *human interaction*. Given this opportunity, the individual shares his or her insight with others through dialogue, thereby acquiring other individuals' tacit knowledge. However, the latter will only occur if the members of this group share each others' thinking processes due to shared experiences. Without this, new information presented will not make sense and, therefore, will not be absorbed.

Figure 4

To further realize the innovative insight, now shared by a group of people, tacit knowledge must be converted into explicit knowledge to enable the allocation of resources for its execution. Nonaka (1994) refers to this mode of knowledge conversion as *externalization*. He

argues that metaphors play a key role in this process as they enable people to understand and experience one kind of thing in terms of another.

In the next phase of the organizational knowledge creation process, the output of the externalization phase at group level must be transmitted to other groups in the organization, i.e. the process now moves to the organizational level. For example, if the individual's insight concerns the concept for a new car model, then the output from the externalization phase could be the car's specifications, which groups such as "production", "marketing", etc. would need to further realize the entrepreneurial insight. This third mode of knowledge conversion, from explicit knowledge to new explicit knowledge, is what Nonaka (1994) calls *combination*; the combining of different bodies of explicit knowledge held by individuals. This conversion process typically takes place through social exchange processes such as meetings and conversations. The critical condition here is the organization's structure, which regulates the relationships between the various groups or sections involved in the knowledge creation process, thus the exchange of information between these groups and, therefore, the allocation of resources. For this reason, the organizational structure has a significant influence on an organization's ability to respond to changes in the external environment and to innovate. We will come back to this issue in section 4.

The fourth mode of knowledge conversion is about converting explicit knowledge into new tacit knowledge, which Nonaka (1994) calls *internalization*, and which is similar in nature to "learning". This phase can take place at both the individual level and the intra-organizational level.

What characterizes the process of organizational knowledge creation described above is, firstly, the continuous dialogue between tacit and explicit knowledge and, secondly, the dynamic interaction between the different modes of knowledge conversion. If this process were represented graphically, it would look like a spiral: *Nonaka's spiral of knowledge* (see Figure 5). Figure 5 shows this dialogue between tacit and explicit knowledge at the level of the individual (*the entrepreneur*), the social processes necessary to raise the level of this dialogue to that of the group, the organization and inter-organization, and back to the level of the individual (*the performer*).

Figure 5

3.2   Nonaka's knowledge management models

The entrepreneurial individual described in the previous section can, in principle, be located throughout the organization. For example, this individual can be a member of the organization's top management team as well as of its lower management. This, however, does not imply that each and every individual in each and every organization can participate in this knowledge creation process, an impression created by many scholars by describing a "universal" approach to knowledge management (Davenport et al. (1998); Hansen et al. (1999); Soo et al. (2002)); Teece (2000)). Nonaka (1988; 1994) identifies three different types of organizations, namely those where new knowledge is only created at the top, those where new knowledge can be created by any individual, and those where middle management is responsible for creating new knowledge. Given the requisite enabling conditions for creating new knowledge, these locations of knowledge creation have profound consequences for the form of management that promotes the efficient creation of knowledge in these

contexts, i.e. each context requires a different management style. Nonaka (1994) calls these management styles *Top-Down, Bottom-Up,* and *Middle-Up-Down*, respectively.

In the *Top-Down* management model, top managers are the only members of the organization that have the autonomy to deliberate and experiment with relating facts and extant knowledge and the freedom to act on entrepreneurial insights by sharing them in open and frank dialogue at group level. The outcomes of this process are top management's concepts (e.g., an idea for a new product or service), broken down in strategic objectives and the allocation of resources so that these concepts can be implemented by subordinates. Of paramount concern here is that implementation at lower levels of the organization occurs as intended by top management. This is achieved by top management through their design of a functional organizational structure with extensive division of labour, a high degree of formalization, long-looped information systems, and centralized control. Therefore, in the *Top-Down* model information processing is concerned with transforming general information into increasingly specific information: top managers' concepts become middle managers' operational conditions (e.g., the specifications of the new product or service), middle managers decide on how to realize these concepts, and decisions by middle managers become lower management's operational conditions for implementing the concepts. Furthermore, as a consequence of this structure and management system, individuals at lower levels in the organization are never in a position to obtain a broad and diverse perspective of the business and the environment it operates in and, thus, to develop and transmit entrepreneurial insights (Nonaka (1988)). Consequently, any of their innovative insights will be restricted to their operational area and only make it up the organization slowly due to a bureaucratic system that is designed to filter and process information downwards. Therefore, the organization is constrained in its ability to draw on its employees entrepreneurial capabilities, thereby

making the organization dependent on the capabilities of its top management, which Nonaka (1994) indicates as a weakness of this model.

