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## **Designing a Training and Development Policy : A Knowledge Creation Perspective**

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A KNOWLEDGE CREATION PERSPECTIVE**

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## Abstract

This study presents a training and development policy which facilitates the creation and sharing of new knowledge. The policy is based upon the principle of generating redundancies, related to core competences. At a first level, training is focused towards basic functional knowledge. At the second level, the programs are oriented towards improvement of the process system by stimulating internal process redundancies. The purpose of the training at the third level is to open the system and to facilitate innovation by developing external functional redundancies. The sharing of tacit knowledge is stimulated by emphasizing externalization and learning by doing.

The business environment of today is characterized by change, ambiguity and complexity. In order to survive in such an environment, the vital capacity of organizations becomes creating knowledge (Nonaka, 1991), increasing organizational learning (Senge, 1990; Van Den Broeck, 1994), building core competences (Prahalad & Hamel, 1990), and understanding and guiding the process of innovation (Bouwen & Fry, 1991). At the same time, organizational structures and management styles are being changed to effectively address these challenges. These changes are oriented towards organizing around core processes and empowering employees (Byrne, 1993; Lawler, 1994, Stewart, 1992).

One of the most important tools to enhance the development and utilization of organizational knowledge are human resource management practices (Lado & Wilson, 1994). In changing HRM policies, most attention has been given to the practices within the reward policy area. The appraisal criteria are reconsidered with a focus on team performance and individual skill development (Stewart, 1992). Compensation systems are redesigned based upon skills and include options like stock ownership (Lawler, 1992). Changes suggested towards training and development, on the other hand, have been minimal or general. For instance, organizations are advised to train their people on a just-in-time, need-to-perform basis (Stewart, 1992), to encourage their staff to develop multiple skills rather than specialized know-how, to train employees how to perform their own analyses on raw data (Byrne, 1993), or to build training programs around the sharing of best practices and requiring all to attend ongoing education experiences (Ulrich, Jick & Von Glinow, 1993). However, there has been no policy designed towards integrating training and development within the organizational context.

In this paper, we want to address the question of how to develop a training and development policy that stimulates developmental opportunities and knowledge creation. Since we see training and development as one of the tools to manage a learning organization, we focus more on the organizational context and its implications for training and development than on the instruments themselves. In

developing such an integrated way of thinking about a training and development policy, we first discuss how organizations traditionally have approached these issues. Second, we rely on recent literature on organizational learning, knowledge creation, core competences and new organizational forms to come to an understanding of the organizational context. Based upon these different organizational challenges, we develop a model of a knowledge based organization. Finally, we design a policy towards training and development, embedded in the organizational context and oriented towards knowledge creation.

### **Training and Development From a Problem Solving Perspective**

In the traditional management paradigm of Taylor and Simon, an organization is seen as an information processing machine that in an efficient way wants to achieve the set objectives. The basic idea about organizations as learning systems was grounded in Taylor's premise that management knowledge can be measured and transferred to other employees. In order to facilitate this transfer, work was divided into separate almost independent functions that seem to have no connection to each other with as consequences a functional and hierarchical structure. Learning a merely executing job was then mainly behavioral and focused towards a job or becoming a specialist. In extreme cases, employees could learn their routine job in a few minutes. This fragmented orientation reflects an analytic approach in which problems or complex situations are addressed by breaking it into components, study each component in isolation, and then synthesize the components back into a whole (Kofman & Senge, 1993).

Besides the behavioral and focused learning that takes place in a machine organization, learning is also reactive. The reactivity is a consequence of managers' fixation towards problem solving (Kofman & Senge, 1993). Problem solving is focused on making something go away and relying on expert knowledge to solve the problem. Both reactions, however, prevent an organization from improving and developing learning capabilities (Kofman & Senge, 1993).

