How to Implement Multidisciplinary Work Processes in the Oil Industry; A Statoil Case

Tom Rosendahl¹, Asbjørn Egir² and Erik Rolland³

¹ Norwegian School of Management BI
0442 Oslo, Norway

² Astra North, Oil & Gas Advisory
4033 Stavanger, Norway

³ The A. Gary Anderson Graduate School of Management, University of California
Riverside, CA 92521, USA

Abstract

This article explores possibilities for using Concurrent Design at Statoil, seeking to understand how they should proceed in implementing this kind of work, and consider potential pitfalls of using this method. We offers ideas that can minimize the time required to implement the multi-disciplinary approach of Concurrent Design.

Few companies have the requisite knowledge and skills required to implement this method effectively. Concurrent Design requires preparation and dedication to planning and implementation, along with adequate resources. It requires numerous changes in the organization’s and in the employees’ mindsets. Top management, department heads, project managers, and employees must adapt and change their work processes.

Key words: Concurrent Design, Organizational Change, Integrated Operations, Multi-Disciplinary Teams, Statoil.

INTRODUCTION

During the past few decades, organizations have increasingly focused on how to structure work (Morton et al., 2006; Ford et al., 2003; Smith et al., 1997; Flin, 1997). This has created a multitude of changes in such firms as Statoil, a major Norwegian oil and gas company, as well as across the entire petroleum industry (Sharp et al., 2001; Flin, 1997). Increasingly companies organize employees in teams and work groups, to meet challenges and to create a competitive advantage (Andres, 2002; Morton et al., 2006; Ford et al., 2003; Smith et al., 1997; Sharp et al., 2001). Statoil seeks to structure work in a way that allows the best use of employees to achieve a more advantageous international position (Reinertsen et al., 1991). Several oil companies on the Norwegian continental shelf have implemented Integrated Operations (IO) as a strategic tool to achieve safe, reliable, and efficient operations (Skarholt et al., 2009; Reinertsen et al., 1991). There are a variety of concepts describing IO, also called e-Operations and Smart Operations. IO allows for a
tighter integration of offshore and onshore personnel, operator companies, and service companies, by working with real-time data from the offshore installations.

The Norwegian Ministry of Petroleum and Energy (2004) defines IO as: “Use of information technology to change work processes to achieve improved decisions, remote control of processes and equipment, and to relocate functions and personnel to a remote installation or an onshore facility”. IO is both a technological and an organisational issue, focusing on the use of new and advanced technology as well as new work practices. According to Henriquez et al. (2007), the IO technology implementation is not considered to be a major obstacle in Statoil. The most challenging issue is to develop new work practices and change management to be able to fully explore the potential of working as a integrated company.

How technology is able to coordinate and communicate tasks within virtual teams is of great importance (Andres, 2002; Kirkman et al., 2004). The IO technology consists of high-quality video conferencing, shared work spaces and data sharing facilities (Skarholt et al., 2009). These arenas include collaboration rooms for rapid responses and decision-making. They are designed with video walls to share information and involve people in discussions, having eye contact with each other both onshore and offshore (Kirkman et al., 2004). IO technology is characterized by vividness and interactivity. According to Steuer (1992), vividness is the ability of a telecommunications medium to produce a rich environment for the senses, which means having a range of sensory input (i.e. voice, video and eye contact), as well as depth of information bandwidth. In their study, Skarholt et al. (2009:821) found “that the use of collaboration rooms creates the sense of being present in a place different from one’s physical location”, a sense of “being there”. The integration of people, work processes and even vendors is a high priority and a key success factor for major oil operators as well as operating service companies to succeed using IO principles (Hepsø, 2006).

In their ambition to achieve this potential, Statoil explored a method called Concurrent Design, to see if their way of structuring projects could be challenged (Reinertsen et al., 1991; Smith et al., 1997). Concurrent Design is a multi-disciplinary work method where all the elements of Integrated Operations are present, but in a planned and structured fashion. This method was originally developed for the space industry and Statoil seeks to use this structured way for creating and running multi-disciplinary teams in their new projects.

Many organizations are moving from a sequential work processes towards a parallel way of working (Flin, 1997). Forming multi-disciplinary or multi-functional teams plays a central role in this change process (West et al., 2004; Sharp et al., 2001; Flin, 1997). Organizations are more willing both to improve the existing resources and to improve the way they structure their work and work arenas. “The motivating premise underlying the use of these teams is that when representatives from all of the relevant areas of expertise are brought together, team decisions and actions are more likely to encompass the full range of perspectives and issues that might affect the success of a collective venture” (Van der Vegt and Bunderson, 2005; Sharp et al., 2001).