The *Bottom-Up* management model is the opposite of the *Top-Down* model. In this model it is not top management that has the sole prerogative to create new knowledge. On the contrary, in this model lower and middle managers are responsible for the creation of knowledge. Pinchot (1985) calls these employees who function as intra-company entrepreneurs *intrapreneurs*. To enable knowledge creation within this context, individuals at any organizational level are given the freedom to deliberate, experiment, and create meaningful information through intense interactions with others. Information technology plays a key role in this process as it allows individuals to find and communicate with others in different locations. Furthermore, in this model, top managers take on the role of supportive leaders and utilize the company's vision and values to select and sponsor promising ideas developed and defined by individuals or self-organized groups. Their sponsorship enables the subsequent allocation of the necessary resources and protects the concept's implementation against any opposition from within the organization. In contrast to the *Top-Down* model, this results in an organization characterized by a product instead of a process focus, a low division of labour, low degrees of formalization, decentralized control, and short-looped horizontal information systems. As Nonaka (1994) argues, the weaknesses of this model are that, firstly, knowledge creation is more time-consuming due to the greater level of interactions between more individuals, and, secondly, the difficulty of coordinating individuals due to the self-organizing principle employed to tap a greater pool of creative thinking. Consequently, resources may be under-utilized or even misused.

Nonaka's *Middle-Up-Down* management model is a synthesis of his *Top-Down* and *Bottom-Up* models and is an attempt to make the process of knowledge creation more efficient in order to keep pace with the intensity of today's market competition (Nonaka (1988; 1994)). In this knowledge management model, the core of knowledge creation is located with middle managers as they are able to combine the strategic concepts of top managers with the hands-on information required by lower managers. Therefore, top management's role is determining the overall direction of the organization and establishing the timeframe within which their vision must be realized. This vision, however, is created in dialogue with middle managers selected by the top, who in turn draw on the combination of individual visions of lower-level personnel for their own input. Before these selected middle managers can realize this vision, utilizing the resources allocated through their interactions with top management, they have to confront and resolve the criticisms of other middle managers through intensive communications. During this stage the vision will evolve into a more concrete concept, which at lower levels of the organization is further refined and implemented by multi-disciplinary, self-organizing teams, headed by middle managers, within the limited timeframe given by top management. Consequently, organizations that adopt this knowledge management model can be characterized by a loose matrix structure combining functional and product groups, moderate centralized control with both horizontal and vertical feedback loops, and an extremely complex and expensive coordination mechanism, which Nonaka (1994) regards as its weakness. Furthermore, the fact that it places great pressure on the entrepreneurial capabilities of middle managers is something Nonaka (1988) regards as an additional weakness of this model.

3.3 *The relationship between environmental characteristics and organizational knowledge creation models*

Nonaka (1988) argues, that the choice of knowledge management model, *Top-Down*, *Bottom-Up*, or *Middle-Up-Down*, cannot be arbitrary but must be appropriately aligned with the level of uncertainty in the external environment. He argues that, when the level of uncertainty is low, the organization can adapt itself effectively by maintaining a low level of knowledge creation, i.e. a small group of individuals that are responsible for creating new knowledge. According to Nonaka (1988), in these situations the *Top-Down* model is an appropriate choice. On the other hand, when the level of uncertainty is great, the intensity of organizational knowledge creation must be at an accordingly high level to adapt effectively, i.e. individuals at all levels of the organization must be involved in this creative process. Therefore, Nonaka (1988) argues, that the *Bottom-Up* management model is an appropriate choice for such contexts. When the organization, on the other hand, is faced by uncertainty due to intense competition and the ability to respond rapidly is essential, Nonaka (1988) argues that the *Middle-Up-Down* management model is an appropriate choice.