Over the last 50 years, organizations and management concepts have evolved but most of the training programs offered today reflect a focused and reactive orientation. Training programs are typically seen as tools to improve the functioning of a person in his/her functional area or in the interfaces s/he has with others. The functional training programs are set up to make the person more efficient in his/her function. Learning to use a software program is a typical example of task oriented training. Other types of training programs are seen as tools to improve the interfaces a person has with others. For example, communication programs are set up to improve interactions between an individual and his/her boss, subordinates or clients. Problem solving techniques in total quality training are taught to improve the interaction among team members. Foreign language courses are given with the purpose to increase managerial competence in dealing with other cultures. Such type of training programs follow the job descriptions and support the operational, day-to-day activities of employees. The implication of this approach is that training programs are designed towards specialty fields and favor focused learning.

Another characteristic of training programs is their reactive nature. The decision of who needs what type of training is usually made by line management. Based on ineffective performance of subordinates or planned changes in their job, they define the needs of their subordinates along the functional and interface lines. Since it is line management who understands best the concrete work context, they are considered to be the best source to assess the concrete, individual needs of their subordinates. The implication, however, is that this approach of identifying needs focuses mainly on the current situation or on planned changes.

### *Conclusion*

The current training and development systems seem to support a first order or single loop learning (Argyris & Schön, 1978). In single loop learning, people define in their own terms the purpose of the situation in which they find themselves and tend to use unilateral behavioral strategies to win. As a consequence, the behavioral

actions of organizational members result into a set of organizational routines which can not be questioned. The reactive and focused orientation of the traditional training programs reinforce this type learning since they are designed to improve the organization's capacity to achieve known objectives and are examples of routine and behavioral learning. In this paper, we want to address the question of how to develop training and development programs that are future oriented towards dealing with change and improvement. The first step in developing such a policy is to explicate our understanding of the organizational context in which training and development will take place.

### **An Organization From a Knowledge Creation Perspective**

As a consequence of the uncertain and complex business environment, innovation and capability to change become more crucial for organizations and knowledge is considered to be the source of sustained competitive advantage (Senge, 1990; Nonaka, 1991). Two types of literature will form the basis of our understanding of the context of a knowledge based organization e.g. the literature on new organizational forms (Byrne, 1993; Stewart, 1992) and on knowledge (Blackler, 1993; Kofman & Senge, 1993; Nonaka, 1991; Senge, 1990; Prahalad & Hamel, 1990). Combining these different perspectives, we identify the organizational challenges to organize around processes and core competences, to generate new ideas with impact, and to share these ideas across boundaries. Based upon these different organizational challenges, we develop a general model of the organizational context that reflects an underlying philosophy of knowledge creation. This model considers the importance of functional as well as process knowledge, and applies the concept of information redundancies for both types of knowledge.

#### *Organizing around Processes and Core Competences*

Depending on the current trends in management, there has always been a tendency to favor different types of knowledge such as general knowledge over



functional expertise or vice versa. Today, different literature has different emphases. The literature on the redesign of organizational life (Blackburn & Rosen, 1993; Byrne, 1993; Lawler, 1994) is focused on the better service of customers and markets in an uncertain business environment. The implication of this increased focus on external objectives is a change in the internal work design. Organizations are being delayed and flattened and managing across horizontal boundaries has become more important than managing across vertical boundaries. Work in such a horizontal organization is organized around processes instead of around narrow tasks and functions. This implies that employees are members of cross-functional teams instead of belonging to a specific department. Self-managing teams are being rediscovered and form the building blocks of the new process-oriented organization.

At the same time, the development of core competences is considered to be an emergent strategy when confronted with a need for continuous change. Core capabilities are defined as a set of differentiated skills, complementary assets, and routines that provide the basis for a firm's competitive capacities and sustainable advantage in a particular business (Teece, Pisano & Shuen, 1990). One of the most necessary elements in a core capability is excellence in the technical and professional skills and knowledge base underlying major products. This knowledge/skill dimension encompasses both firm-specific techniques and scientific understanding (Leonard-Barton, 1992).

So, while the literature on the redesign of organizations emphasizes the importance of process knowledge and encourage managers to develop multiple skills instead of specialized know-how, the literature on core competences discuss the importance of carefully developed technical capabilities for incremental innovation.

