ORGANIZATIONAL LEARNING SUPPORTED BY COLLECTIVE DESIGN OF PRODUCTION SYSTEMS AND PRODUCTS

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ABSTRACT

The ability to adjust to the ever-changing environment is a vital property for companies to stay competitive. To achieve this companies must have an ability to organizational learning. This paper argues that collective design activities are, under certain circumstances, a tool that manages to take individual and team learning into organizational learning through mobilization around visions and missions and thereby change existing structures and develop old structures into new ones. A number of cases are referred to illustrate the possibilities and obstacles in collective design processes and to show the managerial implications in terms of organizational learning.

THE NEED FOR ORGANIZATIONAL LEARNING

Business life today can be described as a rapidly changing process which acts in an ever-changing environment. Fast changes in the environment and customers demands combined with more complex products and processes makes it hard to control the situation and stay competitive. In this environment organizations must be fast, flexible and adaptive as well as sensitive to customers needs. Employees must be motivated and multi-skilled as well as performing high social skills and showing a good ability for networking. With more capital intensive technology in the new production processes organizations must be able to minimize production stops, compensate machine faults and sometimes improvise to perform efficiently. To be able to perform in this situation employees must have a better theoretical education and develop better problem solving competence as well as improve their self-esteem and ability to take own initiatives. More computer based and on-line based industry, in close contact with customers and users, also means that organizations must learn how to use new information systems and to be able to grasp their environment in its entirety. This implicates coordinated management strategies and that companies must be competitive to survive.

Competitiveness can be seen as the ability to master a situation, and its change, due to external and internal dynamics affecting the organization. Short term competitiveness is created by positive exchange with the company‘s environment. Long term competitiveness is created by sensitivity to discover and manage disturbances and changes in the company‘s environment, as well as finding new solutions and ideas. Furthermore globalization and intensified competition unveil weaknesses and slacks in organizations and to stay competitive in this accelerating environment, organizational learning is necessary. Both short and long term competitiveness involves learning among individuals, teams and in the organization as a whole.

An organization always consists of more than one individual. In a company a

number of people are to fulfill shared strategies, goals and visions. That is why coordination of work is so important. Earlier single individuals stood behind important technical leaps and important findings. Company competitiveness and efficiency was based on these individuals; the entrepreneurs, their competence, efficiency and ability to learn from their own and others experience. Management was carried out through horizontal division of work. Today product complexity and development and structure of technology require that many individuals are involved in the development of processes and products which in turn makes efficiency, effectiveness and learning an organizational matter and prime concern.[1-3] A higher level of general education in society today makes it possible to involve people on all levels in an organization in the development of processes and products, instead of using a traditionally fragmented and hierarchical work organization.[4,5] Effectiveness and learning while performing value adding activities involves persons with different skills, experiences and competence. They must be both coordinated and able to learn systematically from each other. Researchers and practitioners alike appear to be reaching a consensus that organizational as well as individual learning is of strategic importance and a key property that supports competitiveness. It is therefore crucial to an organization to have methods, routines and structures that support organizational learning. In this paper we argue that *collective design processes*, in certain situations, support learning both on individual and team level as well as in the organization as a whole.

Individual, team and organizational learning

From a more general definition of learning, e.g. that individuals, teams and whole organizations changes and adapt to changes in environment and new demands, all organizations can be seen as learning in some way or in some time-span. Learning can be categorized into four different steps; i) collection of knowledge, ii) sharing of knowledge, iii) use of knowledge, iv) generating new knowledge. There is also more or less functional kinds of learning, i.e. learning of more or less competitive nature and with or without implications contradicting strategies.