In organizations with a wide range of disciplines that have specialized knowledge and expertise, organizing and structuring the work in more multi-functional and multi-disciplinary ways is a sensible and attractive option for many industries and companies (Van Der Vegt & Bunderson, 2005; Van der Vegt and Van der Vliert, 2000). The potential for gaining both a sustainable competitive advantage and a better work culture seem obvious, but the ability and the knowledge within the organizations to reach this potential are not always available, resulting in measurable benefits being elusive (Van der Vegt and Bunderson, 2005; Koufteros et al., 2001).

In crisis, people naturally form teams and work concurrently (Flin, 1997). The necessary knowledge is ready at hand when needed, and problems that arise can be discussed on-the-spot (Flin, 1997). However, under normal working conditions in large companies, the over-the-wall approach to multi-disciplinary tasks has been common during the past decades (Morton et al., 2006; Koufteros et al., 2001). Some work is done and then passed on to the next person or unit in the production line and so on, with minimal communication (see i.e. Clampitt, 2005). This sequential work order is still carried out today, and if often both less efficient and effective, and wasting organizational resources.

In order to solve complex problems, organization in the oil and gas industry typically require the integration of knowledge from such different specialists as geologists, system engineers, civil engineers, economists, managers, and drilling personnel (Kirkman et al., 2004; Smith et al., 1991). These organizations rely on the formation of complex teams, but how exactly should this work be organized? How can the individual experts contribute his or her special knowledge to help the organization achieve superior solutions, and how can such organizations make timely and consistently high-quality decisions? Realizing that not all tasks gain from being solved in a team environment, there is a need for a methodology that allows work to be completed in the most effective and efficient manner. This chapter explores key success factors in multi-disciplinary task groups and identifies relevant factors for implementing a multi-disciplinary work method (Smith et al., 1991; Sharp et al., 2001). Success means saving both money and time while achieving the best possible result. We describe a successful Concurrent Design implementation at Statoil. Section 2
describes the goals of our case study, and section 3 briefly includes the case setting at Statoil. The Concurrent Design methodology is reviewed in section 4, and the implementation results are summarized in section 5. Notable pitfalls are emphasized in section 6, before concluding remarks are given in section 7.

2 PROBLEM DEFINITION AND METHOD

The goals of our study were to enable more efficient and effective work processes through implementing Concurrent Design at Statoil. The case study followed the designing and implementing of a Concurrent Design pilot project for the early phase (oil and gas) field developments at the Gudrun/Sigrun fields in the North Sea. The study was investigative in nature, looking at a set of factors that may be viewed from several different aspects. As such, we chose to use a case study, since these types of studies typically constitute a proper research method for action research and organizational change processes (Yin, 2002; Kotter, 1996).

We followed the pilot project from early February until late June, observed the team during the first information meeting (a combined information meeting and training session), and then through eight follow-up sessions until the result was ready to be presented to the customer (Statoil). The authors took on a participant – by – observer role. During this period, we observed the meetings and sessions in a non-intrusive manner from within the meeting rooms.

A preliminary assessment tool (a questionnaire) was developed during this project. At the end of the project this questionnaire was made available to all the participants of the team, including the customer and project management. Through the questionnaire, seven elements of the pilot study were assessed: Efficiency, the quality of inputs and outputs, the understanding of the full value chain, interdisciplinary communication, the quality of the product, interdisciplinary consistency, and the “fun factor”. At the end of the pilot, an open meeting was held were the participants were allowed to openly share comments and remarks about the project, the product and the process. A brief summary of these results are presented in this chapter.

During the case study, we had numerous formal and informal discussions with the participants, the project manager and the customer regarding the Concurrent Design method and especially about how Statoil could use this method as their procedure for handling complex problems involving many different disciplines. We also had numerous discussions with the facilitator and the person responsible for introducing this method at Statoil, which provided us with valuable information. At the end of the project, we participated in the evaluation done by the management team and the facilitator where they discussed their experiences, and made concluding remarks regarding the future use of the Concurrent Design method as applied to their project at Statoil.