#### *Knowledge Creation through Information Redundancies and Differentiated Learning*

In recent literature on organizational learning and knowledge creation, one can notice a shift from a problem solving or information processing approach to a problem generating or knowledge creating approach (Nonaka, 1990) or an emphasis on

generating new ideas with impact (Ulrich et al., 1993). In the problem solving model, innovation and new ideas are seen as a matter of efficiently processing objective, explicit information in quantity. However, scholars like Nonaka and his colleagues (1991; 1994) argue that processing and synthesizing codified information from different sources do not really extend the company's existing knowledge base. In contrast, they favor a knowledge generating model in which innovation and new ideas are approached from a qualitative perspective.

Nonaka (1990) argues that knowledge creation is facilitated by the creation of information redundancies in the organization. Information redundancies refers to conditions where some types of excess information are shared in addition to the minimal amount of requisite information held by every individual, group, or organization in performing a specific function. Examples of such conditions are project teams with cross-functional diversity, overlaps between different phases of a development process, or involving subcontracting companies in designing new products (Nonaka, 1990). In such conditions, individuals hold excess information by which it is possible to enter the territory or specialty of others and point out problems which employees don't consider from their own functional perspective. There are many cases in which previously undetected problems are brought up by group members from other domains. If information was non-overlapping, it would be impossible to enter other functional areas and make adjustments of this sort.

A similar concept is differentiated learning (Van Den Broeck, 1994). Differentiated learning, in contrast to focused learning, takes place when one questions existing organizational models and practices and starts experimenting with new approaches. Initiatives which stimulate differentiated learning are, for example, rewarding experimental behavior, engaging in informal contacts, teams consisting of members with overlapping competences, project groups supplementing the functional structure, or development of non-specialized skills. The results of differentiated learning are innovation instead of improvement (Van Den Broeck, 1994).

In general, both concepts of information redundancy and differentiated learning refer to situations in which learning takes place by moving away from one's own task and function and by intruding another field. Employees are not only concerned with strict operational, daily activities but time and opportunities are created to interact with persons of other functions, hierarchies, and organizations. The latter brings in chance, disorder and discontinuity which in interaction with the necessity, order and continuity of operational work can lead to new ideas that have impact (Nonaka, 1990). Information redundancies and differentiated learning also encourages double loop learning. It enhances questioning and reassessing the existing performance standards, work norms and the underlying assumptions and beliefs that are taken for granted (Argyris & Schön, 1978).

#### *Transferring Tacit Knowledge Across Boundaries*

The learning capability of an organization is reflected not only in generating new ideas with impact but also in generalizing these ideas across organizational boundaries (Kofman & Senge, 1993; Ulrich et al., 1993). This brings us to the question of how do we learn and transfer knowledge. Recent developments in the theory of knowledge contrast with the conventional rational-cognitive approach (Blackler, 1993). These approaches emphasize "the complexity of tacit skills and the significance of doing as well as deciding, the importance of culturally provided categories for individual thought, the social process through which concepts and actions are negotiated, and the creative ways in which people use even the most abstract plans and representations" (Blackler, 1993, p. 864).

New ideas are not created by processing objective explicit information but depend on tapping the tacit and often highly subjective insights, intuitions and hunches of individual employees (Nonaka, 1991). This distinction between tacit and explicit knowledge was originally identified by Polanyi (1966). Explicit or codified knowledge refers to knowledge that is transmittable in formal, systematic language. For this reason, it can be easily communicated and shared, in product specifications or

a scientific formula or a computer program. Tacit knowledge on the other hand is highly personal. It is deeply rooted in action and in an individual's commitment to a specific context - a craft or profession, a particular technology or product market, or the activities of a work group (Polanyi, 1966). It is hard to formalize and therefore difficult to communicate to others or as Polanyi has stated it "We can know more than we can tell".