Learning in an organization is a continuous process that change the existing base of knowledge. It is a process performed in interaction between individuals and organizational structures as well as between the internal and external environment. It is also a process based on existing theories of action and a process of relating internal systems to an external environment and, if successful, it leads to increased ability to perform in the given context. [1,6,7]

According to current research there exists a learning hierarchy which defines a spectrum of different forms of learning, both on individual, team and organizational level.[1,6,8,9] It could be described as a hierarchy stretching from the most simple form of adapting and correcting in a well-known context to more complex forms of generative learning in completely new contexts. One form of learning can be characterized as *idiosyncratic adaptation,* i.e. correction of action in relation to fixed plans, standards, norms, values, and instructions. The main mechanism of learning is negative feed-back. Changes are minor, they are reversible and the process is stepwise incremental. Prerequisites for this type of learning is that relevant information can be observed, tried and admitted. Information must also suit the existing mental models to get through organizational shelter, and discrepancies between theories of action and new information must be known through the organization. This type of learning is at its optimum a mechanical and self-correcting system where the main mission, or objective, is

continuously increased efficiency. Idiosyncratic adaptation is a limited form of learning not enough in our recent turbulent environment - where there is a need for a process that not only correct given processes but also change these processes and influence the rules and values behind them.

Type of learning	Single loop learning	Double loop learning	Triple loop learning
Passive / Correcting environment	Idiosyncratic adaptation Problem solving		Adaptation to
Active / Generative	Generative idiosyncratic adaptation - new routines	Generative adaptation to the environment - new norms	Generative problem solving - new values

Figure 1. A description of different types of learning.

Learning can also, in a more elaborated form, be characterized as *adaptation to environment*, i.e. it represents a confrontation between existing ideas, rules and plans for action and observations in the environment. The change based on the confrontation works as feed-back to the base of knowledge. This means that parts of the base of knowledge must be falsified and old routines and theories of action must be abandoned to leave room for the new ones that are needed to perform new patterns of action and behavior. Main mission in this case is increased effectiveness in exchange with, but mainly as a reaction to, a given environment. One prerequisite for this learning to occur is to free and lift oneself above ordinary work and everyday problems in order to be able to use a more abstract and conceptual perspective. Even if established theories of actions are changed, there is a limitation in choice of success criteria for optimization.

Learning can also be characterized as *problemsolving*, i.e. focus on the process of learning how to adapt. The learning is not limited to the goal or quality of change it focuses, but also on the very processes of learning and diffusing best practice. Increased competence is reached by the learning process and repeated experiences supports a better understanding of contextual factors, i.e. to reflect on earlier learning and experiences. Main mission is increased efficiency in the process of getting both effectiveness and efficiency under new circumstances. Main focus is on processes of *adaptation*, not on processes of *generating* new knowledge.

Learning can also be characterized as *generative*, i.e. learning that shapes its environment and affects its environment instead of passive adaptation in relation to environmental changes. For a more extensive discussion on *generative learning* see Mattsson.[10] Both *idiosyncratic adaptation*, *adaptation to environment* and *problemsolving* can be more or less generative as described in figure 1.

Prerequisites for Competitive Learning

A main prerequisite for learning is the ability to change. Organizations as well as teams and individuals have a natural resistance to change if it involves questioning of traditional knowledge or is a threat to vital structures or values. Organizations are based on infrastructures, i.e. rules, procedures, conventions, strategies and technologies and they are supported or prevented by value dimensions such as interests, paradigms, codes, cultures, myths and knowledge. All of these dimensions are parts of the individuals tacit knowledge and are the foundation for professional praxis, status and competence, but they are also the most powerful restriction against development and change within the organization.[11] This tacit knowledge is transformed by socialization, education,

imitation and professionalism.[10] In particular success ties both individuals, teams and organizations to the past. This means that those factors behind company success, often referred to as core competencies, distinctive capabilities etc., also can be seen as major cause for long term inflexibility and resistance to change.[9,12]

A need for change in an organization does not make it happen, nor does awareness of this need among a minority or awareness on a single level in the organization. To conquer the natural resistance for change it is important to *mobilize support* from a majority of the organization behind the change or at least to mobilize people representing different levels in the organization. The larger the need of structural adaptation, the harder it is. When mobilization is accomplished a prerequisite for both individual, team and organizational learning is reached.

