

Towards the project oriented organization with learning capabilities

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TOWARDS THE PROJECT ORIENTED ORGANIZATION WITH LEARNING CAPABILITIES

1 INTRODUCTION

The topic of the 10th INTERNET World Congress is the "Management by Projects" management approach. The benefits and consequences of "Management by Projects" will be analyzed in the congress from four different points of view. One of these sub-topics is "Systemic Evolutionary Project Management". The focus of this subtopic is the management of the evolution of the project and its environment, as a main challenge of project management.

This article can be seen as a contribution to the exploration of this subtopic. We will describe the essence of the "learning organization" an organization able to innovate and evolve and thus meet the challenges and demands of changing environments, and discuss the possibilities of the project oriented organization to meet these challenges.

2 THE LEARNING ORGANIZATION DEFINED

A learning organization can be defined as an organization characterized by a well-considered strategy to increase its learning capabilities on all levels and on a continuous basis in order to optimize its effectiveness [4].

3 REASONING FOR THE LEARNING ORGANIZATION

Under changing circumstances, only those organizations which can adapt themselves to the demands of their environment, will survive in the long term. Under these circumstances, it is important that elements of organizations be able to question the appropriateness of what they are doing and to modify their action to take account of new situations. Using a collective "brain function" an organization can learn from its own and from others experiences so that problems and challenges can be solved and handled more successfully. The better an organization is able to mobilize the spiritual and creative capabilities of the employees in developing the collective brain function, the more the organization can handle/ fulfill changes successfully, and by this realizing a competitive advantage.

4 DESIGN CRITERIA FOR A LEARNING ORGANIZATION

Using the brain as a metaphor for understanding organizations, Morgan [1] explores the implications of the idea that organizations are information processing systems capable of learning to learn, and the idea that organizations can be designed to reflect "holographic principles". In this section we will describe the essence of this exploration.

Neuroscientist Karl Pribram [7] of Stanford University has suggested that the brain functions in accordance with holographic principles: that memory is distributed throughout the brain and can thus be reconstituted from any of the parts. This holographic principle may explain the experiment of Karl Lashley [7]: increasing quantities of the brains of rats which had been taught to run in mazes were removed. Provided that he did not remove the visual cortex and thus blind the rats Lashley found, he could remove up to ninety percent of their cortex without significant deterioration in their power to thread their way through the maze.

4.1 Organizations as information processing systems

The question of how one can design systems that are capable of learning in a brainlike way has been of special concern to a group of information theorists who have interested themselves

in problems of artificial intelligence under the umbrella of what is known as cybernetics. Cybernetics leads to a theory of communication and learning stressing four key principles. First, systems must have the capacity to sense, monitor and scan significant aspects of their environment. Second, they must be able to relate this information to the operating norms that guide system behavior. Third, they must be able to detect significant deviations from these norms and fourth, they must be able to initiate corrective action when discrepancies are detected. In this way, the system can operate in an intelligent, self regulating manner.

However, the learning abilities thus defined are limited in that the system can maintain only the course of action determined by the operating norms of standards guiding it. This has led modern cyberneticians to draw a distinction between the process of "learning" and the process of "learning to learn". Simple cybernetic systems like house thermostats are able to learn in the sense of being able to detect and correct deviations from predetermined standards and norms. But they are unable to question the appropriateness of what they are doing. More complex cybernetic

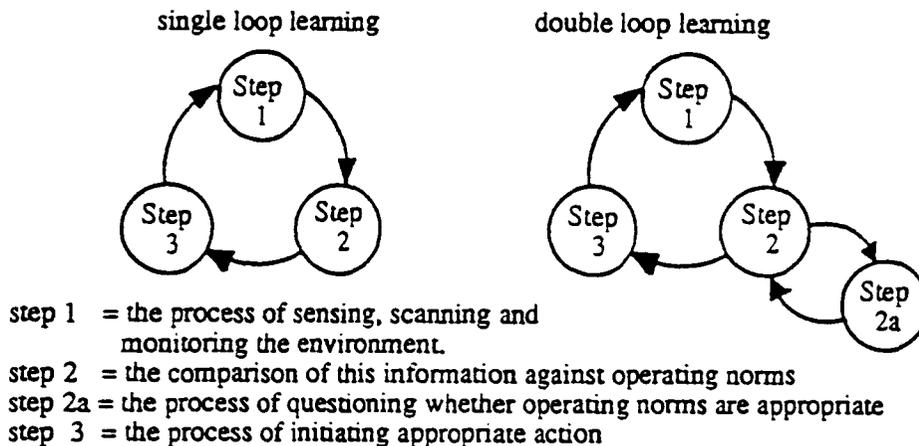


Figure 1: Single and double loop learning [1]

systems such as the human brain or advanced computers have this capacity. They are often able to detect and correct errors in operating norms and thus influence the standards that guide their detailed operations. The essential difference between these two types of learning is identified in terms of a distinction between "single loop" and "double loop" learning (see figure 1).