3 A BRIEF INTRODUCTION OF STATOIL AND BACKGROUND FOR THE PROJECT

In 1972, the Norwegian State Oil Company, Statoil, was formed, and two years later the Statfjord field was discovered in the North Sea. In 1979, the Statfjord field commenced production, and in 1981 Statoil was the first Norwegian company to be given operator responsibility for a field, at Gullfaks in the North Sea. Currently, the company has significant international activities outside Norway. The organization operates in 40 countries and performs exploration and production in 39 of these countries. It has approximately 30 000 employees with the headquarters based in Stavanger, Norway. 11 000 of Statoil’s employees are based outside Norway. The company is the operator of 37 oil and gas fields on the Norwegian continental shelf and accounts for 80% of all Norwegian petroleum production. Statoil’s portfolio outside Norway is growing, and the increased competition among the largest oil and gas companies is very strong. To be able to find new reserves and to win the competition for access to exploration acreage is becoming more important. The production profiles for the industry are bleak, which forces the question as to how can they achieve better results with better margins based on the resources and competencies they already have (Van der Vegt and Bunderson, 2005). The overall aim for Statoil is to find new solutions to be able to exploit its oil fields more efficiently. Organizing more efficiently and effectively than its competitors is believed to help Statoil establish a foundation for a competitive advantage both on the Norwegian continental shelf and internationally (Statoil Annual Report, 2007).

To improve the work processes, and quality of their decisions, and shortening lead-times to generate products, Statoil has decided to explore the possibility of using the Concurrent Design work method (Morton et al., 2006; Takeuchi et al., 1986). Earlier, Statoil worked according to a non-integrative method that was rooted in sequentially based work processes where every department “minded its own business” (Morton et al., 2006). The problem with this, however, was that when the work process needed to be coordinated, it often became apparent that the different departments did
not have sufficient information concerning other areas of expertise – there was little or no inter-departmental knowledge transfer; this was one of the main reasons for introducing the multi-disciplinary work method Concurrent Design (Hayes, 2002; Smith et al., 1991; Takeuchi et al., 1986). Particularly, Statoil’s problems became apparent when the different disciplines met, and it was obvious that the various disciplines did not have sufficient knowledge and expertise regarding the other disciplines. This lack of knowledge transfer and lack of information can lead to bad decisions and a waste of time and resources because of numerous “cold” restarts in their work projects (Van der Vegt and Bunderson, 2005; Takeuchi et al., 1986). Statoil decided to conduct various pilot projects using Concurrent Design in the area of early phase field development, modifications and oil well planning.

By taking on these pilot projects using multi-disciplinary teams, Statoil seeks to enable better decision-making and find faster solutions through collaboration and knowledge transfer between the disciplines involved in that specific project.

4 THEORETICAL BACKGROUND AND CONCURRENT DESIGN

In this section we will focus on Concurrent Design and teams as a driver in change management (Kotter, 1996). Concurrent Design is a multi-disciplinary work method combining the elements of people, process and tools in a new and more structured way (Clark et al., 1990). The results of using such an integrated method can be better decisions and faster solutions through a total system approach which includes integrating diverse knowledge and expertise early in the process (Øxnevad, 2000; Clark et al., 1990).

Every organization, one way or another, has been through some sort of change or change process, including those organizations that did not see it as necessary or never saw it coming at all. If an organization is about to change, either voluntarily or involuntarily, due to its surroundings, creating teams and team work methods can be a very effective way of handling such a change process (West et al., 2004). Katzenbach and Smith (1993), also argue that if an organization is facing major changes within its surroundings, team and multi-disciplinary work methods can play a crucial part in the process of dealing with and adapting to the new environment. When Statoil creates teams containing disciplines from several departments, it is a golden opportunity to bring the message to a lot of employees, and it creates groups of committed people (Van der Vegt and Van der Vliert 2000). These employees will put the message forward that we need to change to be able to maintain or improve our position in the future, and the way to do it is by working ‘smarter’ together using the Concurrent Design work method.

By using teams to both develop a new way of working and to bring the message out to their own discipline is a way to bring the message and the information to the whole organization in a very short time (Hayes, 2002). The Statoil management team has decided it is time to change the way they work. Trying to convince employees one by one will take too long. Using the different teams and their experience will not only take less time; it will also be much more influential. A group of people giving the same message as a single voice can be very convincing when presenting a potentially frightening message (Hayes, 2002).