To achieve competitive learning we must transfer *individual learning* both into *team learning* and into *organizational learning*, as well as to spread learning between all levels in a continuous process and in cooperation with chosen strategy. The mobilization phase mentioned earlier should also include *collective formulation of goals, missions and visions.*

The first signs of fundamental change appear among the customers and rarely reach the top management first. Often it reaches operative personnel directly and usually there is no room for asking for permission to act or respond. If an organization have rules that imply that every employee need permission to act and respond from top management the organization will not be able to manage change efficiently. To master change both bottom-up and top-down there must be a common mental model and belief concerning chosen strategies.

Learning at individual level is hard to transfer to learning both at team level and at organizational level. Individual learning is created in the process of getting new experiences tried against existing beliefs and mental models at individual level. Team learning is hard to transfer to organizational learning in the same way. Teams also learn internally by trying new experiences against the team members individual and collective beliefs and mental models. From their experience teams also build a knowledge and competence hard to blueprint for others. This difficulty might in the worst case prevent organizational learning when the leap and differences are too big. To accomplish organizational learning the main difficulty is to collect organizational experiences and try them against the mental models and beliefs of the organization. To get this done *transformation and adaptation of structures* is needed. Things that matter when it comes to change of company infrastructure are, according to Mattsson, technical content, environmental implications, access to information and knowledge, use of technical equipment, internal and external network, strategies of adaptation, feedback systems, shared vision, systems thinking and individual and collective learning processes.[10]

Individual learning and team learning, whether it is passive and correcting or a more active and generative learning, in an organization does not automatically lead to organizational learning.[6,7] But both forms support development of organizational learning.

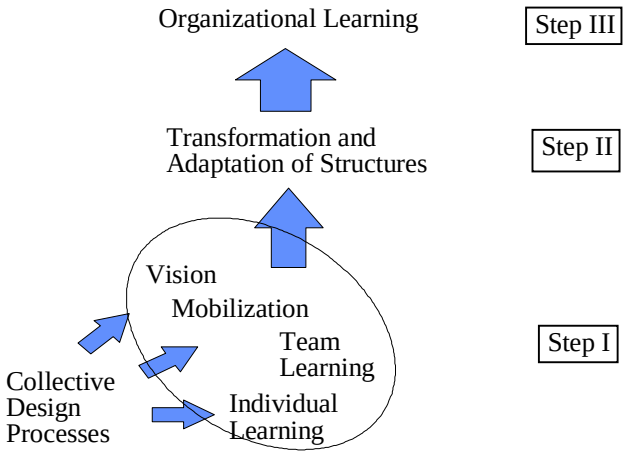

Figure 2. The process of organizational learning

COLLECTIVE DESIGN-PROCESSES

The concept *collective design* was introuced in the early nineties to separate a new dimension of participatory design from the way it had been looked upon during the seventies and eighties.[13-15] In the seventies participatory design was mainly a matter of *democracy*. A new interest in work environment issues in the mid-seventies in Sweden resulted in a set of legislations. There was a new Work Environment Act in 1978 and a Co-determination Act in 1976. Together these two gave the work environment concept a wide definition and stated the right for employees to take part in the planning of issues related to work environment. The legislation formalized a procedure for employees co-determination that gave them opportunity to affect the results of a design process. A lack of knowledge and experience on the employees side and a fear, on the employers side, for not being able to handle the new situation made the first attempts to cooperate difficult. In some cases the co-determination became just a matter of procedure to fulfill the new legislation.

There where however a growing interest to develop methods and tools for participatory design that would turn it into something more than just a matter of *distribution of power*. Researchers had since the beginning of the seventies worked on methods to educate the employees so that they would be able to be more proficient when they took part in work environment projects.[16] The strategic aim of the research was to make participatory design meaningful to employers and employees and a resource for the whole company. Researchers and experts of different kinds tried to find methods for participatory design. Consulting experts tried to develop procedures that would make the participation due to the legislation less cumbersome without loosing the quality and control of rich information to the employees.