The process of double loop learning hinges on an ability to remain open to changes occurring in the environment, and on an ability to challenge operating assumptions in a most fundamental way. Morgan gives four guidelines on how this learning oriented approach to organization and management can be developed.

First, encourage and value an openness and reflectivity that accepts error and uncertainty as an inevitable feature of life in complex and changing environments. This principle is fundamental for allowing members of an organization to deal with uncertainty in a constructive way. This is particularly important in turbulent environments where the problems that organizations face are frequently large, complex and unique, and hence difficult to analyze and address.

Second, encourage an approach to the analysis and solution of complex problems that recognizes the importance of exploring different viewpoints. This principle helps to define a means of framing and reframing issues and problems so that they can be approached in an open ended way. This is best facilitated by managerial philosophies that recognize the importance of probing the various dimensions of a situation, and allow constructive conflict and debate between advocates of competing perspectives.

Third, avoid imposing structures of action upon organized settings. Cybernetics emphasizes the central role played by norms and standards in the learning process, and stresses that double loop learning develops as we question the relevance and desirability of these norms and standards as guidelines for action. Cybernetics shows us that these guidelines are of significance as limits to be placed on system behavior, rather than as specific targets to be achieved.

Fourth, facilitate the development of double loop learning, by creating organizational structures and processes that help implement the above principles.

4.2 Organization as holographic systems

According to Morgan [1] there are four things to be done in order to create a holographic organization:

- get the whole into parts;
- create connectivity and redundancy;
- create simultaneous specialization and generalization;
- create a capacity of self organize.

In exploring the means, Morgan thinks of four interacting principles: "redundancy of functions", "requisite variety", "minimum critical specifications" and "double loop learning" (see figure 2).

Any system with an ability to self organize must have an element of redundancy: a form of excess capacity which, appropriately designed and used, creates room for manoeuvre. Without such redundancy a system has no real capacity to reflect on and question how it is operating, and hence to change its mode of functioning in constructive ways. According to the Australian systems theorist Emery [8], there are two methods for designing redundancy into a system: "redundancy of parts" and "redundancy of functions".

In the "redundancy of parts" method, each part is precisely designed to perform a specific function, special parts being added to the system for the purpose of controls and to backup or replace operating parts whenever they fail.

This design principle is mechanistic, and the result is typically a hierarchical structure where one part is responsible for controlling another. Such systems are organized and can be reorganized, but they have little capacity to self organize. In the redundancy of functions method, instead of spare parts being added to a system, extra functions are added to each of the operating parts, so that each part is able to engage in a range of functions rather than just perform a single special activity.

An example of this design principle is found in organizations employing autonomous work groups, where at any one time, each member possesses skills that are redundant in the sense that they are not being used for the job at hand. However, this organization design possesses flexibility and a capacity for reorganization within each of every part of

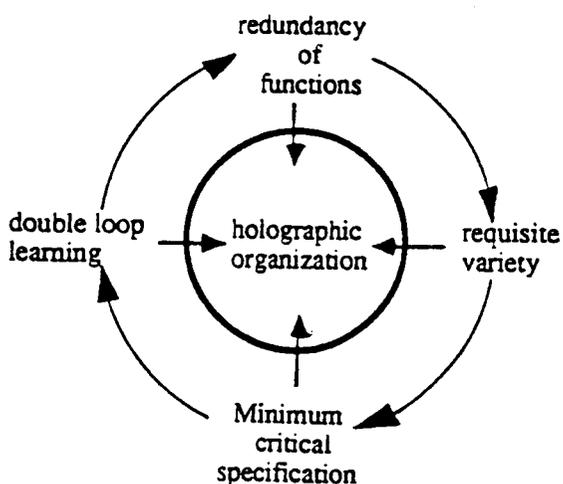


figure 2: Principles of holographic design [1/6]

the system. In implementing this kind of organization design, one inevitably runs into the question, how much redundancy should be built into any given part? While the holographic principle suggests that we should try and build everything else into everything, in many human systems this is an impossible ideal. For example in many modern organizations the range of knowledge and skills required is such that it is impossible for everybody to become skilled in everything. So what to do?

It is here that the idea of "requisite variety" becomes important. This is the principle, originally formulated by Ross Ashby [9], which suggests that the internal diversity of any selfregulating system must match the variety and complexity of its environment if it is to deal with the challenges posed by that environment. The principle of requisite variety thus gives clear guidelines as to how the principle of redundant functions should be applied. It suggests that redundancy (variety) should always be built into a system where it is directly needed. This means that close attention must be paid to the boundary relations between organizational units and their environments, to ensure that requisite variety always falls within the unit in question. If all the skills for dealing with the environment being faced can be possessed by every individual, the organization can be built around these multifunctioned people. If not, then build around multifunctioned teams that collectively possess the requisite skills and abilities and where each individual member is as generalized as possible, creating a pattern of overlapping skills and knowledge bases in the team overall. Organizations can be developed in a cellular manner

around self organizing, multidisciplinary groups that have requisite skills and abilities to deal with the environment in a holistic and integrated way.

