# A Generalized Critical Success Factor Process Model for Managing Offshore Development Projects in Norway

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# *Abstract*

Managing offshore development projects in Norway is no doubt a challenging task because such projects often involve large capital investments with risks under dynamic and complex environments. Project managers play a critical role for project success. This study concentrates on project core team level of management.

The study focuses on one major task of project managers: top-down identification, communication and monitoring of management focuses in order to lead an organization towards the same goals/success. There are three steps: demonstrate that a need for a new tool for this purpose exists; further develop a generalized critical success factor (CSF) process model to meet such a need; test the model in real-time Statoil offshore development projects through a multiple-case study design. Four research questions (see Figure 3-1 The four research questions in this study) are formulated accordingly and answered.

Through the case studies, it is clear that goal definition and breakdown is management lore also practiced well in offshore development projects. Definition of task, responsibility and authority is also attended to. Good project managers all have a picture of what is critical for their projects at each time, yet often implicitly. Mangers agree that it is manager's responsibility to let the project organization know what is the most important and dangerous for the project at any time. However, besides project governing documents, which is event independent, risk register and regular meetings, much of such communication happens informally. We can also demonstrate that risk register covers just part of management focuses. Different CT members have different understanding of project management focuses and priorities among them. Subjective evaluation is extensively used to evaluate the status in management focuses, sometimes according to implicit or even different criteria. It is therefore clear that a structured tool is needed to ensure good identification, communication and monitoring of top-down management focuses.

A management tool, called a generalized Critical Success Factor (CSF) process model, is therefore further developed for this purpose. The

model is based on semi-structured interviews with all project core team members except Administration (secretary function), which is considered having a function with too little management responsibility.

The model has two parts in data collection. The first part aims at retrieving interviewees' perception of their jobs, their understanding of project success criteria, the role of project core team and their management information sources. This part helps one understand the team dynamics and thoughts behind individual actions. The other part is a comprehensive and systematic list made of eleven (11) categories for identification of critical activities for reaching project success. These activities are then grouped into related topics. Consistency and criticality checks are carried out within and among the groups. Each group is then given a title in terms of activity and becomes a critical success factor (CSF). The result is presented to CT manager or CT for comments and necessary revisions are made.

The two cases in the multiple-case design show the generality of the model by analytic generation rather than statistical enumeration. The CSFs found are explicit and project specific. The CSF results are purely based on managers' statement in the interviews with no interpretation by the author. It is clear that CT members contribute to better quality of CSF identification comparing to the situation where only CT manager is involved. This supports the introduction of team-CSF approach in the model developed. This model contributes to better communication (vertically between the CT manager and her team and horizontally among the CT members) through making management focuses explicit, documenting them and reaching consensus.

However, the study shows that managers experience difficulty in identifying a set of measures representing the identified CSFs. The measures suggested, following the principle suggested by Dobbins [Dobbins, 2000], are not representative or concise enough. Other method than pure interviews may have to be tried out in this aspect in future studies in order to reach the full potential and acceptance of this model by practitioners, for example one can develop a questionnaire based on focused literature review on the identified CSFs, the use of which can facilitate interviewees in identifying good measures for their project.

This tool is logic with low application threshold. Managers have full control of the results. It can help discover potential conflicts or problems and allow for modifications both in and outside project organization. It offers a channel between project and outsiders, academic and practitioner alike. It is also a step towards better-documented management process.

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Last but not least, I want to thank my parents who once again showed their love by putting their own comfort and ease in the second place and supported me in the process. I also feel in debt to my husband and my son for the patience they showed me.

I feel that Thor Heyerdahl expressed very well what I felt from this long process: "My expeditions have taught me that only optimism can help, that faith can actually move a mountain when it is most fearful[1]."

It has been a worthwhile expedition.

Kolsås, May 2002
Qinli Dyrhaug

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[1] In Norwegian: Mine ferder har lært meg at bare optimismen kan hjelpe, at tro faktisk kan flytte fjell når det står på som verst"

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# 1 Introduction

*Project managers do not have the luxury of turning their backs on organizational politics. Too much of what they do depends upon their ability to effectively manage not only the technical realms of their job, but the behavioral side as well.*

[J.K. Pinto, 1996]

## 1.1 Background

In this section, we will give a short introduction of Critical Success Factor (CSF) and the CSF method before a more in-depth discussion in literature reviews in the next chapter.

Critical success factor is a very commonly used term. However, practitioners and researchers alike do not necessarily have a common understanding of what CSF is and how this method works. Here we start with the original CSF definition [Rockart, 1979]:

"…the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization. They are the few key areas where things must go right for the business to flourish. If results in these areas are not adequate, the organization's effort for the period will be less than desired.

…the critical success factors are areas of activities that should receive constant and careful attention from management. The current status of performance in each area should be continually measured, and that information should be made available."

It is obvious that CSFs are high-level management considerations. CSFs are *necessary* because unsatisfactory performance in CSFs will be a major deterrent to project success. However CSFs are not everything that is needed to achieve success. Project still needs activities like budgeting and detailed planning, etc. CSFs are management focuses, not detailed project plans.

CSF method is a procedure that starts with recognizing organization strategies and goals. It then tries to make *explicit* the key areas that dictate managerial or organizational success with regard to the strategies and goals. These key areas are called CSFs, which emerge from a series

of structured dialogues between a skilled CSF analyst and key personnel of a firm. The next step is to identify proper performance measures that represent the CSFs. Finally one should agree on what kind of information is needed for such measurement. The information should be made readily available for managers for successful management. CSF method is therefore a top-down approach.

CSF method originally aims at helping *corporate executives* to come out of the situation where they are flooded by traditional financial reporting, yet starving for information they really need. The method helps them define their own information needs and incorporate them in a computer-based information system (CBIS).

Survey rather than interviews was later one introduced to CSF method. The application areas for CSF method has been expanded to strategic planning and implementation, assess threats and opportunities in its environment [Leidecker and Bruno, 1984], MIS planning and implementation [Shank, Boynton and Zmud, 1985] [Martin, 1982], MIS requirement analysis [Boynton and Zmud, 1984], material requirement planning (MRP) [Sum, Ang and Yeo, 1997], project management [Pinto and Prescott, 1988][Walsh and Kanter, 1988], creating superb self-managing team [Wageman, 1997], new product development [Lester, 1998], Program management for Department of Defense (DoD) in the United States [Dobbins, 2000] etc.

Offshore development projects[2] involve large capital investments, typically in billions or tens of billions of Norwegian kroner. Duration for such projects will typically last 3-6 years from Decision to Start Planning (in Norwegian BOK) to Start Operation (see Fig. 1.1). During the most labor-intensive period, there could be several thousands of people from different organizations or companies and geographical locations working for the same project. Such projects are technology intensive, with high complexity. In recent years, the Norwegian petroleum industry has experience large structural changes: privatization of Statoil, establishment of Petoro, Gassco, abolishment of the Norwegian gas negotiation committee (in Norwegian GFU), EU gas directives and major mergers among large petroleum companies, etc. These changes have further increased the complexity and competitive requirement of such projects where information flows are enormous. Project managers must have correct focuses on which they can get timely information feedback all the time in order to lead the project to success.

However none of the research up to now has attempted to apply CSF method in a *real-time* project for *contextual* CSF identification and monitoring. There are actually limited researches in CSF application in project management. These researches have either been in off-line

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[2] Projects that builds new offshore facilities, in contrast to modification projects

manner [Walsh and Kanter, 1988] [Dobbins, 2000] or focused on identification of general CSFs applicable to all kinds of project from any industry [Pinto and Prescott, 1988]. Even Walsh and Kanter have actually identified general CSFs for Management Information Systems (MIS) projects in a firm, rather than a specific MIS project. Dobbins first developed a generalized CSF process model for contextual CSF and measure identification for *program* managers in acquisition programs in the Department of Defense in the United States. However he applied the model in an offline mode: He tested the model with managers on educational leaves. He generated personal CSFs for each program manager.

In this study we will further develop Dobbins's generalized CSF process model, adapt it to offshore development projects in Norway and test it in real time projects. We promote team approach in our model, which is targeted for project core team (CT)[3]. We generate core team CSFs rather than individual CSFs. We test our model in two ongoing Statoil projects (Case1 and Case2). We will later on explain why Statoil projects are chosen for this exploratory study.

Now that we are using Statoil projects, we introduce some Statoil practice and basic terminologies in Statoil project execution model (Figure 1.1). Project CT is first established after the decision gate (DG) called *Decision to Start Project Planning* (In Norwegian BOK) and last until Start Operation. A project is regarded to be in early phases until the decision gate for Project Sanction (in Norwegian BOG) or when the Plan for Development and Operation (PDO) is submitted to the Norwegian government for approval.
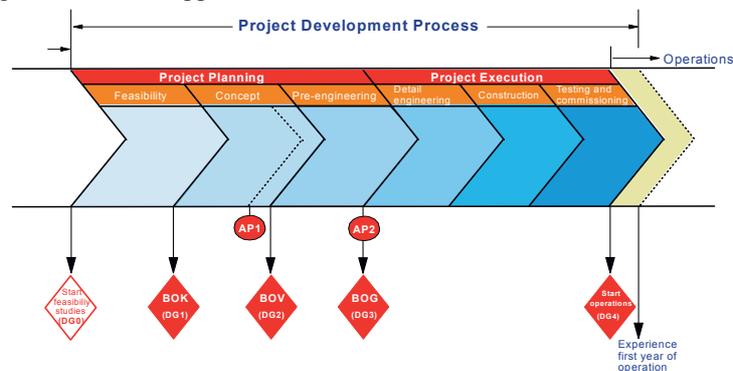


**Figure 1-1 *The project development model for investment projects with phases and decision gates (AR005--Statoil governing documents for project development)***

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[3] Temporary organization established to develop a business opportunity from the moment it is concluded ready for planning to the completed plant is in regular Operation. The CT has total responsibility for all aspects of the business development (business, commercial, economic, technical and administrative). (Statoil definition in AR005)

In the following text, we will describe the challenges in managing offshore development projects in Norway, focusing on top-down management focus identification, communication and monitoring, which we claim our CSF process model can help managers with.

## 1.2 What are the challenges?

Many offshore development projects on the Norwegian Continental Shell (NCS) experienced delays and large cost overruns in recent years. As the biggest owner, the Norwegian Ministry of Petroleum and Energy[4] (MPE) appoints a committee to investigate the reasons [MPE, 1999]. The analysis shows:

A 29.9 billion kroner (27%) cost overrun for 13 projects between 1994 and 1998, of which 10 billion kroner were due to drilling operations.

The committee concludes that some of the main reasons for project cost overruns are as follows, all of which are *project management* issues rather than *technical* issues: insufficient decision foundation, insufficient understanding and budgeting of risk, choosing main contractor before PDO submission and approval, unfounded optimism and lack of experience data, new contract model like EPCI and use of *function* specification, reduced project life cycle and use of parallel activities.

Although these are referred to as the main reasons for cost overrun, not all of them are regarded as negative. Some of these are new ways to execute projects, specified in NORSOK standards that have actually contributed to significant reduction in actual unit cost compared to projects before 1994. Some of them like EPCI and choosing main contractor before PDO approval are still being practiced by ongoing projects. The report concludes clearly that there are no reasons to go back to the traditional time phased execution model.

The main challenge therefore is how to ensure that new ways of project execution be implemented according to their intention in a contextually adapted manner. Some of the recommendations from this report are: more open *communication* and less positioning between different disciplines and companies (operators, contractors and service companies), more quality in decision and definition of premises in early phases, realistic risk management and reliable estimate, more reliable experience data, identify consequences for radical changes etc.

Statoil has imposed concrete measures like arena review[5], work process reviews[6], and independent project reviews[7] etc, to improve decision

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[4] The Norwegian state is a major license owner in Norway and therefore the overruns will disturb the national economic planning.

[5] Arena review (AR)**:** Last stage in quality assurance process at decision gates (DG). The purpose is to ensure that the decision basis meets Statoil's requirements. The arena recommends towards the responsible business unit.

quality at major decision gates, especially in early phases. Statoil establishes "best-practice" at basis organizations, while projects also actively go to other similar projects for experience on their own initiatives. Open communication, risk management (use of risk register) and change control are also very much focused in most projects.

In their analysis of the *Statoil operated projects* from the same time period as the MPE report, Aanstad and Ravndal conclude that project core team manager and its members are of decisive importance and this level of management should be strengthened [Aanstad and Ravndal, 1999]. This is supported by literature: "True leadership on the part of the project manager has been shown time and again to be one of the most important single characteristics in successful implementing projects [Slevin and Pinto, 1991]". Aanstad and Ravndal also point out the importance of strategy, risk evaluation and interdisciplinary cooperation among the seven major aspects to be improved. These are also generally supported in literature [Pinto and Slevin, 1987].

Morris in his article "Key Issues in Project Management" [Pinto, ed. 1998: p3-26] pointed out the importance of *leadership* and its role in *communicating* project objectives to others in order to make teamwork more effective:

> "Leadership and teamwork at all levels are the essence of effective implementation. A large number of people will now be working on the project, under considerable pressure, to accomplish difficult tasks as efficiently and productively as possible. …The reality is that the more clearly everyone can understand the overall project objectives and their part in accomplishing it, the better it will be. Leadership at all levels in the project plays a crucial role in defining and communicating objectives and in motivating people to put in extra effort. And by working together synergistically, teams will achieve much more than working in compartmentalized groups. [Page 23] "

Strategy/objective, leadership (by project core team in this study), teamwork, communication, and cooperation are some of the key words mentioned. It is project manager's responsibility to ensure that her project has the right focus all the time, to gather her team together and to move towards the same goals. In this sense, a project core team, including all functions and sub-projects from a complete project life cycle, represents a miniature project organization at the highest management level. However, there is no existing management tool that aims to help a project core team to define, communicate and monitor their management focuses, except the well known top-ten list from risk

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[6] Work process review (WPR): Review or verification of a documented decision basis per competence area. Competence area means a grouping of disciplines headed by a chief engineer/chief consultant.

[7] Independent project review (IPR): Review of the documented decision basis at a general level to evaluate whether status/condition in a project is in accordance with the given assumptions and if the project is prepared to continue the project development process.

register and regular meetings. Most of the communication is bottom-up based, including risk register. There is very limited *structured top-down* communication. Besides, as we can demonstrate in our case studies, many management guidelines or principles are not natural entries in risk registers. However they are important to communicate them clearly downwards in project organization. We will describe briefly the current status with regard to top-down communication of management focuses in projects in the following text. The description indicates that project managers need some new tools.

### *1.2.1    Manager's tools and responsibilities*

All project managers know very well that project is teamwork and some structures must be in place to get a team function well. The most commonly applied management tool is goal definition. Goal definition and breakdown are the most common communication form between different levels of management [Rockart, 1979].

> "The essence of leadership is to get a group to define and commit to an agreed objective [Youker, 1993, pp78]."

Most project managers feel that projects are generally quite good at defining project goals. After goal definition, project managers will emphasize on the definition of task, responsibility and authority and to ensure that they commensurate with each other. After these, it is the communication of management focuses so that project participants move towards the same goals. We discuss these elements in the following text to see the associated challenges.

**Goal definition and breakdown**
Although it is common that project have goals in time, cost/profitability, HSE and quality, goal definition is not just a simple task. First of all, some goals are very difficult to define clearly. Quality, for example, is difficult to define in terms of quantifiable parameters. The absolute minimum requirement for quality is that product meets function specifications. Some projects will add, "no mandatory instructions resulted from government inspections" and "at project completion, there is no need for modifications due to wrong design and bad workmanship" as quality goals.

Some projects have also additional project goals in "soft" aspects like project reputation (the project should be regarded as a successful project through positive result, good cooperation and good reference) and organization (project should be a good working place, with focus on cooperation and working environment).

We see that projects put different degree of effort in goal definition process. Goals in time, cost and HSE (or more in safety and environment) are more clearly defined (often quantitatively) and therefore closely monitored in projects. We don't know exactly which

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*measure*(s) managers use when they conclude that projects are generally quite good at goal definition. If they refer only to the quantitative goals, they are right.

Secondly, priority among the goals is also part of goal definition. However, this part of goal definition is very often neglected by the argument: "we want them all". Different priorities lead to different actions that may cause conflicts in a team. As one manager in our case studies says, "it is difficult to get everyone agree on what is the most important of the important because we have different understanding of what quality is and we have different priorities among the goals". There are always reasons for different goal prioritization. Understanding these differences may trigger necessary adjustments that ensure everyone in a project moves towards the same goals.

Finally, there is also challenge in goal breakdown. "Competitive individual goals cause inter-group conflict but super-ordinate[8] goals give rise to inter-group cooperation, which enhance group output" [Pinto, Pinto and Prescott, p1284]. In cases where sub-projects' activities take place in series, goal breakdown can be difficult because the subproject that finishes first will disappear from the project. They will have less ownership, if any, to the project goals that can first be realized after they have left. In this sense, it is the core team manager's responsibility to change individual goals to super-ordinate goals as far as it is possible or use other measures to protect project total interest.

**Tasks, responsibility and authority should commensurate**
In addition to goal definition, managers will also tell you that it is very important that task, responsibility and authority are clearly defined and commensurate with each other for all personnel in the project. This is confirmed in literature: "Problems associated with cross-functional cooperation result from not only the interdependence of work process and technology, but from conflicts over authority and jurisdiction among different units [M.B. Pinto and J.K. Pinto, 1990, p204]". Project use position specification for this purpose. However it varies from project to project how well these three elements are defined and applied.

**Manager's responsibility in communication**
Project managers will then tell you that the next step is to ensure that project knows what the most important and the most dangerous are at each time. This is project managers' responsibility and a top-down communication. There are several components in this responsibility:

  ➤ How are these focuses defined (evaluation foundation),
  ➤ How are they communicated (structured process),
  ➤ How are the status of these focuses monitored (measures)

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[8] Super-ordinate goals refer to "goals that are urgent and compelling for all groups involved but whose attainment requires the resources and efforts of more than one group" [Pinto, Pinto and Prescott, p1284]

> ➢ Is the information needed for these measures readily available for managers (management information needs)
> ➢ Is management process documented

We will look at these aspects in the following text and show that project managers need a structured tool to manage their focuses and lead their projects.

### *1.2.2    Everything considered before deciding management focus?*

Projects are means to realize company strategies. IMEC[9] concludes that projects with limited strategic evaluation in depth and scope would have less chance for success while thorough in-depth strategic evaluation would do the opposite [*Benchmarking of large projects* from PS2000 summary, 1999, p83]. In offshore development projects, this strategic alignment happens through the interface between project sponsors (or more exactly higher management in operator's parent company) and project core team. Although company strategy is at a higher level than project, project manager should ensure that her project understands the strategy it should serve in order to choose the best front-end loading solutions. Project profitability and technical feasibility may not be the only interests for the company. Definition of project success criteria or goals is therefore very necessary and is the first step.

With good front-end loading, project gets prepared for future in the best way based on available information. However, situation may change. The chance one carries out a project according to the initial plan is not very high, especially for large and complex projects. Conclusions from IMEC show that structural complications and complexity make it normal for projects to experience difficulties. Project with high presentation was not those that can present a flawless planning and execution. Rather they have a structure and organization that can handle changes, solve crisis and restructure to survive under uncertainty [*Benchmarking of large projects* PS2000, 1999, p83].

However, many projects have a tendency to focus too little on *external* factors. Karlsen supports this statement and concludes in his Ph.D. dissertation [Karlsen 1998] that the uncertainty from project environment is under evaluated in the Norwegian projects. Many practitioners realize the significance of external factors but feel they lack full control over them. They will try to make the project independent of such factors. If they cannot, they expect those who have more control to take care of such factors for the project.

In Figure 1-2 Project environment, we show that external factors and company strategy are two important parts of project environment that

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[9] IMEC is a Canadian research program from 1990s on benchmarking of project control and later on benchmarking of projects. The main goal is to identify best practices in project control through comparing projects. Best practice here refers methods and techniques that seem to give good project results, not necessarily the absolute best possible practice [PS 2000 summary, 1999, p80]

project managers cannot afford to ignore. We use a solid arrow between company strategies and project core team to show that project must ensure its alignment to the company strategy all the time.

Project managers must have a balanced consideration on all aspects that could influence their projects' contribution to company strategies. This is a top management responsibility and one cannot rely only on bottom-up approach most common in projects.
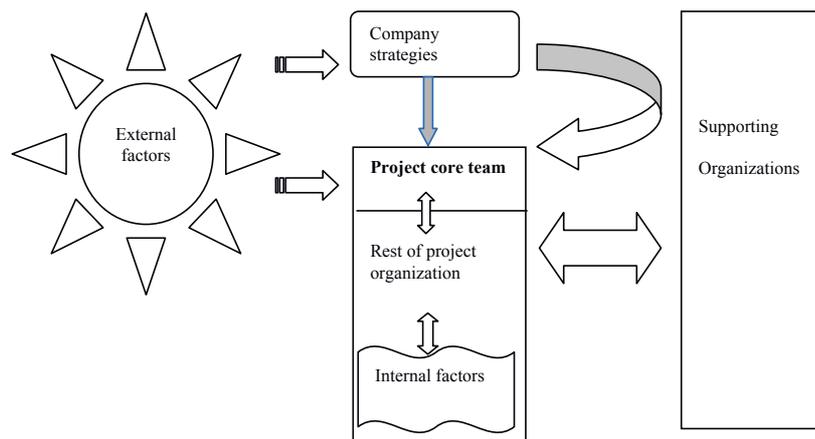


**Figure 1-2 Project environment**

Project managers will have good foundation to define their project management focuses based on such a balanced consideration.

### 1.2.3    Explicit management focuses, measures and information?

Offshore development projects have complex project environment. Without a conscious effort to clearly define major management focuses at any time, a project manager may spend time on evaluating situations that are not critical for the project success.  However, much of top-down communication is informal. In fact, extensive use of informal communication was found to be a characteristic for Norwegian projects [Andersen and Jessen, 2000].

Although positive, there are also drawbacks. An experienced project manager once said that projects were getting too informal now. Too extensive use of informal communication will make it difficult for any "quality assurance" on management focuses, so that corrections can be made in time. In fact, some have, during their careers, also experienced that some CT manager or members focus on wrong issues in a project.

Dobbins points out several disadvantages of not having explicit management focuses [Dobbins, 2000]:

> Implicit management focuses do not become a part of the program history and management reporting process. They will not be used as a foundation for the managerial information design and establishment of the data reporting requirements for successively lower levels of management.

> The underlying constraints are not paid proper attention to and the criticality of identified CSF is seldom validated, ranked and measured.

> A successor manager will focus on a different set of intuitively perceived management focuses, if indeed any at all. Thus the project encounters wide swings in managerial focus and direction due to personal skills and background to project managers.

**Management focuses are in risk register?**

Many project managers will claim that their management focuses are clearly stated in top-ten list in risk register. Many project participants agree. However, we can show that this is not absolutely true.

First of all, the risk elements are normally in form of *events*, like delayed delivery of a pump, which one sees coming. This is quite natural because risk register is mainly a bottom-up approach. Management focuses like "establish positive working environment" or "strengthen product quality control" may less likely appear in a risk register if there is no "warning sign" indicating a risk yet. In this sense, the risk register could not represent all management focuses at each time.

Secondly, risk register has a tendency to focus on project internal and operational/technical issues rather than external or managerial issues like strategic alignment, decision quality etc. An example from our case studies: we ask a manager what his major focuses are. He gives us some most important milestones in the near future. When we ask why, he explains that the repeated delays in one specific higher management decision will make it more and more difficult to reach these targets. However, no risk elements can indicate this! To ensure that higher management makes their decision in time is obviously outside the project's control sphere. Another manager refers to top-ten list when we ask for his management focuses. All top-ten risk elements are concrete events. However, in later talks, he mentioned that he is not satisfied with the project effort in the use of risk register, which is one of his major management parameters.

Finally, there is no clear guideline for what should be regarded as a risk and be registered in risk register. A very experienced technical manager once complains about this because the risk elements are quite similar to potential variation orders. He sees no point of doing the registration twice.

It is therefore doubtful that top-ten list represent *all* management focuses and if all management focuses are clearly defined in a project.

**Are there clear measures for evaluation?**

Someone will suspect how formalities can contribute to better project management. They prefer informal communication because it is faster: "we talk together". An example from our cases shows that sometimes this is not enough: Everyone in the project core team thinks that the project has very open communication. The project core team focus very much in risk management, or more specifically, risk register. The quality manager and project control manager have recently gone through all the risk registers from all sites in the project to see if they function well enough. They are quite satisfied after the inspection. However, the core team manager tells us that project is not good enough in updating the risk registers in a timely manner and he is not completely satisfied. We are getting contradictory evaluations on the same issue at the same time by different CT members. They must have used different *measures* to evaluate risk registers! It is therefore quite obvious that we need to define a clear set of measures to come up with reliable status for management decisions. Informal and subjective evaluation has limitations.

**Is management information readily available?**

If you ask a project manager what are their major sources of management information, they will say meetings, databases, emails etc. and informal contacts.

Meeting is important information exchange forum. However much of the time in a meeting is used for horizontal information exchange because the CT manager would normally have been informed by now. As one core team manager says: I talk with each CT member on a continuous basis. Meeting is to ensure that everyone gets the same information.

With easy access to information technology, more information is made accessible to everyone. However, project IT strategy tends to focus on offering a work forum for a group of people working on a same issue, maintaining data traceability, automated report generation and making information available to everyone at same time. Managers feel that they have enough information and it is a more interesting question on how to get more essence out of the massive information available.

All managers say that they are totally dependent on *informal* contacts like direct talks with others, conversations in corridor, informal contacts via telephone, etc. to get the real project "temperature". Only people can give them indications for how the project would develop. Therefore, most project managers spend a lot of time traveling to different locations to make themselves available and talk to people.

  "Project standard reports are for outsiders, I should have already known the content before they are written."

"Project control reports on history. I also need information about future."

"I have a very large email postbox. Database does not work for me because it is too time consuming to look for all necessary information, if it is possible at all. If there is something I should know, I should be informed directly."

"Databases are only useful when one knows what and where to look for."

"I will be totally helpless without informal contacts with others."

Such statements indicate that project managers are deliberately trying to find some information that they regard as important, yet not readily available in project standard information systems.

### 1.2.4 Documented management process?

When we talk about a documented management process, many will immediately think about decision documentation. There are seldom any documents on what, how and why management focuses is defined. To the best, only bits or pieces appear in minutes of meetings and project governing documents.

An example from our case study will show that project management process is not always properly documented:

A core team manager may have different expectations from the business development function before and after design concept is frozen. In one of our cases, the CT manager tells clearly his business development manager that business develop should be based on the available capacity under the current construction phase. Without this guideline, business development manager may have tried more actively in seeking new business opportunities to increase project or Statoil value, although this may introduce changes that make it difficult for the project to finish on time and under budget. There could be much frustration no matter what kind of decisions CT makes in that case.

Luckily, this is not the case. The CT manager gives this guideline, which is at a lower level than project goals. It is in how the goals should be realized based on his evaluation on project totality. With this clear guideline, the business development manager knows what is expected of him from his leader. He tries in fact to prevent other projects' business development managers from disturbing his project during the construction phase and he feels safe in doing so, knowing that this is what the CT manager wants. Not all CT managers are willing to give such a clear guidance. Many may prefer to make a decision on case-to-case basis. This may cause frustrations and de-motivation because unpredictable decisions by higher management make subordinates feel insecure and thus difficult to do a good job.

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Although important, this guideline is <u>not</u> documented in any project documents. It is thus hard for outsiders to analyze and learn from this project management process and judge if this guideline or management priority is correct or not contextually. This is not surprising because much of top-down communication happens in terms of goal definition and breakdown. As to how these goals shall be realized, much is up to individual managers.

We have gone through the main aspects of management communication we mentioned earlier: evaluation foundation and explicit identification; definition of measures representing the focuses; information needs for such measures and documentation of management focuses. We feel that managers are interested in improving these project management aspects. The fact that both of the *real life* projects we have approached to, participate and offer full involvement of their entire core team in this research, led by the author who has limited practical experience, has shown their genuine interest in strengthening definition and monitoring of management focuses and top-down communication to draw project organization towards the same goals, which is our study topic.

### 1.2.5    *Reconnecting practitioners and researchers*

In order to develop a tool that can be directly used in practice, the tool must have low application threshold and better, a tool that fits manager's way of thinking. This is not a trivial point anymore. A practitioner once complains in a coffee break under a project management conference that it is the same group of researchers who participate at project management conferences all over the world while practitioners don't bother to attend!

This situation is not that surprising when we have seen how the research in project management has developed. Take risk management as an example, too much research has been on development of concrete software programs*,* mainly using simulation technique, and integrated uncertainty management models that include all major disciplines and a complete value chain. They often have high application threshold that requires specialized personnel from a competence center. There are also many assumptions attached to such models. The tools function like black boxes, of which practitioners feel they lack full control. The result is "very few risk management tools developed were used in practice and with success [PS 2000 summary, 1999, p136]".

This must be a sad phenomenon. Practitioners and researchers have different tasks. Practitioners shall manage a project where actual result counts (the results may not be optimal due to pressures on time, budget etc.); while researchers can use the time they need and come up with better knowledge for later projects. Without researchers, the development of project management will be much slower; without practitioners using the generated knowledge, research is useless. We must try to connect the two together.

## 1.3    Research purposes, approach, context and scope

In the last section, we have presented the "common practice" in offshore development projects with regard to identification, communication, monitoring (incl. measure definition and information needs) and documentation of management focuses. We can see that good managers regard it as their major responsibility to ensure that their project knows what the most important and most dangerous are at each time. However, there is no structured procedure or tool that exists in this aspect of project management. Much is left to individual manager and much is communicated informally. Performance varies a lot from project to project. In this study we want to develop a tool for top-down management communication that has low application threshold.

Our research purposes are three-folded:

1) Demonstrate that project CT in offshore development projects in Norway need a structured tool for explicit identification, communication and monitoring of management focuses.

2) Further develop a generalized CSF process model that could help project managers *explicitly* identify a set of CSFs that are critical for reaching project goals, based on comprehensive and balanced considerations. With balanced, we mean that project managers should consider all aspects of project, not only the aspects they have full control of; neither should they be focusing only on technical challenges and expect that the soft aspects will develop positively on their own; and that project should keep awareness on strategic alignment of their project to the corporate strategy and goals at higher management level immediate above them. Proper CSF measures should be developed to monitor these focuses.

3) Finally, we will test the application of the developed CSF process model in ongoing Statoil offshore development projects to show that the model can contribute to better management focus identification and communication.

**Research approach**
The research purposes 1 and 3 will be answered through a multiple-case study. Semi-structured (also called *focused*) interviews, where the interviewer introduces the topic, then guides the discussion by asking specific questions [Rubin and Rubin, 1995, p5], is the major form of investigation in both cases. The further development of a generalized CSF process model, which is the second research purpose, will be based on theoretical review of literature.

**Research Scope**
This study is about project management focuses. We emphasize the project manager's role in having right focus on the right issues all the time and leading a team towards the same goals.

We are not trying to apply general project management CSFs presented in literature into real time projects. On the contrary, we develop a general CSF process that can help project managers to extract their CSFs based on their experiences, knowledge and evaluation of the project they work on. Through this process we can make explicit a set of contextual CSFs they are really committed to.

Evaluation of project total performance is either the purpose of this study. The tool is to help a concrete project to explicitly identify project specific CSFs that they can use. The product is primarily for project internal use and project can decide how they will use the result.

This study is either trying to identify some key indicators for cross-project comparisons, which is typical for benchmarking studies. The CSFs will change as project develops and are project specific. They are not constant and context free like key indicators often are.

Establishment of a complete *management* information system (MIS) for a project is also out of the scope in this study. There is so far no such application for *project* environment. However, before we can come so far, we choose to concentrate in introducing CSF method application to management at project level first. There is by now no such application in real time project environment. The management characteristics of executives and project managers are different.

Although the CSF process model offers a means to document project management process that will facilitate later project analysis and experience transfer in project management practice, we are not trying to discuss knowledge management in project organization or project as a learning organization in this study.

This study either intends to demonstrate the direct effect of this CSF process model on project success. There are several reasons for this:

1) This study is exploratory, involving developing a tool at prototype stage.

2) Project success depends on a lot of issues. This process model is a concrete tool for top-down management focus identification, communication and monitoring. Both literature and practitioners we have talked to regard this as main responsibility of project managers. It is therefore very logical to assume that this tool contributes to project success through improving management practice. However, it is difficult to estimate the model's direct contribution to project success. If this is possible to measure at all, it will require a different research design that will most likely require much longer study duration than a dr.ing study allows. In this research we use the operative proofs (see

Case Study Protocol in Appendix) and interviewees' subjective responses to demonstrate the benefit of this tool.

**Research Context**

Two real-time *Statoil* offshore development projects are our research context. These two projects are in different development stages (one in planning phase and the other in execution phase), with different sizes in investment (middle and large according to Statoil definition) and come from two complementary business areas in Statoil business value chain (upstream and downstream). Managers at CT level in the two projects are our interview objects.

## 1.4   CSF Process Model as a response to the challenges

One characteristic of CSF method is that it fits senior managers' way of thinking.

"Senior-level managers are receptive to the CSF concept of identifying important organizational issues. CSFs provide a common language for managers and analysts that threatens neither party and provides insights useful for both "[Boynton and Zmud, 1984, p26].

This characteristic is a good starting point to develop a practical tool with low application threshold.

Bullen and Rockart point out that CSF is at a level lower than goals and clear definition of project goals is the premise for application of CSF method:

"It is important for a manager to determine his goals, which are the targets he will shoot for. That is common managerial lore. It is equally important, however, to determine, …the basic structural variables… which will most affect his success or failure in the pursuit of these goals. These are CSF." [Bullen & Rockart, 1981]

We have therefore introduced discussion of project success criteria in "interviewee's perspective" to our CSF process model. These goals are the real motivations in project context.

Inspired by the work done by Dobbins for program management [Dobbins, 2000], we want to extend it to project management. Unlike Bullen, Rockart and Dobbins we promote team approach rather than one individual manager in our model. There are two reasons for this. One is that managers at core team level are chosen based on past achievement and documented competence. A team approach will therefore improve CT manager's management practice both in technical and managerial aspects. The other is that we emphasize on management focus communication rather than development of CBIS for an individual manager, which is the original goal for CSF method. Teamwork is the prominent project characteristic. Communication and aligned action is

critical to ensure good teamwork and it is manager's responsibility to ensure that this happens in her organization.