Based on the distinction between tacit and explicit knowledge, Nonaka (1991; 1994) identified four different modes of sharing knowledge: socialization, combination, internalization and externalization. First, socialization is a way of sharing knowledge through shared experience or interaction between individuals. In this mode, one moves from tacit knowledge to tacit knowledge. Socialization however is a rather limited form of knowledge conversion since the knowledge never becomes explicit, it cannot easily be leveraged by the organization as a whole (Nonaka, 1991). Second, an individual can also combine discrete pieces of explicit knowledge into a new whole. Through the sorting, adding and categorizing of explicit knowledge, the existing information is being reconfigured. This process of creating explicit knowledge from explicit knowledge is referred to as combination. However, combination does not really extend the company's existing knowledge base. Reliance on explicit knowledge synthesizes information from different sources but the impact of such knowledge conversion is not high (Nonaka, 1991). It is in the third and fourth modes of knowledge conversion, when tacit and explicit knowledge interact, that knowledge sharing happens in a more powerful way. The third mode, externalization, involves the conversion from tacit knowledge to explicit knowledge. Moving from tacit to explicit is really a process of articulating one's vision of the world. Here, one is able to articulate the foundations and underlying assumptions of tacit knowledge, thus allowing it to be shared across different professions, technologies, markets, or work groups. The fourth mode, internalization, involves the conversion from explicit knowledge to tacit knowledge. As new explicit knowledge is shared throughout an organization, other employees begin to internalize it. They use that explicit

knowledge to broaden, extend, and reframe their own tacit knowledge base. Nonaka (1991) argues that in the knowledge creation company, all four of modes of knowledge conversions exist in dynamic interaction. They form a kind of spiral knowledge but externalization and internalization are the critical steps in this spiral of knowledge.

### *Organizational Model*

Based upon these theoretical developments, we develop a general model of an organizational context that reflects an underlying philosophy of knowledge creation. Within this model, we consider the distinction between functional and process knowledge, and the importance of information redundancy for both types of knowledge. This model of a knowledge based organization is presented in Figure 1. A more focused and boxed model is presented in Figure 2 for reasons of clarity.

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Insert figure 1 and 2 about here

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Within our organizational model, we identify two types of knowledge e.g. process and functional knowledge and argue that organizations have a potential need for both types. In order to define process knowledge, we rely on Bohn's definition of process: "a process is defined as any repetitive system for producing a product or service, including the people, machines, procedures, and software, in that system" (Bohn, 1994, p. 62). Process knowledge then refers to the knowledge about the functioning of the sequence or the effects of the input variables on the output. Functional knowledge on the other hand refers to the input factors or the building blocks of the process. We define functional knowledge as the skills and capabilities that individuals with a particular functional background bring to the process.

Within the knowledge creation framework, the two concepts of information redundancy and differentiated learning are crucial for generating new ideas. While

scholars like Nonaka (1990) and Van Den Broeck (1994) consider their importance mainly for improving process knowledge, we apply these concepts for both process and functional knowledge. Process redundancies refer to excess information or interfaces between different territories or functional specialties (Nonaka, 1990). Functional redundancies refer to functional expertise which is not directly used in doing the operational daily work. For example, an engineer in agriculture working in a brewery will use approximately only 7% of his/her knowledge in the process of yeast propagation. We consider the 93% of excess knowledge a functional redundancy since this knowledge is a reference frame in which new ideas can be created in order to change the operational work. The more specialized someone's knowledge is with respect to the product or service, the higher the functional redundancy will be. Considering both process and functional redundancies implies that knowledge creation or generating new ideas can happen both within the process and within the functional field but outside the process.

Given the distinction between functional and process knowledge, an organization performance depends on the quality of the 'input' knowledge (functional knowledge) and the way the different building blocks are organized into a system (process knowledge). These are two important criteria to consider when designing a training and development policy. However, these two criteria are internally oriented which may lead to rigidity. We therefore add the third criteria of bringing in new functional knowledge outside the process. Such knowledge may create innovation in the products, services or process. These three criteria of organization performance imply then three levels of training and development. The concepts of information redundancies, core competences and the different modes of transferring knowledge will further guide the design of the training and development policy.

### **Training and Development From a Knowledge Creation Perspective**

Within a knowledge creation framework, the overall goal of training and development is to facilitate the creation and sharing of new knowledge. In order to

develop such a policy, we identify three levels of development and needs analysis. At the first level, training and development is oriented towards optimizing the basic functional knowledge. At the second level, training and development is oriented towards improving the internal functioning of the process. At the third level, the policy aims at product, service or process innovation by bringing in new knowledge developed outside the process. At the second and third level, the training and development programs are based upon stimulating excess and differentiated information by creating respectively internal process and external functional redundancies. The concept of core competences will form a guideline when considering the degree of redundancies. Besides creating new knowledge, the design of the programs is oriented towards facilitating the transfer of tacit knowledge. This transfer will be advanced by considering the different modes of knowledge conversion (Nonaka, 1991).