With growing proficiency among the employee representatives and a growing awareness among employers of these skills the participatory design became a tool to *collect knowledge*. With the help of the experience of the employees when implementing various new concepts, the results of the design processes would reach better quality and performance. We are here mainly talking about development of the traditional work environment aspects, although in a wide sense, and not about related process and product development. Unless there were clear and evident implications on the work environment these aspects where not included. The product design activity in companies was still

fragmented into disciplines and serially divided in time.

The development of methods for work environment design focused on the early stages in the design processes, i.e. the programming. Advanced methods to collect data and different ways to put them into programs, where quantities and quality levels were defined through a combination of analyses and bargaining, were designed. The relation between the experts and the employees was still the traditional and the expert was, in almost every case, representing the employer. A good expert had the ability to listen to both parties and interpret what he heard into solutions that everybody could agree on, maybe after a few rounds of adjustments.

As mentioned above the increasingly more complex situation in industry demanded more involvement from the whole organization. The skills and knowledge of the employees thus became one of the companies most important assets. Clipson found that a great number of successful US companies had cross-disciplinary collective design of products as a common property.[5] In Sweden the design of the final assembly plant for Volvo at Uddevalla became the first major collective design project regarding whole production systems. One significant aspect of this new approach to participatory design was, *the creation of new knowledge,* i.e. generative learning. Of course the democratic procedures according to the legislation were still valid and so was the need to collect data. The new dimension was that the participants were all experts and played that role in the process of producing new knowledge that originated out of cross-disciplinary interaction.

Figure 3. The shifts of approach and main goals in participatory design

The characteristics of a collective design process

A collective design process is a participatory design activity where the people, or actors, concerned and affected by the design result take part and with their respective expertise, knowledge, values and interests in a collective way formulates the design result. They affect each others knowledge and values in such a way that the common knowledge and objectives of the organization are both questioned and developed. The design activity also generates new knowledge and goals. Collective design is something more than contributory influence and just participation. It is not a process aimed at compromising in order to find the smallest common denominator. Rather it is a process where knowledge and values confront, complete and modify each other leading to something new.

Main characteristics of the collective design process are factors that deal with integration and interaction. One of the most prominent aspects is the multi-disciplinary, or cross disciplinary, participation. As an opposite to fragmentation of knowledge this is supposed to allow actors with different knowledge background to work in an integrated process. The expert knowledge, values and interests as well as different types of language, by people inside the organization and external consultants, complete and

inspire to a manifold of ideas. It also raises questions and pose problems that have to be discussed in order to reach understanding and cooperation in the design activity. This points to an important generative quality of the collective design activity where the design work allows solutions to be looked after outside traditional models and where the interaction leads to new concepts not considered or even feasible in earlier design situations.[12]

In the collective design activity emphasis is put on relevant knowledge and competence. That is to say, the fields of knowledge relevant to the definition of the design issue. Participation in the design activity is therefore based on the relevance of the participants knowledge and experience rather than their roles as representatives of different interests. External resource persons and consultants are called in to complement the internal competence. These external persons should, during the project, as far as possible be present and do their job on site.

In the early phase of the design activity the actors have to acquire an understanding of the different view-points on the design issue. This is a period of confusion, hard work and a period when a common language starts to develop and it is also an important part of the design activity in which participants share each others knowledge by dialogue. In the dialogue conflicts and underlying values must surface in order to make it possible for all participants to have an understanding of the real basis for their decisions. To make this possible, and as a consequence of it, the dialogue has to be free and to be seen as a tool for articulating the participants respective views and ideas. Furthermore everyone has the right to comment on every question.[17] The articulating and communication of implicit views is essential as misunderstanding and lack of insight in other actors references might lead to incorrect assumptions. It is at this stage where an integrated base of knowledge starts to develop within the framework of the project. New knowledge and insights are generated out of the collective and individual reflection on the design.[12,18]