Bullen and Rockart also suggest that any executives will likely to have CSF that relate to five fundamental areas. They are:

1. Industry
2. Competitive strategy and industry position
3. Environmental factors
4. Temporal factors
5. Managerial positions

In addition, CSF can be classified along three major dimensions [Bullen and Rockart, 1981]:
1. Internal vs. external
2. Monitoring vs. building adapting and
3. The five prime sources of CSF

Dobbins has expanded the number of CSF categories into ten, based the criteria of coverage comprehensiveness and applicability to virtually any level of management in any industry [Dobbins, 2000]. We feel that Dobbins's CSF categories will contribute to lower application threshold and therefore choose to base our CSF model on his work with some modifications. We focus on strategic alignment and external factors. In addition we adjust our model to Statoil project environment.

We use the same data analysis principles as Dobbins:
➢ Categorize into groups the activities that are regarded as important for project success by managers;
➢ Check internal consistency among activities in one group; do this consistency check for all the groups;
➢ Check inter-group consistency;
➢ Check criticality of the activities;
➢ Give a name in terms of an activity for each group;
➢ Present the result to interviewees for comments;
➢ Revise and make final report.

This model offer projects a structured tool for management focus identification and communication. The CSF process model fit manager's way of thinking so that the tool has low application threshold. All managers in a CT are involved in the process. The CSF process extracts managers' evaluation of project situation based on their experience, knowledge and project contextual conditions so that they have full control and ownership over the project specific CSFs generated. By using the same process, managers can communicate systematically their management considerations to each other (horizontally and vertically). The CSFs are documented with description of background and measures so that they become explicit. If a capable external interviewer applies the model for a project, the CSF process model is also very time efficient

with regard to required management time, which is one of the most critical project resources. We feel therefore that the CSF process model is an answer to our challenges.

## 1.5 Research result generality

So far we have shown that this study is based on projects from only one company-Statoil. In 3.3.1 Choice of cases in this study we will explain that this choice is due to the nature of CSF method's dependency on knowledge of the *company strategy* and *the organization format* used in the company concerned. Because the researcher is an employee of Statoil, other companies' strategies can be sensitive information difficult to attain. We also argue that Statoil projects are representative client organization in Norwegian offshore industry for our study. With regard to project organization, adjustment to the existing organization format will lower the application threshold of the CSF process model, as we have done in our model for Statoil organization. Application of our CSF process model to other companies may require minor adjustment due to possible different company internal project organization format. The macro organization format like involvement of license group, government, and the existing infrastructure in Norwegian continental shell will be the same.

We have also explained that this study will be based on only two cases. However these two cases were no arbitrarily chosen. They were part of a multiple-case study design, based on analytic generalization [Yin, 1994, p10] rather than statistic generalization (enumerating frequencies). We have ensured the analytic generalization by applying the generalized CSF process model in the two cases that represent totally different challenges in project management according to practitioners: one from project early phase and one from execution phase. They are like two experiments that represent our application domain: management challenges in Statoil offshore development projects in Norway. In addition, the two projects come from two complementary parts of Statoil business area: upstream and downstream with different project contextual challenges. The size of capital investment for these two projects is respectively large and medium. We can then say that this conclusion of this study is general for managing offshore development project in Norway, yet the application of the CSF process model in this study may require minor adjustment due to different internal project organization format in different companies.

## 1.6 Structure of this dissertation

We have so far described briefly our research motives, the tool developed to meet the specified challenges, the research design and claimed contributions. In the following chapters we will give a more detailed descriptions of these aspects.

Chapter 2 Literature Review gives us a general research status on project success and success criteria, the CSF method and its applications, especially in project management discipline. We also explain why we choose CSF method for our study.

We describe our research strategy and design in Chapter 3 followed by presentation of the CSF process model in Chapter 4.

Data collection and analysis are presented in Chapter 5 and 6 before we draw our conclusions and give some suggestions for future research. The project specific CSFs generated for the two cases are attached in Appendix together with Letter to Interviewees and Case Study Protocol.

# 2      Literature review

Petroleum industry is of significant importance for Norway as a nation. Offshore development projects are important means for value realization in this industry. Project core team as the highest management group in such a project is critical for project success. In order to lead a team towards project success, good top-down communication of management focuses is essential. We feel this is the aspect of project management that has large improvement potential, at least in Norway.

Before we can move on to definition of management focuses, we want to find out manager's understanding of what they want to or is supposed to achieve, which includes their perception of performance measurement criteria by which they will be judged and motivated for. These perspectives will influence managers' course of action[10].

In the following we will present literature review in two sections: project success criteria and critical success factor method. The first section helps us better understand manager's perspective, while the second section gives us the theoretical foundation for how to help manager identify, communicate and monitor management focuses. Without clearly defined project success criteria, identification of critical success factor can be misleading or meaningless[11,12].

## 2.1    Project Success Criteria

We concentrate on core team in client or operator organization in real time offshore development projects. It is obvious that every project organization wants to achieve project success. We deliberately avoid using project goals here because that will bring many automatically to goals in time, cost and specifications. We want to give individual project organization a chance to think over what they want to achieve with their current project or even be able to define priorities among the criteria.

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[10] Liu and Walker used Behavior-performance-outcome cycle in organizational psychology [Liu and Walker, 1996] as a theoretical structure for what we mentioned here

[11] Different success criteria are associated with different critical success factors [Pinto and Prescott, 1990].

[12] The variability and individuality of goal identification, definition, measurement and evaluation suggests that projects CSFs are likely to be highly individual and project specific; a search for generally applicable CSFs may be misplaced. [Liu and Walker, 1998]

The academic circle has been discussing how to define project success for a long time, which is necessary to measure project performance. As project is used by more and more organizations to achieve competitive edge or financial results, it is important to draw project management knowledge by finding out what contributes to success most. This is so important that PMI devoted a whole seminar for this purpose in Montreal, Canada in 1986.

The traditional golden triangle (time, cost and quality) was challenged. Stakeholder satisfaction was already mentioned as part of project success criteria at that time. In the recent years, researchers begin to add other criteria, for example learning effect, motivation, strategic alignment/contribution, preparing for future, all parties are satisfied during the project and with the outcome of the project etc. [Andersen and Jessen, 2000][Shenhar, Levy and Dvir, 1997] [Wateridge, 1998]. There exists no consensus definition of project success. Much of success evaluation is subjective. We call research in this direction as effort in project success definition.

Some have also begun to look at project success from another angle: structure or dimensions. The most commonly accepted dimension of project success is that project success is made of product success and project management success. They point out that project success should not be mixed with project management success and there is no direct correlation between them. There are also other dimensions like time for evaluation, management level concerned, which stakeholder perceives success and type of projects concerned etc. [de Wit, 1986].

There are also different characteristics with project success. Macro environment like economic development, the company focus at each time will influence project success criteria definition. There will be trade-offs among the success criteria. The importance of success criteria will also change with time. Different stakeholder should be responsible for different elements in project success. Several researchers recommend that project success criteria should be clearly defined and agreed up among several key stakeholders (client, user and project team) before project starts [Wateridge, 1998] [Shenhar, Levy and Dvir, 1997]. Understanding of these dimensions or characteristic will give us insight for project management.

Although useful, we do not intend to treat these theoretical constructs of project success as the only absolute truth. We want to find out their perspectives, which is the only relevant understanding in that project environment. They are competent managers chosen for the positions based on past achievement. They must have sound reasons for such understandings in the specific organization or system. In other words, we have no belief in the point of imposing project managers on what they should think. However, the theoretical discussion of project success is

useful to understand what project managers tell us so that we can better understand organization dynamic and the CSFs they identify.

### 2.1.1 Definition of project success

Baker et al. [Baker, Murphy and Fisher, 1983] did a comprehensive research based on survey on 650 *completed* projects. They define the project success, or perceived project success as:

➢ Meeting the project technical specifications and/or project mission to be performed
➢ Attaining high levels of satisfaction from:
  a. The parent
  b. The client
  c. The user or clientele
  d. The project team itself

Note that time and schedule are not in the definition at all. This might be explained by the fact that their survey were totally based on completed projects, where performance in time and schedule targets were no longer important in a phase when parent, client, user and even the project organization were more concerned on whether the product was performing as desired, which decide very much the degree of satisfaction.

This finding first indicates that project success criteria can change with time. In addition, much of project success is about satisfaction of important stakeholders rather than just meeting technical specifications.

However they are somewhat ambiguous in what they meant by project mission in the definition. If project mission refers to long-term goals, it is then strange to treat it as an equal to technical specifications, which is short-term goal and can be measured at product delivery.

There are six success criteria most frequently used to measure construction project success [de Wit, 1986] when project is limited to engineering and construction portion of the project life cycle:

➢   Budget performance
➢   Schedule performance
➢   Client satisfaction
➢   Functionality
➢   Contractor satisfaction
➢   Project manager/team satisfaction

It is quite interesting that construction projects have long been using such "untraditional" success criteria like contractor satisfaction and project manager/team satisfaction. However, we can notice that user/customer satisfaction is not included here.

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Might and Fisher [de Wit, 1986] uses six structural factors to measure project success:

- ➢ Overall- the subjective measure of the overall success as perceived by the respondent
- ➢ Cost- the measure of the cost over/under run as a percentage of the initial estimate
- ➢ Schedule- the measure of the schedule over/under run as a percentage of the initial estimate
- ➢ Tech 1- the subjective measurement of the technical success relative to initial plan
- ➢ Tech 2- the subjective measurement of the technical success relative to other development projects in the firm
- ➢ Tech 3- the subjective assessment of the technical success measured in terms of the technical problems identification process.

The study is primarily concerned with project management success. They point out the importance of relative performance with regard to other projects and the quality of process for identification of technical problems. They are not so clear about whose satisfaction is relevant.

It also points out that the choice and articulation of specific performance criteria should be given considerable care. Since the traditional performance are not unambiguously related, it is conceivable that project manager may be managing with one set of expectations while her performance is being judged on the basis of another.

Morris [de Wit, 1986] used three measures for project success:

- ➢ Project functionality (financially, technically, or otherwise)
- ➢ Project implementation (budget, schedule, technical spec.)
- ➢ Contractors commercial performance (short term, long term)

Project success is no longer restricted to project implementation process. Long-term benefits or goals like profit are also included. It seems that Morris has replaced satisfaction criterion by these concrete parameters.

Slevin and Pinto defines successful project as one that results in organizational change [Pinto and Slevin, 1987, p24]. This is obviously quite loosely defined and is doubtfully of any value.

Pinto and Prescott use a 13-item scale to represent project success, which include measures of budget, schedule, performance, client satisfaction and so forth. They then use a principal components analysis to determine if project success should be considered a single or multiple factor construct. The analysis shows a three-factor solution [Pinto and Prescott, 1990]:

➢ Implementation process (efficiency related measures: adherence to budget, schedule, satisfaction with the implementation process and overall evaluation of the project implementation)
➢ Perceived value of the project (assessment of the "value" or merit of the project as determined by both the project team and clients for whom it was intended)
➢ Client satisfaction (related to concern for and attendance to client's needs)

This is the first objective analysis of project success construct. The first factor is efficiency oriented while the remaining factors are "external" success measures. Managers will likely to take different course of actions (different management focuses) if they have different emphasis on these success measures. Only project team and client are relevant stakeholders.

Freeman and Beale [Freeman and Beale, 1992] summarized project success criteria base on 14 papers they reviewed:

1. **Technical performance** (93%): to what extent the technical requirements specified at the commencement of the execution phase were achieved
2. **Efficiency of project execution** (93%): the degree to which targets of time and cost were met
3. **Managerial and organizational implications** (43%): A measure of client, parent and user satisfaction, incorporating the degree to which the project was carried out without disturbing corporate culture or values
4. **Personal growth** (29%): the satisfaction of the project team, particularly in terms of interest, challenge and professional development
5. **Project termination** (14%): the competence of the termination, the absence of post project problems, and the quality of post-audit analysis
6. **Technical innovation** (14%): the success in identifying technical problems during the project and solving them
7. **Manufacturability and business performance** (43%): the ease with which the product resulting from the project can be manufactured, and its commercial performance

They point out the personal growth, technical innovation and manufacturability and business performance in addition to client, user and parent organization's satisfaction. We believe this indicate that different types of project (research, new product, construction, IT, technology intensive, public/commercial etc.) will have some trace in the success criteria they use. It is strange to use project termination as one of the project success criteria because it is normally regarded as part of project scope.

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Atkinson [Atkinson, 1999] studies IS/IT project management and does not distinguish project management success and project success. He offers a Square Route rather than the traditional Iron Triangle in time, cost and quality. He basically separates client or owner from the rest of the stakeholders. He also strengthens product evaluation aspect in project success evaluation.

```
┌──────────────────┐              ┌──────────────────┐
│ The Iron Triangle │             │ Resultant product │
└──────────────────┘              └──────────────────┘
          │         ┌──────────────────┐        │
          │         │ The Square Route │        │
          │         └──────────────────┘        │
┌──────────────────┐              ┌──────────────────┐
│     Benefits      │             │     Benefits      │
│  (Organization)   │             │ (Stakeholder community) │
└──────────────────┘              └──────────────────┘
```
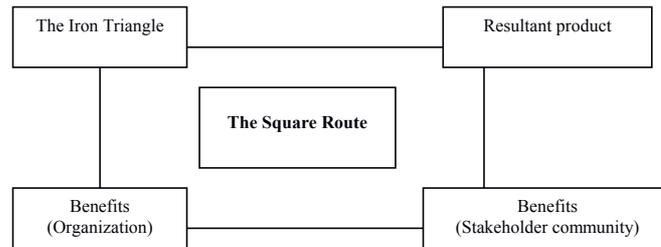
**Figure 2-1 The Square Route project management success criteria [Atkinson, 1999]**

The breakdown of the four success criteria is:

| Iron triangle | Resultant product | Benefits (organization) | Benefits (stakeholder community) |
|---|---|---|---|
| Cost<br>Time<br>Quality | Maintainability<br>Reliability<br>Validity<br>Information<br>Quality<br>Use | Improved efficiency<br>Improved effectiveness<br>Increased profits<br>Strategic goals<br>Organizational-learning<br>Reduced waste | Satisfied users<br>Social and Environmental impact<br>Personal development<br>Contractor profits<br>Capital supplier,<br>Content project team<br>Economic impact to surrounding community |

**Figure 2-2 Square route to understand success criteria [Atkinson, 1999]**

Wateridge [Wateridge, 1999] studies measurement of project success of IS/IT projects. He offers the following success criteria:

➢ It is profitable for the sponsor/owner and contractors;
➢ It achieves its business purpose in three ways (strategically, tactically and Operationally)
➢ It meets its defined objectives
➢ It meets quality thresholds
➢ It is produced to specification, within budget and on time
➢ All parties (users, sponsors, the project team) are happy during the project and with the outcome of the project

He includes profitability for contractor as project success criteria. He does not assume that meeting project objectives will ensure that project will meet business strategy at three levels and meeting of specification will meet quality threshold.

Andersen, Dyrhaug and Jessen define project success from three perspectives for the Norwegian project management landscape [Andersen, Dyrhaug and Jessen, 2002]:

➢ Project goals achieved
➢ Project purpose achieved
➢ Learning and motivation

They point out that when evaluating the results of an effort, it is necessary to focus both on the task- and the person-oriented aspects. In the person-oriented part they emphasize that a project should be a learning experience and motivation for future work. In practice, the Norwegian practitioners are very concerned with project culture which implies that participants complement each other and challenge each other based on respect and trust, and that they regard the project as a good project to work for and are motivated for the next project. They will certainly not regard a project is a success if this culture is not there.

It is obvious that there is no consensus on project success definition. However, some elements are agreed upon:

1. Cost and time should be included, especially if project is not completed
2. Meet initial project technical specifications
3. Meet project objectives or project contributes to strategic, tactical and operational goals financially and technically
4. Client/owner satisfaction

Other criteria has less consensus:
1. Satisfaction of user, project team, contractor, parent organization
2. Benchmarking with other projects
3. Evaluation of quality of technical management process
4. Separate product evaluation in terms of manufacturability, reliability, maintainability, etc.
5. Personal growth
6. Learning and motivation for future projects

For offshore development projects, the project objectives are usually quite clear through the project goal definition process: the profitability and/or market share. Client satisfaction is somewhat subjective and we don't know how much this criterion is used in practice. The development of customer-satisfaction-based quality assessment device in Aker Rauma Offshore [Pinto, Rouhiainen and Trailer, 2001] shows us that this criterion can actually be used in project management.

It is not a contractor-subcontractor relationship between the project core team and the business area that assigns the project to the team. However they are at different levels of management and project should contribute

to goals at a higher management level. Communication of what higher management really wants or expects from a project is quite relevant for how the project should be executed. The main message from the example is also valid in this relationship: true success can only be understood when looked at through the eyes of the customer. We include this example in our CSF model to use it as an inspiration for our managers.

Much of project success is also subjective, like satisfaction and degree a project has met the strategic, tactical and operational goals. A project has many stakeholders. We know that stakeholders will have different interest. Whose interest is more important or relevant for a project?

Project success is therefore multidimensional. They are generally internal efficiency (time, cost) and external effectiveness (client satisfaction, meeting project objectives and contribute to organization strategy etc.). Different emphasis on these aspects will influence what one will prioritize. As we are studying project core team, there are several aspects that are worth clarifying:

- ➢ *Who* defines project success criteria
- ➢ *When* project success should be measured,
- ➢ *How long* a project team should be held accountable for the project outcome,
- ➢ *To whom* project should be most loyal to etc.

Project owner or client must clearly communicate what they want and apply corresponding performance measures on project manager before project starts.

A review on project success structure and characteristics in the following text can help us find answers to these questions.

### 2.1.2   *Project success structure and characteristics*

It is generally consensus that success criteria in time, cost and quality specifications are generally internal efficiency measurement. They are actually measures for project management success, rather than project success [Baccarini, 1999][Freeman and Beale, 1992] [de Wit, 1986]. Some researchers offer a more in-depth description of project success.

Anton de Wit [de Wit, 1986] points out that project management success can contribute towards project success but is unlikely to be able to prevent project failure. Many large projects were saved from disasters by fortuitous circumstances and therefore are regarded as a success because the higher-level management objectives are met.

He says the most appropriate criteria for success is the degree to which project objectives are met. The project objectives are far more than just time, cost and quality. Project objectives varies along four dimensions:

> *Different stakeholders* (not just client and contractors are worth considering) *have different objectives*
> *Objectives change for each major phase in project life cycle* (like for oil field development project, under exploration phase, the primary objective is to find oil in large enough quantity for development; under development phase, the primary objective is to develop the field in the most economic manner; and under production phase, objective is to maximize daily production and optimize total oil recovery)
> *Objectives has a hierarchical dimension* so that the primary objectives also vary for each level of management in an organization (important to understand the organization objectives and project objectives)
> *Objectives vary with type of projects* (private/public section) due to different motives: necessity (it should work), opportunity[13] (it should pay), prestige (it should exist) and research (reaching a solution).

Trade-offs among project objectives are usually necessary. The overriding objective ("it should pay"--profitability for offshore development projects) will have to wait until the field is depleted and abandoned. Primary objectives tend to be used to determine the performance and success of each phase. Therefore the project status with regard to success will change with phase. He suggests a project success framework for a commercial oil field development project from the client's perspective; see Figure 2-3 Project Success Framework [de Wit, 1986].

The economic climate will also influence project success criteria through project objective at higher management level.

de Wit concludes that measurement of success seems invariably to concern with completed projects or at least a completed project phase. The measurement of success does not contribute to the control of project. Any attempt to link performance to success is unlikely to be productive, for project control purposes, because of the large number of variable involved. It is illusion to think that one can objectively measure the success of a project. One can suspect this conclusion after the research done by Pinto et al. on using customer-satisfaction in quality assurance for real time project management [Pinto, Rouhiainen and Trailer, 2001].

It is true that general and objective definition of project success is not possible or even interesting. However in our case, the type of project is offshore development project. We study project core team in an operator or client organization. We have then positioned ourselves clearly with

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[13] Oil field development projects are under this category

regard to stakeholder and level of management in de Wits' framework. Only project phase is open.

We can see, from de Wits' framework, that the way project is organized has changed since 1986. There is no longer clear departmental boundary between the last three project phases. Project core team is established already after the feasibility study and is responsible for planning, construction and product delivery/operation start. Operation function has also become an integrated part in project core team from day one.
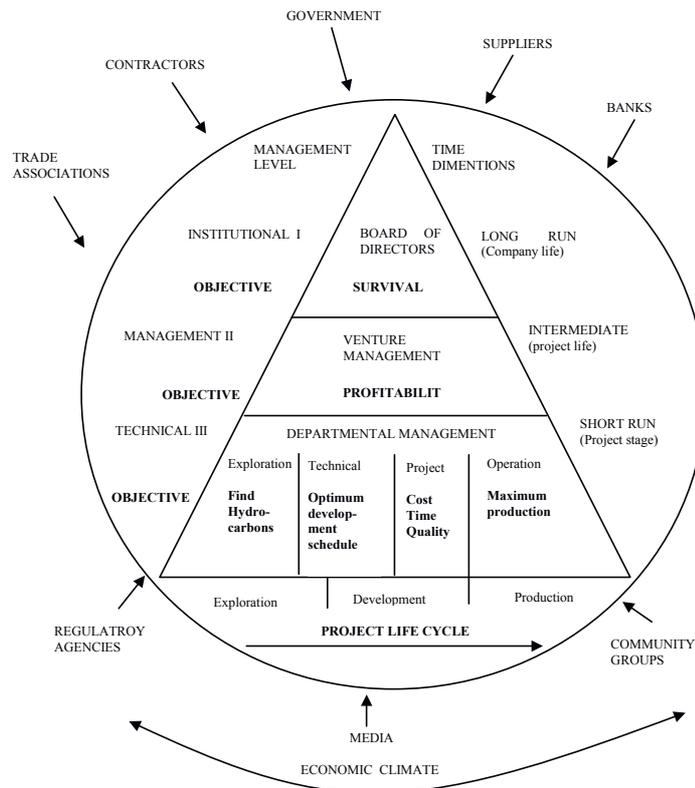


**Figure 2-3 Project Success Framework [de Wit, 1986]**

Because of these changes, project managers have got larger responsibilities over a longer period of time. According to Statoil governing documents for project development, project core team should be responsible for project profitability in addition to project HSE, time, cost and quality. In this sense, the boundary between the vertical levels of management has also moved because profitability is actually a project success criterion, which is long-term oriented, rather than a project management success criterion, which is short term oriented. It will then be interesting to see how the "mentality" of project managers and their higher-management has changed with regard to communication of project objectives.

Munns and Bjeirmi [Munns and Bjeirmi, 1997] made a genuine effort in defining the role of project management in achieving project success and different stakeholders' orientation and relationships.

The important actors in a project life cycle are client, user, project team (contractor), parent organization and third party (statutory authorities, media, environmental groups and general public). These important actors also exist in the type of projects we study, although they are client's project team rather than contractor organization. These actors will have different orientations and responsibilities. We ask project managers to explain their "attitude" towards these actors in "interviewees' perspective" in our CSF process model.

They point out project management success and project success is not directly related. Project management is focusing on short-term goals and last until product delivery, while project success covers the whole project life cycle and includes long term orientation. It is inappropriate to place all responsibility for integration on the project team. It would seem more logical to make individual who has a wider view responsible for the project. The client has the longer term and wider orientation and there is a logical argument for making the client responsible for the end project. The client is responsible for the creative processes in identifying possible ideas for a project. This perspective is interesting in our study of relationship between the project and its higher management in its parent company and between the project and its contractors. We will see where the responsibility for project profitability objective really lies (higher management or project), although it is part of obligatory project goals and how the quality issues between the project and contractor be handled, although contractor is responsible for the quality of their product.

They propose that project performance can be assessed in one of three ways along the project total life cycle:

➢ The implementation--can be used when project product is delivered
➢ Perceived values--the view of *users* who will interact with the project during the utilization phase
➢ Client satisfaction--at project closedown when the client can examine all influences on the project and an assessment can be made as to the satisfaction of the original goals.

They further developed the time dimension pointed out by de Wit [de Wit, 1986] by explaining when and by whom. For our study, it is interesting to see if the Operation manager, who is really a user representative, can share the same project objectives as the rest of the project core team; if the rest of the team have a more balanced view on project success because of the user involvement from the start.

Munns and Bjeirmi suggest that client can adopt two courses of action. Either the client has to become actively involved in the planning or production phases, or the involvement of the project team has to be extended into the utilization phase. They implicitly imply project team in their study is contractor project organization. However we can also regard the project core team as a "contractor" to their higher management in the parent organization. The degree of higher management's involvement in project planning and construction phase is then an interesting aspect.

Shenhar, Levy and Dvir propose four dimensions of project success [Shenhar, Levy and Dvir, 1997]:

- Project efficiency (budget and schedule),
- Impact on customer (mainly on performance, meet clients real need),
- Business and direct success (the sales, income, and profit, market share, etc.) and
- Preparing for the future

They point out that the traditional dimension--meeting time, budget and performance goals--is not really one homogeneous dimension. Meeting project resources constraints (time and budget) is one thing, while meeting specification is another. It is indeed the latter factor that reflects the impact on customer. The impact on customer, however, has a wider meaning. It reflects not only how the project meets specifications, but also reflects the subsequent satisfaction of the customer with the final product (responding to customer needs and solving his or her problems). Poor project definition and weak articulation of product requirements may result in dissatisfied customer even when project specifications are fully met.

This is a quite relevant point in offshore development projects. The "builders" in a project will typically use the following argument to refuse changes proposed by Operation under construction phase: the project has gone through the planning phase when Operation has incorporated their wishes and requirement in the design. If project follows this design, the user should be satisfied. At the same time we know that it is difficult to have complete and clear operation specifications pinpointed in detail when nothing is physically built and there are several years before operation starts. There may appear internal or external changes that call for modifications. Here we are talking the different interpretation of quality by "builders" and Operation function. To which degree this "conflict" is balanced is quite relevant for what kind of project success the sponsors want.

Shenhar et al. also point out that typical project manager is obviously interested in delivering a good product to the customer, on time and within budget. Additional considerations such as marketing opportunities,

or even increasing profits, are only side issues to the main effort to satisfy the customer. We can see if client organization will have the same focus on user satisfaction, their priority of this criterion among other project objectives and if the priorities are really encouraged by the parent organization and sponsors.

Shenhar et al. ask why not make project manager responsible and accountable for the long-term success and the product they produce, because they can certainly influence the project outcome during project execution. Project managers must be made aware of the results expected from the projects and they must constantly focus their attention on these results during the project management process. In our concern, it is a question around product quality. Offshore development project delivers very complex product. What kind of responsibility a project has for product quality is a very relevant question when there have been several projects experiencing serious quality problems in the last few years.

They also point out that the traditional assumption is that performance is well defined and if met correctly, the customer must be satisfied. In reality, this is not always the case. Many projects have failed because they did not fulfill customer expectation, even though they are well executed. It is no longer just the responsibility of top-level management or market. In the current competitive and cross-functional environment, project managers must be attuned to customer requirements and to his or her real needs. Consequently project managers must act decisively to rectify any gap between project perceived performance and actual customer needs. Similarly, project managers must be mindful to the business aspects of their company. They can no longer avoid looking at the big picture and just concentrate on getting the job done. They must have long-term benefits in mind.

We have mentioned earlier that project managers get larger responsibilities or expected responsibilities because profitability is a project success criterion and it is a life cycle concept. However project organization is dismissed by product delivery. They must either have tremendous self-discipline or there exists clear performance measures that encourage them to take balanced consideration of short-term and long-term objectives. They should also to a greater degree than before orientate themselves more in company strategy and how the project can best serve this strategy.

As other researchers [Wateridge, 1998], Shenhar et al. propose that project and top management use this framework prior to project initiation. They should identify in advance the expected benefits from the project along different dimensions and focus their teams on this pre-specified set of expectations during project execution. We can see how this process happens in our study context.

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They also find out that project managers regard customer satisfaction as the most important dimension, followed by project efficiency and business and direct success. This is true for both projects that produce product to open market or with specific clients. During the execution phase, project managers pay little attention to future potentials. It is then to verify is these finding also applies to our projects.

They find out that the importance of these 4 dimensions of project success changes with time. Project efficiency under execution, impact on customer when the project is delivered (weeks or months after), business success, one or two years and future potential, three to four years.

Some other researchers have discussed these dimensions and the relevant project manager's act. Wateridge points out that project managers tend to focus too much on short-term success criteria relating to the project "process" and concentrating on meeting the time and budget constraints which are set by senior management as opposed to the longer-term criteria relating to the "product" such as delivering a system with which the users are happy [Wateridge, 1998].

Through questionnaire and interviews, he concludes, "the fixation, on the part of project managers particularly, to satisfying timescale and budget constraints, at the expense of other criteria, is leading to failure of IS/IF projects. It may also be the case that project managers are applying the wrong factors, or simply applying the right factor badly (such as too much detail planning, not enough high level planning) to achieve the success criteria instead examining and controlling the products and user functionality (p62)."

He points out that project manager's success is very often judged on their ability to deliver projects on their objective criteria in the short-term. Their future career may depend on it (Here Wateridge points out the motivation aspect of project success definition). However this may not be the users' and sponsors' perception. Users may be more concerned about being happy with the implementation in the longer-term. On the other hand, sponsors may be more concerned about the project delivering the strategic benefits. Therefore each project must have a start-up activity to define the success criteria, particularly on the more subjective issues, to identify the project objectives and constraints, to organize the project team and to strategically plan the project. Only when the success criteria have been defined can project managers consider the appropriate factors to deliver those criteria. This is supported by the findings by Pinto and Prescott [Pinto and Prescott, 1990]: tactical CSFs became more important than planning CSFs only with regard to the success measure in efficiency: implementation process. Planning CSFs remain important all the lifecycle for other two success factors: Perceived value of the project and Client satisfaction, which is contrary to common impression. In other words, meeting

targets in time, cost and quality may not ensure client satisfaction and perceived value of the project.

Baccarini [Baccarini, 1999] supports the definition of project success as product success and project management success. He points out that correct formulation of a project goals and purpose (product success criteria) is outside the responsibility of the project team. However, the project team should review early in the project the appropriateness of the linkage between the outputs, purpose and goals as part of the scope management process. Project managers must understand the business environment and view their project as part of the company's struggle for competitive advantages, revenues and profit. This is not always the case in practice.

He also suggests following characteristics of project success criteria: Project success is perceived, not always objectively measurable; success criteria must be prioritized (focus on important stakeholders); success is affected by time; success is not always manageable and success may be partial, rather than in black and white.

Although many of the project success criteria are subjective, project cannot afford to neglect these criteria and bind themselves to the objective and easy-to-measure criteria like time and cost. Instead project should strive to achieve better performance also in other success criteria like strategic alignment and client satisfaction. It will require a different approach from the traditional quantitative reporting on a monthly basis on cost and progress.

In order to know how to achieve client satisfaction, for example, one needs to finding out what factors contribute to client satisfaction. Getting a score in client satisfaction at the end of the project cannot benefit the on-going project. One may have to use interviews with key personnel from the client organization to find out what they want and what they appreciate most; analyze and identify a set of critical factors that will contribute to their satisfaction; focus on these factors to ensure project success; define proper measurement mechanism to monitor the performance in these factors in the project lifetime.

We are not studying the relationship between contractor and sub-contractor. However we can regard the relationship between different levels of management in an organization as a kind of "client and contractor relationship". It is vital to find out what the project objectives are and what factors contribute to achievement of these objectives and how we measure our performance in these factors so that we can carry out corrective actions accordingly.

We can call the identified factors as critical success factor, which we will talk about in the following text.

## 2.2    Critical Success Factor (Theory)

We will first introduce the origin of CSF method. We will then discuss the general CSF approach, lessons learned or success stories, which we mean have their merits, yet not optimal for guiding a new contextual project situation. We promote generalized CSF process model instead. In the end, we will discuss relationship between general CSF method and generalized CSF process model.

### 2.2.1    The origin of CSF method

CSF method developed by MIT research team evoked much attention. However according to Rockart [Rockart, 1979], the theoretical origins for the CSF concept could be traced back long before them:

D. Ronald Daniel first discussed 'Success factors' in the management literature in 1961. He focused on industry related CSFs that are relevant to *any* company in that industry. "…a *company's information system* must be discriminating and selective.  It should focus on "success factors". In most industries there are usually three to six factors that determine success; these key jobs must be done exceedingly well for a company to be successful. … In the automobile industry, styling, an efficient dealer organization, and tight control of manufacturing cost are paramount…"

Robert N. Anthony, John Dearden and Richard F. Vancil drew attention to CSF concept in their design of a *management control systems* in 1972. They point out that the system, in addition to measuring profitability, identifies certain key variables that significantly impact profitability. They suggest, among other things, that there are 6 different variables; these variables are important determinants of organizational success and failure; *they are subject to change and this is not always predictable*. The management control systems is described by 3 "musts":

"The control system *must* be tailored to the specific industry in which the company operates and to the specific strategies that it has adopted; it *must* identify the 'critical success factors' that should receive careful and continuous management attention if the company is to be successful; and it *must* highlight performance with respect to these key variables in reports to all levels of management."

While continuing to recognize industry-based CSFs, Anthony et al. placed additional emphasis on the need to tailor management planning and control systems to both a *company's particular strategic objectives* and its *particular managers*. That is, the control system must report on those success factors that are perceived by the managers as appropriate to a particular job in a particular company. CSFs differ from company to company and from manager to manager [Rockart 1979, p86].

Rockart points out that in addition to industry CSFs, there are other CSFs that will be particular to one or some companies, but not all, which are generated by differences in environmental situation (development of macro economy, politics, regulations etc), temporal factors (special abnormal situation, development stages etc.), geographic location, or strategic situation.

Many critical success factors require information external to the organization-information concerned with market structure, customer perceptions or future trends and that traditional financial accounting systems rarely provide the type of data necessary to monitor critical success factors. Many other CSFs require coordinating pieces of information from multiple data sets that are widely dispersed throughout the company. A small but significant part of the information concerning the status of CSFs requires subjective assessment on the part of others in the organization, rather than being neatly quantifiable.

A great deal of the information needed will not continue to be desired year after year. Periodic review of CSFs will therefore bring to light the need to discontinue some reports and initiate others.