The principle of requisite variety has important implications for the design of almost every aspect of an organization. Whether we are talking about the creation of a corporate planning group, a research department, or a work group in a factory, it argues in favor of a proactive embracing of the environment in all its diversity. For example corporate planning teams built around a diverse set of stakeholders who can actually represent the complexity of the problems with which the team ultimately has to deal rather than corporate planning teams built around people who think along the same lines.

The third interacting organizational principle, is the principle of "minimum critical specification". This principle reverses the bureaucratic principle that organizational arrangements need to be defined as clearly and as precisely as possible. One of the advantages of the principle of redundant functions is that it creates a great deal of internal flexibility. The principle of minimum critical specification attempts to preserve flexibility by suggesting that, in general, one should specify no more than is absolutely necessary for a particular activity to occur. The danger of such flexibility, however, is that it has the potential to become chaotic. This is why the principle of "learning to learn" must be developed as a fourth element of holographic design.

For a holographic system to acquire integration and coherence and to evolve in response to changing demands, the learning capacities of single- and double loop learning must be actively encouraged. If the organization of self organizing systems is completely random, they will take an almost infinite amount of time to complete any complex task. If, however, they use their autonomy to learn how to find appropriate patterns of connectivity, they can develop a remarkable ability to find novel and increasingly progressive solutions to complex patterns. Such systems typically find and adopt a pattern graded in a hierarchical manner, in that sets of subsystems link to higher order systems, as described by Herbert Simon [10] and W. Ross Ashby [9], but the pattern is emergent rather than imposed.

The principles of holographic organizations attempt to create the conditions through which such patterns of order can emerge.

5 PROJECT ORGANIZATION AND LEARNING ORGANIZATION, ARE THEY COMPATIBLE?

Gareis [2] observes a trend from few, project oriented companies towards many project oriented companies. Traditionally contractors in the building- and engineering industry and research and development groups in companies perform their jobs "in projects". Due to new demands from a more complex and dynamic business environment, recently companies from other industries such as manufacturing, banking, insurance, tourism and from administration, have begun to manage (part of their business) "by projects", too. These companies establish project organizations for complex strategy planning, R&D-, marketing-, personnel development-, organizational development-, and PR-tasks and decisions in order to achieve problem solutions in

short time periods and within budget. "Management by Projects" is seen by Gareis as a logical extension of Project Management: "as the structures and processes of the project performing company influence the success of the single project, the management of the project oriented company itself becomes an object of consideration. One of the benefits of a "Management by Projects" approach mentioned by Gareis is "the chance for individual and organizational learning in projects".

Carlsson et al [3] developed a better understanding of the R&D process at Procter and Gamble by applying the David Kolb model (see

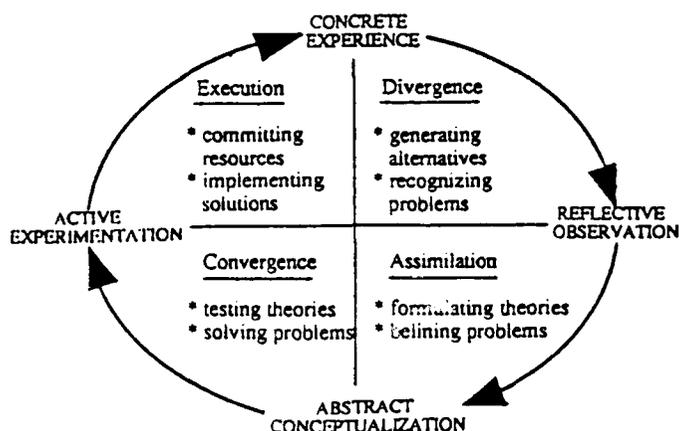


figure 3: The learning model [3]

figure 3) of individual learning to the organizational learning process. Their findings supported their hypothesis that the Learning Model is descriptive of the dynamics of R&D projects. While the research and applications of Carlsson et al have been almost entirely within R&D systems, they believe the Learning Model has parallel applications in other kind of systems. The importance of production of new knowledge as an organizational goal. To the extent that technical, social and political turbulence is forcing even the most stable organization and institutions to adopt a learning orientation if they are to survive, Carlsson et al expect the Learning Model to be increasingly useful.