### *Three Levels of Training and Development*

#### Level 1: Basic Functional Knowledge

The purpose of the training and development programs at level 1 is oriented towards optimizing the repetitive process system by improving basic functional knowledge. The programs are tools to further develop the focused and specialized functional knowledge of individuals so that they will better perform in their job. The underlying logic is that optimizing the quality of the building blocks of the process system will increase the performance of the repetitive system. More general, each part of the system is developed at its own in order to optimize the input factors of the system.

The needs analysis at this level is focused towards ensuring high quality basic functional knowledge. This involves identifying current functional deficiencies as well as future needs with respect to specific functional knowledge. The types of training programs and tools to manage development at this level represent the more traditional approaches. Training needs analysis identify the gap between desired and

actual performance and training programs are set up in order to decrease this gap. As discussed before, examples are on-the-job training and functional training programs such as trade marketing, inflation accounting, or logistics. Besides the question of the gap between the current and optimal performance of the parts, the training and development policy at this level will consider internal staffing questions. Training activities are designed to prepare employees for their future positions and future organizational needs. Succession planning, age distribution, organizational growth expectations, acquisitions are tools and strategic plans that help to decide what type of functional knowledge are more or less needed in the future.

As already pointed out in the introduction, such programs are focused since they are oriented towards improving the performance within a specific job. Such training programs will improve the functioning of the repetitive system but will not lead to a questioning of the system. Although they are primarily oriented at single loop learning at the system level, they are a first step in order to move to the next level of training and development. A high quality level of functional knowledge is needed before learning about the different interactions in the system. At the same time, functional knowledge provides a reference frame in which learning about the process system will be happen. The insights gained from internal process redundancies will be interpreted with respect to one's own functional perspective. The value of these insights will only be high when the functional knowledge is sufficiently developed.

### Level 2: Internal Process Redundancies

The purpose of training and development programs at level 2 is oriented towards improving and changing the organizational process system. Such improvement and change can happen by the development of process knowledge. Since process knowledge can be created by stimulating redundancies (Nonaka, 1990), training and development programs that stimulate internal process redundancies are important. Internal process redundancies refer to different possible interactions of the functional parts within a particular process. They create knowledge or insights about



the different interactions within the system and the way the different parts are integrated. They may lead to insights by which differentiation within the process can take place and the system can change. In general, the goal is to increase flexibility and a capacity for reorganization within each and every part of the system (Emery, 1969).

Examples of training and development at this level are initiatives such as job rotation, semi-autonomous work teams, project teams, total quality programs, Kaizen, re-engineering etc. Through such types of initiatives, people are in an experiential way confronted with the different interactions that take place within a process. Stimulating internal process redundancies can generate new ideas within the process which can then qualitatively improve the internal functioning of the organization. Given that process knowledge is firm-specific, the development of process knowledge will primarily take place inside the organization.

While job rotation is a well-known technique in training literature, the other initiatives are more considered in contexts such as organizational development or work design. They both however can be used as tools to manage internal process redundancies. Their use can be further refined when considering the expected learning opportunities linked to a person's functional background and possible process improvement. For example, the criteria about what type of job to rotate should be related to the type of interactions that are crucial for understanding the process. A logistic manager's process knowledge about scheduling of delivery times may benefit substantially when s/he has been rotated to engineering. Similar, the selection criteria of members for a project team can be linked to the type of past and future learning opportunities. For example, the head of a product development team can be selected based upon experience in both research and production to combine the more divergent learning skills of research development with the convergent perspective of production. In general, the needs analysis at this level is oriented towards identifying the 'hinge'-functions and their relevant interfaces within the process system. Involving employees who fulfill such functions in internal redundancies projects becomes then a developmental decision.