Two years later Bullen and Rockart summarized the CSF interview experiences and conceptual frameworks [Bullen and Rockart, 1981]. They described the hierarchical nature of CSFs from a *company* viewpoint, which we include here for convenience.
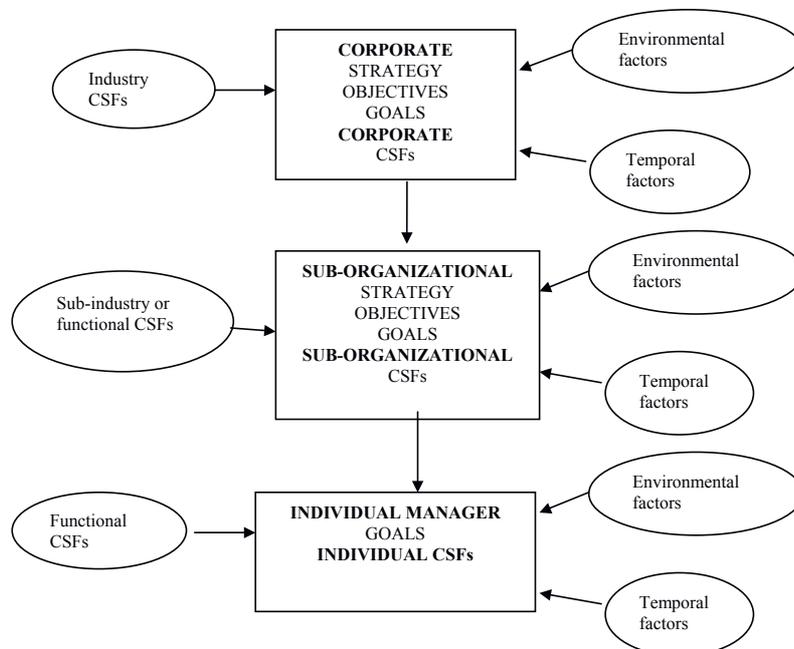


**Figure 2-4 From a *company* viewpoint [Bullen and Rockart, 1981]**

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We can see that managers at lower organizational levels will have an individual set of CSFs that depend heavily upon their particular roles[14] and on temporal[15] factors, and less heavily upon the industry and the environment.

The MIT research team [Rockart, 1979] was aiming at helping managers identify their own managerial information needs within the context of corporation and sub-organization described in the figure above. They looked at different ways of providing information to top management already existed at that time: by-product technique, null approach, key indicators and total study process and analyzed their strength and weakness.

**By-product (predominant)**
Chief objective is to make reporting cheap
No attention to real management information need
Centered on development of Operational systems in the company: Available to all interested executives
Data are heavily aggregated
Exceptional reports of significant interest in the dime past

**Null approach**
Too much stress on the executive's strategic and person-to-person roles
Overlooks the management control role of the chief executive
Focusing on dynamic
Depend on rapidly assembled information
Often subjective and informal information delivered by word of mouth from trusted advisors
Regards computer-based reports as useless

**Key indicator system**
Provides a significant amount of useful information
Often results in many undifferentiated financial variables and usually oriented towards hard data needs alone
Tends to be financially all-inclusive rather than on-target to a particular executive's specific needs
Fails to provide assistance to executives in thinking through their real information needs.

Based on 3 concepts: 1) set of key indicators of the health of the business 2) exception reporting: only those indicators where performance is significantly different from expected results are reported to manager 3) expanding availability of better, cheaper and more flexible visual display techniques.

**Total study process**
Comprehensive and can pinpoint missing systems
Expensive
Huge amount of collected data, analysis of this input is a high form of art, designer bias, difficult in devising reporting systems that serve any individual manager well.

**Figure 2-5 Four main ways of determining executive information needs [Rockart, 1979]**

With these methods in place, executives still suffered data overload, but were starved for the right kind of data essential for management. None

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14 Role-oriented CSFs cut across all industries. They are an integrated part of the job itself and therefore persist regardless of pressures produced by other factors [Bullen and Rockart, p33]. In this aspect, work done by Pinto and Slevin on general CSF for project management can well serve as a reference for all project managers [Pinto and Slevin, 1987,1989].

15 Temporal factors for each manager are usually related to the current problems and opportunities that the manager is facing [Bullen and Rockart, p33]. CSFs generated from these factors will often be neglected in general CSF research and which calls for method that takes also consideration of contextual situations.

of these methods can meet all the criteria, like being systematic, dynamic, focused and efficient[16], in focusing on individual managers and their hard and soft information needs. They developed CSF[17] method to solve this problem. This is the first effort in developing a concrete process to help practicing managers to identify their managerial information needs. Before this, CSF was only a concept in management theory. This contribution was a breakthrough in promoting CSF theory application in practice later on.

The method is based on two or three interviews with executives. It starts with the executive's goals, then the CSFs that underlie the goals. The interrelationships of the CSFs and the goals are then talked about for further clarification and for determination of which recorded CSFs should be combined, eliminated, or restated. An initial cut at measures is also taken in the first interview.

The second session is used to review the result of the first, after the analyst has had a chance to think about them and to suggest "sharpening up" some factors. In addition, measures and possible reports are discussed in depth. Sometimes, a third session may be necessary to obtain final agreement on the CSF measures-and-reporting sequence [Rockart 1979, p85]. In a later article they pointed out good preparation for CSF interviews is essential. Analyst must try to have as deep knowledge as possible about the industry, the company and the job of interviewees do [Bullen and Rockart, 1981].

We can see a clear sequence: Goals→CSFs→measures→information /reports, in their way of thinking, which is a clear *top-down* approach. The focus is identification of management information needs for *individual* at executive or general manager[18] level. Use of CSF method with an individual executive and example of similar organizations with different CSFs clearly show that they promoted the usefulness of *contextual* CSFs for practical management. They suggested five prime sources of CSFs, which we mentioned in chapter 1.4 CSF Process Model as a response to the challenges.

The CSF method helps manager to focus so that significant factors will receive careful and continuous management scrutiny. CSFs can be arrayed hierarchically and used as an important *vehicle of communication* between different management levels, either as an informal planning aid or as a part of the formal planning process. Executive response to this new method has been excellent in terms of both the process and its outcome [Rockart, 1979].

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[16] In terms of interview time / management time needed

[17] Refer to Chapter 1.1 Background for CSF definition

[18] Managers to whom multiple functions report [Rockart, 1979]

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All of these characteristics qualified CSF method very much for our research interest: better top-down management communication through clear definition of focus and monitoring. We can see extensive use of By-product method in offshore development projects. Managers rely heavily on informal communication (Null approach). Key indicators systems are more common for Operational organizations and corporate management. However, there is no systematic tool in helping managers to focus and communicate these focuses, especially not as a management group.

CSF method has invoked quite some attention and much research around CSF method followed, both in terms of expansion of CSF application domain[19], applicable level of management and development in CSF method. We will focus on the CSF applications related to the field of program/project management. What became mainstream was identification of general CSFs using survey method or direct reports from "lessons learned" or "success stories".

### 2.2.2    Project general CSFs

Baker et al. carried out one of the most extensive research in uncovering factors that are related (statistically) to perceived project success[20] [Baker, Murphy and Fisher, 1983]. Their study resulted in a wide range of technical and behavioral factors. They used survey method.

They came up with 29 project management characteristics, which strongly affect the perceived failure of projects. A large number of the variables center about *poor coordination and human relations patterns*.

They found 23 necessary yet not sufficient conditions for perceived success, which showed the need for good *tight controls and commitment* to the goals that have been established.

Effective project planning is absolutely essential to project success because they influence most of the factors both for success and failure. They have also suggested some general strategies for directing projects:

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[19] We mentioned some application areas in chapter 1.1 Background

[20] We referenced their definition of perceived project success in chapter 2.1.1 Definition of project success

> ### Strategies for directing projects
>
> 1. Projectized organization is most often associated with perceived success
> 2. Success criteria salience and consensus should be clarified and agreed upon by the client, the parent and the project team and after that it is essential to permit the project team to "carry the ball" with respect to internal decisions
> 3. Participative decision making and problem solving within the project team was highly correlated with success for the totally sample of project. Under highly complex project, or one where initial over-optimism prevailed regarding the time and cost for completing the project, it was especially important to employ participative approaches to overcome the adversities.
> 4. Project manager's technical skills, human skills and administrative skills are all important and their importance decrees in that order.
> 5. In very favorable or in very unfavorable situations for getting a task accomplished by group effort, the autocratic, task controlling, managing leadership works best.

**Figure 2-6 Strategies for directing projects [Baker, Murphy and Fisher, 1983]**

Most of the strategies are quite commonly known. Strategy no.2 emphasized the need for clear definition of success criteria and consensus by several groups, which supports our way of thinking in introducing discussion of project success criteria into our CSF process model. However whether strategy no. 3 in participative decision-making is always proper is questionable [Slevin and Pinto, 1991].

They used stepwise regression and came up with 7 CSFs with more detailed makeup below them. Their impact in descending order is shown in Figure 2-7.

> ### Seven CSFs for project success
>
> 1. Coordination and Relationship Factors
> 2. Success Criteria Salience and Consensus Factors
> 3. Initial Over-optimization, Conceptual Difficulty Factors (Negative impact)
> 4. Adequacy of Project Structure and Control Factor
> 5. Competitive and Budgetary Pressure Factor (Negative impact)
> 6. Project uniqueness, Importance and Public Exposure Factor
> 7. Internal Capabilities Build-up Factor

**Figure 2-7 Seven Factors contributing to perceived project success [Baker, Murphy and Fisher, 1983]**

The findings are valuable. However, the readers will normally be overwhelmed by so many variables and strategies that they don't know where to begin.

Slevin and Pinto [Slevin and Pinto, 1986] followed the footstep of Martin [Martin, 1982] and Baker et al. [Baker, Murphy and Fisher, 1983] in using survey method.

Without define what project success was, they asked members of Project Management Institute (PMI) to think of a successful project, put themselves in the position of project manager in that project and indicate things that they could do that would substantially help implementation success. Based on 94 usable answers, they classified 10 CSFs. They

developed a conceptual model for project implementation based on these factors and made a diagnostic tool in form of questionnaire called Project Implementation profile (PIP) (Figure 2-8).
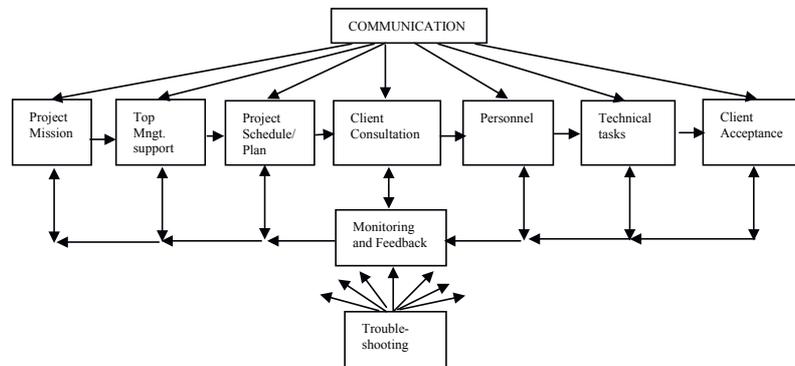


**Figure 2-8 Ten key factors of the PIP [Slevin and Pinto, 1986]**

When using the questionnaire, a project team can give scores between [0, 9] to the statements under each CSF. CSF that has received scores below the 50th percentile[21] indicates bad performance. The method is quite simple and time efficient, with almost no application threshold. It helped managers to better monitor and systematically oversee the status of project management, not only in progress and cost, but also human and managerial aspects. They suggested periodic use of this diagnostic tool (monthly basis or more frequently as needed).

Later research showed that CSFs would have different importance in different phases in a project life cycle [Pinto and Prescott, 1988]. Different and/or additional CSFs beyond the 10 CSFs will appear in different types of projects [Pinto and Covin, 1989] [Slevin and Pinto, 1989]. Different culture will also cause different CSFs [Andersen Dyrhaug and Jessen, 2002]. Different definition of project success will also cause different CSFs [Pinto and Prescott, 1990].

These research results pointed out the major weakness this survey-based approach in CSF identification: lack of context and premises for the identified CSFs. Survey method is based on average concept, which does not ensure unconditional validity. In other words, direct application of these CSFs will lead to wrong prioritization in concrete projects. In this sense, the general CSFs are departed from the original CSF definition!

With no knowledge of whose answer on what projects constituted the database that a later project will be compared to, project managers will not be sure how they should interpret the results, let alone identify corrective actions.

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[21] One uses PIP survey to collect data from many projects and thus gain an average for each CSF to which later project can compare their PIP scores.

There may also be a problem in the logic of using 50% percentile as the boundary for good or bad performance and use resources on the CSF with bad performance. CSFs will have different criticality in different projects/situations. In projects with limited resources, one has to prioritize correctly.

Different sets of CSFs from different research results [Baker, Murphy and Fisher, 1983] [Slevin and Pinto, 1991] [Lester, 1998] [Andersen and Jessen, 2000] also make practitioners confused.

What is most critical with this general CSF approach is that does not encourage project managers to think in terms of CSFs themselves. As pointed out above, there are other important variables that can have a powerful impact on either the success or failure of the intended project. These factors may be beyond the control of project team, yet they cannot afford to neglect, like environmental events, power and politics [Pinto, 2000].

With predefined CSFs, this method focuses too much on control effort through status monitoring and does not encourage creativity and system thinking. We can clearly see this limitation by comparing the CSFs in PIP with what was reported in Britannia project [Tetlow, 1999].

Having mentioned all the limitations, general CSF based on survey approach can discover trends or test hypothesis at a general level and therefore contribute to general knowledge of project management. However it is not practical for guiding project managers in real time projects, at least not before one has made a considerable effort in assigning these CSFs contextual meanings and verifying their relevance.

### 2.2.3 *"Lessons learned" or "success story"*

Many companies and organizations have realized the importance of experience transfer. We also see quite a lot of such articles in literature. They are normally in form of "lessons learned" or "success story" ([Shell Mars report], [Tetlow, 1999], [Marshall et al. 2000], etc.).

One of the advantages of this approach is the high context relevance: they report experiences with a description of their project. Readers are usually in the same trade of life or even in similar projects. In this case, other's experiences can be very inspiring. However this advantage is linked together to its disadvantage: the limited application generality. What is effective in one project may not be so in another project because each project has its own environment, foundation and premises. How far one should copy the "experiences" into her project is a tricky decision. An example is the use of Integrated Team. While integrated team contributes to large cost reduction in Britannia field development project from 1984-1998 [Tetlow, 1999], Åsgard project experienced great difficulty with this form of organization in the same period of time. It is

obvious that one can only allow oneself "inspired" by others and then tries to find one's own way. Copy others or impose projects with other's solutions is risky.

Tetlow presented a Performance Improvement Model to explain how they have achieved the good result (lower cost and earlier completion) in the Britannia field development. The model covers leadership and purpose, communication, learning and sharing, technology, contract philosophy, materials strategy, people development (individual and teambuilding), process development, measure success, celebrating success. Leadership and purpose is the center and communication is the glue/media between the center and the rest of elements in the model. The project believes that they have to *create* the environment they wish to have because it does not come up automatically. Empowerment and encourage are two other principles. What they did in Britannia was described according to this model.

The project management group made a considerable effort in defining project mission, visions, value and objectives, not just project goals in term of time, cost and quality. From Figure 2-9 Mission, Vision, Values & Objectives for The Britannia Development [Tetlow, 1999], we can clearly see what the leadership team wants: cost reduction through adoption of best practice and what is value in this project: continuous improvement, focus on use of creativity, establish win-win relationship with supplier and contractor etc., all of which under the premise of safety.

---

**MISSION**

We, the Britannia team, will successfully complete the Britannia Development, on Stream 1st October 1998, fulfilling all cost, value and acceptance criteria

**VISION**

Britannia will be viewed as a significant step forward in large field developments with high safety and environmental standards and achieving excellent financial margins by focusing on minimizing costs through the adoption of best practices

**VALUES**

Value everyone's contribution by empowering them to achieve success; continuous improvement of business and technical practices; encouraging creativity to challenging tradition. Develop individual and team skills. Build win-win relationships with supplier and contractors.

**OBJECTIVES**

High safety standards, reliability and quality, lowest cost safe operator, high environmental and ethical standards, maximize economically recoverable reserves, achieve the lowest compatible capital cost.

---

**Figure 2-9 Mission, Vision, Values & Objectives for The Britannia Development [Tetlow, 1999]**

We cannot list all the "actions" they have done under each of the elements in the Performance Improvement Model. This article is one of the examples that have made an effort in generalizing their experiences from one concrete project. This generalization gives us better knowledge than just a list of success factors from a specific project. However, what is not described is how they have developed this model based on their project context.

### 2.2.4    Generalized CSF process model

Now that we are looking at CSF method, we will not limit ourselves to CSF application in project environment because they are few applications. There is no direct application of CSF method in real time project environment.

To overcome the problem of lack of context for the general CSFs generated through survey method, Sum, Ang and Yeo came up with an interesting approach [Sum, Ang and Yeo, 1997]. They summarized general CSFs for MRP implementation from literature into eight CSFs and then used multiple-case study through interview method to get the contextual elements. They asked interviewees to list as many elements as possible, which they associate with each of the CSFs.  The contextual elements were obtained based mainly on the frequency of citation by the interviewees.

This study shows out that the value of general CSFs in guiding practical work is very limited because of the disconnection between CSFs and their context. One can understand a general CSF differently. Significant effort is needed if one tries to use the general CSFs in practice.

This research had a different goal from ours: they intend to gain a better understanding of the CSFs themselves, rather than trying to help practitioners to come up with a set of CSFs that were applicable in a concrete MRP implementation project. The interviewees were not necessarily involved in a project either. Besides, they did not give practitioners any chance to come up with other CSFs based on their own experience beyond the eight CSFs in their study.

In our research we are trying to develop a generalized process that practitioners can use to come up with a set of CSFs they have ownership to. We do not want to impose them with a set of chosen general CSFs from literature for offshore development projects and try to turn these into project contextual CSFs through interviews. Rather, we should try our best to avoid leading them into what we thinks are critical success factors for their project. This approach will create ownership of the generated CSF among interviewees and avoid introducing bias from researcher.

Boynton and Zmud summarized the strength and weaknesses of CSF method in MIS planning, as [Boynton and Zmud, 1984]:

The strengths and weakness of CSFs

**Strengths**
1. Provide effective support to planning processes
2. Develop insight into information services that can impact firm's competitive position
3. Are received enthusiastically by senior management who identify with thrust of CSF concept
4. Serve as top level of structured analysis and promote structured analysis process

**Weaknesses**
1. Farther removed managers are from senior position within organization, the more difficult it is for them to identify meaningful organizational CSFs
2. Managers not involved with strategic and tactical planning can experience difficulty in dealing with conceptual nature of CSFs
3. It is difficult for certain managers to ascertain their information needs using only CSFs.

**Figure 2-10 The strength and weakness of CSFs [Boynton and Zmud, 1984]**

The whole study was based on interviews. They pointed out the importance that analyst using CSF method has thorough understanding of the organization, since the dialogue between the manager and analyst determines the quality of the CSF effort. Conducting CSF interviews on multiple levels of the organizational hierarchy could enhance planning efforts. These recommendations are in line with what Bullen and Rockart [Bullen and Rockart, 1981] recommended and we followed these suggestions in our study. Project core team represent a minimum multilevel management group that represent a complete cross section of all major functional areas in a project. The importance of this management group for project success makes it even more interesting to pinpoint just this group for our study.

They concluded that while CSFs could be used to arrive at specific information needs for *high-level managers*, lower-level managers might have considerable difficulty in defining specific information measures related to CSFs. CSF method needed other tools and techniques when attempting to translate CSFs into specific information needs for most managers.

They suggested a prototyping, as a means of product development in the effort of translating CSF into specific information needs. They used available information resources (e.g., microcomputer-based application generators) to develop prototype information systems. This process will need interactive cooperation between researchers and managers.

In offshore development projects, project managers are under general managers within a business area in Statoil. They are not involved in corporate strategy planning process. Their main responsibility is to develop and execute a concrete project that has already passed the feasibility study and been concluded to be able to contribute to company strategy with certain uncertainty. However the projects involve high capital investment, considerable complexity and last over several years. Project managers for these projects must be able to think strategically for the project too. We are therefore not so sure whether we are going to

encounter the same difficulty in translating CSFs into information needs; if we do, what kind of "prototyping" means we have in a field like project management.

Bergeron and Begin used CSF method as a way of evaluating the information available for planning and control activities in a multi-institutional health care arrangement [Bergeron and Begin, 1989]. This is an evaluation study that forms a decision foundation for whether the arrangement should exist in the future or not. They found large differences in management information needs in the team. They experienced difficulty in identifying performance measurements for the CSFs identified following pure CSF interview method. They could not be sure if this was due to the lack of confidence between researcher and managers under the evaluation study or managers really had difficulty in defining meaningful measures.

Questionnaire was used as an additional method for identification of measures after the CSFs have been identified. Bullen and Rockart said that there was no danger for leading interviewees in measure identification [Bullen and Rockart, 1981]. The questionnaire gives managers a set of tailored measures that could represent the identified CSFs, where they can judge the usefulness and availability of each measures. A positive gap between the measurements of usefulness and availability would indicate a need for additional information.

However Bergeron and Begin did not focus on discussing and reaching consensus on the measures. They knew that information required through a questionnaire is determined through the eye of the researcher and is thus the researcher's definition of information needs, not the managers. However information system design is not their research purpose. They just want to find out if important information for CSFs is available. Nevertheless using other tools than interview is an inspiration for our study.

The study compared two groups within the management team: the line and staff members. These two groups have different opinion on the level of usefulness of each CSF. In our research, we also try to see project core team from this angle.

Walsh and Kanter reported their CSF process in improving project management within an MIS organization [Walsh and Kanter, 1987]. The main purpose for this case study was to come up with specific advice on how the MIS department could improve the ability to develop applications in time and within budget. Although it was focusing project management issues, it was not a study to help one specific project. The process was shown in the following figure.
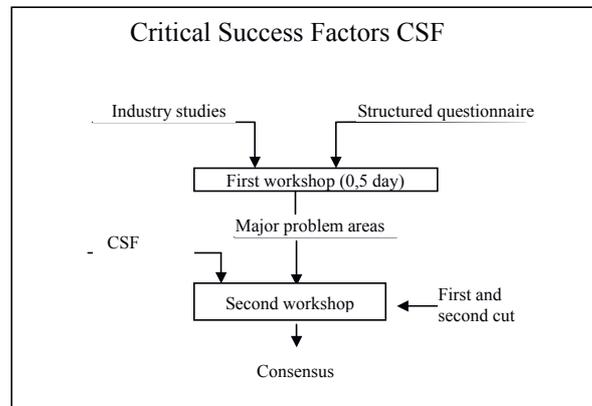
**Figure 2-11 CSF process for project success case study [Walsh and Kanter, 1987].**

They use two half-day workshops with all project managers from the MIS department. In the first workshop, the group managers focus on specific projects, articulating why project failed in the past and answer the questionnaire. They can also add additional responses out of the questionnaire. Then the results will be discussed. The second workshop focusing on what is needed to make project succeed. CSF way of thinking is introduced. Managers have their first cut of CSFs before they enter into a group discussion and come out with a second cut of CSFs, which is the final result for this workshop. The consultants analyze the results and came up with a set of CSFs that draw consensus. The result CSFs are reviewed with the development director, who makes corrections or adjustment before the result is presented to a management level above: VP at MIS department, who has assigned consultants the task.

The process stopped at a list of consensus CSFs for successful MIP implementation project for this company. An appointed task group made of persons that are recognized and respected in the organization for their experiences and knowledge will take the responsibility to identify specific actions for each of the resulting CSFs.

They report the process has improved communication, which is regarded as the most important reason for project failure. At the same time, the involvement of all managers in the process establishes focus on what issues the department should work on and prepares everyone to become more cooperative partner in forthcoming changes.

In addition to interviews, they use questionnaire in the first workshop. They have adopted terminology used in the department in the questionnaire. At the same time they offer the opportunity to have open discussions beyond the questionnaire. These are useful hints for our research.

This study promotes *consensus* CSFs. We also got ensured that team approach could really contribute to better communication because the CSF process offers a "formalized channel". However, we cannot see the significant value in using the first section to just prepare the managers for the CSF workshop. The results from the first and second workshop are quite similar. In our case, we are doing a research study, not an assignment from higher management. Project core team members in a real time project are already heavily loaded with project work and have different time schedules. They will not prioritize their time on a research project to be carried out by an analyst with no heavy industry experience. Two half-day workshops with a whole team are out of the question. Only individual interviews are flexible enough for this study.