Katzenbach and Smith (1993) also argue that team-based organization is much more open and positive when it comes to change and change processes. It is much easier for an organization that is based on a team structure instead of a hierarchical structure to respond faster and more positively to changes. Employees organized in teams are far more involved and have an active voice in what goes on in the team. They produce suggestions about how they can improve the way they are working and they listen very carefully to the other team members and their suggestions as well.
The Concurrent Design approach is based on the interconnection between the members of the team, the Concurrent Design process and the use of relevant tools early on in the process (Øxnevad, 2000). These three main elements are illustrated in Figure 1. The development of the operational method called Concurrent Design started at the National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA). The main principles of the method are listed in Figure 2 below.
The eight principles in Figure 2 are the bases of the Concurrent Design method (Øxnevad, 2000). When establishing a multi-disciplinary team (1), a total systems approach to the problem must be ensured. Bringing in all the relevant disciplines into the project makes sure that all the functional areas are covered. The team members are brought together in the same room to work in concurrent sessions. This makes certain that the disciplines have quick access to the relevant knowledge and have the opportunity to deal with the problems and the challenges in real time, faster than before. With quick and sufficient access to the relevant knowledge, it gives the disciplines the opportunity to challenge the parameters and the data early on and to work with the solutions in real-time (Hepsø, 2009). This will, in the end, save a great deal of time and consequently money for organizations that are able to structure their work in this more efficient way (Øxnevad, 2000).

Today, much of the time at work is spent in meetings that are often unproductive (see i.e. OLF, 2005). Concurrent sessions (2) give the team members an opportunity to perform design analysis and work in real-time (4) as well as working in close proximity with the relevant disciplines (Øxnevad, 2000). A special Concurrent Design working arena was constructed at Statoil for this purpose, and illustrated in Figure 3 below. The work arena in this figure shows four ‘pods’, where members of the Concurrent Design team work. The center pod is reserved for the session lead, customer (3), and external participants (Danilovic, 2006). The rectangles along the wall are overhead display units controlled by the session lead, and where each can display any of the computer screens in the room (Øxnevad, 2000).

Using Concurrent Design, the customer is in the room to make decisions and to monitor the process and the progress (Danilovic, 2006). If it is necessary to make adjustments to the project or to look at new scenarios, the customer is in there, ready to make these decisions. The session lead plays an important role in the Concurrent Design methodology. This person has a prime responsibility to make sure that the communication in the sessions goes according to plan, that the objectives are being reached, and to involve the project manager and the customer whenever needed (Øxnevad, 2000).

All the relevant disciplines are in the room and the customer is present in the middle, able to make decisions and change the course of work, if necessary. In these sessions, the team members use high-end inter-linked computer tools (5) to
perform their work (Andres, 2002). The disciplines use these tools to establish facts as early as possible (6). They share the data and the information with the other disciplines, and this enables them to have a high level of accuracy and an integrated system from early on in the process (7,8) (Øxnevad, 2000; Kirkman et al., 2004).

A team is never totally isolated, neither when it comes to its own organization and nor when it comes to their external relations. A specific team is a part of a larger organization and that organization gives the team a set of boundaries and rules in which the team can operate and function (Smith et al., 1991). The organization has a considerable amount of influence on how the team can perform its task and attain its goals. But this relationship also goes the other way; the team has a considerable amount of influence on the organization in which it is located. If Statoil is to successfully implement a multi-disciplinary work method, such as Concurrent Design, it needs to understand how the organization and the team work together and how they interrelate with other parts of the organization (Hayes, 2002).

5 RESULTS AND ANALYSIS

This section is organized in two parts. The first part summarizes data from the pilot study at Statoil. The second part relates the observations from this study to Hackman’s six elements of organizational support for implementing a multi-disciplinary work method, and they are the key to Statoil’s further implementation and use of Concurrent Design throughout her organization.

Pilot study results

For the purposes of comparing the concurrent Design work method with Statoil’s traditional work methods, we constructed a simple pilot survey to be used as a preliminary evaluation for this case study. A set of seven questions were asked, related to efficiency, quality, understanding the value chain, interdisciplinary communications, quality, interdisciplinary consistency, and the fun factor. We used closed-ended questions with Likert scale values ranging from 1 to 5; each associated with an “improvement scale” given in Table 1 below. We note that the scale is somewhat biased, in that the midpoint (“neutral”) is not a score 3. However, this was communicated to the team members before the survey was taken. The questions were framed as “compared to past work projects, what type of impact did the concurrent design method have with respect to” each of the seven factors given in Table 1. The full sixteen (16) team members answered all seven (7) survey questions.