4   Aligning knowledge management models with organizational strategic types

4.1   *Integrating organizational forms and knowledge management models*

In this section of the paper we bring together, for the first time, Miles and Snow's organizational form framework and Nonaka's knowledge creation spiral and management models. Our aim is to examine knowledge creation (Figure 6) under the conditions of each organizational form. Specifically, we aim in this section to address our third research

question: "Which approach to knowledge management forms the best alignment with each generic organizational form?"

Figure 6

4.2   The *Defender* organizational form and *Top-Down* knowledge management

As stated earlier, top managers of *Defender* organizations tend to perceive developments in their niche market as stable, thereby allowing them to disregard developments outside their market domain and direct most of their efforts and investments towards improving their operational domain. *Defender* organizations achieve this through a hierarchical organizational structure with extensive division of labour, a high degree of formalization, centralized control, and a reward system that favours production and finance. This enables these organizations to maintain their market image of low-cost leader or provider of superior quality offerings. We argue that these strategic and organizational behavioural choices have significant consequences for knowledge creation in these organizations and, therefore, the approach to knowledge management. As indicated in Figure 7, in *Defender* organizations senior managers set out the organization's strategic direction, create new product concepts, develop the specifications for these product concepts, and allocate the resources for their realization as well as continuous improvement of business processes (Miles and Snow (1978)). Therefore, we argue that knowledge starts as a coherent whole at the top of this organizational form and then gets driven down the functional silos. At each subsequent layer of the hierarchy, new process-oriented knowledge is created by middle managers, going through knowledge spirals separately from those in other silos, to achieve the strategic objectives set by the top team. We argue that as a consequence knowledge becomes highly

diffused at lower management levels with each functional and departmental community creating its own knowledge in isolation of others (Brown and Duguid (1991)). The challenge for *Defender*-type organizations is, therefore, ensuring that the communities of experts going through these isolated knowledge spirals create complementary knowledge outputs. We argue that the unifying force for these knowledge creations derives from the clarity of the strategic directives. The approach to knowledge management that fulfils these requirements best is Nonaka's *Top-Down* model. Therefore, we propose the following hypothesis:

Hypothesis 1: The effective management of knowledge creation within Defender organizational forms is achieved by adopting a Top-Down knowledge management framework.

Figure 7

4.3   The *Prospector* organizational form and *Bottom-Up* knowledge management

Prospector organizations perceive their market environment as constantly changing and utilize this context for developing a competitive advantage by pioneering products and markets. *Prospectors* achieve this by creating a high degree of flexibility in their business operations, and a flat organizational structure with a diverse and entrepreneurial workforce at the lower management level. This organization form provides people with access to information and other resources to gain insights into market developments and customer needs and develop these into novel concepts for developing new products or entering new markets. This enables these organizations to remain at the forefront of product and market developments and to maintain their market image as creators of change. As for *Defender*

organizations, we argue that these strategic and organizational behavioural choices have significant consequences for knowledge creation in these organizations and, therefore, the approach to knowledge management. Knowledge creation in *Prospector* organizations can take place at any level but is most prevalent at the lower levels of management, as represented in Figure 8. Therefore, we argue that in this organizational form knowledge creation is diffused from the very start, i.e. there is no central or senior management team that has a coherent view of the organization's knowledge capital. Furthermore, porous functional and departmental boundaries allow diffused ideas to be shared, fostered, and developed by both individuals and teams. The knowledge created at this level flows upward through the organization and is ratified by middle managers using top management's strategic vision and organizational values as guides. This organizational ability to combine fragments of knowledge that start life in different communities into an integrated whole is a key *Prospector* strength and of vital strategic importance (Kogut and Zander (1992)). The challenge for *Prospector* organizations is, therefore, ensuring that good ideas are not being stifled as they progress upward through the organization. The latter might happen when new ideas proposed to potential sponsors are similar to ones that failed in the past, thereby representing a possible risk for damaging a manager's reputation and remuneration prospects. The approach to knowledge management that addresses these issues best is Nonaka's *Bottom-Up* model. Therefore:

Hypothesis 2: The effective management of knowledge creation within Prospector organizational forms is achieved by adopting a Bottom-Up knowledge management model.