York Freund describes CSF characteristics as those shown in Figure 2-12:

```
CSF characteristics [Freund, 1988]

•   Important to achieving overall corporate goals and objectives
•   Measurable and controllable by the organization to which they apply
•   Relatively few (5-10) in number--not everything can be critical
•   Expressed as things that must be done--not the end point of the process
•   Applicable to all companies in the industry with similar objectives and strategies
•   Hierarchical in nature--some CSFs will pertain to the overall company, while others will be
    more narrowly focused in one functional area.
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**Figure 2-12 CSF characteristics [Freund, 1988]**

He was the first one that pointed out specifically that CSF should be "expressed as things that must be done, not the end point of the process." One should not confuse CSFs with performance indicators. For example achieving 8% increase in new business is a measure of business, not a CSF, because it is not a description of things that must be done.

He also pointed out that CSF analysis was most effective when done from the *top-down* because CSFs alignment can be achieved.

As to CSF measurement, he pointed out that it should include both the measure (e.g. new business generated) itself and the standard against which success will be measured (e.g. 15% higher than last year). The presentation format should be based on the measure's ability to illustrate trends. There may be more than one indicator for each CSF or strategy. His studied an insurance company where many qualitative measures exist.

He summarized "what can go wrong" with CSF application as:
➢ Too many CSFs
➢ Incorrect CSFs
➢ Weak performance indicators
➢ Management frustration

He concluded using this top-down approach enables management to focus on the most critical areas and this whole process becomes an effective tool for *communicating* with and *unifying* the strategic approach of the organization. His study is at corporate level. We want to see this effect from CSF application in offshore development project environment.

Dobbins first pointed out that it was the process for CSF method application that could be generalized, not CSFs themselves [Dobbins, 2000]. In order to avoid the difficulty that lower level managers (compare to executives) having difficulty in identify meaningful CSFs, he argued that researcher should not ask managers directly what the CSFs were. Instead, researcher should help manager to think systematically and creatively in identifying critical activities by following predefined CSF categories, which were comprehensive. This CSF category is a main part of the CSF process model design. Researcher should then group these activities according to topic; check consistency and criticality of these activities for project success within each group and among groups. Give each group a title in form of activity[22], which became the identified CSFs. The activities in each group became constraints for their CSFs and measures would be identified for each constraint.

He developed the CSF process model for acquisition programs in the Department of Defense for the United States and manager at program level. This is the first time CSF process model was developed and the aim was to help one specific program, not a corporate organization. He also pointed out that CSF method and risk management were closely related to each other.

Only one individual program manager or deputy program manager was interviewed for each program he studied. In other words, it was personal CSFs for a specific program. These managers were on educational leave and participated the study voluntarily.

Program management is closely related to project management. However we assume that program manager is more used to conceptual and strategic thinking than project managers. Acquisition program is also large and complex, involving large capital investment with high technology and political influences. It lasts even longer than offshore development projects. We feel Dobbins' CSF process model is a good start point for CSF method application also in project environment.

## 2.3 Choice of CSF method over other management tools

Project is a temporary organization. Project manager was traditionally held responsible for executing a project within three clearly defined targets in terms of time, cost and specifications. However, these success

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[22] York Freund shared the same opinion [Freund, 1988]

criteria are changing and a project manager is given more and more responsibilities. They are getting involved earlier in a project life cycle, e.g. right after feasibility study in Statoil. They are responsible for project profitability, HSE targets in addition. Profitability is a life cycle concept and cannot be measured at production start. As we discussed earlier, client satisfaction is also part of project success criteria. Client can refer to project sponsors, parent organization and project product user etc. Therefore a project manager has many stakeholders to take care of.

A project manager is responsible for product delivery; yet not everything is under her control sphere because both internal and external factors can either influence her project legitimately or in terms of budget. At the same time, she has no ensured authority in the parent hierarchical organization, as a line manager has. She will have to learn to negotiate and learn to accept and maneuver in complicated political issues and networks to achieve her project goals, in addition to being technical and managerial competent [Pinto, 2000].

Offshore development projects are complex and information flow can be enormous if project manager could not focus properly. This focus must also be correct in order to bring her organization with her in the process towards the goals. Many project management tools have been developed: originally project control tools like WBS, network planning, earned value method; in the last 10-15 years, risk management has become well established among practicing project managers; Benchmarking are new popular tool after that. We can also see use of balanced scorecard in the recent years.

As we are interested in strengthening top-down project management and communication in a specific real time offshore development project, these methods have their merits and drawbacks.

WBS and network planning are the basic management tools for cost/budget and plan control. The tool offers a structure in projects so that one can measure progress in terms of earned value and evaluate project status by comparing earned value, actual value and planned values. Deviation in cost and plan could generate management focuses. However project management covers a wider range than just cost and plan.

Risk management consists of four distinct elements: risk identification, risk quantification, response development and risk control [Pinto, 2002, p24-26]]:

> ➤ *Risk identification*: isolate the set of relevant risks for any project to be taken. Until recently, the problem with risk identification was that management would address it in a haphazard or incremental

manner, responding to difficulties in an ad hoc way and making little effort to develop a standardized protocol for risk identification.

➢ *Risk quantification*: clearly isolate the various risks, including their impact factor or likely effect on project outcomes qualitatively or quantitatively. Regardless of the form of risk quantification an organization used, the logic of standardization is key. Risk assessment and quantification is only useful if it is uniformly applied across all projects and project teams conducting the analysis.

➢ *Response development*: employing sufficient contingency planning to be confident that problems, once encountered, will not be extensively damaging to the project's development. Contractual agreement with external clients and uses of resource reserves or supplemental allocation are often appropriate methods.

➢ *Risk control*: create formal protocols for future risk response. Control, in the form of feed-forward processes, allows companies to anticipate problems at the time development is beginning. The logic of feed-forward control is that it is forward-looking, based on a collective database of past project problems. "Lessons learned" case histories of past events need to be collected and disseminated.

We can see that risk management is very extensive. CSF method and risk management overlap each other, especially in identification. However, there are differences:

➢ The two methods have different emphasis on manager's role in it. Risk management involves everyone equally, at least identification phase. Risk elements tend to be dominated by technical risks issues or events, which usually stem from technical personnel or project control personnel rather than management personnel, and very little on organization, managerial or political risks.

➢ Risk management does not focus very much on goal definition, strategy alignment etc. which are typical management concerns.

➢ Risk management does not focus on status measurement on the areas of concern; assuming that when risk actions are carried out everything should be fine.

➢ Risk management focus on uncertainty, and usually on negative uncertainty in practice, and not on criticality for project success. Sometimes issues that will significantly influence project success, yet is organizational rather than technical, or important areas that need to be developed (e.g. encourage creativity, teamwork etc.) and thus showing no negative sign yet, or issues that are not completely under project control yet important, are neglected.

We feel therefore that CSF method can better fit for management tool. With CSF process model, we can also offer a standardized protocol for risk/CSFs identification, although at a high management level. CSF process model offers a complete top-down management process made of focusing, communicating, measuring and information identification and feedback.

Benchmarking has become a popular tool also for project management. The way of thinking is to learn from others through comparing with them, or the best. Benchmarking is not focusing in contextual influences, like Independent Project Analysis, Inc. (IPA)[23] says on its homepage:

> The analysis is empirically grounded and provides a fair, industry-wide benchmarking for assessing and comparing project results with a known degree of accuracy.

However, this study is not about comparing with other projects or imposing general project management best practice on a specific project. We limit ourselves to the project core team in a specific project and help them making explicit their management focus and communicate and monitor them. The produced CSFs are based on the experience, knowledge and capability of the project managers engaged in the project. Someone will have difficulty in distinguishing key performance indicator and CSFs. As pointed out by Freund [Freund, 1988], they are totally different. CSFs are some things one can do, not performance criteria. Although benchmarking is a useful tool also in project management (refer to Canadian research program IMEC for benchmarking of project control and projects), it does not fit our research interest.

Kaplan and Norton say: Many organizations espouse strategies about customer relationships, core competencies and organizational capabilities while motivating and measuring performance only with financial measures. An overemphasis on achieving and maintaining short-term financial results can cause companies to over invest in short-term fixes and to under invest in long-term value creation, particularly in the intangible and intellectual assets that generate future growth [Kaplan and Norton, 1996.

Balanced scorecard (BSc) offers a very powerful tool that translates strategy into specific objectives, measures and targets and monitoring the implementation of that strategy during subsequent periods. It is a top-down management tool. It includes four sequential perspectives[24]:

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[23] A well-known consulting firm doing benchmarking studies for offshore development projects

[24] The four perspectives should be in this sequence if one makes strategy based on strategic position rather than core competencies/capabilities-driven. In the later case, the customer and internal business process should be interchanged.

> ➢ Financial,
> ➢ Customer,
> ➢ Internal business process, and
> ➢ Learning and growth

While financial benefit is the final goal and the bottom-line proof that other measures in other perspectives are effective, strategy must be established through measures and drivers in the other three perspectives to achieve the financial goals, so that both short-term financial benefits and long-term growth are balanced and ensured.

The objectives and measures in these four perspectives are linked, consistent and mutually reinforcing through perceived cause-and-effect relationships. A good Balanced Scorecard should have an appropriate mix of outcomes (lagging indicators) and performance drivers (leading indicators) of the business unit's strategy. Leading indicator servers as early indication about whether the strategy is being implemented successfully.

However, BSc is a management tool at strategic level. "Balanced Scorecards are best defined for strategic business units. An ideal strategic business unit for a Balanced Scorecard conduct activities across an entire value chain: innovation, operations, marketing, distribution, selling, and service [Kaplan and Norton, 1996, p36]." It is also a combination of short-term and long-term goals.

In our study, we are aiming at project managers for offshore development projects. They are not dealing with corporate strategic issues. They are working at tactical level, responsible for carry out a concrete project whose objective is aligned to the corporate or business unit strategy.

Balanced Scorecard is a framework incorporating short-term and long-term goals together. However project organization is temporal with short-term goals. In case of project contribution to business area's long-term objectives, this must happen by that business area establishes proper motivation and measuring mechanism for project organization, which is outside project manager's responsibility.

In addition, offshore development project does not cover a complete value chain. It involves only investment. Although it is project manager's responsibility to choose a design that ensures the best profitability on a life cycle basis, the project organization will be dissolved at production start before income comes in. The cost and time targets are also just best estimates. Final project success in financial terms could be quite different from the achievement of time and cost targets for offshore development projects.

The four perspectives: financial, customer, internal business process, and learning and growth are not that relevant for project management of an offshore development project without considerable modification. For example, the project is task oriented. Although higher competence improvement among the project participants will benefit the company in the long run, project will not have incentive to put extra effort in using financial resource for this purpose, at least if they are not measured in this aspect by higher management. This is why project organizations just require experienced and competent personnel.

At the same time we feel that project is more dynamic than business unit strategic implementation process and should thus be more closely related to risk management than strategic implementation. We also want a tool that is simple and easy to use and fits the manager's way of thinking. We feel therefore that CSF method is the best method for our research interest.

# 3        Research Goals, Method and Design

*"The demands of a case study on a person's intellect, ego, and emotions are far greater than those of any other research strategy. This is because the data collection procedures are not routinized.... a well trained and experienced investigator is needed to conduct high-quality case study because of the continuous interaction between theoretical issues being studied and the data being collected. During the data collection, only a more experienced investigator will be able to take care of unexpected opportunities rather than being trapped by them--and also to exercise sufficient care against potentially biased procedure"*

[Yin, 1994, p55]

## 3.1    Research objectives, questions and process

In line with research purposes presented in 1.3 Research purposes, approach, context and scope, this research has the following objectives:

1) Is there a need for structured and documented top-down identification, communication and monitoring of management focus?
2) Can we develop a generalized process model to meet such need if the answer to the first objective is confirmative?
3) Can we show that such a model has the desired benefits through its application in real-time Statoil offshore development projects in Norway?

Based on these three research objectives, we developed four research questions, see Figure 3-1 The four research questions in this study.

The first research question intends to demonstrate that if there is a need for a top-down management tool for identification, communication and monitoring management focuses, which is corresponding to our first research objective.

The second research question describes the characteristics of the CSF model we further developed in this study. We present the model in the next chapter. This corresponds to the second research objective. The benefits of such a generalized CSF process generating contextual CSFs over the general CSFs were discussed in the preceding chapter.

Research questions 3 and 4 describe the expected effects from the application of this model and we demonstrate their existence in two real time projects. They correspond to the third research objectives.

We can show that we have reached our research objectives if we could answer confirmatively to these questions.

<div style="border:1px solid black; padding:1em;">

The four research questions in this study

1. Does senior management (project core team) need anything more or better than what existing monitoring and control tools can give them today in Norwegian Offshore Development Projects to achieve project success? (Corresponding to research objective 1)

2. Whether a CSF process model can be used as a *generalized* method for explicit CSF identification, analysis and monitoring of *contextual* CSF, based on managers' *personal* intuition and skills in Norwegian Offshore Development Projects? Manager in this study is at project core team level. (Corresponding to research objective 2)

3. Whether the CSF process model can be used to determine if there exist consensus *team-CSFs*, which must be accomplished through the project core team working together? (Together with research question 4 correspond to research objective 3)

4. Whether a CSF process model can be used as a *tool* for management focus *communication* among different levels of management (vertical communication) and among management at the same level (horizontal communication)? (Together with research question 3 correspond to research objective 3)

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**Figure 3-1 The four research questions in this study**

As pointed out in preceding chapters, we do not have the ambition of establishing a management information system for the projects concerned. Every new tool needs time to be accepted and proper measurement for such dynamic environments as those in projects may need more academic research. We feel that, at this stage, acceptance of CSF way of thinking and clear identification and communication of management focus should be in focus.

The total research process is described in Figure 3-2 Research process. Initially, we wanted to investigate which of the following could predict project result better: 1) the traditional project control tools or 2) the project evaluation schemes (PEVS) developed by Andersen and Jessen [Andersen and Jessen, 2000] for Norwegian projects. Development of PEVS is inspired by the Project Implementation Profile (PIP) developed by Pinto in 1986 and is adjusted for the Norwegian project climate. Both use survey method. The questionnaires cover all aspects that are believed to be important for reaching project success. A project gives itself scores in these aspects. The logic is that a project can predict its result by comparing its scores to the average of a large number of projects: A project should pay special attention in the aspects where they receive a score lower than the average.

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┌──────────────────────┐          ┌──────────────────────┐
│ Personal experiences │ ◄──────► │ Talks with practitioners │
└──────────────────────┘          └──────────────────────┘
              ┌──────────────────────────────┐
              │ Preliminary literature reviews │
              └──────────────────────────────┘
                            ↓
              ┌──────────────────────────────┐
              │      Research direction        │
              └──────────────────────────────┘
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              ┌──────────────────────────────┐
              │  Directional literature review │
              └──────────────────────────────┘
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     │ Research questions │ ◄──► │  Research method  │
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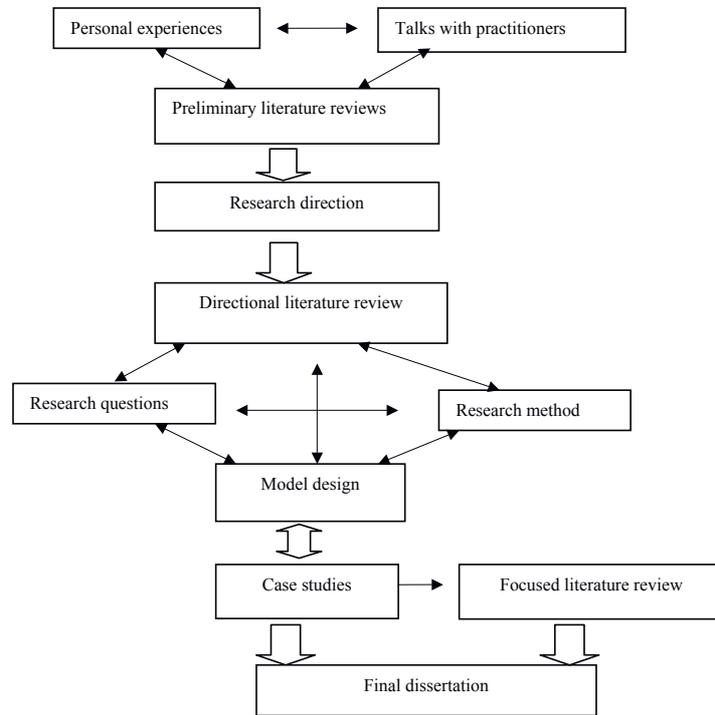
**Figure 3-2 Research process**

However, we find some limitations with the method. One of them is the distance to practitioners. Different individuals can understand survey questions differently and questionnaire does not allow exchange of ideas. The average scores to be compared with and the analysis process appear like a "black box" for practitioners. It is therefore difficult for practitioner to judge if the result is valid for their specific project. In other words, they do not have enough control to feel comfortable to use the results. Another limitation is that PEVS does not differentiate projects in different project phases. This may give unreliable data for early phase projects because they have not started working in the aspects typical for later phases yet. We have discussed the strength and weakness of this method in Chapter 2 Literature review .

At this stage, literature search is relatively broad. Project performance, project success, project management success, project management, performance measuring, critical success factors etc. are the important key words we use in the preliminary literature searching. The literature shows the connection between corporate management and project management. At the same time, we know it is project management we are to focus in. Balanced scorecard, benching marking, knowledge management, learning organization, management by projects, etc. are some of the key words that appear gradually. We also collect project reports on their CSFs, especially in petroleum industry.

Dobbins's ([Dobbins, 2000]) work on generalized CSF process model seems to solve the limitations mentioned for survey method. We trace back to the origin of CSF method [Rockart, 1979]. The method was initially designed to help executives define their management information needs themselves rather than relying solely on traditional functional reporting. We compare this with project situations:

Project performance, individual's motivation and satisfaction with project work depend very much on good information flow, including correct focus and understanding of project totality. Much bottom-up reporting is standardized for all projects, for example reports in progress, cost and prognosis. However, extend of top-down "reporting" in projects varies a great deal, and unfortunately tends to be very limited. Many project managers think that definition of goals and responsibilities are all that is needed. Each individual is responsible for getting the information she needs. Project tends to be very task-oriented and not all project managers spend enough time to consider all aspects of project management beyond goal definition.

Many practitioners also agree that it is challenging to push for a common understanding of what is the most important/critical for the project at each time. Risk register is a tool in this direction. However, inherent for any bottom-up method, not all team members feel the same ownership with "other's" risks. In addition, risk register does not cover all management focuses at each time, as we can see from the case studies later on.

Because this aspect of project management is complicated and very little formalized, one can either use verification to control its quality. Company project execution model describes what is required from a project in forms of products and activities. It does not explain why and how. Project managers are left to themselves to find out and only the project result will tell how well they have managed.

We felt the need to strengthen top-down communication and monitoring of management focuses in projects. We also wanted to develop something practitioner can use. CSF method seems to fit this purpose well, although it was originally for *corporate* management.

Later applications of CSF method are mainly based on survey method or summary of CSFs for completed projects. We find no readily made tool for using CSF method in real-time projects and in their process towards the goals. However we feel that development of a generalized CSF process model proposed by Dobbins is on the right track, although it is for program level managers on individual bases and not based on real-time project. We decide to further develop Dobbins's model and adjust it for Norwegian offshore development projects in Norway and test the model in *real time* projects to come closer to practitioners.

By now we could focus more in CSF method in literature study and start on formulation of research questions, choosing research method and further development of the CSF process model for our study environment. We want to give managers full control over the process and result when using the model. We aim at project core team, which is the top management group for a project. The result from this model should be contextually CSFs that are directly relevant for the project studied.

We further develop Dobbins's CSF process model in several aspects:

1) We introduce *team* CSF and aim at using CSF process to promote communication and ownership of project management focuses, not just helping an *individual* manager to explicitly identify what is critical.
2) We introduce interview questions to find out manager's understanding of project environment. We regard this information as important to properly understand the managers' "perspectives" behind the CSFs identified and team work dynamics.
3) We adjust the categories for CSF information collection to the Statoil organization.

We also define the criteria for judging if the CSF process model passes the tests or not through answering the research questions 2 to 4 [Yin, 1994, p21]. We choose to use multiple-case study as the main research method.

## 3.2  Why semi-structured interviews and multiple-case study

This is a development in two steps. First step: we discard the survey method in favor for interview method to come closer to practitioners. With interview method, we have chosen to go deep rather than broad. At the same time, we are developing a generalized CSF process model that should have the necessary application generality. Here comes the second step: we use multiple-case study based on analytic generalization [Yin, 1994, p10] rather than statistic generalization (enumerating frequencies). Cases are chosen to best represent the research domain: project management of Statoil offshore development projects in Norway. We explain these two steps in detail in the following text.

### 3.2.1  Semi-structured interview

J.K. Pinto is one of the pioneers in applying CSF method in project management. He developed the Project Implementation Profile (PIP) [Pinto, 1986]. He used survey method that has become the most commonly used method for CSF application in project management. Survey method is mostly used in research questions concerned with prevalence. It is possible to analyze a large number of projects through this method.

We used the survey method comparing project management in Norwegian and Chinese projects and found several interesting phenomenon [Andersen, Dyrhaug, Jessen, 2002]. However during the process, we also realized the limitations of survey method in developing a tool that can give practitioners contextual results and academic insight in real time projects.

One limitation with survey is the reliability of the data due to lack of direct contact with respondents. We know that it lacks a common terminology in project management discipline [PMBoK, 2000] [PS 2000 summary, 1999]. Questionnaire does not give respondent a chance to give a nuance to his/her answers. We suspect that there is a fair chance that respondents understand some of the statements in questionnaire differently from questionnaire designer.

A practical example from PS2000 summary report confirms this: Respondents were asked to rank the relative importance among the nine project management competence areas [PMI, 2000]. Survey questionnaire was used first and then interview. Procurement and communication received much higher ranking in interview than the questionnaire shows! The "soft" aspects related to human, communication and leadership etc. are difficult to describe in a few words. The respondents may answer in the way they understand the statement while the author may express something different. There is no way for double check in questionnaire.

Another limitation is the possibility to learn from the practitioners through lively exchange of ideas through interviews. The educational effect on us and hopefully also on practitioners are obvious in a practical field like project management. The team-based approach also stimulates communication among project participants.

The last limitation is the somewhat mismatch between survey method and our research questions and general research intention. We want to develop a tool that can be used by practitioners in real time projects. We want to focus on project specific CSF that are directly relevant for the project involved. At the same time we want to develop a generalized tool to realize this. The tool should serve as a framework to identification and management of CSFs in project, yet without limiting user's creativity. We can get the comments from the case study participants on the tool and improve it gradually and continuously. We look further to see what kind of interview is best for our research.

There are three types of interviews [Ghauri et al. 1996, p65]:

Survey research interviews: a standard format of interview used with an emphasis on fixed response categories and systematic sampling, and

loading procedures combined with quantitative measures and statistical methods.

Unstructured interview:  the respondent is given almost full liberty to discuss reactions, opinions and behavior on a particular issue.  The interviewer is there just to give lead questions and to record the responses in order later to understand "why" and "how". The questions and answers are unstructured and are not systematically coded beforehand.

Semi-structured interview: topic and issues to be covered, sample size, people to be interviewed and questions to be asked have been determined beforehand.  It is designed to minimize bias.  Bias arises from the sequence in which we address subject matter, from any inadvertent omission of questions, from unrepresentative sampling and from an uncontrolled over- or under- representation of subgroups among our respondents.

Ghauri et al. further point out "the advantage of in-depth interviews (the last two types) is that we can have a more accurate and clear picture of a respondent's position or behaviors. They are suitable for exploratory or inductive types of study.

The interviewer can probe the manager through questions to help draw out information they have but which would not otherwise be expressed. However this probing is not coaching, but rather questioning to elicit information already part of the knowledge base of the manager.

The disadvantage of in-depth interview is that it demands [Ghauri et al. 1996]:

1) A skilled and cautious interviewer. The interviewer should have a complete understanding of the research problem, its purpose and what information he or she is looking for. The course of the interview is decided by the skills of the interviewer when asking questions and probing further with supplementary questions.  The know-how and skills of the interviewer are thus of the outmost importance.
2) Interview can also take a long time, and may require several interviews with the same respondent.
3) In addition, interviews are also difficult to interpret and analyze

We chose to use semi-structured interview. In addition to the benefit of minimizing bias with this type of interview, we can also incorporate the theoretical background on CSF theory, experiences from earlier CSF interviews reported in literature, project CSFs reported in literature, project management body of knowledge and personal experiences in the questions in the interview design. The topics and issues to be covered are pre-determined. Yet we are not to follow the questions under each

topic mechanically like in a survey. We have the chance to ask additional questions based on interviewee's responses as long as they are within the scope of the topic being discussed. We interview only project core team and no more.

The development of the semi-structure interview questions is described in the next chapter. In the following we will explain why multiple-case study design is chosen for our research.

### 3.2.2 Multiple-case study

Methodologically, Yin sorted different strategies like experiment, survey, archival analysis, history and case study according to their characteristics in three conditions:

a) The type of research question posed,
b) The extent of control an investigator has over actual behavioral events, and
c) The degree of focus on contemporary as opposed to historical events [Yin, 1994, p6].

Yin concluded that all the research strategies mentioned above could be used in *exploratory* research questions, which is the case for our research questions. If in addition, investigator has no control over the actual behavioral events, and that the focus is in contemporary rather than historical events, only survey, archival analysis and case study remain as proper strategies.

We have discussed earlier the limitations of survey method for our research purpose. Comparing archival analysis and case study, archival analysis will not involve actively communication with people, who are the main information source for our study. CSF is meant to be a tool that can help project managers to clearly identify their management focuses and then communicate to others in the project. We are also arguing that such focus is not properly documented in project yet. It is therefore only logical to choose case study as a research form. Yin further pointed out the following that confirms the correctness of our choice:

…The distinctive need for case studies arises out of the desire to understand complex social phenomena. The case study allows an investigation to retain the holistic and meaningful characteristics of real-life events (p3)."

…The case study's unique strength is its ability to deal with a full variety of evidence-documents, artifacts, interviews and observations (p8)."

Project management in real time project is complex social phenomena that involve technical, economic, organizational, physiological, ethical and political aspects. We are also to use variety of evidence in our study to answer our research questions.

By now, we are quite certain that case study is the proper strategy for our research. Then it is the question how we are to demonstrate application generality of the CSF process model we develop. The analytic replication in multiple-case study shows us the way: by choosing cases that represent largest possible diversion in our application domain. In the following we will describe how the cases are chosen for ensure this analytic replication.

## 3.3 Case study design

In this chapter we are to talk about why case1 and 2 are chosen, unit of analysis, scope of data collection, case study/interview process, data analysis and evaluation and criteria for judging if CSF process model meets the design purpose.

### 3.3.1 Choice of cases in this study

Statoil-operated ongoing offshore development projects in Norway are context or test domain for this study. There are several reasons for this choice:

Application of CSF method requires that one knows the company strategies, organization structure to which the study object belongs and general company practice in project management, in addition to general macro environment for the industry concerned [Bullen and Rockart, 1979]. Company strategy may be sensitive information for outsiders. Getting enough knowledge of the organization structure and company practice may also require some time and energy due to administration procedures for access and the pure information amount.

Being an employee in Statoil, the sensitivity problem will be difficult to overcome. What is more important is that the time, money and energy spent in overcome these practical obstacles will give secondary[25], if any, research value because the structural parameters like company strategy, organization structure and company practice in a case design all exist in Statoil projects. In other words, choosing projects in other companies gives no larger application domain than that Statoil projects can demonstrate when CSF method is concerned. It is therefore quite sufficient to only use Statoil projects. The same logic explains why other types of projects and projects in other geographic locations are not chosen for this study.

At the same time there are obvious benefits of choosing Statoil projects.

First, Statoil is a petroleum and energy company with its main activity in Norway (Statoil has 95% of its business in Norway). The company has a

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[25] One can best argue that it will increase the application domain of the CSF process model. However, we have to demonstrate that the tool works first.

dominant position in Norway offshore industry (Statoil has the majority of operator-ship for offshore development project present on-going and in the future in this geographic area).

Second, with several ten-years of development in Norway, Statoil has gained massive experience and many competent project managers in managing field development projects in Norway.

Third, Statoil is a project-oriented company, with several projects on going.

Fourth, Statoil is active and positive in developing more effective technology and methods.

Finally, expansion into international market, also in the field development part of it business, will impose an even greater challenge in terms of effective project management where communication quality is essential. All of these will make it more likely that Statoil projects accept this research project.

In the following we are going to explain further how and why projects in case1 and 2 are chosen for our research.

We choose one project in early planning phase (after decision to start project planning and before provisional project sanction) and the other in the middle of construction phase.

All the project managers we have talked with said that managerial challenges in project early phases (early screening, concept) and execution (with approved PDO) phase are quite different. With huge capital investment typical in offshore development projects (in billions of Norwegian kroner), project management in both phases is challenging and critical. Project early phase is full of surprises and there is no established project management recipe in this phase, although everyone agrees efforts in early phases have most significant impact on the final project success--the importance of front-end loading.

The situation in execution phase is quite different. Managers in this phase are heavily loaded by the pure amount of information and activity and decision intensity in a large project organization is extremely high. Although it seems overwhelming, management systems and tools are well established in this project phase and well documented in textbooks. In this study, we are to further develop and test a management tool. It is therefore only correct to represent these two types of management challenges in our study. This is the main dimension for variation, while the traditional variation parameters like size of investment and types etc., are secondary variations.

The capital investments in the two projects are relatively large and medium according to Statoil definition. Yet both are billions of Norwegian kroner. We try to vary the type of project within offshore development projects by choosing one with Reservoir and the other does not. One comes from Statoil upstream business area while the other comes from Statoil downstream. One is a pure Norwegian project while the other is a Norwegian project that has to adapt to regulations from other countries.

### 3.3.2   Units of analysis, study proposition and limits of data collection

We have mentioned our research questions in 3.1 Research objectives, questions and process. We will now better define what our "case" is through definition of unit of analysis, study proposition, which determine the limits of the data collection and analysis.

We use multiple-case study design to test the generalized CSF process model developed in this research. The unit of analysis in the case study is the project core team in the projects chosen.

Project core team is the highest dedicated project management group for a project. It has two vertical levels: project core team manager and the rest of the core team, responsible for sub-projects or functions. The core team, or more specifically the core team manager, is responsible for the project totality.

Study proposition direct attention to something that should be examined within the scope of the study. Our proposition is two folded:

1) We want to study if project management focus based on project totality is clearly defined, communicated, measured and managed within this management group because they are the highest level of management. If what we want to study does not happen within this group, there is no chance that it will happen lower down in the project organization. This corresponds with the first research question.
2) We want to see if the generalized CSF process model can help a core team to achieve this. We develop the CSF process model for the offshore development projects in Norway and then use the rest of the three research questions to answer this study proposition.

With unit of analysis and study proposition clearly defined, the limit of data collection is also determined. The main information sources are individual interviews with project core team members.

The nature of CSF process model requires that interviews knows as much as possible about the industry, the company and the project to be able to follow the interviewee's statements and ask good questions. Useful information sources for industry and the company are articles in newspaper and company intranet. For the project, it is important to read

the project governing documents, like decision notes at major decision gates, project execution plan (PEP) and Plan for Development and Operation (PDO). Important project databases like risk register, CT meetings and change control can also offer relevant information. However it is important to keep conscious about what kind of information that can help us asking better questions and can contribute to answer the research questions. Otherwise we will tend to collect "everything" from "anybody", which is impossible to do or analyze. This is why it is important to be very clear all the time on our unit of analysis and study propositions, in addition to our research questions.

### 3.3.3 Case study process flow

We spent quite a long time to clearly define the research questions and worked hard on preparation of case study protocol before we started actual case study. We then prepared *letter to interviewees* summarizing the research purpose, scope, product, case study conditions etc. (reference to Appendix). Both practitioners and supervisors reviewed this document. We made a budget for the study and applied for financing. We have also chosen the Statoil headquarter in Stavanger as the best location for all case studies taking consideration of the constraints like money and time available, availability of office facility, project and external expertise to give the research the best chance for success.

We can summarize the rest of the case study process in
Figure 3-3 Case study process.

We followed the same analytic process described by Dobbins to come up with project CSFs except that we also introduced *Interviewee's perspective* part of interview. Impartial interviewers guide managers to identify CSFs by first identifying all elements of importance related to each of the eleven CSF categories in addition to answers related to interviewee's perspective, then group all related items of information by topic, check the information gained for consistency and criticality both within group and between the groups (confirm with interviewees if necessary) and then identify the CSF for that topic in terms of an activity [Dobbins, 2000].

We used an improved format in CSF presentation in case2 while case1 used the same format as Dobbins. The new format consists of three parts: why, how and measures. The why part of each CSF will give the project context/situation that argue for that CSF is critical for reaching the project final goals. This is aimed at communication effect so that project personnel find themselves in the description and understand the criticality of the CSF. The how part is the actions that can be taken to ensure that project performs well in this CSF. Dobbins does not clearly distinguish *why* and *how* part. Measures describe the way to measure and thus give a status for the project performance in this CSF.

Project is ensured of information confidentiality between the core team and the researcher. Publication of result will be anonymous.

**Figure 3-3 Case study process**

| | |
|---|---|
| | |

Gather info. about the industry, organization and strategy

Define case selection criteria ⟷ Review of available projects

Gaining access to the case

Gaining access and review project info.

Research questions

Research design,

Interview techniques

CSF theory

Interviews with project core team individually

Preliminary project CSF result after CSF process model

CT manager review the preliminary result

Revision1

CT members review the revised CSF result

Revision 2

CT group review

Revision3 and final report

Multi-case analysis and result

Review by the core team manager in each case and revise

Final report

### 3.3.4 Data analysis and the way research questions being answered

In order to test the effectiveness of this CSF process model, we asked four standard questions:

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> **Four evaluation questions on CSFs generated from CSF process model**
>
> 1. Are all of your CSFs included in the results?
> 2. Do you regard all the listed CSF as project CSF?
> 3. Do you think that it is helpful in making these CSF explicit and make them available in clear text so that they are clear for everyone?
> 4. Have there been any changes in CSF since the last interview?

**Figure 3-4 Evaluation questions on CSFs generated from CSF process model**

CSFs will be the "absolute" CSFs for the project if the CT members answer confirmatively to the first two questions. The 3rd question is to ask for interviewees' direct impression of the CSF process. The last question is to see if the CSFs will be more stable than risk elements, especially those that are task or event-oriented.

We have four research questions. These questions are to be answered by investigators, not interviewees, through data collection and data analysis.

Answers to the first research question will show such a tool like CSF process model is need in real time projects. When management focus is concerned, risk register will quickly turn up with many practitioners. This is good sign that risk management has its established position in projects already. Now that we are focusing at core team level, we will use the top-ten list at this management level as a data set in analysis.

In order to show that CSF process model can help managers make their management focuses explicit in a systematic way, we ask the managers what their management focuses are for the whole project at the beginning of the interviews, so that we can compare this direct answer with the CSFs after the process model. They are the other two data sets.

We can then compare these three sets of management focuses for the project. In case1 we have also compared CSF result with the management parameters defined in project execution plan because they are claimed to be the management focuses by the core team manager. We can then discuss what the CSF process model can contribute with regard to definition and communication of management focuses. In the process, we touched the documentation and measurement of management focus in a project. Without documentation and measurement, one will doubt how the focused are measure and managed. This is what CSF process model can offer.

This study introduced team-CSF because team effort is one major characteristic for a project work. Earlier application of CSF method focused mainly in helping on individual manager in identifying his management focuses and information needed. We want to show that team has much to contribute to the CT manager. Besides, management focus will have it full power if the team has ownership to the management focuses and this does not happen without involvement of

the team. As many practitioners know, it is very challenging to get everyone understand what is the most important at each time.

In this study, we compare the CSF results based on the whole CT input and reach the consensus on this result before we compare with the CT manager's input. We can than have a clear idea what the CT can contribute and how much more effort the CT need to reach consensus CSF with better ownership among CT members. This is how research question 3 is to be answered.

We also asked for direct impression by interviewees on communication effect from the 3rd evaluation questions mentioned at the beginning of this section. We observe also the changes in interviewee's project evaluation in the CSF process. The difference between the individual input and the final CSFs everyone agrees with is also a proof for communication.

Through the multiple-case study design based on analytic generalization, the gaining the results in both cases, we can demonstrate the application generality of the CSF process model.

For more detailed description for how the research questions are answered, please refer to Case Study Protocol in Appendix.

In order to show why we regard project managers need a tool for contextual CSFs, we can compare the CSFs identified in the two cases with the general CSF for the corresponding project phases in the literature.

We can also compare the two cases and see if there is any CSF that will continue to be critical throughout a project lifecycle.

Changes in why- and how-parts may indicate that some CSFs become obsolescent. Managers need be prepared to go through the analysis process routinely to include new CSFs.

We also find that CSF process model can serve as a good channel between insider and outsider, practitioners and academic. This is quite valuable now that project management is very complex and practical and in larger degree than before we see a disconnection between practice and research in this field.

## 3.4 Research design validity and reliability

Yin wrote the following about case study:

"A research design is the logic that links the data to be collected to the initial questions of a study [Yin, 1994, p18]."

This study is an exploratory multiple-case study. Three tests for quality of research design are relevant: construct validity, external validity and reliability.

**Construct validity**: establishing correct operational measures for the concepts being studied [Yin, 1994, p33]. The case study tactics to achieve construct validity are: use multiple sources of evidence; establish chain of evidence; have key informants review draft case study report.

In this study, we used several sources of evidence: individual interviews with core team members so that they serve as different sources of evidence among them, project governing documents like Project Execution Plan (PEP), Plan for Development and Operation (PDO), project decision gate memorandum and project risk register. These different sources of evidence converge on the same set of facts.

We have established chain of evidence by describing explicit links between the research questions, the data collected and the conclusion drawn in the Interview Protocol.

We have also had interviewees reviewed the CSF reports before final presentation.

**External validity** is defined as establishing the domain to which a study's findings can be generalized. Case study tactics for this validity is to use replication logic in multiple-case studies.

We chose two cases that represent totally different challenges in project management according to practitioners: one from project early phase and one from execution phase. They are like two experiments that represent the application domain: management challenges in Statoil offshore development projects in Norway. In addition, the two projects come from two complementary parts of Statoil business area: upstream and downstream with different project contextual challenges. The size of capital investment for these two projects is respectively large and medium. We show that the generalized CSF process model can be applied in both cases.

**Reliability** shall demonstrate that the operations of a study--such as the data collection procedures can be repeated, with the same results. Case study tactics used in this study is to use case study protocol, where we describe research purpose, research questions, data collection procedures and chain of evidence. We have also kept record of interviews on minidisk, made transcripts of these interviews and made notes on comments and thoughts underway.

What we have to point out here is the use of case1 as a valid case study although it was originally intended as a pilot case.

The aim of this pilot study was to gain interview experience and to test and adjust CSF process model design to ensure best data collection stage. The original case study design was to have group interviews for CT staff members. We changed this to individual interviews to fit in their busy schedule. This change was also implemented in case2. In case2, we ran both "Interviewee's perspective" and CSF categories in one interview rather than in two interviews as was done in case1. This was also a practical adjustment because it was possible to do so in case2. We used the same structural design (major topics) in both cases. We therefore feel it satisfactory to use this pilot case as a valid case.

We used management parameters defined in the Project Execution Plan (PEP) as additional evidence because CT manager claimed them as part of his management focuses for the project. Not all projects have established PEP yet, like in case2. It may either be true that all projects use PEP as an active management tool, which is a real phenomenon known for practitioners. It is important to ask interviewees where the management focuses are documented and adjust to project situation in each individual case.

## 3.5 Strength and weakness

Recognizing differences between a corporate environment and project environment, we developed this CSF process model. It gives project manager a tool to clearly identify the most critical areas of activity. It fits the way a manager at high management level thinks. Involvement of core team in the process will increase the understanding among the team members on CT manager's decision criteria (management principle, strategy and focuses) and thus give them a chance to challenge or compromise and then commit to them in terms of their actions. The whole team will then have a better chance to move in the same direction and to the right direction.

The model includes several important aspects of project management that are not always explicitly discussed: project success criteria, strategy alignment, goals definition, personal performance criteria and thus touching the motivation and incentives behind actions taken. The model will give project a chance to look at their organization, performance evaluation etc. that may be soft yet significant.

The method is thorough, including all aspects that could significantly influence the project success, hard and soft, quantitatively measurable or not. This will avoid project focusing only on certain "typical" problems and forget about what are most influential to project success.

The method is also relatively time effective when project management time is concerned. The time used may also strengthen the relationship among the core team members.

The tool also offers a channel for learning and training between the practitioners and academic. Who learn and who teach will depend on the competence the two parts have in each application of CSF process model. However, in most cases, both will benefit through this process.

One of the weaknesses is the dependence of the desired skills of the investigator in two areas, which is intrinsic for all non-mechanical evaluation process.

1) The investigator, with engineering background, had no significant experience in interview techniques before the case study. The only form for preparation was to review literature on interview techniques, especially the literature in carrying out CSF interviews. The investigator was very conscious about the interview techniques in the first case (22 interviews) and it went much better in the second case (16 interviews). Within the time frame for a dr.ing study, it is not possible to carry out many more interviews with the aim to improve interview techniques. Although lack of experience in general interview techniques on the investigator's part is an obvious minus, this is compensated by careful design of case study with regard to chain of evidence so that investigator knows where the limit for data collection for this study is and the measures to avoid typical mistakes in interviews like "leading" questions in interviews.

2) The investigator's limited experience in project management. Better experience in project management will help investigator to better absorb the interview material and improve the process in CSF generation. The investigator tries to compensate for this by doing a thorough investigation of the industry and the project as possible, talking to other experienced project managers beyond the case study participants, keeping a desire to learn and do the interviews with an open mind, in addition to literature study.

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# 4         A generalized CSF process model

We introduced *team* approach to the CSF model because teamwork is a prominent characteristic for a project, especially in offshore development projects we are look at.

In a project environment, the decisions are in principle made according to managers' given authority although managers will try to hear different opinions. Decision-making is not a democratic process. Project core team leader has the highest authority in a project organization.

The theory about time orientation and project management says that project manager brings into an organization her basic orientation toward the past, present and future, called temporal alignment[26]. Different project managers will have different set of temporal skills[27] because of their temporal alignment [Thoms and Pinto, 1999]. At the same time different tasks require different temporal skills. We know that projects represent a series of complex or interrelated activities requiring that attentions be paid to multiple operations in various stages at the same time. A project manager will need most of the temporal skills although they are not all critical at the same time.

By applying team approach we can not only make a project management group complement each other in the technical knowledge and experiences, but also in the leadership aspect as we mentioned above, as long as core team leader and her team alike have reasonable insight in individual's strength and weakness and be open-minded.

Manager's main task is to lead her team toward common goals. It is therefore quite logic to say that *communication* and *acceptance* are equally important as identification of management focus in a project. Involvement of the team is a good measure to achieve this. Dobbins's work is based on one individual program manager or deputy program manager for each program. In order to facilitate communication, we have also introduced new format for CSF presentation: why, how and measurement.

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[26] Temporal alignment comprise a number of cognitive elements like timeline orientation, future time perspective, time span, polychronic / monochronic preference and time conception [Thoms and Pinto, 1999, p20].

[27] Temporal skills are specific past, present and future time-related skills and ability needed by leaders to perform specific tasks. [Thoms and Pinto, 1999, p21]

We also regard it important to introduce a section to get insight into how managers view their "world". We believe that this perspective is the driver for why managers have the focus they have and their actions. It is also important to understand the dynamic within a team. We have therefore introduced "Interviewee's perspective" in the CSF process model.

We have also modified the CSF categories to better fit the Statoil offshore development projects.

As we can see later on in data analysis, through this further development and adaptation of CSF process model, we have established a channel between project "insiders" and "outsiders" and between "practitioners" and "academic", whose connection seems to be somewhat broken.

In the following we will describe in detail the further development and adaptation we have made. The semi-structured interview design is made up of two parts: interviewee's perspectives and CSF categories.

## 4.1 Interviewee's perspective

This part of interview covers questions in four areas:

1) Interviewee's perception of his job,
2) Project success criteria,
3) His view of core team's importance for project success and
4) Interviewee's information sources from management perspective.

We have listed the four research questions in 3.1 Research objectives, questions and process. In order to answer the first question, we also need to find out through case studies how managers define, communicate, monitor their individual management focuses and on what information.

At the same time, project is much more teamwork-based comparing to hierarchical functional organization for corporate management, where the CSF method has its original application domain [Rockart, 1979]. One of the main responsibilities for project managers is to ensure that his team moves in the same direction towards project success. Each individual team member will certainly have a perception of how his responsibility fits in the project team and how he is to relate to others on the team. Here comes our concern: is the project focus properly defined and communicated so that everyone on the team knows it and feel ownership to it? We want to find out if the managers have a functional perspective or project wide perspective.

We start with what manager knows best: "what, in your opinion, are the most challenging elements in your present job?" This is an easy way to get a manager into the process and to start him talking. More importantly, as the manager discusses his job, he almost always provides clues as to how he "views the world". We can also get a hint on the

manager's management style: if the manager is problem-oriented, function-oriented or goal oriented. We can puzzle up a total understanding of the dynamics or interrelationships among all the functions in a team based on all individual answers. Sometimes these answers also give us a hint in less formally stated goals, which is equally important in deciding how one will work. For example, one interviewee says the most challenging element in his job is to get involved in decision process that is important for project success. He views his function as an advisor for project core team manager.

We try to catch the information mentioned above through the questions in: *your view on your job and this project*.

Bullen and Rockart used the following steps to come to CSFs:
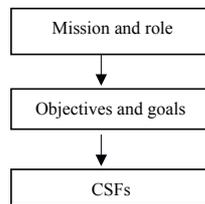


**Figure 4-1 Bullen and Rockart's approach [Bullen and Rockart, 1981]**

They made it clear that goals are more meaningful for CSFs than objectives according to their definitions (refer to 9 Appendix-Definitions). We feel that project, as a means to realize an organization's strategy, is no longer at a mission or objective level anymore. When project organization is established, there is normally a task defined, at least for offshore development projects we are talking about. Here we can see a clearly different situation between a project organization and a corporate organization with functional organization. We decide therefore not to follow the same levels of questioning like Bullen and Rockart did [Bullen and Rockart, 1981].

Having said that, we do feel the importance to discuss project goals, or project success criteria, to try to avoid being framed in the traditional thinking in time, cost and quality only. There have been many discussions on what a project success is and how to measure it in literature, without much consensus. Still literature shows that clear definition of success criteria and consensus on them are very important for project success [Baker, Murphy and Fisher, 1983] [Wateridge, 1998]. Baker et al. suggest that this should be clarified and agreed upon not only within the project organization, but also with client and parent organization.

We want to find out what are the project success criteria that really lie in the understanding of these managers in the project they are currently engaged in. It is their understanding that lies behind their evaluation and actions to be taken. Client satisfaction has been a quite accepted project

success criterion in literature for a long time. However we do not know if this is really established in practitioner's understanding of project success. Work done by Pinto, Rouhiainen and Trailer for contractor organizations (Aker Rauma Offshore) at corporate level [Pinto, Rouhiainen and Trailer, 1998], as late as in 1998, indicates that this full acceptance may not be the case in project organization yet. What is more to it is that we are studying operator's project organization, which is "client" for contractor organization in the first place. How will this "client" organization relate itself to their client?

We also believe that priority among the eventual project success criteria is relevant. Different priority will result in different evaluation and actions.

Now that we have mentioned client, we also want to know how managers want to relate to other main actors like contractor organization, license group, Statoil higher management, Statoil basis organization and government etc. These are the common actors in an offshore development project.

We also believe that personal incentives are important aspects to understand how managers decide how to approach his responsibility. Everyone will be measured in a way, either by the goals they set for themselves (professional pride) or by their leader and in form of payment. The case study really has confirmed this.

We have got an indication how individual managers perceive their jobs in the project total picture through the first of the four areas. Core team concept in its present composition, where both facility builder and Operation are involved from the project start, is relatively young. We feel teamwork is so central[28] for project work that it is import to find out how the core team works and how each individuals think it should work. CSF method was originally designed to help individual managers in defining their information needs [Rockart, 1979]. This seems to be acceptable for corporate executives and general managers. Dobbins applied CSF method to program level management, still based on individual managers. At project level, it will be a too obvious miss if teamwork is not properly promoted because project have relatively clear goal definition and the challenge for top management in project is to pull everyone towards the same goals. In this sense, communication is extremely important.

The last part: your information sources, is to find out if a project has a proper *management* information system where information about management focuses are readily available. IT/IS strategy is required for all Statoil offshore development projects. The main goal is nevertheless making project information readily available for all project participants.

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[28] Core team's management ability is concluded to be critical for project success in the analysis of the Statoil offshore development projects [Aanstad and Ravndal 1999].

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CSF method is used to determine managerial information needs. It is therefore correct to say that questions in this areas is to justify if there is a need for application of a CSF method with the aim of establishment of a proper management information system.

Bullen and Rockart mentioned it is important to understand the "world" from the manager's perspective. However, there is no more structure for what kind of information one should search for, while Dobbins focused only on the categories for information collection, with virtually no words in the "thoughts" behind the information collected. With the questions in the four areas mentioned above, we feel we can get the information we need to be able to understand manager's perspectives and project current status in management focus identification, communication and monitoring. We can then begin to collect CSF related information.

## 4.2   CSF categories

As pointed out by Dobbins, major lesson learned in application of CSF method is to ask a manager to identify their specific CSF too early, thereby leading them to identify CSF that are too abstract, hard for others to grasp conceptually, and which are difficult or impossible to measure. Managers are also tend to reacting to the most pressing current problem or the most recent crisis when they are asked to simply list the activities he or she feels are critical. As we pointed out earlier that a project is normally established to finish a task or realize a goal, it will be more likely to encounter this problem with project managers than with corporate executives if we follow the CSF interview steps described in Figure 4-1 Bullen and Rockart's approach [Bullen and Rockart, 1981], which was originally targeted to executives that are used to think at mission, strategy and objectives level. We therefore chose to go in the direction of the generalized CSF process model promoted by Dobbins with some adjustment for Statoil organization.

With this generalized CSF process model we are able to come up with contextually valid CSFs for the project concerned, avoiding the problem with general CSFs in their applicability as we have discussed in literature review. As we can see form the case study result, there is difference between project contextual CSF and general CSFs.

Bullen and Rockart identified five *prime sources* of critical success factors [Bullen and Rockart, 1981, p14] as we have mentioned in Chapter 1.4 CSF Process Model as a response to the challenges:

1. *Industry CSF* --Structure of the particular industry
2. *Competitive strategy and industry position*--industry position and geographic location
3. *Environmental factors*--areas over which an *organization* has little control like gross national product, national politics, population, energy availability etc.

4. *Temporal factors*--These are areas of activity within an organization that become critical for a particular period of time because something out of the ordinary has taken place. Normally these areas would not generate CSFs, for example lost of key personnel

5. *Managerial position*--Each functional managerial position has a generic set of CSFs associated with it.

We want to have CSF categories as detail and comprehensive as possible because project environment is at a more detailed level and more dynamic than a corporate environment. We therefore based our model mainly on Dobbins's CSF categories:

```
                The 10 CSF categories defined by Dobbins

        1.   Global or Industry related
        2.   External influences
        3.   Internal influences
        4.   Current and future
        5.   Temporal and enduring
        6.   Risk abatement
        7.   Performance
        8.   Special monitoring
        9.   Quality
        10.  Modification management
```

**Figure 4-2 The ten CSF categories defined by Dobbins [Dobbins, 2000]**

We made some adjustment:
We adjusted Dobbins's category no.6 *Risk Abatement* to *Risk Abatement/uncertainty utilization*, as one should also be observant to the positive uncertainty and try to use them fully.

We have also merged Dobbins's categories no.8 *Performance* and no.9 *Quality* into one (our category9: *Performance/quality requirements*) because there is no significant difference between these two categories, at least for offshore development projects.

Operator organization is to perform a task on behave of the license group. However it is no secrete that an operator project organization will have very high loyalty to their company at the same time. The operator is also to get access the necessary resource and knowledge in the process. Therefore the higher management above the project organization in the company and the company's other organization units that assist the project become two very important areas for all projects. This the why we split Dobbins's category2 *External influences* into the following three categories:

1) Higher management within the company and external to project (Category3): the higher management that a project organization must report to in its own company. A project will have a special loyalty to this project owner with regard to its corporate strategy.

2) Between project organization and basis/supporting organization (Category4)*: the rest of the company organization an operator project organization has a horizontal relationship to. This is typically the basis organization that is responsible for supply project with human resource, market information, QA, expertise etc. However, labor union in the company is also included.

3) Macro environmental factors (Category2)--the rest of the project external environment. It is.

We will now review the categories we use in our interviews with relevant examples in oil industry to make each category more understandable. In our interviews, however, we used examples in other industry found in literature to avoid introducing bias by leading interviewees. The categories are quite comprehensive and cover a multitude of situations. It is not necessary to have CSF under all listed categories. It is also important to remind managers not to limit themselves to think about what is or has been available, but rather to consider what should be done or should be available. "If you keep doing what you have always done, you will keep getting what you have always received". Our CSF categories are:

1. **Global or Industry CSF**—Areas of activities essential to project success that would be true of any project operating in the particular environment (industry or business area), not just one company or project. When applied at project level, a contextual view must be applied, i.e. the CSF for your type of projects.

   These CSF are determined by the characteristics of the industry itself. As economical, political, social or competitive conditions change, the industry CSFs will change

   For example, the profit margins for the fields to be built out now are getting smaller than before. New and better technology is often the solution. It is therefore important that the concept chosen must be feasible, i.e. the technology applied must either be tried out before or that one leaves time float or budget buffer for qualification of these new technologies.

2. **Macro environmental factors**—Factors that can significantly influence the project success, but over which a project manager and its parent company has little control.

   These factors can be the economy, market (manpower, material supply, facilities, etc.), regulations, nature, politics, development with the major competitors, etc.

   For example, the Norwegian petroleum industry has experienced large structural changes in the last couple of years: the abolishment of

GFU and introduction of company-based gas sale; the establishment of a new state-owned oil company Petoro to take care of SDFI (State Direct Financial Interest); the establishment of non-profitable operator company Gassco for transport network and related facilities and new approved ownership structure for gas transport that is still subject to approval by the EU. Both of the projects we studied are influenced by these changes.

3. **Higher management within the company and external to project**—Factors that significantly influence project success, which are mainly under the control of the company's higher management and over which project manager has little control.

   This may include areas of activity like clear communication and alignment to company's competitive strategies, evaluation criteria for success; Management priority at portfolio level (synergy, competition on resources, experience transfer, etc.) by higher management that is outside project's direct reporting chain; Organizational issues within the parent company which is outside project influence sphere etc. Robert Gareis claims, "...in the continuously changing organizational structure of a project-oriented company, an explicit business strategy and corporate culture are required to integrate the projects into the company [Gareis, 1989].

   An example is the need for proper human resource administration strategy competence for the company's employees is a part.

4. **Between project organization and basis or supporting organization**—Factors that significantly influence project success and over which project manager and the company's line/basis organization have shared influence.

   These factors include access to qualified personnel, experience transfer, establishment of best practice, training, synergy analysis, disciplinary support and quality assurance at major decision points etc.

5. **Managerial position factors**—Factors that significantly influence project success and that are mainly under the project control. Generic set of CSF for the managerial position.

   For example, open communication, strategy alignment, project definition, feasibility of concept choice, quality of interface definition, risk management, decision quality and change control etc.

6. **Current management focus and preparation of future management focus**—Factors that are project life cycle dependent and are essential to project success. "Current" may have a time span of 2-3 months. Planning for future management focus success may be

an activity that requires immediate attention. These are typically life cycle dependent.

Change control is very important in construction phase while preparation for Operation start is a typical example for preparation of future management focus at the same time.

7. **Temporal or enduring factors**—Factors that are event driven rather than life cycle phase driven and that are essential to project success. These events have happened yet were difficult to anticipate.

   Example is loss of key personnel, like we see in case1. Enduring fire fighting can be the general situation for lack of qualified personnel in Statoil and that new projects may draw people away.

8. **Risk abatement and uncertainty utilization**—Activities that may or may not happen and that if not prepared for, will pose a significant risk/loss of positive impact to project success. These activities are with reasonably high probability of occurrence and high consequence if they occur.

   All potential risks must be considered, whether technical (design basis, changes, technical quality, delivery, coordination, interface, verification, quality control,), financial (contractual), schedule, organizational, personnel, environmental, political, economical, and methodology/procedure. Alternate plan should be in place should the risk event occur.

   Projects normally do not distinguish category7 and 8. Whether it is event that has happened and that has to be dealt with, or something that could have happened are not regarded as risk. However, we feel it is no harm to distinguish them to see how reactive or proactive a project is in risk management. We also adjusted Dobbins's one side focus on negative consequences by pointing out the positive uncertainties.

9. **Performance/quality requirements**—Activities that are associated with the achievement of an identifiable level of performance or quality requirement that must be realized for the project to be successful.

   Platform regularity is a commonly used quality parameter for final facility. In construction phase there are also concrete measurable performance requirements (in quality plan) elements of product must meet. There are also other key indicators in progress, cost etc. for projects.

10. **Modification Management**--Activities that are now done as part of the regular business process, or physical conditions that currently exist or are currently planned, and which, if not changed, will cause the project to fail.

Example, the organization of commissioning planning with proper definition of task, responsibility and authority

50/50 estimate required in Statoil projects should be changes to a "safer" estimate[29].

11. **Special monitoring**—Activities or events that require special monitoring, or contingency planning in order to assure project success. They cannot be ignored.

The level of injury frequency should be below a predefined level and zero serious personal injury.

Product weight development comparing to the lifting capacity of the vessel already employed--there is little lifting contingency available

Bullen and Rockart also suggested classifying CSF with two additional axes:

Internal and external factors to project manager's control sphere: "Many CSF require information external to the organization—information concerned with market structure, customer perceptions or future trends [Rockart, 1979, p92]."

We have actually incorporated this in the CSF process model so that project managers are reminded to think along this axis.

"Monitoring" and "Building": "the more competitive pressure for current performance that the CEO feels, the more his CSFs tend toward monitoring current results. The more that the organization is insulated from economic pressures or decentralized, the more CSFs become oriented toward building for the future through major change programs aimed at adapting the organization to a perceived new environment [Rockart, 1979, p93]."

Offshore development projects normally have a development lifetime between four to six years. They also have tight budget and clear goals. Project is also under constant monitoring. It is therefore much less likely that in such projects, managers take a "building" as CEOs will do. However, project with capital investment in billions of kroner will have different levels of management. The higher level a manager is at, the more he/she should look further than others. We feel it is therefore more relevant to use "reactive" or "proactive" axis in a project organization.

The model will prevent managers from focus only in crisis management, and lead the managers to view the program from a variety of

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[29] Statoil is going towards using expected value in their estimate now.

perspectives which are both tactical and strategic, and which focus on specific issues such as external support.

## 4.3   CSF generation process

In this study, we follow the same data analysis principles suggested by Dobbins in contextual CSFs generation [Dobbins, 2000]. In key words form, these principles are consistency check, criticality check and CSF in form of an activity. Dobbins does not ask managers what their CSFs are, as originally CSF method suggests because many managers experience difficulty to think conceptually. Dobbins therefore uses CSF categories where activities that are important for project success can come from. We follow the same way of thinking because we believe that project managers in offshore development projects will not be any better used to thinking conceptually than program managers in large acquisition programs for Department of Defense in the United States. We can describe his data analysis steps as following:

The interviewer examines all the activities enumerated under each of the CSF categories and groups them according to subject and topic. Then the activities in the first group are analyzed for internal consistency. If the activities are consistent, they are then evaluated for critical validity. This means that if the interviewer identifies an activity that seems to be irrelevant to success, it is flagged to bring to attention of the manager during the follow-on interviews to see if it should be discarded. The residual sets of activities are then analyzed and a candidate CSF determined that exemplifies what that full set of common activities is advocating. This is identified as CSF no.1. The grouped set of activities on which the CSF is based is the set of constraints for that particular CSF. The process is then repeated for each of the other groups of activities until a CSF is identified for each group of activities [Dobbins, 2000, p88].

What is different is that we interview managers on a project core team on individual basis and base our CSF generation on input from all the interviews, rather than identify CSFs for each of the managers. We are aiming at team-CSFs or project-CSFs rather than individual CSFs, although project core team manager is the central person.

In addition, we introduced the part of interview called *Interviewee's perspective* in order to better understand the "motives" behind actions, team dynamic in projects, to answer our four research questions. By doing so we have also enhanced the CSF process model application domain so that it becomes a tool to identify "imperfectness" in project as we will describe further in 6.3 Integrated data interpretation Introduction of team approach and emphasize communication of management focus is a further development from Dobbins's work.

In the process of coming up with project contextual CSFs, the interviewer served as a facilitator rather than a determiner of content.

The interviewer did not add additional material to the report not given by the manager. The interviewer does not affect whether the results are positive or negative with respect to the research questions.

In the next chapter, we will describe the data collection using the revised CSF process model.

# 5 Data collection

In this chapter we are to describe the data collection process and present the data collected in the two cases, following the Case Study Protocol in Appendix. Both of the cases are Statoil operated offshore development projects.

## 5.1 Case1

We summarize information about case1 in Figure 5-1 General information on case1.

Information on Case1

**Project goals**:
- Project profitability (including development of business opportunities as a connecting point for other facilities in the area)
- Execution (adherence to time and cost targets in PUD/PAD)
- HSE
- Quality

**Project characteristics and conditions**:
- With existing field facilities around; the area need extra transport capacity
- Reservoir is high temperature and high pressure, with relatively uncertain data
- Integrated drilling module on platform
- Profitability was marginal according to the prevailing Statoil economic assumptions at the time project was sanctioned. The project was therefore sensitive to cost overruns (50/50 estimate) and lower product prices.
- Very limited use of new technology
- Engineering duration is longer than normal Statoil standard

**Project capital investment size**: large (>NOK 5 billion)

**Current project phase**:
- Platform is around 50% complete
- Drilling and Operation functions are in preparation phase
- Pipeline is in the phase of engineering start and contract evaluation and let

**Contract**:
- Various contract formats for different parts of project facility.
- Use of the new Norwegian standard NTK2000 with main contractor
- Statoil is responsible for interface management among the contracts

**Major modifications**
- An update of PAD/PDO due to increased number of wells and larger reservoir coverage.
- There was a major shift of CT members right after submission of Plan for Development and Operation (PDO).

**Use of critical path**:
- The project control function updates a project main plan at all time. Although the critical way is not clearly marked out, the critical path is obvious and everyone knows it.

**Figure 5-1 General information on case1**

The project negotiates business agreements with neighboring installations to cope with the inherent project uncertainties and at the same time sell their extra transportation capacity. The latter aspect may not be a decision at project management level. Project must be flexible

enough to incorporate changes that benefit Statoil. As one CT member says, "Decisions are always made based on company economy, not on project economy". However, the project must ensure that these changes will also benefit or not in conflict of interests for other project licensees and that the project progress as planned.

The CT organization chart is shown here:
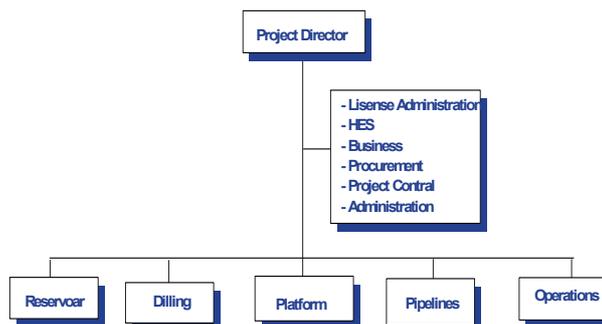


**Figure 5-2 Core team for case1**

We refer to functions and sub-projects as Reservoir, Drilling, Platform, Pipeline and Operation etc. in the following text.

### 5.1.1 Gaining access to case1

The project core team (CT) manager responds positively to the enquiry of participating in the CSF case study sent out by Statoil process owner in project management. The investigator then takes contact with the project CT manager on telephone. He realizes that the whole CT will have to participate in this study. He is reluctant to make any promise because he does not want to force his team to do this. We agree on the initial meeting.

In the first meeting with core team manager, the investigator explains what this study is about, what is expected from the case study and how the investigator has thought to carry out study, according to *Letter to Interviewees* (ref Appendix). The CT manager introduces his project. It seems that the study is about something he is interested in--put focus in the right issue all the time. He agrees for a presentation in the coming CT meeting at the end of this meeting.

We also agree quickly that group interview of core team members[30] is not a feasible solution due to the tight and different time schedule each manager has. Besides, some are more open than others in meetings. It would be difficult to gain everyone's opinion at the same time. Therefore individual interviews are chosen instead. The time needed for the study is thus prolonged to six weeks. In the mean time the investigator gets

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[30] Originally it is designed to divide a core team into core team manager, stab function and sub project managers and use group interview for stab-functions

access to the project execution plan, Plan for development and Operation (PDO) and organization chart. The investigator is later given the same access as a normal project participant.

After the presentation in the CT meeting, three out of nine (three CT members were not there) make an appointment for interview immediately before the CT manager suggests that investigator makes appointment afterwards over telephone.

### 5.1.2  External help and review of preliminary information

Seeking external help and review of preliminary information is done in parallel with the interview process. New information (on restructuring process in the industry, terminology, etc.) comes up during the interviews. Clarification of the new information will make the interviews more effective. This is quite natural because all core team members have their own functions, special disciplinary knowledge and experiences. At the same time, investigator follows industry development through Statoil intranet, internal newsletters, and major newspapers, and especially on information related to case1. Talking to other colleagues and supervisors helps investigator keep thing in perspective and keep the spirit up. Case studies in real time projects were full of surprises, especial in this first case. As Yin said "the demands of a case study on a person's intellect, ego, and emotions are far greater than those of any other research strategy. This is because the data collection procedures are not routinized...." [Yin, 1994]

### 5.1.3  Information on data collected

The data collection process follows the procedure described in Case Study Protocol attached in Appendix. Besides the parallel process of gaining general information about the business area and the project described in the preceding section, our main data collection is based on interviews with the CT in the project. Only the project CT members were interviewed.

All CT members (12 persons) in this project were interviewed. Each member was interviewed twice. However the interviews with the Administration responsible were not used because this function turned out to be too far away from a project management function.

Besides the interviews, the author had also several meetings with the CT manager with respect to first access to the project and its general information; presentation of the results of project specific CSFs, receiving his comments on the results.
The interviews were recorded on minidisks, which were later on written down into text files as truthfully as possible to the recording. The data presented in the following two sections are summaries of direct citations of the CT members' answers to the interview questions, which are

presented in Appendix. The data presented does not include any interpretation by the author.

### 5.1.4 CT members' perceptions

This part of interview covers four topics: 1) Your view on your job and your project, 2) Project success criteria, 3) Your view on project core team, and 4) Your information sources. The information on the first topic will be presented together with the CSF categories in the next section.

#### Understandings on when the project ends

Everyone in the CT has an understanding of when this project ends and the understandings are different. Some refer to the point of time when the platform is installed offshore, while others refer to production start. Nobody regards the project to last until one year after the operation start (which is the definition in Statoil governing document for project development AR005), let alone consider the project to last until abandonment several ten years later.

The project CT manager says it openly that it is time for him to move on to another job when the platform has been installed offshore, although the core team manager function will last into operation phase. Drilling and Operation will first start main part of their jobs after the platform installation offshore. The CT manager is aware of his total responsibility. He considers Drilling as having a more challenging job to do after offshore installation and he supports the Drilling and Operation managers as if he would remain in his position all the way into operation phase. Still Drilling and Operation managers consider it as unfavorable because they think the CT manager's perception will influence his priority and focus. They prefer that the core team manager stay in the position until full-scale production starts.

#### Project success criteria

There are three dimensions in project success criteria definition: the list of criteria, the understanding of each criterion and the priorities among the criteria.

All CT members mention reaching goals in HSE, quality, time and cost as project success criteria. There are several additional project success criteria mentioned in the interviews.

1) *Client satisfaction*, with "client" refers to different project stakeholders: the core team manager, the project license group, direct line management in Statoil, government, Statoil control organs like QA team, Statoil process owner, product users--Drilling and Operation, and product buyer in the open market (one CT member regards satisfaction of the buyer as the most important success criteria).

When the project sponsors--the project license group and Statoil higher management is considered as client, everyone agrees that they will be satisfied if the project delivers what is defined in the PDO. The majority will not regard sponsor's satisfaction as a project success criterion itself, but as a means to gain necessary trust and approvals from the sponsors so that project could do their work without much resistance and control.

2) *Project's contribution to increased Statoil equity* (i.e. strategic value-- establish premises for other projects), which sometimes may be a cost for the project without direct contribution to the project profitability. Although important, this criterion will have a lower weighting than the goals in HSE, cost, time and quality after PDO is approved.

Although, in theory, project should do what could contribute most to Statoil strategic value, project will be reluctant to accept changes for this good course before its cost and time consequences are compensated for first. After all, the project is held responsible for the cost and time targets by the license group and Statoil as well. Project must also be sure that the license group will accept the changes.

This is why communication with Statoil higher management is very important so that they know their decision consequences on the project. This is not always an easy matter for the project, partly because this is a leader-subordinate relationship, where project manager has only influence possibility rather than decision power, partly because the decisions depend on input from many organizations with much larger consequences than that for the project alone and may therefore take time.

3) *Profitability*: Only the CT manager weighs the profitability highest. However, he emphasizes at the same time that decisions should be made on a balanced evaluation of all project success criteria, for example trade-off against project adherence to time and cost targets. Some say it openly that profitability consideration is no longer relevant after the PDO is approved, except if one finds it necessary to update the PDO, while others find it difficult to manage according to profitability because so many factors beyond the project control can influence the project profitability, for example the product prices[31]. Besides, there is only expenditure, no income by the time the project organization dissolves at production start. Therefore profitability consideration is a major guideline in project early phases. In project execution phase, profitability is secured by keeping the project on time, in budget and to spec.

4) *The correctness of the strategic decision for developing the project* is also regarded as part of project success evaluation. The decision was made in the past and is not quite relevant for this study, which is focusing at what should be done from now on that could best contribute to project success. Still it is a relevant project success criterion.

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[31] The project NPV has increased from MMNOK 0,5 to 2.0 purely because of product price.

Understanding of some of the obvious and "consensus" project success criteria is not the same among the CT members. The project has a clear slogan "we deliver what we have promised in PDO". This is the main principle for the project to achieve project success under the current project phase. What is promised is quite clear with regard to time and cost. However, there is still vagueness in the quality concept and to some extend HSE.

The builders define quality as meeting designed function specification with lowest building cost and without compromising time target. The Operation defines quality as the function specification that gives the lowest life cycle cost or best product operation friendliness at each time with consideration of the project cost (CAPEX) and time targets. Operation friendliness is difficult to quantify yet needed in estimating OPEX, which is part of LCC consideration. The possibility for later modification because of unsatisfactory user friendliness is even more politically toned[32]. Applying LCC in defining quality is therefore not always easy in practice.

What everyone agrees here is to avoid *major* modifications after product delivery. What is "major" is a subjective evaluation. The builders would like to believe that major modifications should have been avoided by full involvement of Operation from early phases. In this project, one of the sub-project goals for Operation is "no changes from Operation after engineering is 60% complete (start fabrication)". This is to push Operation to must maximum effort in project early phases so that changes after fabrication start can be reduced to minimum.

The differences in understanding of project success criteria push for active user involvement from design, construction until product delivery to make sure that users' quality needs are met according to their understandings. The Operation and Drilling knows that they cannot expect to receive a desired product without their involvement and control, even though they are from the same company as the builders.

Avoid serious personal injury is certainty taken very seriously by the project. This is what first comes to mind when HSE is mentioned. Environmental impact is also a major concern for design. In other words, the technical safety is no doubt most important. It is in "H (health)" that different opinions exist, especially working environment for those who will use the facility after product delivery.

Project works actively on working environment in the project organization. Project managers at different levels remind subordinates to use the chances they have to take care of themselves and their family. Open communication is highly promoted to cope with the unspecified or

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[32] Statoil labor unions for offshore installations have very strong influence on issues like working environment. They can push for modifications.

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changes that turn up on the way to project goals. Everyone should feel that this project is a good working place and look forward to the next project when they have finished with this project. Nobody regards this as a project goal. However, some say that a project is certainly not a success if it fails in this aspect.

In addition to a list of project success criteria and understanding of each of them, one should also include the priorities dimension. Among the project success criteria, especially the criteria in HSE, time, cost and quality, the CT members will have them all. However they have different priorities among them. Their prioritization will also be influenced by what Statoil values most at each time[33].

The builders (pipeline and platform) will prioritize time and cost performance, followed by good enough quality-- i.e. to meet the function specification with the lowest building cost. The project product users (Reservoir, Drilling and Operation) are more concerned that the product works at delivery, which is quality aspect. For Reservoir and Drilling, on-time delivery is also very important because they also have deadlines to meet--production start. Operation will do their best to ensure that the facility is to their satisfaction, i.e. user friendliness and low OPEX/LCC.

We can see a clear difference in priority between time/cost and quality. The emphasis goes from time/cost to quality depending if one is product user or not, and if one is ultimate product user or not. In other words, when one perceives that one finishes ones job in the project will influence this priority. This explains why the point of time the core team manager plans to leave the project is not regarded as favorable for product users in the core team.

Builder and Operation are at two opposite ends and they have different priority of quality, although both regard time, cost and quality (including HSE) as important project success criteria.

It is also interesting to discover that all *staff* personnel (Business Development, Project Control, Government and Partner Contact, Procurement and Contract, and HSE) weigh quality more than project time and cost targets. Of course the quality here can be generally meant, including satisfaction of Operation or quality of drilling preparation work.

***Relationship with major stakeholders***
With regard to *contractor*, there are several relevant points of view:

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[33] Two CEOs in Statoil history had to go because of large cost overruns. The present CEO emphasizes predictability of project execution. He wonders if it was time to introduce zero philosophy for cost overruns for new development projects [Statoil intranet news, dated Feb.27th, 2002]

> ➤ Everyone agrees that close cooperation and open communication with contractor (some also mention good personal relationships) is important.
> ➤ Statoil and contractor have conflicting interests.
> ➤ Risk distribution should be fair. Contractor should also earn money. Contractors should be responsible for their own productivity, not design changes.
> ➤ Cost is dominating in this project. It is not always communicated to contractor what is dearest (priority between quality, time and cost or combination of them) for client organization (some CT members will not choose, "we want them all").
> ➤ Contractor is responsible for their product quality, not for total project wide consequences caused by the bad product they delivered. The latter is always a risk client organization must take. The client organization will either establish extensive quality control using client resources because it will also cost too much. Therefore quality is essential yet a difficult task to manage.

The project will have complete open communication with *license group* and *government* in the construction phase. The project has clear loyalty to the project sponsors. It follows the government regulations 100% and informs government if the project does not progress as planned. The most important is to establish trust from the license group and government on the project. There is not much direct contact with *environmental organizations*. Everything goes through the government institutions like the Norwegian Pollution Control Authority (SFT).

Different CT members choose to rank interest from different stakeholders differently. Some say it frankly that it is their own discipline's interest that has the highest priority. Others say it is their direct manager's interest. Others mention Statoil and the well being of the project participants.

### Core team
Builders regard a core team as a contributor to product quality so that larger modifications can be avoided. However, the early involvement of Operation makes it more expensive and difficult for them. They are sure that they can deliver a usable product without involvement of Operation. Internal product users agree that builders are mainly measured according to time and cost adherence.

Core team is an information and experience exchange forum, not a decision forum. The decision lies with the CT manager and the disciplines involved. Only major decisions are made in core team meetings, where CT members are asked to express their opinions before core team manager makes a decision.

Everyone agrees that the core team is very critical for project success in early phase. This project is now under construction phase. The builders no longer regard the core team as critical because major design is frozen

and they are building. CT is equal to CT manager for them in this phase. The project internal product users, who haven't really begun with their main physical activities, regard the core team as very critical to keep a total project perspective --so that their interests could be taken care of. The project has therefore intended to keep the CT meetings as they are after the Reservoir, Drilling and Operation move to another location[34]. To which degree the geographic separation of users and builders will pose negative impact on decision making process is subject to subjective judgment, especially when we see the importance of informal communication channels. The challenge lies in ensuring good communication between the two groups so that conflicts can be identified early and solved constructively. This is part of project core team manager's responsibility.

Project CT manager regards the difference in understanding and priority of success criteria as sources for positive conflicts that will contribute to better solutions. However, he emphasizes the quality of decision process, which is one of his four management parameters. This project has a database for CT meetings where request for decision must be brought up several days before CT meeting takes place so that everyone can have a chance to make up a qualified opinion before decision is made. Still the CT manager regards it as a challenge to get all CT members involved in decision-making. Most CT members also admit that they don't always have time to get prepared for issues that are not directly relevant for their disciplines. However, they will prepare very thoroughly on issues that have direct impact on them.

Some point out that the skill to present and sell one's proposal to other CT members who have different function, background, experience, priorities, culture and knowledge is also very critical for decision quality. This skill varies among CT members.

After the CT re-composition at PDO submission, the project has got some of the most competent personnel in Statoil. What is challenging afterwards is the social aspect. As one CT member says, it is challenging to get everyone agree on what is the most important of the important and what is the goal one really wants to achieve and how. One should have both individual goals and common goals, consider their own issues in context of issues from other disciplines, and are able to see the consequences in totality. The contribution from each member should be balanced, not according to the budget one has. A comment like "everyone here in the CT is rational" is a good sign. Still, this statement can change with project phases and deserves attention all the time.

An interesting thing, which investigator cannot prove is universal or not, is that all builders have pointed out the importance of social aspects of project management, while the product users have not. The investigator

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[34] There has been a decision from higher management that the user group be moved to another geographic location in the first coming summer in this project.

is not sure if this is because of the organization size in their individual disciplines.

*Management information sources*

All CT members regard informal contacts, like unscheduled person-to-person conversation, telephone, email etc. as very important source of management information. Some regard them as the most important. CT manager regards conversation with individuals as the most important source of information. As project organization grows and spread in different geographical locations, he feels it becomes more challenging to get in touch with as many persons as he wishes.

Managers also expect that if there is something they should know, they should be informed directly.

What is somewhat surprising is the fact that project managers do not read the standard monthly reports from sites/contractors. Reports are made for outsiders and for documentation. Managers should have known the information before reports are made. Some managers require special reports in the aspects they are concerned with, for example prognosis or site team managers evaluation and forecast of their scope of work.

Managers go through project status under meetings. Everyone regards meetings as an important formal information source. Manager uses meetings to ensure that everyone in his team works towards the same direction. In other words, meetings are important channel for communication of management focuses. Some also mention minutes of meeting and correspondence as important management information sources.

Project databases, governing documents for project execution, including Statoil governing documents, regulations and project governing documents are also information sources, although the usage varies.

Advancement of IT technology in general has made databases readily available in projects. However the CT members understand that its main function is to facilitate a group of people to work together on an issue and that databases are only efficient if one knows what information to look for and where to find it. Managers cannot stroll through databases in hope of getting project "temperature"--to find out what one should know in order to manage the project. The overall aim for project IT/IS is to make information readily available for all at the same time and offer traceability. Some of the CT members prefer using email rather than databases. There is no especial focus in improving availability of *management* information managers need in this project.

Communication between project and Statoil basis organization varies from discipline to discipline. However, those who have frequent network involvement with basis organization really appreciate the offer.

The Statoil governing documents also have varied qualities. The majority agrees that Statoil should have these documents. However, they are far from fully developed to be able to cover all aspects of project management (technical and process) in all phases of offshore development projects. Some also regards governing documents as being too conservative. The Statoil best practice is not readily applicable in real-time project yet. Many have the opinion that the best practice is the most recent practice—their own project.

Many regard top-ten list as management focus in totality. Although a discipline will have more emphasis on their elements in the top-ten list, the core team manager expects all CT members have ownership of all top-ten elements. Some mean that management focuses are documented in PEP (project execution plan).

All in all, the informal contacts, top-ten list in risk register and meetings are the most important channels for management information communication. IT strategy has not focused specifically on management information needs yet. There is a tendency for too much information. The core team manager points out that the direction for further improvement is to "get more substance from the information available and to select the information I really need."

The information above is import to understand why and how the CT works together. In the second part of interview, we use the CSF categories to come up with the team CSFs.

### 5.1.5   Team-CSF and project responses

When the interview started, the project had the following eight elements in CT Top-ten[35] list:

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**Project Top-ten list**

- Lack of competent personnel in Statoil with many projects ongoing
- Serious incidence in construction phase
- Change in gas-in-place
- Number of wells available at production start
- Most of the wells will be drilled after field depletion has started and some could be very difficult
- Quality of purchased delivery
- Delayed frame contractors for the project main contractor
- Scope of work offshore

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**Figure 5-3 The Top-ten risk elements at core team level for case1**

In part 1 of *Interviewees' Perspectives*, we ask the interviewees the following question:

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[35] Top-ten list is commonly used term in projects. However number of risk elements does not limit to ten.

*What, in your opinion, should be the management focus for <u>the whole project</u> in order to achieve final project success?*

The answers are summarized in Figure 5-5 CT members' understanding of project management focuses for case1.

After the CSF process, the investigator comes up with the project CSFs, of which the titles are shown in the following table.

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Project CSFs for case1 after application of CSF process model

1) Impose strict cost and progress control and change control
2) Plan for personnel transition and movement of Reservoir, Drilling and Operation to Bergen.
3) Proactive risk identification and scenario analysis
4) Establish good relationship with higher management so that we understand each other and their decisions are made in time
5) Ensure that product meets the function specifications
6) Maintain the honest, proactive and open project atmosphere based on safe foundation, respect, trust and competence

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**Figure 5-4 The CSFs for case1 after the application of the CSF process model**

Each CSF was described with *background* and *measures*. In background, which is the text before measures, the situation that makes the CSF critical is explained. The concrete project tactics for each CSF are also documented in this part. The measure part covers actions that CT members regards as important and that project should do to achieve good performance in the CSF. Some have already been done by the project. This structure was later improved and organized into three distinct parts: why, how and measurement, in the second case.

With regard to confidentiality, the project name is replaced by "the project" in this dissertation. The year for major milestones are also written as year N. In addition, who has suggested what, is also taken out of presentation.

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CT members' direct answers to project management focuses

**CT member 1**:
My management focuses, independent of concrete events in the project, are in four areas.
- Clear definition of project goals: project goals are also divided into sub-project goals.
- Good decision quality: The decision should be documented, clearly communicated and accepted by owner and participants.
- Risk management: risk register hierarchy and top-ten register by core team manager
- Project control: clear status all the time of what have been spent and what was achieved.

More concrete, in terms of events:
- Reservoir and Drilling have a more challenging job to do in the time to come and deserve management focus from now
- Platform completion
- Preparation for operation start--built up operation organization. However it goes well now.

**CT Member 2:**
- Complete platform construction according to plan, cost and quality
- Overview of reservoir
- Prepare for drilling activities
From project life cycle perspective, CAPEX may not be that important. It is more important to see how much reserve one manages to retrieve.

**CT member 3:**
- Correct risk picture and communicate it clearly to other disciplines and incorporate measures that cope with these risks in design
- Clear decision rules, one should not go back to earlier decisions
- Necessary competent resources should be available
- Platform completion according to plan, budget. Have the scope of work under control
- Platform offshore commissioning

**CT member 4:**
- Avoid changes
- Open for new business opportunities
- Progress, cost and of course quality
- Competent personnel with good internal cooperation
- Open communication so that one is updated in all focus areas all the time.

**CT member 5:**
- Get the deck construction speed up: material and equipment supply for deck and no late delivery from frame contractors
- Ensure that contractor does not give a lower priority to fabrication of our drilling module
- Jacket connection between upper and lower parts and fracture in steel
- Ensure that my subordinates work together, pay attention to details and actions are taken to reduce risks. Risk management is my focus.

**CT member 6:**
- Keep the cost (CAPEX) down and have control in progress and quality

Others in the project will pay enough attention to cost and plan. What I need to focus is to ensure a good quality in the product.

**CT member 7:**
- Project should manage against time and cost. You can also add quality here. The platform must work when it is delivered

**CT member 8:**
The project manager should have clear goals and lead people towards the goals. The project should reach the cost (CAPEX) and schedule targets and quality standards. It seems that cost and time targets are reasonable under control. It is quality that needs extra attention. For example preparation for drilling and the drilling operations in HTHP field

**CT member 9:**

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**Figure 5-5 CT members' understanding of project management focuses for case1**

- Have clear responsibility definition.
- Clear reporting routes.
- People must feel safe to communicate.
- Everyone should be good at listening to each other.
- Those who have done a job are given the chance to present it
- Avoid changes

After all, what is the most important in achieving project success is people.

**CT member 10:**
- For Drilling, it is preparation for drilling activities so that production can start as planned. This includes experience transfer from other disciplines and personnel training for drilling.
- For platform, it is mechanical completion of platform on land and then offshore hook-up.

**CT member 11:**
The project has gone well so far. The challenge is not to believe that this will last forever. We have to be prepared for the unexpected.
- We must try to identify what could go wrong.

There is little new technology in pipeline and Well & Drilling (W&D) that needs research or testing before application. The largest uncertainty is in reservoir and there is nothing one can do with it, at least not now. We have to wait at least until we have drilled a few wells.