According to Bomers [4] the Learning Organization has to be built around multi-dimensional teams. A multi-dimensional team in his option is a team consisting of people with a requisite balance of skills in each of the stages of the learning process (see figure 3), and with a mix of roles (Leavitt differentiates the "pathfinder", the "problem solver", and the "implementer"), experiences, perspectives and the presence of both generalists and specialists in the team, in order to guarantee on a continuous basis the optimal learning conditions. These are the core conditions for the multi-dimensional team in the learning organization. Besides this "core mix", Bomers describes a "variable mix". The variable mix consists of requisites such as functional expertise, know how, experience, etc.. They depend on the specific demands of the task to perform (see figure 4).

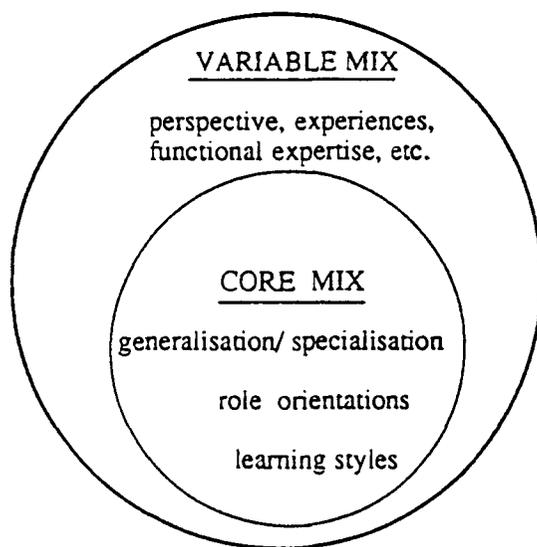


figure 4: The Multi-dimensional Team [4]

organization to learn from her own and from others experiences so that problems and challenges can be solved more successfully. In the case of many frequently changing groups it may be harder to realize the desired "collective brain function". Interesting in this context is the "improvement paradigm" for software development [5]. The paradigm explicitly recognizes the need to capture and reuse knowledge, products and processes from prior projects. Reuse in the context of the paradigm can be an effective mechanism only if it is paired with learning and viewed as an integral part of an improvement oriented (software) evolution process.

In a traditional software process model, learning and reuse only occur because of individual efforts or by accident. As a consequence, this experience is not owned by the organization (via the project database) but rather owned by individual human beings and lost after the project has been completed.

A reuse oriented process model must view reuse, learning and feedback as integral components, and place all experience, including software evolution methods and tools, under control of an "experience base".

A project cannot afford to generalize or tailor experience for another project within its budget constraints. Even worse, it may not have the perspective to do so since objectives and characteristics are different from project to project, and even more from environment to

The findings of Carlsson for R&D project organizations as described earlier, fit very well with the multi dimensional team description by Bomers.

Bomers [4] formulates three ways to guarantee the integration and control of the organizational parts within the Learning Organization. These are a well articulated overall mission and overall strategy, a clear set of norms and values identifying the organization culture and an online information system. In his table of "cost and benefits" of the "Management by Projects" approach, Gareis [2] identifies similar strategies for the "Management by Projects" approach.

Typical for the project oriented organization is a network of large and small projects. A project is established for a limited period, and people are working together on a temporary basis in the project team. One of the criteria of the learning organization is the collective "Brain function", which enables the

environment. Generalizing and tailoring require a broader perspective of the organization and the products it develops. Systemic reuse requires support activities, performed independently of any particular project in order to improve the reuse potential of existing experience in the "experience base". They cannot be part of the normal development organization because they require a different focus, a different set of processes and an independent cost base. According to Basili the implementation of the improvement paradigm would best be served by a separate organization part, which he calls "the experience factory". This organization part will have the role of monitoring and analyzing project developments, developing and packaging experience for reuse in the form of knowledge, processes, tools and products, and supplying it to the project organization upon request. The level of automated support clearly depends upon the state of the art in the packaging of experience. The support will change over time, starting with small packaging of experience and building to higher level ones. It will be clear that through the realization of an experience base, one of the most crucial criteria for a learning organization - the holographic principle of getting the whole into the parts - will become much easier to reach for the project oriented organization.

6 CONCLUSION

Under changing circumstances, only those organizations which can adapt themselves to the demands of their environment, will survive in the long term. It is important that elements of organizations be able to question the appropriateness of what they do in order to modify their action to take account of new situations.

Due to new demands from a more complex and dynamic environment there is a trend to solve new, complex problems by establishing project organizations. The efficiency and the success of project management are determined by the way projects relate to their environments.

The better an organization can mobilize the spiritual and creative capabilities of the employees and reali a collective brain function, the more the organization can solve these new and complex problems in the future. The challenge for the management of the "project oriented" organization will be to become a "project oriented" organization with learning capabilities. Interesting developments in this context are the "experience base", the "multi dimensional team" , and the "learning model", as described by respectively Basili, Bomers and Carlsson et al. We are now standing at the "vision" end of the "vision to reality" sequence in bringing the idea into being.

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