Collective design is, in its extreme, a design activity where each and every one that participates contributes to the design as individuals as well as actors in the design group. The participants can be seen as having two roles, one as an expert on one subject in the design activity. The other as user of the other participants expertise, or knowledge, both as an individual and together with the other participants. This enables the participants to comment on the design issues both as expert and user and thereby also comment on each others input. In this respect it differs from traditional design situations where few persons, often not directly affected by the design result, make decisions affecting a great number of people. Of course not all affected by the result of the design activity can participate in the process; that would be an overwhelming situation. Some actors will represent ”all”, but the important difference is the criteria for participating as noted above. The very design process also has to be open and admit insight by those not taking part in the process. To make the ideas and reason behind decisions in a design process clear is difficult, and it requires tools that in an objective way can disseminate information. In a project with participants unused to collective design a facilitator or resource person, often an external consultant or researcher, can be used to facilitate the design activity.[12,19]

LEARNING THROUGH COLLECTIVE DESIGN PROCESSES - SOME CASES

Earlier we have argued that collective design processes, under certain conditions, is a tool for organizational learning and competitiveness. We will in the following use examples from our collected experience and elaborate on this. We will use figure 2 as a

guide for the discussion.

One objection that has been relevant all through the history of participatory design is that it leads to high expectations among the employees. This makes of course a successful project even stronger but also an unsuccessful one a bigger failure. So what is a successful project? Some of the projects we have taken part in have not actually been completed according to the design result but none has been a failure in the sense that the design group did not reach a relevant result. The reason why the projects was not completed was out of control of the design team. In the seventies Granath was involved in a collective design process concerning a new camera factory for Hasselblad AB.[12] A number of employees where, together with the architects, designing a new factory. The project was stopped because the owner unfortunately passed away and a shift of owners took place. When visiting the factory a few years later it appeared that the employees that had participated in the design process had been able to use their knowledge and design capability from the project to change the old factory into something much better than before. In the same way the design process had revealed, to the management, some very disturbing facts about the production process, which they had been able to deal with. This is an example of how collective design processes can cause individual and team learning. The vision and the knowledge of the design team had in this case been strong enough to break through the structure of the company and lead to organizational learning. A reason for this might be that the company was managed very much with Victor Hasselblad as a father figure to the employees. This made it, in the first place, natural to involve the employees in the design, and after the shift of management there were a search for new structures. A situation where the well educated design teams could have an influence.

In a recent collective design activity in an electronic design department, where one of the most important issues where to increase productivity and time and cost management, the outcome in terms of physical change has been minimal. The design team very soon in the project realized the importance of cross disciplinary cooperation in product design in order to reach this goal. The team found that one group of engineers that was located far from the others had a key role as a bridge between the disciplines and between design and production. The team therefore suggested a quite open space solution where all different categories of engineers could work together but still get the benefit of good contacts within their own discipline. The design team presented this concept several times to a group of managers and were encouraged to continue the work with this strategically interesting concept. Some managers said they were not aware of the actual interaction that took place in the design department. When the project finally was presented it was drastically cut down because of investment reasons, but more interesting, the interconnecting group of engineers were not a part of even the cut down solution. One explanation was that it was against the local culture to let this low status group sit together with the rest of the higher educated engineers. The explanation the group of engineers got was that even if their role in product design were of such a strategic value that they should have had a more dominant role their roles should now change. In the future they should have a totally different and less strategic role than before.[3] Afterwards, in interviews with the participants from the design team they mentioned better ability to articulate their knowledge and a better ability to listen and understand other people as main result of the design process. They also say that they and their colleges now have got a much better understanding of the importance of cooperation in product design.

The reflection we make on this case is that policies and structures within the

company are powerful restrictions for individual and team learning to become organizational learning. Furthermore it is important that middle management and higher management are involved in the mobilization and formulation of visions, otherwise the results of a collective design process will not be realized. A mobilization on a team level that does not result in an understanding and positive reaction on higher lever will, from the organizations point of view, result in a negative metha-learning implicating that it is not worthwhile to be engaged in strategic development because the management does not listen anyway. On the other hand there is a positive metha-learning, from an individual point of view, among the team members of knowing better and being able to understand, analyze, articulate complex strategic matters that not even the managers do.