- For platform, it is risk management, change control and deviation rectification.
- For pipeline and W/D, it is strategy and procurement.

**Figure 5-6 CT members' understanding of project management focuses for case1 (continued)**

Figure 5-7 shows CSF1 in full text. For the complete CSF result for case1, refer to Appendix.

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Case1-1. Impose strict cost and progress control and change control

The project has a relatively long period for platform engineering, which is now about 70% complete. Core team has recently decided that all changes should be brought up to core team level and decision will be made on individual basis. This is to avoid unnecessary and costly changes. Necessary minor changes may be postponed to commission phase to avoid variation orders where contractors will include disturbance cost.

Two major milestones in the future are August 1st, Year N (Platform is installed and production Drilling starts) and October 1st, Year N+1 (start production). The project has as a goal to complete onshore commissioning 100% before offshore installation. Due to the problems with material and equipment delivery for Deck and drawing availability for Drilling Module (DM), both construction of Deck and DM are behind schedule at the moment and they constitute two parallel critical paths.

*The project was built with extra capacity because of lack of processing and transport capacity in the area. In other words, the project is to be used as a connection point in the area. Right now under the intensive construction period, business development function realizes that it should protect the project from being disturbed by newer business opportunities that may cause large changes in the part of project already under construction. Business opportunity is thus based on using existing extra capacity.*

**Measures**:
1. Strict change control with clear scope of work communicated to all disciplines
2. Clear decision routes (e.g. changes should be brought up to core team) and rules (when decision is made, one should not come back to it)
3. Close follow-up of delivery from Statoil frame contract suppliers by Statoil project personnel
4. Report physical progress rather than traditional project control progress that includes management, engineering and procurement etc. which may show misleading measurement due to different principles from different companies.

5. Verification of progress for critical (e.g. long lead time) item deliveries
6. Regular verification of correctness of contractors cost and progress reporting
7. Cost visibility. Use forecast and identify rectification work if necessary
8. Establish good relationship with contractor personnel so that information (e.g. contractors' activity level and use of resource, facility and their priority etc.) will come up earlier than formal reporting.
9. Allocate project contingency according to the risk picture in different disciplines to avoid the disciplines that finish first eat up contingency for others.
10. Prevent impact from newer business development opportunities that will cause significant changes for construction
11. Honest cost and progress update
12. Add contract personnel to contracts with the highest possibility for cost overrun, for example Deck
13. Focus in quality of plans (sequence and feasibility) to avoid waiting

**Figure 5-7 Full description of project CSF1 for case1**

The result is presented to the CT manager under a meeting. The investigator explains how the result is derived, the structures of the results, and what should be improved further (especially the measure part). It is also pointed out that the information is solely based on the information from interviewees, without subjective evaluation from the investigator. The investigator's thoughts and suggestions are presented in a separate document for his reference, which is not part of this study.

After having scanned through the result, the CT manager confirms that he feel the CSF results describe the project situation quite well. He regards it useful that an outsider (investigator) comes in and makes a neutral analysis and he will definitely benefit from this.

However he does not think that the measures in CSF 3 *Proactive risk identification and scenario analysis* are systematic and that they are

more of a snapshot character. The investigator explains that the project has established systems for risk, change and interface management. Project Control is responsible for the establishment of the systems, while the builders in the project use them. The other CT members have not mentioned any weakness in these systems when risk management was discussed in interviews. On the contrary, some are quite satisfied with the result from a complete verification round of project risk registers recently being carried out. Still, the CT manager thinks that the project should have done better in updating the risk registers and use them more actively. "The project should focus on *continuous use* of risk management system although the systems are there", he says. The investigator takes this comment as a new input and adds it in the measures for CSF 3.

CT manager also says that he may not follow all the measures listed in the results (the measures suggested by the CT members) because he prefers to keep actions to the minimum and demand quality for those that are implemented, rather than launch a extensive action plan with no clear result. He will also have to read more thoroughly to say if there is missing any missing CSF from the list derived by the investigator.

Three weeks later, the investigator sent the revised CSF result (as presented above) with the four evaluation questions (Figure 3-4 Evaluation questions on CSFs generated from CSF process model) via email.

One week after that, on telephone, the CT manager says that he regards the CSFs as a different formulation of his four management parameters specified in PEP. We agree for a meeting. In the mean time, the investigator compares the CSF result to the four management parameters (Figure 5-8).

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Project management parameters used by CT manager in Case1

1. **Management by goals or objectives**: Through Communication and breakdown of project goals in project execution plan, project performance contracts and governing documents. Media: general meeting, CT meeting (quarterly follow-up) and project meetings.
2. **Uncertainty management**: Through risk register and use this in monthly CT meeting, project meetings and meetings with contractors.
3. **Project control**: Through project main plan, WBS structure, budget and estimates. Media: monthly CT meeting, project meetings and meetings with contractors
4. **Management of decision quality** (including change control): Through proposals to the project, business development and change control database with license group, Statoil line management, CT meeting (if necessary) and project meetings.

**Figure 5-8 The four management parameters defined in PEP for case1**

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The CT manager does not find anything that is directly wrong in the CSF result. The investigator has specially pointed out the part with italic font. The CT manager confirms their correctness. However he has the following comments:

- CSF1: *Impose strict cost and progress control and change control* falls exactly to his management parameter Project control.
- CSF2: *plan for personnel transition and movement of Reservoir, Drilling and Operation to Bergen* and CSF3 (Proactive risk identification and scenario analysis) are under his management parameter: *Risk register and uncertainty* and CSF2 is an element in his top-ten list.
- The CSF5: *Ensure that product meets the function specifications* is his focus. He confirms the understanding of quality should be meeting the function specifications and no more. However he agrees that quality is difficult to measure and it will be a nightmare if the platform does not work as designed when being installed.
- He does not feel that the CSF6 *Maintain the honest, proactive and open project atmosphere based on safe foundation, respect, trust and competence* should be a CSF because he regards it as a foundation and should exist in project already.
- He will either regard CSF4: *Establish good relationship with higher management so that we understand each other and their decisions are made in time* as a CSF.
- His fourth management parameter: *decision quality* is not explicit enough in the CSF result although the principle is mentioned in the CSF results.

The investigator first points out that the project execution plan (where the four management parameters are described) and the CSF serves somewhat different purposes.

The PEP is *system*-oriented (this is the skeleton for the project management system) with the structure of project goals → strategies → management systems. It is in form of requirements with no description on why different requirements are critical for project success in this project at the present project phase. There is either any obvious priority among the requirements or even goals based on the project development context at each time.

The CSF method focuses on the *critical* areas of activity for reaching project goals or project success. CSF is at a level below the project goals. The CSFs are based on the project personnel's understanding and evaluation of project totality and *contextual* situations. CSFs tell us where the management decides to use their time, which is a "rifle-shot" technique [Bullen and Rockart, p42, 1981].

The prioritization of the project goals is also discussed to better understand the "mind" behind CT members' actions. Knowing what decision criteria CT manager uses will make his decisions more predictable for others and thus make team members feel safe (the CT manager agrees). By having prioritization and be contextual to the project, CSFs are easier to communicate (the CT manager agrees).

There will be some limitations in using goal breakdown as the main communication tool of management focus. For example, one of the goals for Operation: "No changes from Operation after engineering is 60% complete". Everyone understands the intention of this sub-goal is to push for maximum Operation effort in engineering early to avoid large cost consequences due to changes after fabrication starts. However, Operation's main responsibility is to avoid solutions with higher LCC. They will therefore come up with changes based on LCC principle even in fabrication phase despite this goal.

There is either any specification of priority among the goals in the PEP. Different priority will trigger different course of actions under pressed situations. In reality, managers always have priorities. Very often this is communicated through decision-making. For example, in project operation and maintenance strategy, it says: *high degree of automation with remote control from central control room; choose of equipments based on LCC calculation and experiences in usage*. However, the project has just refused a change order proposed by Operation for installation of intelligent equipments, which is in line with the strategies. This is a result of weighing between the benefits of lower OPEX and cost consequences (cost adherence) this change would introduce. Although effective, communication only through decision-making may cause frustrations in project personnel [Slevin and Pinto, 1991].

At the same time the goals that are not readily measurable or with large uncertainty (for example quality[36] or reservoir recovery degree) are likely to "suffer" for more clearly defined goals, for example in time and cost.

Besides, some principles in PEP need more detailed guidelines for how to follow in practice. One example is "the project should be business development oriented project". What does this mean? It is therefore very important to clarify the management tactic and guideline for project participants here is that *the business development should be based on the facility capacity being built right now to avoid major changes*. However this is communicated only personally between project core team manager and the business development manager and is not documented anywhere.

As to other CT manager's comments, the investigator answers it like this:

That CSF2 is separated from CSF3 is because CSF2 is a concrete event with significant impact that the project must be prepared for, while CSF3 says that risk management is not enough with risk register structure or risk identification based on each sub-projects. More emphasis should be put to scenario analysis and interdisciplinary communication of risks and implementation. This is a process-oriented concern. In that sense, it is

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[36] Quality is defined as "platform must be functional and robust", which is difficult to measure on the way towards completion

logical that CSF2 and CSF3 stand for themselves. CT manager shows his understanding for this consideration.

As to CSF6, the CT manager takes it as a matter of course[37]. The investigator explains that there are reasons (ref. CSF6 description in full text) for the project to be prepared for changes in this. Better score than company average in company working environment survey does not necessarily mean that communication in the project is so good that critical information is communicated. Hypothetically, a problem between a manager and a key project person will not show in the company survey result. CT manager says he takes this aspect seriously in recruiting process. However, although CSF6 refers to a very important area, he would not use a lot of time on it, because it is a matter of course.

What is worth mentioning is that a new risk element: "maintain support services agreed between the project and XX" with cost consequences at MMNOK 1 (with 20% possibility), appeared in top-ten risk register right after the case study. CSF6 is based on statements from some CT members because they feel that although the project has good record up to now, the management should encourage individuals to come up with "worries" and the management should be careful not to blame the honest messengers with bad news. Some mention that one should pay attention to stop what can be called a "team within a team" tendency and ensure that everyone gets the same information foundation for their decisions.

The CT manager agrees that CT members have contributed something in the CSF result and his job is to listen and pull everybody together. When being asked if the CT members have contributed somewhat different degree of emphasis in CSFs, the CT manager says he will need some time to digest, especially CSF4[38] and CSF6. He has taken them for granted. The CSF result flags them out for him. Maybe he has worked with these *unconsciously* all the time (The investigator totally agrees here based on the interviews with him. CSF6 is a good example).

The CT manager thinks it is too early to say anything on the necessity and usefulness of the CSF process model in general. However he will keep an open mind about it. He says, "When one lives in ones own world and regard something as critical, there maybe something one has neglected". He says he may use the CSF result to introduce new CT members to the project and show them why these factors are important

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[37] The investigator also had the impression that the project has very good open communication. This project has very open discussion in how to improve working environment and relationship. They encourage experience transfer with others. The project has monthly newsletter with input from all parts of the organization where their values/priorities can be seen between the lines. They have an internal "project" going: *Make the project into an attractive working place.* CT members are behind this, which means that the project does use management time on CSF6!

[38] In CSF we mentioned the decision on whether field X's oil pipeline goes through this project and we should install a larger pump than designed. The decision from higher management was delayed and changed. The cost consequence was around MNOK 12, which the project had to pay itself in addition to the compensation from X.

and how the project manages them. PEP cannot do that. This confirms the documentation effect of CSF result!

The CT manager says that he may bring the CSF result up to a CT meeting someday and the investigator can come. However the investigator has not pushed for this due to several reasons: 1) CT manager indicates that he needs some time to think about the CSFs, other CT members may also need some time; 2) The investigator starts with the Case2 immediately afterwards; 3) The investigator is not sure if one hour with 12 persons at the end of a CT meeting would be fruitful. This consideration is proven to be correct in the second case. The project should set off a day for this kind of discussion. However, with the present activity intensity and no immediate crisis in sight, there is little possibility for a project to do so.

As a result, case1 has managed to identify explicitly the project CSFs. The core team manager receives the input from his team. The investigator gets the initial experience in application of CSF process model, which contributes to better result in case2. However the horizontal communication is limited to individual CT member's review of the CSF result. Group discussion should have been carried out.

## 5.2 Case2

The information about case2 is summarized in Figure 5-10 The general information about case2.

The establishment of the core team is almost complete (Managers for Gas Market/supply and Terminals are still not appointed). None of the CT members have been involved in the project more than three months. Some are part-time engaged in the project. The core team organization chart is shown in Figure 5-9 Core team for case2.



**Figure 5-9 Core team for case2**

We refer different functions/sub-projects as Platform, Pipelines, Operation, HSE, Procurement and Project control etc. in the following text.

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Information on Case2

**Project goals and strategies**:
- Increase market position in Europe through offering extra transportation capacity to the right market window in Year N
- Ensure that the chosen technical solution is cost effective with regard to capacity offered at the same time leaving feasibility for future installations

**Project characteristics**:
- No Reservoir involved
- Good profitability based on current Statoil economic assumptions and sales prognosis
- Very limited use of new technology
- Subject to authority regulations from several other countries beyond Norway
- Two license groups for one project
- Uncertain if other licensees will favor this project on the next decision gate based on their company strategies
- The capacity offered is larger than obliged sale in Year N so that choice of technical solutions will not be influenced by small market swings
- The delay of completion date will be costly due to lost of sale
- Who the project should report to in Statoil will change with project phases. Gassco could also take over the operator responsibility
- The start of the current planning phase has been delayed for six months while the production start date stands
- Several structural changes in the business area: 1) Petoro was established June 1st, 2001 as stately owned company administrating the stately owned licenses in Norway. 2) Gassco was established Jan. 1st, 2002 as a state-owned, non-profitable operator of transport systems and terminals. 3) Norwegian Gas Negotiating Committee (GFU) was abolished and company-based gas sale was introduced June 1st, 2001. No company is allowed to coordinate gas sale any more. 4) The ownership structure for the existing transport systems in Norway is under development. 5) Regulation for $CO_2$ taxation in Europe is still under development.

**Project capital investment size**: Middle (between 1-5 NOK billion)

**Current project phase**:
- In planning phase, right after project feasibility study

**Figure 5-10 The general information about case2**

### 5.2.1   Gaining access to case2

During the first case study, the CT manager and several other CT members claim that project management challenges in early phase projects and project in execution phase are totally different. This is one of the reasons why many projects change project management group at this phase shift, although it is theoretically beneficial to maintain the personnel continuity, especially that for key project personnel.

This is why the second case study chose this project to best cover the research sphere: the Statoil offshore development projects in Norway.

The researcher reviews a complete list of Statoil operated projects, searching for an early phase project, with an established project organization and reasonable intensity of project activity. Other constraints that have to be considered are:

- ➢ Project location (economic constraint for this study),
- ➢ Recent change of project manager (they must have got the chance to know the total picture of the project),

> ➢ Chance to go on as a project (lower internal investment priority is not a good sign),
> ➢ Possibility for participating in a research based on the project decision schedule (preparation for PDO is an extremely hectic period and probably a bad point to come in).

Three projects are picked out with Case2 as the first choice. This project comes from downstream while case1 comes from upstream. They represent the Statoil business area well. Reservoir is a major factor for case1 and market prognosis is a major factor for case2.

The investigator asks help from the Statoil chief engineer for project management to establish contact with the project. The chief engineer thinks the project may benefit from such an exercise in its early phase. He talks to the project manager in Case2 and forwards him the *letter to interviewees*.

A few days later, the investigator takes contact with the project manager. He says he hasn't decided yet, but the project will most likely participate. He agrees for a case study presentation in the first coming CT meeting. Decision will be made there and then based on the opinions from the CT.

In the mean time, the investigator has started to review the project information. The project database is still under construction at that time with very little information. However, the investigator gets the recent memorandum on decision of whether to allow acceleration of project decision gates (the project applies for exemption of some requirements for the first coming decision gate in order to meet the schedule for the next decision gate) from the process owner of project management.

The case study is approved under the coming CT meeting. CT members point out that 1) it is the time that projects began to think in how to achieve project success rather than just focusing in avoiding pitfalls. 2) Projects should make more effort in improving communication[39] part of project management, in addition to goal definition and breakdown. 3) The CSF case study may help the project in formulating the governing documents required by Statoil at decision gates.

Interviews are scheduled in the same manner as in case1.

### 5.2.2   *External help and review of preliminary information*

This is done in the same manner as in case1. Because the project is still in establishment phase, the project has no PEP yet. In fact, the project database is also under construction. The most import project information is collected from the process owner for project management, who is

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[39] One CT member points out that functional management includes three parts: 1) goals 2) action plan to reach the goals 3) communication (tell everyone all the time what has been done and what we will do, etc.). Most projects are good at the first, not that good in second and worst in the third: communication.

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involved in decision gate reviews. The investigator also gets some general project information from the core team manager before the CSF case study interviews begin.

The business area where the project originates is new to the investigator. The investigator has therefore done some information searching in this business area's organization, its relationship with the rest of Statoil business areas, its challenges, business environment and strategies.

### 5.2.3 Practical adjustment in case2

Based on interview experiences gained in case1, we choose to run the CSF categories first to ensure that we have enough time to go through this "brainstorming" section that may deteriorate with time pressure. However we get to run both parts in the first interview for all CT members except for the CT manager. We have therefore limited the impact due to the swop of the two interview parts and at the same time reduced time consumption due to repetition of same information. We regard the adjustment as a practical improvement in data collection, rather than a design change. The interview time for the first round is about 3 hours.

The investigator explains more clearly the relationship between project goals and CSFs and looks more consciously for measures for eventual CSFs in the interviews for this case.

CT member responsible for Administration (the secretary function) is not interviewed because this function has very little management responsibility[40]. Investigator also manages to have a presentation and discussion of CSF result in a CT meeting in the second case.

### 5.2.4 Information on data collected

The data collection process follows the procedure described in Case Study Protocol attached in Appendix. Besides the parallel process of gaining general information about the business area and the project described in the preceding section, our main data collection is based on interviews with the CT in the project. Only the project CT members were interviewed.

By the time the case study interviews started, only seven CT members are appointed in this project. They are CT manager, Procurement manager, HSE manager, Project Control manager, Pipeline Manager, Platform Manager and Operation Manager. All of them were interviewed. Each member was interviewed twice. Based on the experience from the last case, the Administration responsible was not interviewed as we have mentioned in the last section.

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[40] The CT member responsible for administration is interviewed in case1. It turns out to be difficult to get any answer when using CSF categories because of the character of this function. The interview for this function is not used in this study.

Besides the interviews, the author had also several meetings with the CT manager with respect to first access to the project and its general information; presentation of the results of project specific CSFs, receiving his comments on the results.

The interviews were recorded on minidisks, which were later on written down into text files as truthfully as possible to the recording. The data presented in the following two sections are summaries of direct citations of the CT members' answers to the interview questions, which are presented in Appendix. The data presented does not include any interpretation by the author.

### 5.2.5 CT member's perceptions

There are four topics in this part of interview: 1) Your view on your job and your project, 2) Project success criteria, 3) Your view on project core team, and 4) Your information sources. As for case1, we present the information from the first topic together with the information gathered through the CSF categories in the next section.

#### Understandings on when the project ends

All CT members consider the project comes to its end when authorities approve operation start and all the paper work is done. Everyone is "bound" to the same product to be delivered in year N. Once again, no one understands the project as lasting until one year after operation start as the Statoil governing document for project execution AR005 defines.

#### Project success criteria

We discuss the three aspects: the list of criteria, the understanding of the criteria and the priorities among the criteria.

With regard to project success criteria, all members mention reaching the project goals in HSE, quality, time and cost. Several additional project success criteria are mentioned:

1) Resume--Positive project image in the outside world

2) Client satisfaction (especially in terms of information project sponsors and government gets. Measurement of client satisfaction happens normally at the end of the project)

3) Organization: (no divorce, no personal fatigue, no frustration etc. in the organization).

4) Profitability: only the project core team manager mentions this as an important parameter at decision gates. Yet he admits that this project will most likely concentrate on investments (CAPEX and OPEX) because the project has no control over product prices in the market, as we can see through the definition of project goals in Figure 5-11 Project goals for case2. CT manager has either

appointed a manager for gas market/supply function in the core team so far.

Many do not regard client satisfaction as a project success criterion because they are sure that the client will automatically be satisfied when the project reaches the goals in the four aspects mentioned above. However, there is no unified answer to who the project client is. What are mentioned are: Gassco, Gassled2, Operation, Terminals, CT manager, Statoil higher management and project license groups.

They don't regard the project's relationship with Statoil higher management, who assigns the task to the project organization, as a contractor-client relationship because, unlike contractor companies, the project does not have a goal to ensure that the higher management will come back to them for a later assignment. The relationship is more a collegial character. Besides, the higher management for this project will be different in early and execution phases.

After the first round of CSF interviews, the project defines the following project goals in a two-day teambuilding section, see Figure 5-11 Project goals for case2:

Now that the project is still in the establishment phase, CT members does not have strong opinion on what kind of priorities they have among the project success criteria. However the Platform managers knows that different understanding of quality between Platform and the Operation will appear in the process and it is very important that Operation brings in their expertise and experience into design now in the early phase.

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Project goals for Case2

**Project profitability/cost:**
- CCE(N) < MCE(N) < PDO
- CCE(N) < x MMNOK?
- OPEX < y MNOK?

**Time/execution:**
- The facility starts up with full capacity on Oct.1st, year N
- Reach all contractual milestones
- Ensure interface works, through clear responsibility definition and understanding of tasks at all interfaces
- Documentation should be completed and delivered at product delivery
- Operation organization is operative at facility take-over
- Keep continuous overview of significant uncertainties, and manage them well through taking actions

**HSE**
- Avoiding personal injury has the highest priority
- Project should be planned and executed without undesirable incidence or professional diseases. Good emergency readiness organization will minimize injury and losses if accident occurs
- Project should ensure a good working environment on the facility through focus on working environment in design and execution phases and through recruiting and training of new operation organization
- FAR value on the facility shall be minimized through choosing safe solutions
- Planned emission of polluted materials should be minimized through good design, choice of equipments and execution method. Unplanned emission should not occur
- Project should be planned and executed so that risky operations with high consequences are avoided.

**Quality**
- Government inspection should not result in mandatory actions.
- Get all the necessary approvals from the government and owners
- There should not be identified needs for modification because of bad design or workmanship.

**Resume**
- The project should be regarded as one of the most successful project in Statoil through good results, good cooperation and good comments
- Ensure that the project is proactive and open towards government, owners, operator, contractors and project participants

**Organization**
- High degree of well being and good working environment in the project where good cooperation contributes to good results
- Ensure that the project is optimally organized to the actual situation at all time
- Ensure that work load for individuals is at an acceptable level

**Figure 5-11 Project goals for case2**

We summarize the measures CT members suggest in order to reach good project performance in their focus areas in Figure 5-12.

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Measures to ensure good performance in focused areas

**CT member 1:**
- Use the three steps for functional management: 1) goals 2) action plan to reach the goals 3) communication (in meetings, tell others what we have done and what we will do so that there is a structured possibility to go through the questions like "what is the most important?" and "what is the most dangerous?" for this project weekly and monthly. Important topics should be discussed in teambuilding gatherings. These meetings should be documented.)
- Team building, lunch meetings, and managers set examples for others, make office location pleasant, etc. so that it is more natural for informal contact.

There is no unified way of performance measurement in the defined focus areas. Everyone thinks about it and talks about it in different "languages".

**CT member 2:**
- Decision plan with clearly identified products and time for delivery;
- Meeting activities
- Personal network for resource (personnel) identification

We can measure progress based on the decision plan; we orient each other and talk to Statoil project sponsor (higher line management) and other central actors so that they back us up in our decisions. It is through these conversations and milestones we get status.

**CT member 3:**
- CT must agree on what issues are to be discussed with the Statoil line management and clarify these issues with them
- CT must have a common understanding of what is import and what is not. Otherwise it will cause confusions.
- Risk register shows what is important at each time

One estimates cost consequences to rank risk elements. Project top-ten list is normally established based on input from all in the CT.

**CT member 4:**
- Conscious CT recruiting process
- Information on totality and individuals contribution in the totality
- CT has a common understanding of what is the total task
- Team building
- Care for each other and use time on each other both in professional and social arena so that we get to know each other's competence and network and use them based on trust and respect
- Communicate management focus through task breakdown with appointed responsible person. Define task dependence

**CT member 5:**
- Involving individuals from basis organization and process owner and use brainstorming sections.
- Team building
- Project manager being observant and take actions when necessary
- Project managers motivate subordinates
- Each individual could express their real opinions and avoid dominance

**CT member 6:**

I have just started in the project and attended two CT meetings. The project has no systematic measurement in the focus areas yet. It is still in the identification phase.

**CT member 7:**
- Make project really committed to the use of uncertainty management systems and change control systems; the core team manager must push for it
- Have workshop on uncertainty management in connection with baseline updates

My experience shows that we are not good at measuring performance. One expects that when goal is defined, everyone will understand them and act accordingly.

**Figure 5-12 CT members' measures for good project performance in Case2**

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We can see that there is no measurement mechanism for evaluation of management focuses. Status in these focus areas is based on individual and subjective evaluation in addition to progress measurement according to plan.

### *Relationship with major stakeholders*

CT members have different opinions on how to work with an eventual contractor:

- ➢ The project depends on an open and close cooperation with contractors with short decision route. The client and contractor are bound to the same boat. Contractor will accuse the client for disturbance or interruption anyway when they begin to loose money.
- ➢ The project should make a major effort in good contract formulations, and apply hand-off policy to a larger degree in execution phase. Statoil has chosen the best contractors and should trust that they have the ability to solve crisis by themselves. Statoil could have avoided many variation orders (VO) that are actually not real changes. At the same time, project should use the contracts consistently so that Statoil will not give the impression of always being "nice".
- ➢ Impose control of contractors' work through more involvement. However, Statoil should avoid messing up with contractor's responsibility for its product. If contractors ask, "Is this good enough?" the answer is either "no" with suggestions for improvement or "no comments".
- ➢ The relationship with the contractor depends contract format.
- ➢ Contractors should be treated no differently from any other project participants. "Involve them early, establish openness, trust, cooperation and use contract to regulate the relationship"
- ➢ Contractor should also earn money and we should have open communication. However we have different interests. Therefore we are all friends until contracts are signed. We should then follow the contract intention and pay for the issues we have neglected and contractors should stand for their own mistakes.

Change is a central topic in the relationship with contractors. Some say that the project should stay firmly with the decisions made in the early phases later on in order to achieve success. Others will not have this as an absolute principle and will decide from case to case.

With regard to *sponsor/partner and government authorities*, the attitude is "open information and information should be given early or in time". This project considers it positive to recruit personnel from other sponsors' organizations into this project.

The project expects services from the *Statoil basis organization* (the project direct higher management is not included here) in human resource, QA and professional advises. In principle the project wants as much autonomy as possible.

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*Core team*

Everyone regards CT as of significant importance to project success when it functions. One says that the CT's importance is most obvious in project early phase and will decrease as project moves towards fabrication. The importance will increase again towards installation.

CT members have somewhat different statements on what CT's most important responsibility is:

1. To have focus in the most important and dangerous issues and communicate these downwards in the organization (internal oriented)
2. To get the organization move in the same direction through common goals & plans and communicate with Statoil higher management, partners and Statoil QA so that the project can relate to clearly defined premises or parameters (internal and external)
3. Management of interfaces and totality
4. To listen to each other and use the best ideas (internal oriented)
5. To have control on management parameters

*Management information sources*

All CT members, except one, mention *meetings* as the most important source for management information. Other sources are minutes of meeting (MOM), especially the action list from MOMs; revision reports, review reports, uncertainty registers, weekly and monthly reports, emails and project Arena databases.

As to informal contact, some regard it as essential for their management and make themselves available in different places and talk to people while others do so out of necessity and time available. The project is still under establishment with a little over 20 persons. Most of them work in the same office location. Telephone will therefore not be a natural form for communication with each other yet. From the interviews, it is obvious the core team talks to each other quite a lot.

As to management information system, some associate it immediately with the bottom-up reporting system [Rockart, 1979]. There is no formal reporting from higher management downwards to subordinates. Management focuses are mainly communicated through meetings. Top-ten risk register is mentioned as the place for management focus. How the CT evaluates the project totality at each time cannot be found in one place.

### 5.2.6   Team CSF and project responses

Risk register has not been established yet during the interview period. Two weeks after the case study interviews are completed, the project holds a one-day brainstorming section focusing in identification of risk elements for the project, where twenty two persons attend (the whole

project organization with three external persons, i.e. 22 x 8 =136 hours). It results in 79 elements. Out of these elements, twenty-one elements are picked out as the most important. We list the original 21 risk elements in the following figure. The numbering does not indicate priority.

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**Case2 Risk elements from risk seminar**

1. Authority application (relevant regulations and time needed for gaining approval)
2. Positioning of the riser valves
3. Operation concept, location and responsibility
4. Quality of technical foundation for provisional project sanction
5. Clarify the juridical questions with Ministry of Petroleum and Energy
6. FAR value for the concept
7. Economic vulnerability in operation (close-down) activities
8. Contract strategy
9. Partner
10. Pigging philosophy
11. Point of time and approval of the concept
12. Clarify consequences at boat collision
13. Need for stakeholder analyses
14. Choice of powering method (gas or electricity)
15. Clarify roles of Gassco
16. Close-down time and economic loss per day (same as the 7th element?)
17. Need for modification of downstream facilities for this project
18. Choice of manned vs. unmanned platform
19. $CO_2$ emission
20. Internal decision process
21. Decision process with partners

---

**Figure 5-13 The most important uncertainty elements in case2**

These elements are then drawn in a bobble chart. Because of the project confidentiality, we have taken the numbers of the elements away from the bobbles.
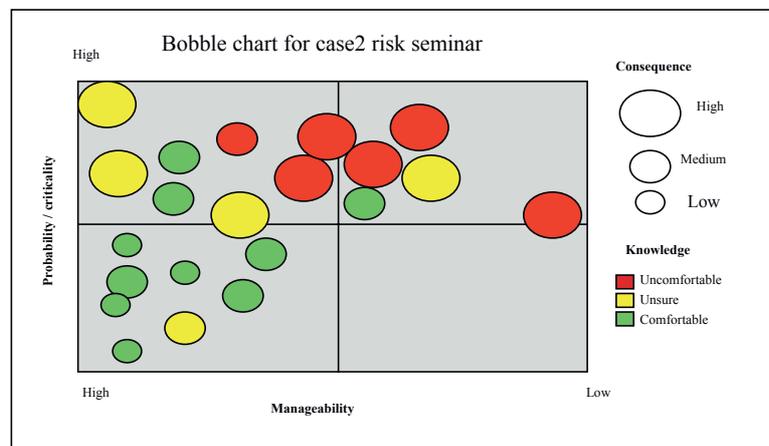


**Figure 5-14 Bobble chart for case2 risk seminar**

The list is obviously very event or task oriented with a few more general entries like 4, 20 and 21, keeping in mind that the CSF interviews happens just before this brainstorming section. Project managers' inputs are equally treated as those from the rest of the project organization.

There is either no indication of how the management evaluates the project situation and how they want to manage this project.

As in case1, we ask the same question:

*What, in your opinion, should be the management focus for the whole project in order to achieve final project success?*

The answers are summarized in Figure 5-15 Case2 CT members' direct answer to project management focuses.

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### Direct answers to project management focuses

**CT member 1:**

The CT manager should focus very much in getting people to work together because each one of us is capable of doing the job we are assigned to. There are two different parts in this: management and leadership. Management includes definition of goals, action plan and communication. Leadership implies setting a good example for others through oneself.

This focus is clearly defined. However it is not clearly written down anywhere. We in CT are so experienced that everyone knows this.

**CT member 2:**

The project should focus on the following:

- Get the resources the project needs
- Get the decisions on technical premises/parameters made in time
- Establish the project culture (including contactor organization) for cooperation: keep clear and continuous focus in goals, meet individual's curiosity, maintain personnel continuity, motivate subordinates, have good horizontal communication, avoid pitfalls/risk management, make the right and large enough decisions in time, establish project behavior codes and identity, avoid being anonymous in the outside world.
- Push the higher management in clarifying the partners' position to the project
- Government contact

These focuses are not written down anywhere.

**CT-member 3:**

- Decision on which compressor to use because of its long lead time
- Design temperature to be used
- Resource availability
- Budget after the coming decision gate
- The CT must agree what is important and what is not.

Most other CT members will come up with a list like this. You can find these focuses in MOM for the CT meetings.

**CT member 4:**

- Good cooperation and relations so that everyone works well together through: recruiting persons with experiences from execution phases into CT; building trust and respect (through for example team building) so that participants go to each other for advices; open dialogues; inform well so that everyone sees his/her own contribution to the totality
- Establishment of project governing documents (project assignment, PEP, Project control basis, procurement strategies etc.) or management systems
- Government contact to know which regulations are relevant
- Inform license groups well in order to pass the next decision gate

These four focuses are clear for all the CT members, not for all participates in the project.

**CT member 5:**

The project should focuses on

- The overall strategies prepared for approval at the DG (provisional project sanction) should be good so that the project will get necessary budget to go on
- Good strategies are based on choice on technical concept, clarification of government regulations, decision on flexibility to be built in concept
- Build a team with open communication based on trust and respect. Project manager should be observant and take action if needed, motivate others; everyone can express individual opinions.

The first two are discussed in meetings. Maybe we use too little time in the last one, although we think it is important.

**CT member 6:**

I have just joined the project. It is too early for me to say anything specific about this project. I have to focus on finding my "place" in the core team, the way the project works, and establishing relationship with others. CT meeting is the place management focus is communicated. I feel that the project has clear management focus.

**CT member 7:**

I am in the transition phase from another job into this project. The present project focuses are:

- Establishment of project governing documents like project handbook, PEP, project goals
- Project internal cooperation

**Figure 5-15 Case2 CT members' direct answer to project management focuses**

In addition, some CT members have also mentioned some CSFs when we ask,

*"How many CSFs do you think you have for the project?"*

at the beginning of the CSF interviews. The answers are listed in Figure 5-16 CT members direct answer to CSFs.

---

Direct answers of CSFs by the CT members

**CT member 1:**
- Government contact: time needed for application approvals
- Quality control, especially in critical areas: Statoil should use its own expertise in revision/qualification of the procedures to be used.
- Interface (physical and operational): always the most challenging task. Define interfaces as simple as possible and quality assure them. All should be involved in the process. This is part of project handbook to be established.
- Quality in project management: Clarity in definition of task, responsibility and authority and that the three commensurate with each other. We should make special effort in definition of authority, which is normally our weakest point. This is also part of project handbook.

**CT member 2:**
- Avoid getting negative focus from government and media. Establish a good environmental profile through thorough and good environmental impact analysis, especially in $CO_2$ emission
- Realistic estimates. Deliver what we have promised (meeting expectations by doing a thorough work and informing others before being asked)
- Good resume by realizing the goals and meeting the expectations from Statoil, partners, government etc.

**CT-member 3:**
- Clarification on which government regulations are relevant for this project and where we should apply for permissions
- Decision on what type of compressor is important for choice of equipment and consequence evaluation (EIA-- Environmental Impact Assessment)
- Good estimate in gas sale prognosis for year N and how much is a day worth.

**CT member 4:**

He says his will have between 5 to 10 CSFs, without listing them in detail.

**CT member 5:**
- Push for that license groups vote for the project
- CT members have the competence and get contribution from basis organization and consultants
- The contractor can deliver the product we need

**CT member 6:**
I have just joined the project. It is too early for me to say anything specific about this project.

**CT member 7:**
I am in the transition phase from another job into this project. Too early to say anything specific

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**Figure 5-16 CT members direct answer to CSFs**

The list of the CSFs generated for the CSF process is shown in