Although the training and development programs at level 1 and 2 are oriented towards improving and changing process knowledge, the underlying assumption is that one of the organization as a closed system. In order to overcome the danger of closed systems, there is a need to bring in or develop knowledge outside the existing process. Therefore, the purpose of the training and development programs at level 3 is to open the system and to create new knowledge outside the existing process.

### Level 3: External Functional Redundancies

The purpose of the training and development programs at level 3 is oriented towards product, service and/or process innovations by creating new knowledge outside the system. Such innovations can be stimulated by setting up external functional redundancies. External functional redundancies refer to further in-depth development of functional knowledge that is not directly related to the operational activities of a person. Generating new ideas outside the process can bring in new functional knowledge which can make an incremental innovation both in the products or services and in the process.

The training and development programs at this level will be oriented towards developing in-depth functional knowledge outside the immediate process unit. Such programs can take place outside the organization by attending scientific conferences and following highly advanced courses at universities, or inside the organization by working together with other specialists on projects not related to the process. Another option is to bring outside-knowledge into the organization by inviting outside experts to give training programs or to hire top specialists in a particular field. Such training options represent a focused way of learning since specialist interact with other specialist from the same functional field. Other types of training programs towards external functional redundancies can imply differentiated learning. New functional knowledge is differentiatedly developed by interacting with functional specialists with closely related expertise, transferring it back to the original domain and applying the new ideas to the process. For example, an engineer in agriculture working on yeast

propagation in the process of brewing beer can study aspect of genetic engineering or inorganic chemistry, two loosely related fields, and transfer some elements back to agriculture and further to yeast propagation. New knowledge can be created by focused and differentiated learning but both types of development take place outside the immediate process unit. Besides specific programs, the stimulation of external functional redundancies can also happen through a general education policy. For example, the education policy of a high tech telecommunication company in Belgium states that their R&D specialists can spend 20% of their working time freely on issues they choose.

An important question regarding the training and development policy of external functional redundancies knowledge refers to the degree to which a specific functional expertise needs to be developed. An answer to this question lies in the concept of core competences. Core competences refer to differentiated skills (Teece et al., 1990), idiosyncratic to the organization. We argue to mainly create external functional redundancies that are related to the organization specific knowledge, to open the system at those places where knowledge is differentiated. Again, in a brewery, knowledge of how to change the taste of the beer is not available at the market. It are the engineers in agriculture who will improve and change the brewery process. They only use 7% of their functional knowledge with respect to the yeast propagation process but this small interface is of crucial importance for the organization's success. Further in-depth development of their functional expertise is crucial if the brewery wants to continue innovating. Therefore, an important tool for training and development is to map the functional redundancies of the core competences.

For other organizations, however, the core competences may lie in their process knowledge or the way they have organized the system. Here, external functional redundancies can be brought into the organization which will then lead to a reconfiguration of the existing process system. For example, a service company can bring in new knowledge - new technology or a logistic system - which leads them to

reorganize their process in an original, idiosyncratic way. In both cases, however, the external functional redundancies - whether they are developed or brought into the organization - are linked to the differentiated competences of the organization.

### *Facilitating Tacit Knowledge Transfer*

Besides stimulating the creation of new knowledge, training and development programs will need to facilitate the sharing of knowledge. The challenge to share new ideas and knowledge involves crossing boundaries of space, time and organizations (Ulrich et al., 1993). However, the traditional emphasis on focused learning and fragmentation may create difficulties when crossing functional boundaries (Kofman & Senge, 1993). Fragmentation of work and focused training programs have resulted not only in geographic isolation but also in the development of different mental models. Specialists have developed their own personal tacit knowledge and cannot talk across specialties. However, as discussed before, knowledge conversion and sharing depend on tapping the tacit and often highly subjective insights, intuitions and hunches of individual employees (Nonaka, 1991). This implies that training and development programs will need to consider ways in which the sharing of tacit knowledge can be facilitated.

The type of training and development programs at level 2 that create internal process redundancies in themselves facilitate the sharing of tacit knowledge across boundaries. The sharing of tacit knowledge in conditions of information redundancy and differentiated learning happens especially through socialization and externalization. Socialization happens through intense interactions between organizational members within and across their function which encourages meaning creation (Nonaka, 1991). Externalization is facilitated because members who share overlapping information can sense what others are trying to articulate.