Table 1: Pilot Survey Results

<table>
<thead>
<tr>
<th>Question</th>
<th>Average Score</th>
<th>StDev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you experience Efficiency in your work?</td>
<td>3.38</td>
<td>0.72</td>
</tr>
<tr>
<td>Did you experience Quality in your results and output?</td>
<td>2.63</td>
<td>0.72</td>
</tr>
<tr>
<td>Did you experience Understanding of the full value chain?</td>
<td>3.50</td>
<td>0.73</td>
</tr>
<tr>
<td>Did you experience Interdisciplinary communication?</td>
<td>3.88</td>
<td>0.50</td>
</tr>
<tr>
<td>Did you experience Quality in the final report?</td>
<td>2.80</td>
<td>0.86</td>
</tr>
<tr>
<td>Did you experience Interdisciplinary Consistency in the final report?</td>
<td>3.00</td>
<td>0.97</td>
</tr>
<tr>
<td>Did you experience Fun Factor?</td>
<td>3.69</td>
<td>0.70</td>
</tr>
</tbody>
</table>

Given the small sample size and therefore lack of a better statistical analysis of the data, we need to execute caution as to how to interpret the numerical results. In our opinion, these results should be viewed as indicators only, and an improved survey with proper statistical analysis would lead to more definite conclusions. Thus, the results outlined in Table 1 indicate that the concurrent design work method may lead much better interdisciplinary communication, as well as an improved ‘fun factor” for the involved team members (as seen from both the higher average scores and the comparatively lower standard deviations for these questions). The team members’ understanding of the full value chain seems to have been improved compared to traditional project work. Quality and interdisciplinary consistency seem also to be improved.

If Statoil wants to have effectively working teams, the teams need organizational support to be able to function properly and be an asset and a creative force throughout the organization. Hackman (1990) identified six aspects of organizational support provided by different levels of the organization. It is essential for Statoil to be aware of these six,
different elements if the teams and the organization are going to function well together and to bring out the best from the relationship. These six elements will be relevant for Statoil when they start to implement Concurrent Design as their way of handling complex problems throughout the entire organization (Hackman, 1990). The six elements are:

1. Clear targets
2. Adequate resources
3. Reliable information
4. Training
5. Regular feedback
6. Technical support

We have integrated these elements in our evaluation from the empirical data collected at Statoil below.

Clear targets for the Concurrent Design teams

Statoil needs to formulate and articulate a clear and well defined target for what the team or teams are supposed to do (Hackman, 1990). It is impossible for a Concurrent Design team to function properly at its best if the target is communicated poorly to the participants. The target will certainly vary depending on the projects, but the objectives and the purpose from the Statoil management still need to be clear and well defined for the team to reach its potential. The team needs to understand the objectives and the discussion behind them to be able to work as a well-integrated and fully functional Concurrent Design team (Smith et al., 1991).

The results from our investigation into the Gudrun/Sigrun pilot point in one direction. Both the results from the measurement of “interdisciplinary consistency” and “the understanding of the full value chain” reflect this. The highest improvement, by far, was the element of “interdisciplinary communication”. The ability to talk and explain to the other team members in the room, and the opportunity to transfer knowledge among the different disciplines based on the project and the objectives, was the biggest improvement.

Statoil management and the different teams need to be interlinked with regard to communication and common understanding of the problem at hand. As far as the definition of the problem goes, it is in both the Statoil management’s and the specific team’s interests that they are both involved when it comes to defining and developing the target or the vision for the exact problem at hand. If both parties are involved they will have a common understanding of the area and the pitfalls of the objectives as well as having this understanding freshly in mind when the project arrives at the different decision gates in the Statoil system. The people in the Concurrent Design team work closely together and have expertise in different parts of the project process; thus it would be beneficial to both the timetable and the result to make use of the expertise already at hand.

Adequate resources from Statoil

When Statoil forms Concurrent Design teams, it is crucial for the teams to be provided with adequate resources when needed. A team will not be able to perform to its highest standard according to its objectives if a significant amount of resources is not provided by the organization (Hackman, 1990; Smith et al., 1991).