```
┌─────────────────────────────────────────────────────────────────────┐
│              Case2 CSFs from the generalized CSF process model        │
│                                                                       │
│   1.   Establish the project culture for cooperation based on trust   │
│        and respect                                                    │
│   2.   Establish the project governing principle and systems          │
│   3.   Clarify which government regulations are relevant for this     │
│        project                                                        │
│   4.   Lobby activity towards partners in the license groups for      │
│        project approval at the next two                               │
│                            decision gates[1]                          │
│   5.   Ensure access for resource needed by the project and           │
│        contributions from the basis                                   │
│                            organization                               │
│   6.   Careful planning and controlling of the process towards the    │
│        decision gate for provisional                                  │
│                       project sanction                                │
│   7.   Ensure good product quality in early phase for smooth          │
│        implementation in execution phase                              │
│   8.   Work for positive image in the outside world (including media) │
│        and meet the expectations                                      │
│        from license group, Statoil internally and government.         │
└─────────────────────────────────────────────────────────────────────┘
```

**Figure 5-17 CSFs generated from process model in Case2**

The project CSFs generated from the CSF process model is presented to the CT manager first. The investigator explains how the CSFs are summarized; that the results are solely based on the CT members' evaluation, with no "contribution" from the investigator, expect the "measures", which is purely investigator's suggestion to show the format for a CSF presentation; that more informative measures can be found through CT discussion; that the first step is that CT agrees on a set of CSFs that fits for this project, and the next step is to define the most informative measures.

The CT manager comments specifically on CSF2. He thinks the *governing principles* should be more *general* than what are described in the CSF result. He says that the governing principles should be about how the project ensures information and communication; how to make decisions, how to work together, etc., i.e. the formal and informal rules for internal cooperation in the project. At the same time, there are many actors involved in the project, both internally and externally. They will have different interests and influence on the project and want to drag the project in different directions. The governing principles should say something about how the CT should manage this project in this total picture. He thinks what is written in the CSF result is at a level lower than what he regards as governing principles!

The investigator agrees that this complete set of principles is not described in CSF2. The investigator points out that the nature of CSF process model is to make explicit what has been implicit before by asking what the CT regards as the most important for reaching the goals. What the interviewees haven't mentioned will not appear in this CSF result. Investigator's contributions to CSF result, except the "measure" part, are consciously kept out to limit introduction of bias. The CT manager agrees that the team has not discussed much on this matter yet.

He also suggests making the part explaining why the CSF is critical for project success more conspicuous to facilitate better acceptance. The investigator accepts this suggestion. Some information related to resource availability and personal competence that is relevant for project

success, mentioned by interviewees themselves, are removed based on his recommendation. He considers such information as too personal for such documents. The CSF result is revised accordingly (except CSF2 in governing principles) before the investigator talks to the rest of the CT members individually.

Many would rather that the CSFs description be shorter. The investigator chooses to present the evaluations from all CT members as complete as possible to enhance communication. The investigator considers such a presentation can give more exact description on what is meant by the CSF titles. CT members will then have a chance to comment on the CSF titles used. Every CT member has actually read through the whole result, including the footnotes!

One CT member points out that the title for CSF2 should be "establish *ownership*" to the project governing principles. Establishing governing documents is not that difficult and can be done by few individuals in their offices. There are templates for such documents. Too often such documents are made and then stored on bookshelves, just to meet the company requirements. The challenge is therefore to ensure that everyone in the project follows the principles described in the documents in everyday work, in other words, to have ownership of these documents.

One CT member points out that there may be a need to distinguish premises[41], uncertainties[42] and critical success factors[43] among the eight CSFs listed. However the CSF in this study is defined as the areas of activity that are critical for reaching project success. The project team is given the task to deliver a final product for the best interest of its owner. It does not really matter from which of the three aspects a CSF comes, as long as it is critical for reaching the goals or success and to which the project should pay attention. Project cannot afford to neglect the factors that are critical just because they are out of their complete control sphere if they want to achieve project success [Pinto, 2000].

Several other comments are also incorporated in the CSF results. The final result is presented in a CT meeting. The following table shows the list of the CSFs:

---

[41] Organizational (from Statoil) or the regulations/laws needed to do this job. One needs necessary authority.

[42] Those elements are intrinsic to the activities towards final product. They must be few and important and those one can do something with.

[43] Those that make the project result becomes from good to excellent

---

Revised CSFs from the generalized CSF process model

1. Establish the project culture for cooperation based on trust and respect
2. Establish ownership to the project governing principle and systems
3. Clarify which government regulations are relevant for this project
4. Lobby activity towards partners in the license groups for project approval at the next two decision gates[1]
5. Ensure access for resource needed by the project and contributions from the basis organization
6. Careful planning and controlling of the process towards the decision gate for provisional project sanction
7. Ensure good product quality in early phase for smooth implementation in execution phase
8. Work for positive image in the outside world (including media) and meet the expectations from license group, Statoil internally and government.

**Figure 5-18 The revised CSFs generated from the CSF process model for case2**

In an effort to make the CSF result more concise, one CT member suggests a different CSF grouping:

List of CSF from one CT member
1. Project culture based upon trust and respect
2. Excellent relationship with the authorities and partners
3. Ensure Statoil management sponsor and manpower resources
4. Decision ability, in time, with correct delegation of authority
5. Early phase quality, no late changes
6. Meet authorities, partners, Statoil basis, and other customers' expectations
7. Create ownership towards the project execution philosophy and plan
8. Control of uncertainties and interfaces.

**Figure 5-19 A list of CSFs for case2 suggested by one CT member**

Without a complete description of what each items cover, we can only guess from the titles. It seems that all are covered by the CSF result generated from the model. The CT member feels the need to focus more closely in some, for example his CSF4 and CSF8, while making others more phase-independent, for example his CSF2 and CSF3.

The investigator decides to take this list as a reference and keep the original CSF result as it is because the initial CSF result has a clearer fitness for this early project phase and makes it easier for people to understand the content of the CSFs through CSF descriptions. Communication is one of the main purposes for this CSF model. It is the intention to identify contextual CSF for this project, not general project CSFs. At the same time, other CT members may also have other preferences.

CSF1 in its full text in Figure 5-20 CSF1 for case2 in full text shows the format of CSF presentation for case2. For the complete result, refer to Appendix CSF for case2.

As suggested by the CT manager, the CSF presentation is formulated in three parts: "why", "how" and "measures". In case1, the "why" and "how" are somewhat covered under "background", which is the text preceding "measures". The "why" and "how" parts are based solely on

CT members' statements from the interviews under the application of the CSF process model, while the "measures" are investigator's suggestions.

During the second interviews, the same 4 questions are asked as in Case1. For convenience, we list them here again.

1. Are all of your CSFs included in the results?
2. Do you regard all the listed CSF as project CSF?
3. Do you think that it is helpful in making these CSF explicit and make them available in clear text so that they are clear for everyone?
4. Have there been any changes in CSF since the last interview?

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***CASE2-1 Establish project cooperation culture based on trust and respect***

**1. Why**

It is important to keep a balanced focus in both technical and human/organizational challenges in the project. Project participants come from different units and have different technical and social experiences and background. They do not necessarily know each other from earlier. At the same time, project requires *creative teamwork*. It is impossible to define each individual's responsibility and information flow with 100% accuracy because of uniqueness of the task and unavoidable changes. It is therefore vital that project participants, including contractor organization, know each other and the project totality and follow project behavior codes and cooperate. Good working climate generates comfort and creativity. It is also the project success criterion that is most meaningful for project participants.

Project culture (behavior codes or the way we work together) will take its form as the project organization is established, regardless of whether we want to or not. It is wise that project makes a conscious effort in establishing a positive project culture. Maintain a positive culture will be much easier than to modify an unfortunate culture already established.

**2. How**

In addition to establishment of project formal governing principles and systems (ref. CSF2), the project must do several other things:

Core team, as the project highest dedicated management group must
- Ensure that project has realistic goals in time and budget
- Identify and establish common understanding of what is the most important/dangerous and what are the largest opportunities all the time, so that they can make early enough and large enough decisions.
- These evaluations and decisions must be communicated downwards the organization.
- Have control over interface and totality;
- Ensure communication and agreement with Statoil higher management and license group.
- CT must be visible
- Core team must be open for good ideas.

CT manager must be
- Clear in what he wants and be able to make decisions
- Be structural and keep overview and general direction for project
- Good at asking for information, coaching, backing and pushing subordinates for development
- Gather people in the same direction through common commitment;

All: Everyone should be
- Loyal to project behavior codes and decisions
- Everyone should be able to express his or her own opinions. Avoid dominance by few individuals
- Conflicts should try to be solved at the lowest level first
- All functions should know enough of the role of other functions (e.g.: technical personnel

**Figure 5-20 CSF1 for case2 in full text (to be continued)**

should know enough of the contract and take commercial consequences into consideration in their daily work).

- Single point of contact: do not over steer a management level. Show respect for others' authority.

Rules are not enough. One should use time together and care for individuals, both in professional and social aspects. Get to know each other's personality, competence, network etc. and establish respect and trust so that we will search for advices and use each other's competence. We will be willing to listen to arguments in case of disagreement, rather than taking it personally and being hurt. Informal information exchange is as important as formal meetings.

With contractors: We should
- Tell contractor what our expectations are, what are critical for us and how we intend to work together with them: Close cooperation with contractors.
- Be as open in communication as possible. In this case, the project is pressed in time and it is therefore critical that contractor does everything right the first time. If not, inform us early.
- Consistent management according to contract. (Contract review twice a year. Require contractor do the same);

Make information available and communicate so that everyone has a common understanding on the project totality and sees one's own contribution to it:
- Monthly bulletin that informs what's going on; Intranet web page, where one can search for information.
- If there is a decision that influences many, there will be a process around that
- Decisions should always come with explanations so that individuals can understand why
- Structured information system: Information technology is there. However information tends to be too much. Structure is important to be able to find information.

**3. Measures**
- ➢ Establish project specific survey questionnaire in project-desired culture and use it every six months. Present the result to the whole project; identify and implement corrective actions.
- ➢ Personnel continuity: percentage of newcomers and percentage of personnel in transition
- ➢ Degree the project organization sits in the same location.
- ➢ VO/VOR status; the trustworthiness of contractors prognosis; communication with contractor

**Figure 5-21CSF1 for case2 in full text (continued)**

Everyone in the CT answers "yes" to the first two questions, i.e. the eight CSFs represent the project well. Everyone answers "no" to the last question, which means that CSFs are relatively stable. With regard to question 3, most say yes, while one says a CT discussion on the CSF is needed before the real communication effect can take place. By making the CSFs clear, it offers a starting point for discussion.

After a CT meeting and some further adjustments, the investigator asks the CT members to rank the eight CSFs. A few weeks later come the answers. Two of the CSF members feel it difficult to rank them so "finely". However, to keep the same scaling, we use their "fine" ranking from 1 to 8. We divide the CT into 3 groups: Stab functions, sub-projects and CT manager to see if there is any difference in CSF perspective among these groups. Based on the average ranking score, we can get a new ranking from 1-8 for each group. The result is as follows:

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| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| CSF | Culture | Govern. syst. | Government | Partner | Resource | Process to PPS[44] | Quality early | Positive image |
| **CT manager** | **4** | **6** | **1** | **2** | **7** | **3** | **5** | **8** |
| stab1 | 7 | 6 | 2 | 1 | 4 | 3 | 5 | 8 |
| stab2 | 6 | 7 | 3 | 2 | 4 | 5 | 1 | 8 |
| stab3 | 6 | 4 | 5 | 7 | 3 | 1 | 2 | 8 |
| **Stab** | **7** | **6** | **3** | **3** | **5** | **2** | **1** | **8** |
| sub1 | 1 | 7 | 6 | 3 | 8 | 5 | 4 | 2 |
| sub2 | 7 | 6 | 5 | 2 | 4 | 1 | 3 | 8 |
| sub3 | 7 | 6 | 1 | 2 | 5 | 3 | 4 | 8 |
| **Sub-proj.** | **5** | **8** | **4** | **1** | **6** | **2** | **3** | **7** |
| **AVG** | **6** | **7** | **3** | **1** | **5** | **2** | **4** | **8** |

**Figure 5-22 CSF ranking table for case2**

The core team manager mentions something for the first seven CSFs although his input for CSF6 is more limited. Sub-project managers focus more in CSF6 than CT manager. They need decisions on important parameters being made by a certain time to be able to go on with concept development and ensure reasonable product quality and progress to meet the decision gate requirements. This is important because the project has already lost six months due to the late start and the date for operation start stays unchanged. Approval at the coming decision gate without further delay is critical to start up operation as planned. Besides, the project has only budget up to this decision gate.

One CT member points out that project success is subjective and not absolute (ref. CSF8). No other CT members will disregard CSF8 as a critical success factor by removing it from the CSF list, yet they will not prioritize it either, as we can see from the ranking table above. Everyone feels the power media has in forming a general opinion of a project success, with the Åsgard project in fresh memory. However it is still not much *engineers'* "tradition" or a natural task to work specifically on this issue yet.

Some CT members agree that the CSF process model helps formulating a more balanced evaluation of what is critical for project success. "Often, there are things we haven't thought over and they just turn out as they are. Take project culture as an example, if you only concentrate very much on a few documents, you will very likely forget about something in this aspect. A project culture will still take its form. However, it will less likely to be based on cooperation and trust.... One will get the most payback in this if we put some effort in it now."

Another CT member says that for the whole project, "the most challenging element is to establish a good cooperation culture in the project so that people can be clear over and accept both the goals and the way we do things in the project and feel comfortable with it. I do not always have time for this. One is often tied up to technical issues."

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[44] Provisional project sanction

In this study, the investigator has not pushed for a CT-committed set of measures for each CSF because of several reasons:

1) The project is preparing for a decision gate that is about 3-4 months away. The project will have to prioritize their "obliged" work first to ensure the existence of the project.
2) It is difficult to see the benefits of any measurements mechanism in such a short period of time.
3) The project managers experience difficulty in define/identify meaningful and representative measures. It seems more proper that investigator develops better "measures" for the identified CSFs and then come back to the real-time projects for testing. Further research is needed.

What is promising is that most of the CT members agree that "measures" definition and application is worth an effort later on. One CT member says that it may be useful to set up some simple measures for those CSFs that will last over several phases. "Many things are implicit and it is beneficial to have a structure for them". He confirms that this approach is new in Statoil projects.

# 6        Data analysis and Results

Both the literature review in Chapter 2 and researcher's personal experience indicate a need for a top-down communication tool for management focuses in a project. We will use the data collected from our two cases to further demonstrate this need, represented by the first research question.

We then develop a CSF process model for meet this need. The desired effects from this model are described in the three remaining research questions. In this chapter, we will use the data collected through our multiple-case design to demonstrate these desired effects. The logic for how the research questions (Figure 3-1 The four research questions in this study) are answered is described in the Case Study Protocol in Appendix.

In this chapter, we will first show how the data from each case answers the research questions. Then we look at what the two cases can tell us collectively and how the claimed contributions are realized.

## 6.1    Analysis of Case1

We have four research questions as shown in Figure 3-1 The four research questions in this study. We will show how these questions are answered by the cases.

### 6.1.1   First research question

In order to answer the first research question,

> *Does senior management (project core team) need anything more or better than what existing monitoring and control tools can give them today in Norwegian Offshore Development Projects to achieve project success?*

we will compare four sets of data claimed to be management focuses.

1) The CT members' direct answers to what the management focus for the whole project from now on should be,
2) The top-ten list from risk register at core team level
3) The four management parameters stated in PEP
4) The CSF results generated from the CSF process model.

Now that the CT manager has four clearly defined management parameters (Figure 5-8 The four management parameters defined in PEP for case1), and that some CT members claim that management focuses are documented in PEP, we have therefore included the four parameters to see to which extend the PEP can serve as a tool for communication of project contextual management focuses. This data set is special for this project.

The first data set will serve as a description of how management focuses are understood by the project participants. Risk register and the PEP are concrete documented products that are claimed to document management focuses at each time. When we compare these two data sets with the first data set, we can see to which extend they can serve as communication tools for management focuses.

Before the comparison, we can give some general comments on the top-ten list shown in Figure 5-3 The Top-ten risk elements at core team level for case1. The elements are quite proactive with time perspective from months to years ahead. However, seven of eight elements in the top-ten list have only negative consequences, while "change in gas in place" can be positive or negative. All elements are event- rather than process-oriented. From the risk register database, we can see that each element has an initiator, who has identified the risk. She will also be responsible for identification and follow up of the risk abatement actions. For each action, there is a responsible person and a deadline. Among the persons responsible for each action, few come from other sub-projects/functions than the initiator. Where this is the case, actions are most likely still open after the deadlines.

We can summarize, in keyword form, the management focuses case1 shown in Figure 5-5 CT members' understanding of project management focuses for case1. It is worthwhile mentioning that although investigator emphasizes that it is project total management focuses we are concerned with, some CT members move very quickly to their own areas of responsibility.

We can see that managers do not have the same understanding of what project management focus should be for this project, at lease judging from what they say.

Most of the top-ten elements fall into one of the management focuses, except the risk element: Serious incidence in construction phase. CT manager defines the top-ten list. It is therefore unfair to say that he does not regard this as important. However, it does demonstrate manager's task-oriented way of thinking.

| Key words | Core team members | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Project goals*[45] | x | | | | | | | x | | | |
| Decision quality* | x | | x | | | | | | | | |
| Risk management* | x | | x | | x | | | | | | x |
| Project control* | x | x | x | x | x | x | x | x | | x | |
| Reservoir and Drilling | x | x | | | | | | x | | x | |
| Platform (time and schedule) | x | x | x | | x | x | x | | | x | |
| Build up operation org. | x | | | | | | | | | | |
| Qualified personnel | | | x | x | | | | | | | |
| Change control | | | | x | | | | | x | | x |
| New business opportunities | | | | x | | | | | | | |
| Open communication | | | | x | x | | | | x | | |
| Product quality | x | x | | x | x | x | x | x | | | |
| Definition of responsibility | | | | | | | | | x | | |
| Experience transfer | | | | | | | | | | x | |
| Contract strategy and procurement | | | | | | | | | | | x |

**Figure 6-1 Case1 CT members' direct answers in project management focuses**

Although three out of eight elements in the top-ten list are from Reservoir and Drilling, only four out of eleven CT members point out that Reservoir and Drilling should be management focus because they are facing a more challenging job than others (including platform) and that cost overruns can be huge if this part of the project goes wrong. CT manager also admits that it is challenging to have the right focus on the right issue all the time and avoid being blurred by the activities right in front of him[46]. His job is to look far ahead, at least one or two years ahead.

The fact that many CT members fail to mention Reservoir and Drilling as project management focuses indicates that risk register alone cannot effectively convey the correct picture of management focus. This is because the top-ten list is mainly based on disciplinary risk registers with occasional input from the CT manager directly[47]. Although core team manager is responsible for choosing top-ten risk elements, it is still very much bottom-up based. Communication is therefore good between the core team manager and the manager with her risk included in the top-ten list. The process does not involve the whole core team in looking at project totality (the project success), who therefore feels no strong ownership of the risks beyond their responsibility. In other words, each discipline is not encouraged strongly enough to be concerned with other disciplines or project totality.

As some CT members point out, Reservoir and Drilling are often considered to be somewhat different (i.e. very scientific) from the rest of the project because they deal with underground, something one cannot see or touch directly. Reservoir manager also admits that it is challenging to communicate his risk picture to the rest of the team.

Some point out that most Statoil managers have solid experience in one discipline. However they have little experience beyond that. It is

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[45] The management focuses marked with * is the four management parameters defined in PEP.

[46] Platform is the main area of activity right now. Most all CT members regard Platform's adherence in time and cost as a management focus. However, pipeline has just started detail engineering. Only one CT member has mentioned the pipeline sub-project[46] in his management focuses, which is still in the early phase and has potential for savings.

[47] In this case it is the risk element no.1.

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therefore not difficult to imagine that communication cross disciplines is challenging. Several members confirm this.

The Reservoir manager has relatively broad experiences, both in technical and commercial areas. He emphasized cross-disciplinary communication and is proud of what the project has achieved in early phase. However this kind of communication is still important in construction phase, in terms of finding the quickest implementation schedules; solving difficulties without compromising schedules or budgets; and that every attempt is made to keep costs down within the terms of the specifications and to increase delivery value [Morris, 1998]. Several members feel that the project is not much different from the traditional project organization with separated subprojects, good in vertical communication. In other words, the horizontal communication among sub-projects is more of a challenge.

The comparison between management focuses mentioned by CT member with the top-ten list shows that not all management focuses are expressed by the top-ten list. It is therefore not fully correct to say that top-ten list alone cannot stand for the project management focuses. However, the CT manager has defined four management parameters in PEP[48] to compensate for this. We will now look at how well the CT manager's four management parameters are accepted by his team members.

We get the impression that project control and risk management are firmly accepted and practiced by the CT members. Some members use Open communication to express the important of risk management. Many CT members also emphasize the importance of clear definitions of project goals and breakdown so that each discipline knows what are expected from them and what they can expect from others. Each CT member is involved in the process of goal definition for his/her function or sub-project in this project. We can therefore say that the team reasonably understands three parameters: risk management, goals and project control.

Quality in decision process, however, is less clearly understood or followed by all in the CT. The CT manager also admits that it is not always easy to get everyone involved in decision process[49]. This indicates that just writing management parameters in a governing document alone may not ensure full ownership by the CT members. One can therefore not claim that PEP, as a document, is an effective communication tool for management focuses. We can see that the CT members have much more ownership in the goals for each discipline

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[48] CT manager is responsible for PEP, which is a project governing document that everyone in the project should follow

[49] Although decision issues have to be register in database for CT meetings a couple of days before the meeting so that every CT member can have to chance to prepare for the issue, many CT members admit they prioritize their own cases only.

because they are involved in the goal breakdown process. In other words, effective communication requires involvement from the core team and necessary follow-up, not just establishment of a governing document.

Until now we can see that the existing measures (top-ten list and PEP) for communication of management focuses have their limitations.

Now we can comment on the CSF results generated from the CSF process model and compare them with the top-ten list, management focuses given by CT members directly and the four management parameters defined in PEP in order to answer the remaining research questions.

CSF1 *Impose strict cost and progress control and change control* is commonly understood and accepted by all CT members as we have mentioned earlier. Change control has become especially critical for the current project phase and the project has decided that all changes have to be approved by the project core team to pose a barrier for unnecessary and costly changes. This is very much in line with the recommended practice in literature: no design changes unless they are absolutely necessary [Morris, 1998]. The CT manager has also clearly pointed out that the business development function should also base their activities on the available project capacity currently being built. These two tactics are special for this phase and set important premises for many people. However, they are not natural entry in risk register. They are either clearly documented in the PEP.

CSF2 *Plan for personnel transition and movement of Reservoir, Drilling and Operation to Bergen* is caused by a higher management decision, which is in conflict with what the project wishes. The fact that the core team manager regards the Reservoir and Drilling have a more challenging job to do makes this CSF more critical for project success. It is not just a matter of finding candidates to fill in the positions when the Reservoir manager and some key technical personnel moves to other projects. The CSF also covers the fact that knowledge of project history may get lost. Different geographic locations may become a barrier for effective communication with the rest of the project, well aware of the discipline distance between the underground and the "builder's". That personnel leave the project with a short notice may become more realistic. How the project copes with this uncertainty, will influence the project success. The CT members have somewhat different ways to cope with the challenge if we look at the "measures" suggested. There is no "project" way established through discussion. This CSF corresponds well with the risk element in top-ten list. However the "measures" are more complete; the historical background and argument for the importance of resource in Reservoir and Drilling for this project are also documented for the ease of communication. This problem-oriented CSF will not be a natural entry for PEP.

CSF3 *Proactive risk identification and scenario analysis* seems to be clearly accepted by all and well documented in PEP. However the understanding of what risk management is varies from person to person. What is focused here is the call for more active cross-disciplinary or cross-sub-project scenario analysis, in addition to the risk register already established in the project. Scenario analysis involving all disciplines is more easily said than done and CT manager must push for this[50] because builders may have limited capacity and interest in this aspect. Risk management is more than an establishment of risk register. It is establishment of an attitude for looking out for oneself and for each other for the risks and opportunities. Based on this attitude, one can identify actions that can best achieve project goals and success. The CSF also points out the importance of utilizing the positive side of uncertainty for tasks still under early phases.

One finding can give us an additional yet useful indication: two of the CT staff members have recently carried out a thorough verification round on all the risk registers in the project and are satisfied with the status. However, the CT manager is worried about the active and effective use of the risk registers. This indicates that although risk management is management focus in the project, there is no unified way of getting status (or measurement) for how the project performs in this focus area of activity. Subjective evaluation is useful. However this form of measurement tends to be unstructured and varies from person to person[51]. Different subjective evaluation in the same areas of activity will not result in any corrective actions. The CSF process model offers a structured method to follow-up critical areas of activity, or management focuses. After clear definition of what project goal and success is, there are three steps: 1) define CSFs explicitly, 2) define measures that represent CSFs and 3) define information needed.

CSF4 *Establish good relationship with higher management so that we understand each other and their decisions are made in time* is about the relationship with higher line management. Although the PDO is approved, there are still decisions that are beyond the control sphere of project CT manager, especially when decision is made on the basis of company economy rather than project economy. The project includes a business development function that has to consider the benefits of both the project and Statoil. We know that project wishes to have no changes under the construction phase in order to realize the project goals. However, Statoil benefits can be increased by introduce some changes in the project. The decisions in whether to implement the changes are not always simple and easy. They will depend on development from other

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[50] Two and half months later, the investigator found the note for CT decision issue for platform offshore commissioning planning, where the CT manager requires that every discipline take this issue as *first priority* and supply with enough resources.

[51] Different person has different sets of parameters they measure the status against. These parameters are usually implicit and unstructured.

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fields, companies, partners etc. and decisions lies with the higher level of management above the project. The timing for these kinds of decisions will not always be favorable for the project. In many cases, the project has to cover part of the disturbance cost from these decisions. In this case, one such decision has cost the project more than MNOK 10.

Other times, the project may have good suggestions that need higher management support, especially in business development function. Higher management could also change the project decision due to protest outside the project (for example labor unions); support the project in exercising pressure on contractors if necessary; ensure that project keeps the key personnel critical for them etc. All of these require close contact, communication, negotiation, understanding and support between the project and higher management.

Although the CT manager could not immediately accept that he regards this CSF4 as his CSF, he is really concerned about this. He insists, during the interviews, the importance of good relationship with his immediate line manager, although many decisions have been taken by a level above, due to the frequent transition of managers immediately above him. This is more an implicit CSF for him. Some other CT members clearly point out this CSF because they feel this impact on their work.

CSF5 *Ensure that product meets the function specifications* deals with the understanding of quality in this phase in the project and its relative importance comparing to time and cost targets. LCC consideration pushes for involvement of Operation in engineering from day one so that one can minimize changes under the construction phase. Disturbance cost due to changes after fabrication has started is somewhat difficult to estimate. Although one can say that LCC is still a valid principle for each decision, the main way of ensuring quality is to meet the function specification to the lowest possible cost and fastest possible. Project Management Handbook published by PMI [Morris, 1998] supports this way of management under this phase. The slogan of "Deliver what we have promised" and zero philosophy for cost and time overrun promoted by the CEO all argue for more strict change control under construction phase. This may in fact be a good quality assurance measure to avoid changes being implemented without complete cycle of technical verification. This CSF is thus to make it clear that under the present phase, the project is following the principle that quality is to meet the function specifications, and no more. There will be Drilling test on land to ensure that the whole system works, not just "passed" sub-systems. This is a measure for quality control in the areas where there could be large consequences. The user group integration at site teams is also effective measure for quality control.

The project has entered several commercial agreements to cover for possible production failure at start-up. Therefore the initial platform

regularity (quality indicator) must be weighed against the time and cost adherence goals. It is a touchy decision when and how much modification/change should be incorporated in fabrication phase.

The CT manager considers CSF6: *Maintain the honest, proactive and open project atmosphere based on safe foundation, respect and competence,* as a matter of course. He has re-composed his team at PDO submission to ensure that all have the necessary competence and that the team can work together properly. He is also regarded as a leader open for new ideas, at the same time, with ability to make decisions in time. The communication in the project is open. However, some CT members see the need for encouragement for honesty in the "we have performed well up to now" atmosphere because nobody wants to destroy that "perfect picture". Some warn the project against "team in core team" where some members have better information than others for decision-making. That some people leave the project and more contractor personnel join the project also calls for attention here.

Although the CT manager hesitates in accepting CSF6 as his CSF, he acknowledges the importance of open communication. He says he uses most of his time talking to people and that is the way he gets project "temperature", not through reports. The project has also an internal taskforce working on: *making the project into an attractive working place*, which is not a common practice in Statoil projects. The CT manager also has a motto: "firm in issues, soft in form", which means one should be have clear and firm opinions on concrete cases while remain gentle or sensible in form of communication. He also repeats time after time that the there is no winner or loser in each CT decision issue. No one should take the decisions personal. The project is also active in experience transfer with other projects. CSF6 is by no means an indication of crisis. On the contrary, it is listed here because it is important for project success. The project has performed well here and new challenges calls for continuous attention in this area to achieve final project success. CSF is quite different from risk consideration in this aspect.

We can see that the CSFs catch the important guidelines or tactics that are not documented. At the same time it offers a more detailed description of management focuses so that difference nuances under the same management focuses formulated in the "well-known key words" appear. These nuances are sources for conflict and different course of actions. This is a clear CSF advantage with regard to risk register and management parameters specified in PEP.

CT manager thinks the CSF result is a good description for project management focuses. However, the project does not have a documented product equivalent to the CSFs result. There are either any defined measures that represent the defined CSFs so that manager can get status

in these CSF in a consistent manner. Different evaluation on the project risk registers by different CT members is a good example.

We can therefore answer the first research question confirmatively: the project core team needs a better for top-down communication of management focuses.

### 6.1.2   The second research question

As to the research question no.2:

*Whether a CSF process model can be used as a generalized method for explicit CSF identification, analysis and monitoring of contextual CSF, based on managers' personal intuition and skills in Norwegian Offshore Development Projects? Manager in this study is at project core team level.*

The CSF model is general while the CSFs generated are contextual for the project. The CSF results are purely based on CT members' evaluations and opinions through interviews in CSF process model. We have managed to make explicit a set of CSFs that CT manager thinks describes the project very well. The six CSFs are also project contextual and project phase specific.

That CT manager think that his fourth management focus is not conspicuous enough is because of the fact that other CT members does not have the same ownership to this parameter. The CSF process model has shown that it is a challenge for CT manager. Measure definition is also based on CT members' inputs.  They are not systematic enough as the CT manager points out. A better development of measure can only first take place when the project has reached consensus project CSFs. This process has not happened because CT manager is not sure if he will regard CSF4 and 6 as his CSFs. He would rather take some time to think about them. As we described in data collection, these two CSFs are strongly mentioned by some of the CT members.

CSFs needs clear definition of measures that represent them, as we have demonstrated by the example of how project status on risk registers is evaluated differently. CSF process model offers the complete process from CSFs to measures and then to the corresponding information needs.

We can therefore answer the research question no.2 confirmatively: the CSF process model can be used as a generalized model for explicit CSF identification.

### 6.1.3   The third research question

As to research question no. 3:

*Whether the CSF process model can be used to determine if there exist consensus team-CSFs, which must be accomplished through the project core team working together?*