Figure 8

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4.4   The *Analyzer* organizational form and *Middle-Up-Down* knowledge management

Analyzer organizations are a hybrid of the *Defender* and *Prospector* organizational forms (Miles and Snow (1978); O'Reilly and Tushman (2004); Tushman and O'Reilly (1996)) and, therefore, perceive developments in their market environment as uncertain due to intense competition from all market directions. To prosper in this environment, *Analyzer* organizations focus their attention on developing competitive responses to market offerings by other *Analyzers* as well as *Defender-* and *Prospector*-type organizations in their industry sector. With regard to the latter, however, these organizations adopt a "second to market but better" approach to reduce their exposure to market risks. *Analyzer* organizations achieve this market orientation by adopting loose matrix organizational structures in which multi-disciplinary project teams concerned with developing new products for new markets interact with functional groups tasked with continuously improving the production of existing products for currently served markets (Chesborough and Teece (1996); Dougherty (1992)). Managing these organizational processes effectively is complex, in particular with regard to the creation of knowledge. As indicated in Figure 9, we argue that in *Analyzer* organizations knowledge can be created at any level of the organization but is most prevalent at middle management level. In contrast to *Prospector* organizations, knowledge creation is diffused to a lesser extent from the start as it is predominantly created by a group of middle managers selected and directed by top management. The knowledge created by these middle managers flows upwards through the organization and when ratified by top management gets driven down and across the organization. At lower organizational levels this results in several multi-disciplinary project teams going through separate knowledge spirals that may overlap where commonalities exist between concurrent developments. We therefore argue that one of the challenges for these organizations is ensuring that existing and newly developed knowledge

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is made widely available and accessible to prevent extant knowledge from being re-invented elsewhere in the organization. Another challenge for these organizations is preventing good ideas from being stifled, attacked, or hijacked as they progress through the organization due to politics and power plays between middle managers. The approach to knowledge management that is likely to be most suitable for dealing with these issues is Nonaka's *Middle-Up-Down* model. Therefore, we propose the following hypothesis:

Hypothesis 3: The effective management of knowledge creation within Analyzer organizational forms is achieved by adopting a Middle-Up-Down knowledge management model.

Figure 9

5   Conclusions and further research

Miles and Snow's framework has stood up to rigorous academic testing for over thirty years. Furthermore, in addition to Miles and Snow, many scholars (e.g., Conant et al. (1990); DeSarbo et al (2005); Hambrick (1982, 2003); Zajac and Shortell (1989)) have empirically established that *Defender*, *Analyzer*, and *Prospector* type organizations can be found in many different industry sectors, and across different continents. Therefore, evidence is widely available for confirming that, within a particular industry sector, organizations do perceive their business environment differently and, therefore, interact differently with it. Consequently, they organize, manage, and adapt themselves in different manners. However, there are only a handful of economically viable ways in which this can be done. Miles and Snow (1978) were one of the first scholars to recognize this and characterized these

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organizational forms in a holistic manner. We have expanded on this body of work by integrating the Miles and Snow framework with the knowledge management models of Nonaka. We have contributed to the academic debate on knowledge management by integrating these two frameworks to question an assumption that pervades the literature; that there is a single approach to managing the creation of knowledge. Instead, we have argued that the approach to organizational knowledge management cannot be an unqualified choice but must be closely aligned with the organizational form in order to be effective. By establishing this integration we have challenged the implicit assumption that a universal approach exists and arrived at a conceptual framework in which knowledge management models are closely aligned with the requirements of generic organizational forms. We anticipate that this perspective will enable organizations to reap the anticipated benefits from knowledge management.