Having the resources and the relevant disciplines available is crucial for the Concurrent Design team (Smith et al., 1991). If a team member was not available to work in a session or had to leave for another work task during a session, we noted that the productivity and progress of the project sank dramatically. On the other hand, we witnessed the efficiency and commitment by the team members were very high when all the members of the team were present and the work flow went according to the objectives for the session. For Statoil to be able to use the disciplines’ engineers to perform engineering work, instead of joining meetings and giving status, might provide an important competitive advantage in the future.

Resources for a Concurrent Design team in Statoil are the various disciplines that are involved in a specific project as well as disciplines are given to participate (Smith et al., 1991). The team also needs an adequate work area as discussed true previously. Finally, the team must have access to the various computer applications needed to solve the tasks of the
project. All these resources are provided by the Statoil organization in which the team operates and works. Putting all these aspects together, communication between the Statoil management team and the Concurrent Design team is of utmost importance if the team is going to produce a robust and innovative solution (Kirkman et al., 2004).

**Reliable information from Statoil management**

To provide creative and innovative solutions for Statoil, the Concurrent Design team needs access to applications and sources of information to be able to gather and make use of reliable information (Hackman, 1990). As mentioned above, the necessary resources, people who know the systems and are able to find and gather the data and information fast are important for the progress of the project. Statoil has many different databases and it can be frustrating and time consuming to find the relevant data you need to move the project forward.

The importance of reliable information is also relevant when it comes to the team’s decision making. The decisions have to be made based on dependable, relevant and updated information and data. The Concurrent Design team also needs access to the information regarding Statoil’s organization. The team has to publicize organizational changes and developments, which could be vital for the specific project the team is working on.

Being involved in the process of decision-making can give teams a better understanding of the overall problem, and knowing why decisions were made makes it more likely that people will be loyal to these decisions (Senge, 1990). Participants of the team can also learn from other fields and see why a solution that is not optimal in their particular field may be an optimal solution as a whole for Statoil.

**Training in a multi-disciplinary work method**

Participants in a Concurrent Design team also need to be trained for this way of working. Since the environment during the sessions sets certain demands on the experts, it might not be suitable for everybody. The experience from the Gudrun/Sigrun pilot in Statoil was that people enjoy this way of working; they found it both fun and challenging to work in a new setting and to work closely with all the relevant disciplines of the project (Van der Vegt and Van der Vliert, 2000). When Statoil starts to use the Concurrent Design way of working throughout the organization, training can not be emphasized enough. The environment and the climate in a Concurrent Design room can be very hectic and sometimes loud with many discussions going on at the same time. We experienced very clearly the element of training when experts and “stand-ins” came to work with the Concurrent Design team. When a new participant joined the team during the project we experienced a decrease in the communication and information flow. The sharing of data sometimes stopped because of the inexperience of the new person working in a knowledge- and data–sharing environment (Kirkman et al., 2004).

Training in the work method has to be provided for all the participants before joining a team in Statoil. The question is whether some people are suited for this kind of work, or if everybody can gain from this way of working with proper training (Hackman, 1990). Either way, the point with the training is that everybody learns to see the value of working this way. For many people in Statoil it is not as natural to work in groups or teams as it is for many young people today. The participants must learn to view each other’s ideas in a positive way, exploring their extent of possibilities and maybe selecting certain points from many ideas to work out a solution. This ensures a more constructive communication during the sessions, hence a better and faster solution through multi-disciplinary decision making (Øxnevad, 2000).

**Regular feedback – both during and after the project**

Getting immediate feedback on their work and the feeling of being heard and appreciated can also be a motivational factor for the participants of a Concurrent Design team at Statoil. Constructive feedback must be given in such a way that it opens up the possibilities of learning and understanding (Hackman, 1990). It should be objective, correct, and given at the right time. This requires good communication. It must not be moralizing and one must have a two-way communication.
Many people see it as a positive thing to be challenged, in this case on the field of their own competence to raise their level of competency and general knowledge through cooperation. For those who are more interested in doing their “own” thing and perhaps those in a narrow discipline challenges might be seen as threats. Hence, these two kinds of people need different means of motivation. For the latter group training becomes a key-factor by teaching them the value of others getting their results. The goal is to create a group of achievers in a high performance culture in the Statoil organization.