According to Nonaka (1990), externalization or articulation will become a major skill in sharing tacit knowledge across different mental models. He further argues that externalization is triggered by successive rounds of meaningful dialogue

which can be established by the use of metaphors. Another way to develop the skill of externalization is to engage line management as trainers for training programs covering their functional expertise. By preparing the teaching and the questions asked by the 'students', people are being confronted with their underlying assumptions and mental models. Involving line management in the training and development programs has the other advantage of increasing line management's sense of ownership towards the development of their employees.

Blackler (1993) however favors an activity approach. He argues that individuals and organizations express their knowledge more in their actions than in their articulations. The suggestion is that "learning occurs as people do more than they yet know how to do" (p. 870). Learning then can only be achieved by active participation and involves a degree of personal involvement. These ideas seem very relevant to us when considering the difficulties of transferring new ideas generated by external functional redundancies to the process. Given the nature of tacit knowledge, the functional specialists will not be able to explicate all their knowledge and new ideas to the novices of the line. Their knowledge is linked to a specific context, their specific profession, and is grounded in action (Polanyi, 1966). Externalization will only transfer those parts of the tacit knowledge that has stayed implicit until then such as underlying assumptions or beliefs. The skill dimension of tacit knowledge will remain personal and contextual. However, in order to facilitate the transfer of their knowledge, one can design development programs by which the functional specialist interact with line management. For example, the R&D engineers in a brewery traditionally experiment in a mini-brewery in their lab. When a new idea has worked out in their lab, it is transferred to the brewery process where line management needs to apply it on a big scale. Difficulties due to differences in mental beliefs, underlying assumptions exist. An alternative way is to bring the R&D engineers and line management together working in the mini-brewery. Both parties interact with each other and develop together their own shared tacit knowledge about managing the interface. Here, learning takes place by participating in activity (Blackler, 1993).

### *Conclusion*

The three different levels of training and development and their respectively purpose and types of programs are summarized in Table 1. Within this framework of knowledge creation, training and development become part of a transformation management philosophy rather than just a mechanism that ensures the efficient functioning of the existing repetitive process system. The three different levels of training and development also imply a differentiated way of managing skill development. While training and development at level 1 is oriented towards all employees, the programs at level 2 and 3 are focused towards particular groups. Although all employees will in principle benefit from the development programs at level 2, the impact of them will be higher for the hinge-functions within the process system. The development at level 3 is focused to individuals with expertise related to the core competences. Special emphasis needs to be given to the facilitation of sharing tacit knowledge across boundaries. Learning by doing and finding ways to articulate underlying assumptions are two major design challenges for training and development programs.

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### **Conclusion**

Organizations of today are confronted with the challenges of generating and generalizing new knowledge. The traditional training and development policy reflect more a problem solving approach instead of knowledge creation perspective. The focused training programs are designed to optimize the repetitive process system but do not lead to questioning or reassessing the operational activities. We therefore identify two other levels of training and development that are oriented towards changing the internal functioning of the process and product, service or process innovation. In designing training programs that reflect these two goals, we advice to

bring in internal process redundancies and external functional redundancies, to consider the degree to which functional knowledge represent core competences, and to facilitate the sharing of tacit knowledge. Within such a knowledge creation perspective, training and development becomes part of change management instead of a support mechanism of the existing situation.

However, generating and sharing valuable ideas can not be managed only by a training and development policy. It may be that other human resource management reflect a focused orientation or that some organizational practices prevent individuals from learning. For example, through the use of current evaluation tools such as job descriptions or evaluation systems, individuals may be only concerned with the set objectives knowing they will be evaluated on the basis of their job description or against specific defined criteria. In addition, the emphasis on competition in most organizations has created identity boundaries and has led to the "not invented here" syndrome or the unwillingness to incorporate knowledge coming from other areas (Kofman & Senge, 1993). Finally, the traditional management style of problem solving and unilateral control is oriented towards setting objectives, planning, and controlling the standards which makes discipline and punishment more important characteristics of managerial life than learning from mistakes (Kofman & Senge, 1993).