Our paper also opens new vistas for further research. First, there is a need to undertake empirical research to test the models and hypotheses we propose. We suggest that this could be achieved by carrying out a large-scale survey among managers responsible for strategy and knowledge management in organizations. Second, we anticipate that the ways in which the knowledge spiral is operationalized in organizations will vary in each generic form. We believe that factors such as culture, leadership and information systems will shape the modes of managing the knowledge spiral. These factors can be best examined by way of in-depth case studies in organizations that have the characteristics of the different forms. We anticipate that the outcomes of these studies will lead to the development of better processes, methods, and frameworks for designing and implementing knowledge management initiatives. These developments will enable more organizations to reap the benefits from knowledge management and enhance their competitive edge.

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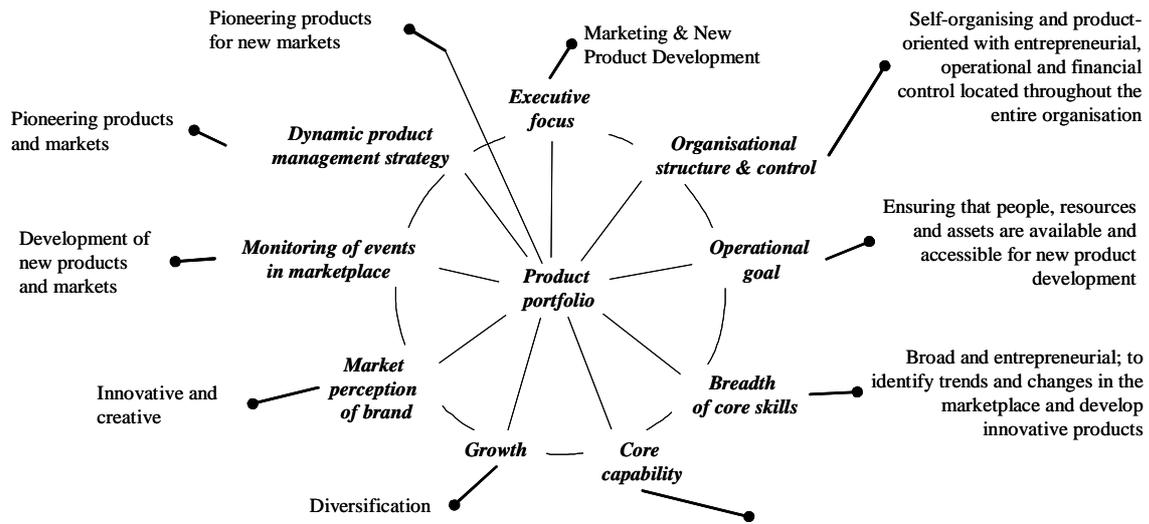Figure 1   Characteristics of the *Defender* organisation.

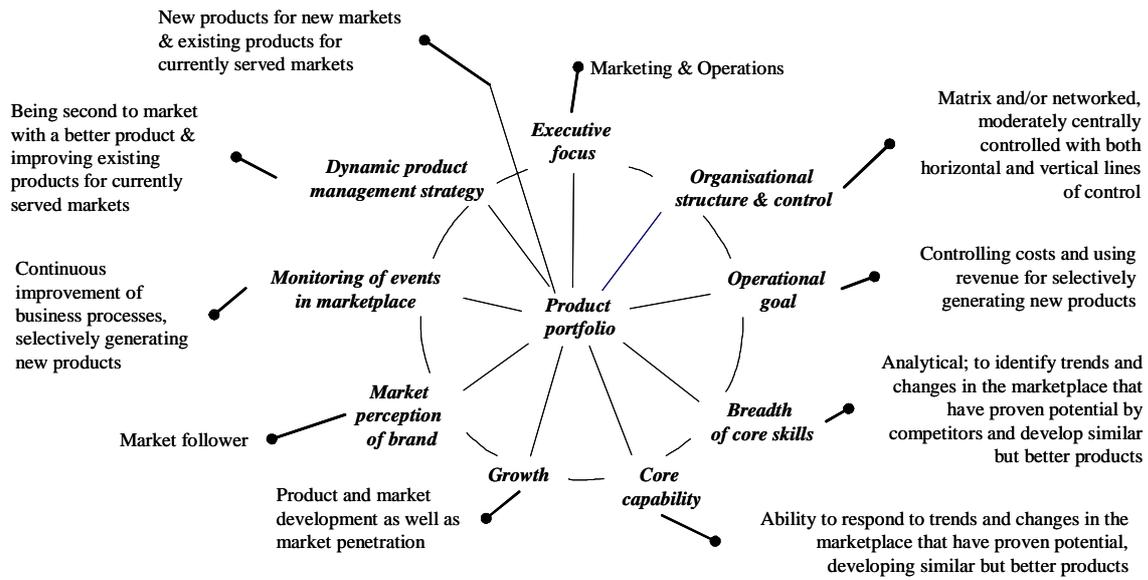Figure 2   Characteristics of the *Prospector* organization.