In an other project, on the other hand, the management gave the design teams an impression of total freedom to do anything without restrictions. To emphasize this they started the project by inviting a Swedish Zen-monk to get the teams into the right mood. The project started in a very optimistic spirit with a lot of activities, but since the creative activities did not relate to the restrictions the existing structure of the company contained, the whole thing ended up in nothing, except unrelated individual and team learning.[20]

In a project in 1991 a major car dealer in Sweden where to build a new paint- and bodyshop. The organization decided to change from a traditional functional organization to one with teams responsible for the customers vehicles. The same team should receive the car from the customer, work on it and give the finished car back to the customer. As this was presumed to have spatial implications our research team was asked to analyze the problem and perform a collective design process, considering organizational and spatial aspects, and aiming at a new type of paint- and bodyshop. Managers on all levels in the work-shop, paint and repair workers took part in the design process together with the research group. Two alternative conceptual designs where carried out and left to the board of directors. These designs were only conceptual and needed much more elaboration in the forthcoming process. It is important to note that we dealt with a new kind of work-shop were traditional standards and procedures could not easily be adapted.

The company was organized in a number of units with their own managing directors. The work-shop unit was a company of itself, the selling unit another. All the units together had one managing director and the whole company was owned by an investment group with its own managing director and a strong structure of its own. Among other things they had a strong building organization that was organized as a traditional building organization usually is, i.e. it was more suited to deal with buildings as an investment, rather than buildings as an asset to fulfill the production goals in the separate companies.

The workshop was run by a managing director that had a leading position in an organization of Swedish companies that work on finding new technical and managerial tools to increase efficiency and quality in Swedish industry. The vision to change the work organization into a team responsibility was his and he managed to mobilize his organization for this vision. His boss had a managerial style founded on his own individual control and involvement, and disliked lower managers and workers taking part in and getting knowledge that he himself did not have or could control. Afterwards he was very critical to the involvement of researchers and the whole idea of a collective design process. The building organization in the investment group did not understand the building as an asset to get a better performance in the company. They therefore used the conceptual design as a finished building design and let traditional architects and construction firms with little understanding of the new concept carry the project further.

We see here how a powerful learning process within a unit of the company is regarded as a threat to higher levels in a company if their management style is different. We also see how building departments in strong structures, by suboptimizing their own activity, can ruin competent design results on lower levels. In this case organizational learning took place within the work shop company. They were inventing a number of new ways to do their job that where more efficient and they acquired a better understanding of the process, but they also got a negative meta-learning, understanding that the organization on higher levels was not prepared to use its knowledge and ability to carry through development projects.

In the design and building of the final assembly plant for Volvo in Uddevalla we had similar complaints from the building project leader. He thought the project was badly managed as he could not get his part, i.e. the building project, efficient enough. The main project, as we saw it, to design a totally new production process for cars was delaying his building project. The vision to design a production process that had a high productivity, high product quality and also working conditions that where better than in any other car assembly plant, was strong enough and the mobilization from the Volvo Uddevalla Company made it possible to fight the traditional structures in the building business. Another issue was the ever-going fight with the values and structures of traditional Taylorism that was dominant in the main assembly factory in Torslanda. As the design of the production system was carried out by people from the Torslanda plant this fight over values was a driving force all through the project. On one side were the traditionalists that saw a further development of the Kalmar factory from early seventies as the most radical solution and on the other side engineers and researchers that were arguing for anthropocentric solutions.

We believe that the new production concept would never had been accomplished without the collective approach in the design process. To convert traditional, since long rooted, Tayloristic values and professional knowledge is very much a question of changing paradigms. To be able to get the efforts of different professional experts with different languages to cooperate and converge in a traditionally fragmented design process would have been almost impossible.

In figure 2 we imply that in order to get organizational learning from collective design processes there must be a transformation of old and adaptation of new structures. The Uddevalla case is an example how a new organization, let be through cumbersome but creative struggles, can adapt new structures from a mobilization around a vision. We have, however, two objections. The first is that the organizational learning on the level of the Volvo group did not occur until the recent decision to reopen the Uddevalla plant. The other objection is that organizational learning very seldom occurs as a result of one loop through our figure. Again the Uddevalla case is interesting.