With the current shift in emphasis from function to process, one can also notice a need to know which competences are being valued within the organization, and to what degree. In absence of a human resource management policy that addresses these issues, employees may experience uncertainty about the valence of their skills. This designed training and development policy forms one part of such a policy. An important characteristic of the policy that addresses this concern is its differentiated nature. Only by acknowledging the differences in expectations and needs for development of different employees that a training and development policy can align individual needs to organizational goals.

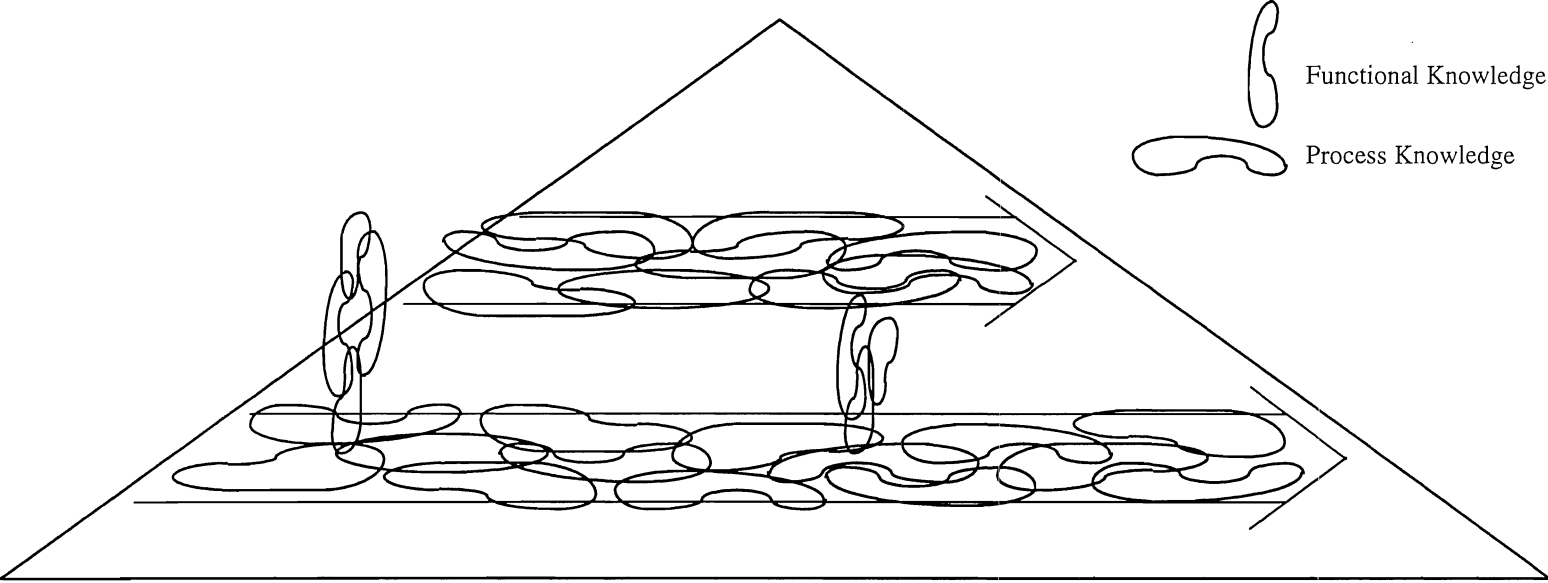
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Figure 1  
An Organizational Model of the Competence Based Organization



Tabel 1:  
Three Levels of Training & Development

	Purpose	Needs Analysis	Training & Development Programs
<u>Level 1: Basic Functional Knowledge</u>	Optimizing the repetitive process system	Identifying functional deficiencies Forecasting future functional needs	On-the-job-training, Functional programs
<u>Level 2: Internal Process Redundancies</u>	Improving and changing the process system	Identifying interface deficiencies of hinge-functions within the process system	Job rotation, Project teams, Cross-functional teams, Total quality management, Reengineering
<u>Level 3: External Functional Redundancies</u>	Innovating the products, services, and/or process system	Mapping functional redundancies of core competences	Doctoral studies, Scientific conferences, Education policy