New products for new markets
& existing products for
currently served markets

Being second to market
with a better product &
improving existing
products for currently
served markets

Continuous
improvement of
business processes,
selectively generating
new products

Market follower

Product and market
development as well as
market penetration

Marketing & Operations

Matrix and/or networked,
moderately centrally
controlled with both
horizontal and vertical lines
of control

Controlling costs and using
revenue for selectively
generating new products

Analytical; to identify trends and
changes in the marketplace that
have proven potential by
competitors and develop similar
but better products

Ability to respond to trends and changes in the
marketplace that have proven potential,
developing similar but better products

Executive focus

Dynamic product management strategy

Monitoring of events in marketplace

Market perception of brand

Growth

Product portfolio

Organisational structure & control

Operational goal

Breadth of core skills

Core capability

Figure 3   Characteristics of the *Analyzer* organization.

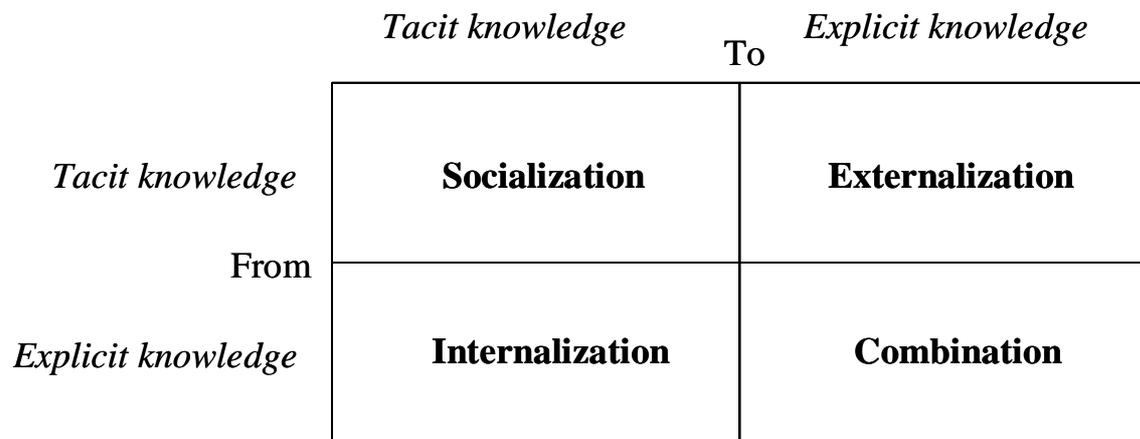|	*Tacit knowledge*	*Explicit knowledge*
Tacit knowledge	**Socialization**	**Externalization**
Explicit knowledge	**Internalization**	**Combination**