There has been experimental assembly of cars according to anthropocentric ideas before in Volvo. The inner group of production engineers had for many years been experimenting with long cycle assembly of cars. In the assembly of buses, long cycle assembly and team organized work had been in full production for many years and in the truck company they had managed to increase the productivity by 26% by assembling trucks in four stations by the same team. The reaction, and objection!, from traditionalists visiting the truck factory was that people seemed to be idle most of the time and not at all working under any stress.

Our point is that one can not expect individual learning or group learning to convert into organizational learning in one step. It might be that a number of loops, where smaller

transformations of existing structures and embryos of new structures take place, have to be made. Furthermore this has to be supported by individual learning and repeated mobilization for a new vision.

In a later project, Volvo decided to adopt the Uddevalla concept on the old final assembly plant at Torslanda. The first ideas to convert the assembly line into long cycle assembly emerged in 1987 and we took part in a number of projects where the collective approach to design was predominant. Members of the first project team were mostly Uddevalla people and the situation was very innovative. Production engineers, logistic engineers, architects and assembly workers were working side by side in a large open former shipbuilding hall. Production layouts, and material handling schemes where developed at the same time as skilled mechanics were welding and building new specialized equipment for stationary assembly of cars. Later on, in 1989, the project was taken over by the engineers and assembly workers from Torslanda. We were still involved trying to carry out a collective design process, which was harder as the Torslanda structure was quite hostile to the Uddevalla concept as a whole. The project ended in 1991 with what someone would call a failure. The Uddevalla concept was never realized in Torslanda and the resistance against the Uddevalla factory from parties connected to Torslanda grew stronger. We, however, will not call it a failure. The traditional Tayloristic culture in Torslanda was so strong that an anthropocentric concept of production never would have survived the everyday problems that every new concept meets. Torslanda decided instead to develop their Tayloristic production concept in a way that took care of the worst problems in quality, productivity and work environment. The organizational learning from Uddevalla, Volvo Trucks and others could not break through the traditional structure at Torslanda. Looking back at the project we conclude that there was never really a mobilization around a new concept of production in Torslanda on operational levels.

A hypothesis that is tested in an ongoing project about Self Designing Design Teams-SDDT is that organizational learning from one organization or a part of an organization to another can not be transferred by learning from practical results. The learning must be transformed into an abstract level and as an abstraction it might be transferred into an analogous abstraction in the other organization and it might then result in new practical interpretations. The collective activities in the Uddevalla project supports this hypothesis. The foundation for the creation of the Uddevalla concept was a deep understanding of the underlying theory, principles and values that was guiding the project. When people from other organizations see the result and try to copy it in their own organization it is bound to fail unless they can understand and interpret their understanding into their own appropriate solutions.

MANAGERIAL IMPLICATIONS AND CONCLUSION

Existing structures can be a powerful obstacles to organizational learning. The structure might be explicit and resistant to change or it might be implicit and not recognized as a hindrance to organizational learning. Through collective design the character of existing structures in relation to individual and team learning are made explicit and possible to deal with. Our experience is however that developing individual and team learning into organizational learning needs time and often several mobilizations, especially if new knowledge or formulated visions are regarded as a threat to existing structures, groups or individuals or need extensive adaptation of existing structures.

It is furthermore important to have a cross hierarchical approach to collective design. This means that top and middle management have to take part in or at least have an open dialogue with the design team. Hiding of restrictions or giving false impressions of freedom from restrictions are as bad as a top-down steering of the design process.

If a collective design process reaches a solution that manages to change the praxis of the organization it makes the organization well fit to manage this new praxis and continuously adjust or redesign it due to changes in the environment. If, however the result does not succeed, the process in itself have a value in terms of new knowledge that later on might result in renewed mobilization for a vision. It is important to notice that a meta-learning also takes place that might be positive to the organization as well as negative.

Collective design can be a powerful tool to organizational learning. It is however most useful in generative learning situations. It is also in these situations metha-learning from the collective design process can be converted into something positive, while the risk of negative meta-learning is larger in organizations that mainly are aiming at adaptive learning processes.

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