Another perspective: What is it that motivates people to be a part of a challenging work method like this in an organization such as Statoil? One of the problems today in Statoil is that many employees work towards their own set of goals and personal bonuses instead of working together towards a common goal in a group. In each session, all participants work together to achieve the same goals. Every participant will be an expert in his field (Øxnevad, 2000). Every participant will have a great deal of responsibility, be pushed to their limits, and explore new areas. However, they are experts in different fields and have to solve different sub-problems. Feeling ownership for their task is therefore an important motivator, just as feeling ownership for the whole project (Van der Vegt and Van der Vliert, 2000).

In addition, the learning process implicit in this work method can and should be a motivational factor (Van der Vegt and Bunderson, 2005). To exploit the Concurrent Design method fully, both formal and informal learning can be central elements in Statoil. Many of these challenges also exist in projects with less concurrency. Implementing concurrent work processes could highlight these challenges and be an inspiration and resource for other types of work as well. Hence, learning how to work this way and transferring that knowledge are central elements in Statoil. Many of these challenges also exist in projects with less concurrency. Implementing concurrent work processes could highlight these challenges and be an inspiration and resource for other types of work as well. Hence, learning how to work this way and transferring that knowledge are central elements in Statoil. Many of these challenges also exist in projects with less concurrency. Implementing concurrent work processes could highlight these challenges and be an inspiration and resource for other types of work as well.

6 THE PITFALLS FOR IMPLEMENTING CONCURRENT DESIGN AT STATOIL

Throughout this case study, we observed firsthand the five tripwires which endanger implementation of a multi-disciplinary environment in an organization (Hackman, 1994). These are discussed in detail below.

Managers call a performing unit a team, but really manage it as a set of individuals

The Concurrent Design way of working is based on the contribution of every team member of the project. The Statoil management and especially the project managers have an important task when it comes to creating a culture and an environment for multi-disciplinary work. To manage this difficult challenge, the first part of the process is to identify and treat the team as a unit. The Concurrent Design team is a unit responsible for its deliveries and final results. To create a common understanding and a feeling of belonging is crucial to the members. Their feeling of commitment and team identification will, in the end, contribute to the standard of the result (Van der Vegt and Van der Vliert, 2000).
Concurrent Design contributes to a better understanding among the team members regarding the process and tasks they perform. The various disciplines get a better understanding of their own deliveries as well as of what the other disciplines contribute to the project. As the results of the questionnaire showed, the percentage of the aspect of understanding the whole value chain increased dramatically. According to Hackman (1994), a real team, as opposed to just a group of people working together, has three distinctive characteristics. The real team has a clear start and end point for the project and a stable number of team members. The second element of describing a real team is that it has a clear, common understanding of the goal and that everybody in a Concurrent Design team relies on the contribution and participation of every team member. The third and last element Hackman uses to describe a real team is the autonomy to manage, structure and, to some extend, plan their work and their processes within the Concurrent Design approach.

**Imposing too much or too little authority**

The management of Statoil and the project manager have a set of goals and objectives they desire to achieve. The implementation of the Concurrent Design way of working is a tool to achieve some of these goals. To be able to make better decisions and faster solutions is a goal for every organization; the question is how they going to reach this set of objectives. When Statoil has decided to implement a multi-disciplinary work method, it creates some important implications for the organization as a whole (Hayes, 2002). Suddenly, Statoil has to balance the aspects of giving the team the autonomy and freedom to make its own decisions and the ability to reach their stated goals and objectives. On the other hand, Statoil has to coordinate and control the team in a way that these goals and objectives don’t interfere with and go against the direction of the rest of the Statoil organization (Hackman, 1994). This dilemma may be a possible obstacle to implementing the Concurrent Design approach. The members of the team need to feel a certain level of autonomy to be able to do their best. The Concurrent Design team as a whole needs to experience that the Statoil management gives them the opportunity to make their own choices as long as the result is satisfying. On the other hand, giving the team total freedom and too much autonomy can result in bad decisions and an unstructured work process. This can, in the end, lead to the team not being able to meet its deliveries on time (Hayes, 2002).

Hackman (1994) believes the best way is to provide the team with a direction for their work. Statoil can achieve this by making very clear what they want the goal to be, and that this is understood by the participants as well as by the project management. However, the team still needs the freedom and the creativity to decide within the team how they should go about meeting those goals and objectives.