To

From

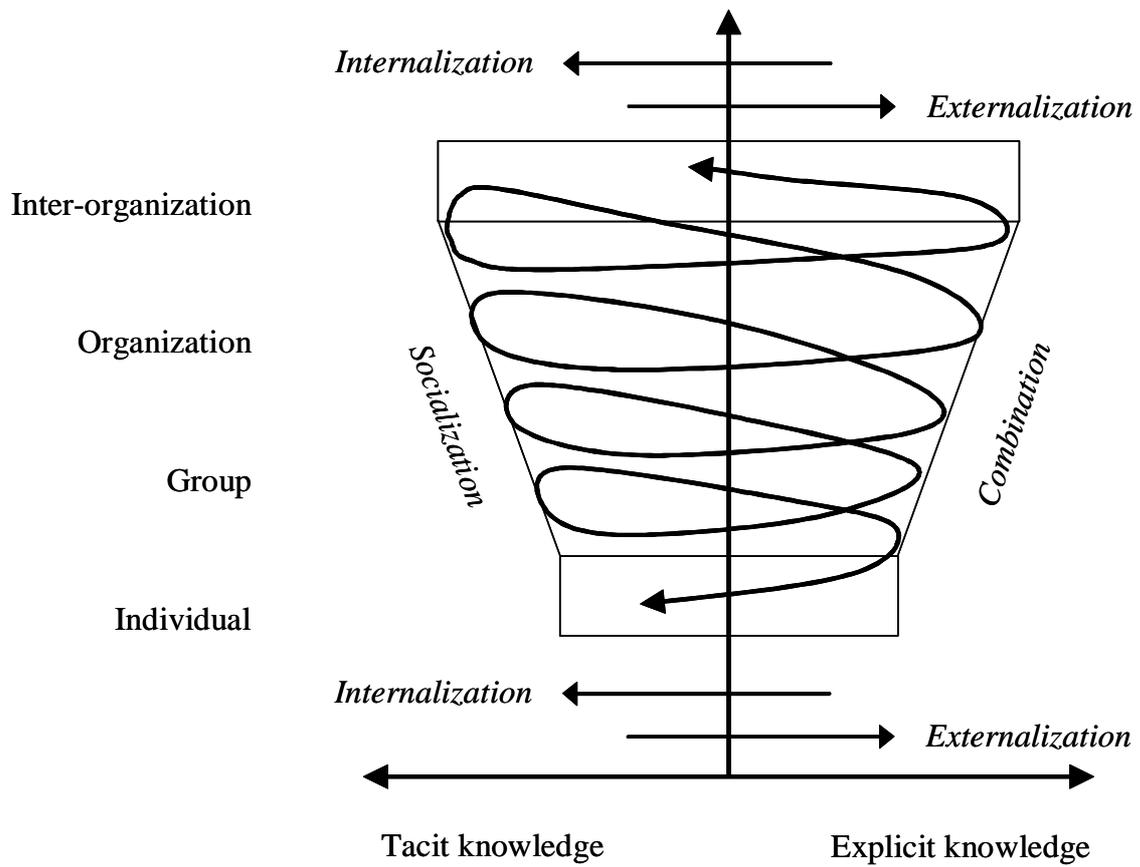Figure 4   The four modes of knowledge conversion (Nonaka (1994)).

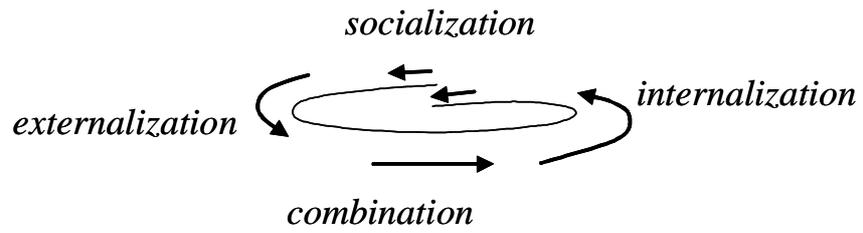Figure 5   Nonaka's spiral of organizational knowledge creation (Nonaka (1994)).

Figure 6   Modes of knowledge creation along a winding of Nonaka's knowledge spiral.
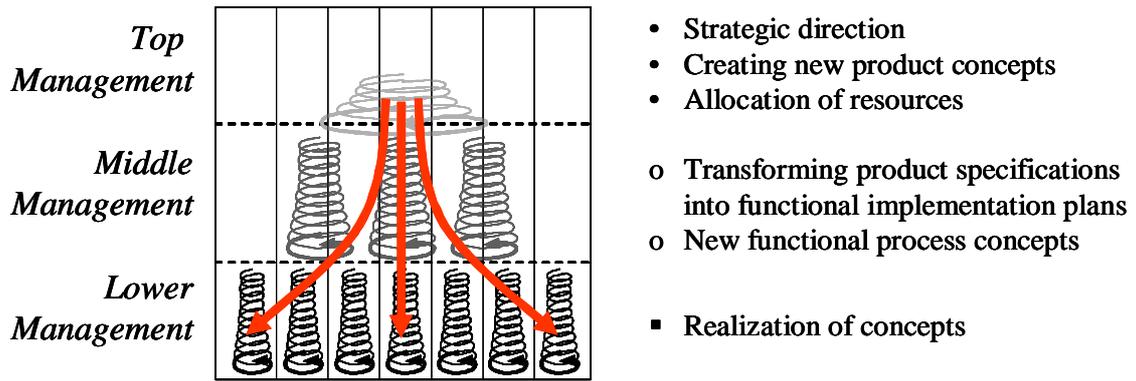
- Strategic direction
- Creating new product concepts
- Allocation of resources