**The tendency to tear down organizational structures**

When Statoil implements a demanding work method such as the Concurrent Design, the rest of the organization will, to a greater or lesser extent, be implicated. The Concurrent Design team will have to position itself in the Statoil organization as well as vice versa. Statoil does not need to turn all their existing structures upside down when implementing the Concurrent Design work method in their organization. Statoil should keep its existing structures but give the Concurrent Design team enough resources and manpower to do the work according to plan and objectives in the most effective way (Hayes, 2002). This will create a better working environment and, in the end, a better result for the team and for the Statoil organization.

The most important elements are to compose the team according to the task, to have motivated and trained members of the team, and to have a clear norm of what is to be expected from the team. As long as these sets of norms and resources are at the team’s disposal, the Concurrent Design team can be a well-functioning unit within the existing Statoil organizational structure.

**Assuming staff is eager to work in teams and that they are already skilled at doing so**

The value of team training cannot be emphasized enough. However, Statoil should not assume or expect that everybody is skilled and ready to work in a multi-disciplinary manner. It takes training and practice to enable a Concurrent Design to function well. The team members have to be trained and skilled in how to communicate with the other disciplines (Øxnevad, 2000; Hayes, 2002). They must learn how to share, explain and especially visualize aspects and problems for the other participants of the team. There might be some resistance towards this way of structuring Statoil’s work. The
training and the preparation of the team members can be a very positive element in dealing with this resistance (Hackman, 1994).

The team members should also be trained in how to communicate and share their data. Often, when just starting a project, the various disciplines have to proceed with the project based on uncertain data. The experience of the pilot project at the Gudrun/Sigrun field was that engineers are not comfortable with the sharing of uncertain data. This is something that has to be learned and experienced through the training method. When working in parallel, the different disciplines have to get used to sharing (uncertain) data throughout the project process. It will create unnecessary stops and delays if some of the participants have not been trained or educated in the importance of data sharing between disciplines. If Statoil decides to establish permanent teams in the various divisions of its organization, the value of team training will be apparent. It will show what a team is capable of doing with regards to reducing time, and obviously costs, working in a multi-disciplinary way.

The same elements of training and preparing for working in the Concurrent Design way are important for the project managers in the different projects. The project manager needs to be able to make faster decisions, structure the project process and be totally involved in the various parts of the project. This requires a different approach and a different mindset for a project manager.

**Skimping on organizational supports**

The last, but probably the most important aspect, is the element of organizational support, or the lack thereof. If a team is going to produce and deliver at its very best, the need for organizational support is crucial. The most effective team operates in safe and predictable surroundings. It creates a culture for the team and its environment that will increase the team’s effectiveness and ability to produce better results in a shorter time.

Hackman (1994) describes the elements of reward systems, an educational system, an information system and material resources as enough for the team and its members to perform at its highest level. All these elements are discussed earlier in the chapter. Statoil cannot expect Concurrent Design teams to be able to fulfill their desired outcomes if they are not given the sufficient resources to do the job required. If some of the elements mentioned above are lacking, it will create frustration and a poor working environment, both in the Concurrent Design team and in the rest of the Statoil organization.

**7 CONCLUDING REMARKS**

To be able to fully explore and make use of a demanding and challenging multi-disciplinary work method like Concurrent Design, Statoil needs to be prepared to make necessary resource commitments. It should pay attention to the psychology of the individuals and the teams. The structures of the organization will shift and so will the demands of the Statoil employee. Implementing this method will be a factor in increasing the empowerment of the employees as well as a contribution to making the Statoil organization well equipped to face the challenges ahead. Especially the increased international build-up, but also the work at the Norwegian continental shelf will benefit from working in a more efficiently and effectively. The impact of information technology, and the proper use of it, will make Statoil a leading company in its field.

If this work method is only implemented halfway, the organization will be damaged. We experienced, through our monitoring of the pilot project Gudrun/Sigrun, the enthusiasm and increased motivation of solving complicated tasks and handling difficult changes during the project. The overall efficiency, as well as the understanding of the full value chain of the project, were dramatically increased. But the best results came from the elements of the interdisciplinary communication and the fun factor. Working in a Concurrent Design way can, and will be, extremely challenging. The individual employee in the team represents their discipline of work. Each member has a huge responsibility to produce the best possible result. However, the employees of Statoil are extremely well educated and like being challenged. Thus, this is a way of working that gives them both the responsibility and the important fun factor of working side by side with experts in different areas, as well as the motivating factor of achieving a good result with the rest of the team.

**REFERENCES**


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