o Transforming product specifications into functional implementation plans
o New functional process concepts

- Realization of concepts

Figure 7   Spirals of knowledge creation in a *Defender* organization.

Top Management

- Strategic direction

Middle Management

o Sponsorship of selected new product concepts
o Allocation of resources

Lower Management

- New product concepts
- Realization of sponsored concepts
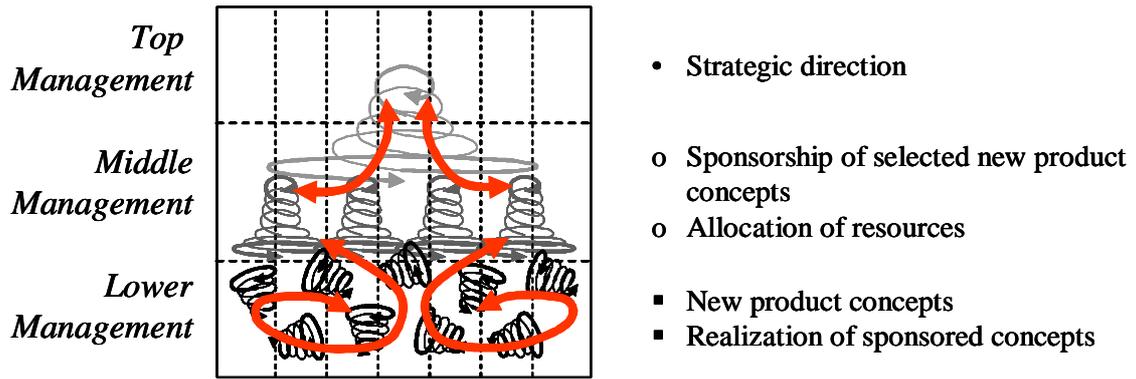
Figure 8   Spirals of knowledge creation in *Prospector* organization.

- Strategic direction
- Allocation of resources to selected concepts

o New product concepts
o New process concepts
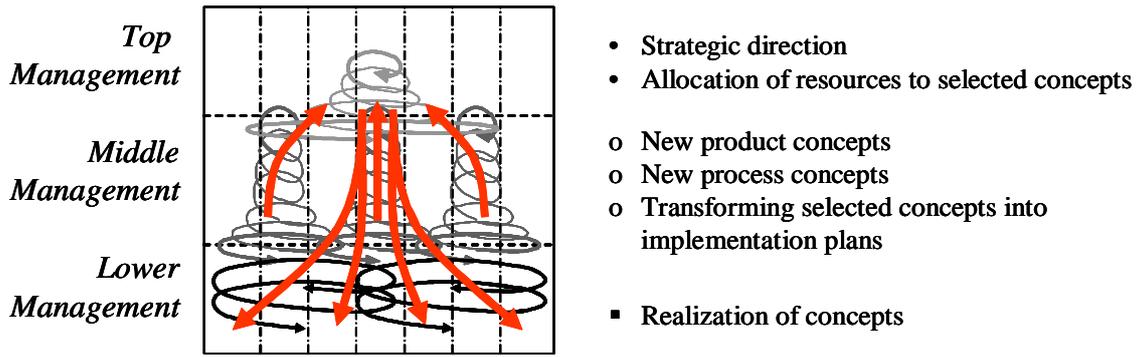o Transforming selected concepts into implementation plans

- Realization of concepts

Figure 9   Spirals of knowledge creation in *Analyzer* organization.