The CSF process model involves all CT members. Two (CSF4 and 6) of the six CSFs are mainly based on contributions from the CT members. Although the CT manager does not immediately accept CSF4 and 6 as his CSFs because he regards them as a matter of cause, they are the issues that CT manager regards as important. Besides, the project does use the project management time to work on CSF6, with the support from CT manager. It is therefore logical to assume that they are the implicit CSFs for him. CSF result also describes the important nuance (for example risk management is not only use of risk register). All CT members have contributed to the measures identified for each CSF. By using the CSF process model only on CT manager will not achieve this. These findings give a confirmative answer to the research question no. 3: team approach will contribute to better definition of management focuses.

During the CSF interview process, we can see the difference in priorities of project goals in time, cost and quality (incl. HSE); understanding of quality; how to work with basis organization, contractor, higher management, partner and government institutions; and the role a core team plays for project success etc. Although we have not presented the CSF result under a CT meeting, it is reasonable to assume that not all CT members will accept all CSFs without reservations. CT manager is an example. This is somewhat expected. The differences should serve as a good starting point for discussion for finding out what are the critical areas of activity for the whole project, rather than focusing on each one's own areas. We can therefore not claim that the CSFs are consensus team CSFs.

### 6.1.4   The fourth research question

As to the research questions no.4:

*Whether a CSF process model can be used as a tool for management focus communication among different levels of management (vertical communication) and among management at the same level (horizontal communication)?*

The CT members have also used the CSF interview process to channel their concerns about the project like "don't punish the honest messenger", "avoid team in core team" and "more emphasis in quality". They are not likely just groundless concerns because they are chosen for the positions because they are considered to be competent. This is especially true in this case after the major re-composition of CT by PDO submission at a time when activity level in Statoil was low. By making explicit these differences and evaluations through neutral investigator, one    can    expect    improved    horizontal    and    especially    vertical

communication; after all it is CT manager that is responsible for the project totality and interfaces. This communication effect could have been more obvious if there is a decided group section for CSF result discussion and that consensus team-CSFs are reached.

Through the interviews, we also get some other observations that indicate what CSF process model can give us. We can see that CT members have different understandings of who the project client is. Many refer the higher line management as the client because they assign the project to the CT manager and his organization. Every few refer the client as the ultimate user of the project product.

In the Statoil offshore development projects, Operation is usually involved from the project early phases to incorporate their needs and user experiences in the product design. However the authority Operation has varies from project to project. Some project has project director who is mainly responsible for project delivery and a production director that will remain in the position until several years after full production start. The project director will report to production director all the way. In this case, the Operation, although formally under project director, will have informal reporting route to the production director in order to take care of the Operation's interest if he feels it necessary and the project director knows this possibility from the beginning. However, many projects do not have this kind of organization format, like in case1: the Operation reports solely to the project director with no reporting route between the Operation and the higher line management for the project. Although project director, by definition, is also responsible for production, there is no real example for a project director to stay in the position until several years after production start. Higher management is responsible for both projects under development and operation of the completed installations. However, many projects complain that projects deserve more attention from higher management, who are mainly concerned with operation of existing facilities. In this case, the distance between the Operations in a development project seems to be quite long from the higher management.

In addition, Statoil CEO emphasizes zero philosophy for cost overruns for new development projects. We can naturally understand the CT manager's the priorities among the project goals under the construction phase. Such organizational format and management signals from parent company all contribute to the formation of implicit definition of project success criteria (including priorities) in projects[52], although no project documents will show any prioritization among the project goals. In reality, all decisions are made with clear prioritization in mind. If the prioritization is not the best for the company, project managers should not be criticized for making such prioritizations. Instead, higher management must establish the premises for correct prioritization.

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[52] Pinto defined client acceptance and use as successful project implementation [Slevin and Pinto, 1986]

## 6.2   Analysis of Case2

We follow the logic described in the Case Study Protocol to answer the four research questions.

### 6.2.1   The first research question

In order to answer the first research question:

*"Does senior management (project core team) need anything more or better than what existing monitoring and control tools can give them today in Norwegian Offshore Development Projects to achieve project success?"*

we are going to compare the three sets of data claimed to be management focuses:

1) The CT members' direct answers to the question: *what should be the management focus for the whole project from now on* or the answers to *"how many CSFs should the project have"*,
2) The top-ten list from risk register at core team level,
3) The CSF result after the application of the CSF process model.

We use the first set of data as the reference for how project management focuses are understood in the project before the CSF process. The second set is a documented product in the project, claimed to be management focuses. The third set is what the project consensus management focused in documentation format.

The second data set is readily documented in Figure 5-13 The most important uncertainty elements in case2. We can see that many elements are event or task-oriented (for example: element 2, 6, 7, 8, 10, 12, 14, 16, 17 and 18). With so many elements listed, it is hard to see how one can read what the project management focuses are. It is also difficult to see what each element is really about only from the short titles, for example "9. Partner". It could mean focusing on establishment of a sponsor group that support the project within the license groups or it would refer to focusing on informing the license groups with project development status on a continuous basis so that license groups could make decisions at the next decision gate without delay, or both.

We can then move on to the first data set: the direct answers to what the management focuses should be and the CSFs directly listed up by some CT members. We can sort the answers in form of key words in the following table:

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| No | Key words for the direct answers in management focus | meb1 | meb2 | meb3 | meb4 | meb5 | meb6 | meb7 |
|---|---|---|---|---|---|---|---|---|
| 1 | Project culture | x | x | | x | x | | x |
| 2 | Government contact | x | x | x | x | | | |
| 3 | Quality control | x | | | | | | |
| 4 | Interface control | x | | | | | | |
| 5 | Quality in PM | x | | | | | | |
| | | | | | | | | |
| 6 | Resource | | x | x | | x | | |
| 7 | Decision in technical parameters made in time (compressor, temperature, gas sale one day worth, flexibility) | | x | x | | x | | |
| 8 | Partner commitment through higher management | | x | | | x | | |
| 9 | Avoid neg. focus from government and media | | x | | | | | |
| 10 | Realistic estimate | | x | | | | | |
| 11 | Good resume | | x | | | | | |
| | | | | | | | | |
| 12 | Budget after PPS | | | x | | | | |
| 13 | CT agrees on what is important | | | x | | | | |
| | | | | | | | | |
| 14 | Project governing doc | | | | x | | | x |
| 15 | Inform partner regularly | | | | x | | | |
| | | | | | | | | |
| 16 | Quality in overall strategies | | | | | x | | |
| 17 | Contribution from basis | | | | | x | | |
| 18 | Contractor can deliver | | | | | x | | |

**Figure 6-2 Case2 CT members' direct answers in project management focus**

Most of the uncertainty elements belong to one of the topics in the above table, except no. 15: Clarify roles of Gassco. During the CSF interviews, this topic is brought up. However, none of the CT members regard this having any significant impact for the project success. They may have re-evaluated the situation after the discussion in the interviews or maybe new information makes it more relevant so that it appears in this uncertainty list. Note that this uncertainty list is produced from the brainstorming section that takes place several weeks after the CSF case study is finished.

What is important is that many important management focuses do not appear in the uncertainty list. For example, establishment of project culture, quality control, interface control, quality in project management, realistic estimate, good resume, avoid negative attention from government and media, and CT agrees on what is most import for the project, etc. These are typical management issues, which are not necessarily task-oriented. These areas are what managers consider as critical for project success and what they will use their time on. The question is how these focuses are communicated to others if they are not in the uncertainty list.

What is interesting is that most CT-members think there is clear understanding of project management focuses, at least within the CT, although these focuses are not documented anywhere. However, from Figure 6-2 Case2 CT members' direct answers in project management focus, only four out of eighteen elements have at least three "votes" (50%). Most items have only one "vote". We find clear difference in the

direct answers from CT members. For example, some CT members regard the most important job for a CT manager is to lead the organization towards the same goal, while others does not mention this at all. Get the decisions on important design parameters are regarded as very critical by sub-project managers, while others do not have the same understanding.

We can also see that some CT members look mainly at factors within the project control sphere, while others also consider the external issues that influence the project result, although to various degree.

We can find the third data set in form of titles in Figure 5-18 The revised CSFs generated from the CSF process model for case2.

Comparing uncertainty list with the CSFs, the uncertainty elements seem to be at a more detailed level than the CSFs, which are about management focuses. We have to remember that the uncertainty list is based on input from the whole project organization rather than just CT members. Project participants with no management responsibility will naturally be more task-oriented because of their functions. They cannot define the management focuses for the CT. This explains why the *bottom-up* risk register mechanism is not good enough as a tool for defining and communicating management focus at each time, although it is absolutely necessary. Management group has to take the responsibility to define project management focuses and lead the organization towards the same goals. This is a top-down approach. The CT members confirm this understanding when we discuss about the CT's contribution to project success. Management focuses covers more than the risk register. The difference is especially obvious in early phase projects.

We can compare the final CSF with the direct answers to management focuses. We put "x" to the places as long as the CT member touches some aspects of the CSF.

| CSF | | Direct answers by CT to project management focuses and CSF | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | Culture | x | x | x | x | x | | x |
| 2 | Ownership to govern. doc | x | x | | x | | | x |
| 3 | Government | | x | x | x | x | | |
| 4 | Partner | | x | | x | | | |
| 5 | Resource and basis contrib. | | x | x | | | | |
| 6 | Process towards PPS | | x | x | | x | | |
| 7 | Quality early | | | | | | | |
| 8 | Resume | | x | | | | | |
| | Focus Documented | no | no | CT meeting | Clear for CT, not others | Partly in CT meeting | CT meeting | |

**Figure 6-3 Comparison of the final CSF result to the CT members' direct answers**

This table shows once again that it is far from being true that everyone has the same understanding of what the project management focuses should be. The CT members say that there is no documentation on

management focuses or that these focuses are mainly discussed in CT meetings. From the results above, it does not seem that meetings have generated a common understanding on what is most important for the project. This situation shows a clear need for clear identification and communication of management focuses even within the CT.

One of the reasons why the project joins the case study is that they hope this study will contribute something to the establishment of project governing documents like project execution plan, procurement strategy and project control basis, etc. that the project is required to do. Several CT members have confirmed that part of the CSF result will appear in these governing documents.

However, the project does feel it difficult to put this CSF result directly into the project governing documents. In case1, the investigator has compared the difference between project execution plan (PEP) and the CSF results. It shows that they serve different purpose and are not the same. As some CT members point out, the governing documents sets the requirements without explaining why. The requirements are also system oriented, covering all aspects of project management, without priority or taking much consideration of the project specific situation at each time. This is maybe the main reason why establishing real ownership of these documents is challenging in a project. The CSF method is a method forcing the project to think by themselves in their own context. The ownership will be more readily established because of the involvement of all the CT members.

Like in case1, the status for the identified CSFs is not systematically measured. As one CT member puts it: everyone measures in his/her own way and expresses it in different languages. The big question is if there exist common criteria for measurement. If the CSFs are not clearly defined, the measurement criteria will either be clearly defined. How can we be sure that we are judging on the same basis? Without the same criteria for status evaluation, each individual may get different impression of status and therefore different "corrective" actions will be triggered or not triggered by different managers. Can we say that we are managing the management focuses properly in this way?

All the discussions above indicate that answer to the first research question is confirmative: project top management needs a new tool for identification, communication and control of management focuses for their project.

### 6.2.2   The second research question

As to the second research question,

*"Whether a CSF process model can be used as a generalized method for explicit CSF identification, analysis and monitoring of contextual CSF, based on managers' personal intuition and skills in Norwegian Offshore*

*Development Projects? Manager in this study is at project core team level?"*

we can answer largely confirmatively.

All CT members in case2 have confirmed that all the CSFs identified are "absolute"[53] for the project. We have also shown that direct answers from individual CT member are partially correct and that no individual CT member is able to come up with the complete set of final CSFs for this project. Through the CSF process model, CT members get input from others and actually also from themselves. For example, the manager that forgets to mention project culture as a CSF agrees that this is an area the project should work on now and it is an implicit CSF for him.

We can also say that the CSF process model can give project *contextual* CSFs. The three CSFs for "Planning[54]" phase suggested by Pinto and Prescott: 1) project mission, 2) Top management support 3) Client acceptance [Pinto and Prescott 1988] are obviously too general for this specific project although there is relevance for this project too.

The CSF process model is general. We have by now used the same generalized model in case1 and case2. The project in case2 is an early phase project while project in case1 is under mainly construction; Case2 comes from the complementary business area to that case1 comes from. The difference in size of capital investment in the two cases is large. Case2 faces different kinds of challenges from those in case1.

In both cases, we have come up with a set of explicit, contextual CSFs. We have thus demonstrated the generality of the CSF process model further developed in this study.

However, we cannot claim that we managed to answer the research question 100% confirmatively. This is because we have not reached consensus on measures that can represent the identified CSFs. Managers show difficulty in defining meaningful or representative measures in this study. The investigator followed the method for measure definition suggested by Dobbins [Dobbins, 2000]. However, they are not concise enough. The investigator feels that more research is needed in this aspect when applying CSF to project management level.

### 6.2.3 The third research question

We can also answer confirmatively to the third research question:

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[53] All CSFs for this project are included and all CSFs listed are CSFs for this project.

[54] They divide the project life cycle into four stages: Concept, Planning, Execution and Termination

*"Whether the CSF process model can be used to determine if there exist consensus team-CSFs, which must be accomplished through the project core team working together?"*

All the CSF members have agreed on the eight CSFs generated through the CSF process model. We can therefore claim that there exists consensus CSFs.

As we have pointed just now, none of the CT members have mentioned all the CSFs that they finally agree upon as project CSFs. We can therefore say the final set of the CSFs is a team effort. We can safely claim that involvement of the whole CT gives better result in CSF identification and definition.

### 6.2.4  The fourth research question

What may be more important is that this CSF process model generates the ownership and facilitates communication among the CT members, which is one major challenge for governing documents (ref. CSF2). This is what the fourth research question:

*"Whether a CSF process model can be used as communication tool for management focus among different levels of management (vertical communication) and among management at the same level (horizontal communication)? "*

is about. Through individual interviews and discussion of the CSF results, in its full length, in CT meeting, each individual CT member has a chance to see how others consider the project situation and how project should be managed in totality. Although CSF is not the same as project governing documents, it has certainly helped sorting out some thoughts in the process and increased the ownership feeling.

CSF process model is a more systematic way of communication rather than ad hoc discussion in meetings. Many issues are actually not natural topics for a meeting before disagreement or problem appears in form of concrete issues, although one can anticipate different opinions at the very beginning. An example is how to handle the relationship between the client organization and the contractors by technical and commercial personnel. The CSF process model offers a channel for such discussion before anything happens, based on the CT members' experiences from former projects. There is no need to wait for a problem to appear.

Although all CT members have agreed on the eight CSFs, there still exists difference in priority as we can see from Figure 5-22 CSF ranking table for case2. There is even no common understanding of the first 3 most important CSFs! The project core team manager regards government contact as the most important because the concept development and "everything else in the project" require a clear overview of relevant government requirements. It is natural to anticipate

that at least the sub-project managers that are responsible for development of design concepts will rank this highly. This is not the case! This indicates that our impressions are not always correct and that challenge to "agree on what is most important within a team" is much greater than one would like to believe.

There may be several reasons for large difference in priorities:

1) The CT member's position. Although we emphasize it is the project CSF we are looking for, each CT member's evaluation will still be influenced by the job he is doing in the project.
2) Lack of information. Some CT members start later than others. Some are sitting in another geographic location. Some works part time in this project. This will obviously influence the information they get at each time. We also have to remember the importance of informal communication in a project life, something a CT meeting cannot replace.
3) Different evaluation based on the same information foundation. This may be more challenging and is questionable if it is possible to do anything about it. Still, knowing this difference will give us the information on where each CT member stands, as Bullen and Rockart did using two axes: internal/external or monitoring/building [Bullen and Rockart, 1981].

We divide the CT into three groups: CT manager, stab and sub-project in hope to see difference in how each group evaluates the project situation. However, Figure 5-22 CSF ranking table for case2 gives us on indication of any group pattern. There are some large differences in priority in both the stab and sub-project groups. It means that a stab function manager will not necessary evaluate a project differently from a project manager. The average ranking in both groups gives us no obvious difference in ranking, keeping in mind that the ranking is originally quite "finely" defined.

When advisory functions have very different priority from that of the CT manager, like in this case, one may have concerns on whether communication is good enough.

We can also see that only one CT member ranks the CSF1: project culture highest, to a large contrast to the rest of team. The CT manager ranks this as the 4th most important CSF while several CT members regard this as the most important responsibility for CT manager. The rest of the CT ranks it between 6th and 7th. Everyone regards establishing a good project culture as fundamental for project success during the interviews and thinks that the project should work on this. At the same time, many also indicate that although this is important, not much time is spent in this because one is always tied up to technical issues.

Almost all CT members have engineering background. They have many suggestions on what a good project culture should be, as we can see in the full text for CSF1 in appendix. However it seems that this is not a natural part of the project scope of work. There is no "recipe" for how to establish a good project culture and it depends on how the individual behaves. Teambuilding is almost always the first that comes to one's mind in this aspect.

How to establish a good project culture in a specific project should be an interesting topic for further research. At the present, much is left to the project manager to find his/her own way out. When time is short, this task is naturally put aside. Much research has been done in communication and cooperation [Pinto and Pinto 1990]. It is true that only theory in this management and leadership cannot solve all practical challenges a project manager faces, however, theory can get practitioner learn faster. It is time for project managers and researchers to discuss how they can make "establishment of project culture" more manageable.

The same CT member who rank CSF 1 as the most important rank the CSF8 in the second place, again to a huge contrast to the rest of the team, who all give it the lowest priority. This is somewhat a more "alien" issue for project managers. Most will say that this is out of their control, although they see the importance.

## 6.3    Integrated data interpretation

We have used the data collected in the two cases to answer the 4 research questions showing that

1) There is a need for a new tool for better communication of project management focuses by senior management in projects
2) That CSF process model can be used as a generalized method in making the management focuses explicit
3) That *team* approach is more powerful than relying on a single manager and
4) That CSF process model can contribute to better communication both vertically and horizontally, although tested only within the CT in this study. However, measurement for each CSF is suggested, yet not fully implemented in this study.

In this section, we are to look at what the two cases can tell us and if the claimed contributions specified in 7.2 Claimed contributions are realized.

### 6.3.1    *Interview questions on interviewee's perspective are useful*

We have introduced a new section to the CSF process model to get an overview of what the interviewee's perspectives in their management focuses, project success criteria, core team function and management information sources are. These are important aspects in understanding

how the interviewees understand the world around them. These perspectives are the reasons behind strategic or tactical actions and why different persons work differently in a project.

The first part is on each interviewee's job situation. By asking what the most challenging elements of one's job, the investigator can get an idea of what the intuitive focuses each CT member is and how familiar the interviewee is to think in terms of CSF. This will make the following discussion more thorough and effective. We can also get a feeling of the relationship within the core team and understanding the dynamic of the team cooperation by asking interviewee's perspective of CT's role in project success and how CT should work together.

Peter Morris says that "...Today's work of project management is much more demanding than the old "on time, in budget, to spec" one. It is about managing project as entities. ... It is about accomplishing projects successfully. It is about managing change and transition. And today, as never before, it is value driven. It is about meeting and exceeding customer expectations... [Morris, 1998, (Pinto ed.) p4]." It will be interesting to find out if this is how the practitioners think.

One problem is how the project success is defined: whether the manager involved has the value driven (profitability) as the highest goal; whether the project customer is clearly defined and if client satisfaction is also a valid project success criterion for client project organizations; whether the higher management has the correct understanding of project and motivates the project managers to act to the company's best interest through proper performance evaluation, etc.

Project success is really a subjective evaluation. There is no absolute project success, only perceived project success. The attitudes in achieving project success varies from "it is enough that my boss and I know that the project is a success" to "we may introduce PR function in the project core team". The majority thinks project success is to reach the goals in time, cost, quality and HSE. Nobody will use any energy in profiling project positively. In case1, they actually decided to keep a low profile in the beginning to avoid negative attention if something went wrong[55]. However, as some point out, the positive image of projects will absolutely contribute to Statoil's image and thus contribute to its value. Maybe this is an area Statoil should have a clear strategy for: instead of just avoiding negative attentions from media, Statoil should also try to attract positive attention on what projects manage to achieve?

Understanding of project success criteria is thus deliberately introduced in this CSF process model. This will avoid any hurry in jumping into the traditional time and cost goals and let interviewees have a chance to

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[55] This project later on changes the strategy and profiles more actively inside Statoil to stay attractive for potential resources the project needs.

think over what *should* be the goals. This understanding decides how interviewees carry out their daily work. This understanding is not just limited to identify a whole list of project success criteria, but also the priorities among them. If one prioritizes the predictability of meeting time and cost targets, one will likely have a less aggressive or a conservative attitude towards quality or profitability. In this case, what kind of signal the company top management sends out is also very important in the formation of this understanding. After all, everyone will be evaluated and everyone wants to succeed. Through the CSF process model, one can evaluate if the project managers are given the premises to act to the best interest of the project owner by knowing their project success criteria and priorities among them.

Through the CSF process model, we also find out that there is no unified understanding of who the project client is. The answers vary from Statoil higher management, license group, product user--Operation, project core team manager, gas buyer, etc. If client satisfaction is a valid criterion for project success, especially for early phase project, these different understandings will certainly influence the way each manager works. We know that project owner and project user is not always the same. With Gassco becoming the operator for transport system and terminals, project owner and user are becoming two different companies.

Through the case studies, it is obvious that information flow is an important aspect for project. Meeting is the major form for management information flow both vertically and horizontally. Not all project managers read site reports. When organization gets larger, they expect that others inform them on issues they should know. The question is whether "others" know well what the managers should know all the time!

Much communication happens informally, like in corridor, on telephones, or unscheduled person-to-person conversations. Both project core team managers regard informal contact as the main form to "measure the project temperature-what's about to happen next". Open communication is thus essential for good project execution. Open communication is based on trust and respect. One tries to work on interfaces; to define task, responsibility and authority properly so that they conform to each other; to recruit competent personnel in a team, including their social competence. Still project is a temporary organization. Project participants do not necessarily know each other on beforehand. Here strong leadership becomes vital, and the project core team manager is extremely important in this aspect. As many say, "if the core team manager does not function as a leader, others in the organization will take over in practice." Now that the project core team manager is the only person who is responsible for the project totality, it is extremely important that he/she has the full control to keep a balanced control towards the project total goals.

Many interviewees will certainly regard the project as a failure if this culture is not satisfactory. This is maybe a quite special phenomenon in the Norwegian culture. Andersen and Jessen use "all participants regard this project as a success" as one of the project success criteria for evaluating Norwegian project success in their PEVS [Andersen, Jessen, 2000].

Both projects regard open communication or project culture[56] as important. This indicates that open communication is not a phase dependent CSF. It is a foundation for project success and management should be observant in the development status in this aspect in all phases.

Although important, the project core team manager in case1 will not immediately regard this as a project CSF, probably based on his subjective evaluations and judgment. The concern working environment and organization survey is the only concrete measurement the project takes. However, the project does have a task force in "making the project into an attractive working place"[57] where several CT members are involved.

In case2, most of the CT members mention this as a CSF; some are very concerned about this based on the impression from interviews. The project core team manager also intends to use project specific working environment survey[58] to get the best information on the principles established in this project. Yet he will wait until later phases when project organization becomes quite large.

Surprising enough, only one (not the core team manager) will regard this as the most important CSF. Most will put it towards the lowest on this list, even though the project is currently under establishment. One way to explain this may be that one feels one has very limited concrete actions (team building) in this aspect. One cannot "work" on it. It can also indicate the limited knowledge and training in this aspect in project. Here managers can get some ideas or knowledge from literature in trust, collaborative virtual teams, cooperation vs. task performance and general positive feeling of accomplishment [Pinto, Pinto and Prescott, 1993], cooperation vs. stress [Pinto 2002], motivation of highly educated people [Clark 2002] etc.

Contributions from outsiders or training of project managers in leadership may be useful. One CT member mentions the positive

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[56] Complement each other, challenge each other based on respect and trust and that everyone should regard this project as a good project and are motivated for the next project

[57] This project is also active in transferring their experiences to others in Statoil organization. Although one may have different "motives" for being so active in this, the project is actually working on positive profiling (perceived project success) in Statoil and even beyond.

[58] In CSF results for case2, an example for project specific working environment survey is shown.

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experience in hiring a "coach" (not an engineer) in improving team communication in his early projects.

Åsgard B review [Åsgard B experience report, 2002] concludes that managers should have combined technical and leadership skills. How can one achieve this in practice is a big question. We have discussed with one CT member if core team manager's leadership should be an open topic for the project so that the core team manager can see the "deviation" of his performance and what is wanted from the team. He regards this as a dangerous Maoism action. The investigator tends to agree. However, this just confirms how much chance a core team manager has in making mistakes in his leadership. At least the CSF process model can channel other team members' opinions on what a good leadership is to the core team manager in a natural way.

### 6.3.2   Systematic, balanced and committed management focus

Through the use of the pre-designed interview structure, it is more likely that the questions cover all aspects of project management in a systematic manner. The interviewee is offered a chance to think from a *project* perspective rather than pure *functional* or sub-project perspective. What could be very efficient is in the aspect of project external issues that could influence project in some way. Project people have a tendency to focus more on the internal issues and neglect to influence the external issues that are not totally under their control. These external issues could be timeliness of higher management decisions, marked prognosis, supply forecast, etc. They feel that they will be taken care of by someone else and that's it. However it is common sense that one tends to be over-optimistic in estimating a situation one does not know enough of.   The role of Gassco is an example.

At the same time, by using this model, one can get a more balanced evaluation of the project situation and management focus. One manager said that one has a tendency to concentrate on concrete products like documents, and neglect the soft aspects like establish project culture, although one knows that it is important for project to work productively towards goals. Therefore a project culture develops into one by itself. If it turns out to be bad, it is extremely difficult to change it to a better one. Another sub-project manager points out the establishment of project cooperation culture so that participants can identify themselves with the goals and way the project do thing and be happy with that, as the most challenging element for a project as a whole. However it is not sure that he will have time to this. One is tied to the technical issues most of the time. Through the CSF process model, we make this implicit aspect that is important for project success explicit so that it will be more properly taken care of through management attention.

The CSF process model gives the project a unique and "legitimate" chance to put what they regards as most important on a piece of paper

without worrying being accused of anybody because it happens before problem appears. This is for their benefit and it is to achieve common understanding and alignment to project goals, strategies and ways of doing things. Projects are very interested in this. At present, this is quite arbitrary or informal. There is no standard available tool for project top management to discuss something like CSF in practice, although risk management is an established practice in every offshore project.

Having made explicit what the project regards as CSF and how they are to tackle these with internal agreement and ownership, it is also possible for the project to better communicate the *project* situation to external experts so that they can get better-qualified advices if project wants to. Someone will argue that a project will not show this to outsiders, at least not those who will decide the quality of project governing documents. However, in practice, project tends to do the opposite. They want to use those who sit in the QA positions because these persons are usually highly qualified managers or project directors. It is project's interest to get approval to be able to go ahead. In the process, it is their interest to get en insurance that they have really got the best quality in their products. With the CSF clearly documented, the project can better communicate (right now it is through meetings) their project specific situation and their way of thinking to these external persons if they decide to do so.

In this sense, it is also more meaningful for QA personnel to review project CSFs or something similar, at least in addition to the standard project governing documents. QA personnel have the dilemma to find the governing documents satisfactory, yet the project lack ownership to the documents they produce. There are templates for all of standard project governing documents and all projects can write their governing documents without much difficulty.

### 6.3.3   Team approach is better

Although decision making in projects are based on democratic rules, it is beneficial for project core team manager to get the opinions or contributions from his team and influence them with his management focuses. PS 2000 concludes that it is more beneficial to use simple consensus-based process that involve central decision makers and experts with competence and experience relevant to the project concerned [PS 2000 Summary, 1999]. CSF process model is such tool.

CSF process model is more easily to be accepted by project in early phases because there are so many open ends and one needs to concentrate. In projects under construction phase, project goals, management systems, the project culture, major external influences like company strategy, government requirements, license group approval etc. are mostly likely in place. The risk management will naturally become the major project management tool and focus in this phase. It may seem to be difficult for practitioners to realize what is the difference between

CSF and risk management in this phase. However, CSF method can help project manager to gain a more balanced view instead of concentrating only in limited identified risks. Another advantage of using CSF process method based on team approach is also to serve as a communication channel upwards, especially in issues that is not so concrete as an event that can be brought up or presented quite neutrally. These issues can be management related issues, personal issues, or it could even be frustration. Of course, the most important is the communication of different managers priority and their evaluation of the project situation and the actions they regards as critical to take. The collected wisdom is better although it may appear to be in conflict in some cases.

### 6.3.4 A spreader of positive experiences

The CSF process model can also serve as a spreader for positive experiences from one project to others. The experiences from case1, heavy involvement of internal user groups in all phases; active experience transfer; good commercial agreement to cover for possible risk consequences; leave enough budget or time to cope with new technology; good open communication and measures in making the project an attractive working place; the four management parameters, etc. are all valuable for other projects.

### 6.3.5 Discover potential conflicts or problems before anything happens

We can also, thanks to the CSF process model, discover some potential conflicts or improvement potentials in system or organization before any real conflicts or harm have become a fact. Of course, one can choose to take the risk and let it be as it is. In that case, it is a calculated risk.

An example in case1 is the core team manager's time perspective for his stay in the project. This is no secret for the project core team and Reservoir, Drilling and especially Operation regards it unfavorable that he leaves so early. They believe that his time perspective will influence his management focus[59]. Some CT member says it is Operation that is the loser and Platform is the winner in the current construction phase. The Operation says that it is the company's wishes to focus on time and cost targets by using the current organization form, i.e. Operation totally under the authority of the core team manager. He suggests that if the company wants to have a balanced focus on time, cost and quality (LCC), there should be a production director above the core team manager (who is the project director), to whom Operation has an informal reporting route, which is known for all from the very beginning.

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[59] Research on the psychology of time has suggested that each individual has a basic orientation towards time that affects that individual's interests and abilities. There are also research showing the relationship between leadership and time orientation. Some researchers points out the project management skills should vary with time [Thoms and Pinto, 1999].

Åsgard B review [Åsgard B review, 2002] concludes that one should try to reach equivalence between project and Operation organization so that Operation can be strong enough to refuse to accept products that are not good enough for Operation. We can reach the same conclusion through CSF process model focusing project success from case1. Here we are not indicating problems in this area for this project. The information from interviews does not lead us to this conclusion yet, thanks to the core team manager's "well balancing" so far. However, we are pointing out a "weakness" in organization format that may trigger a "unbalanced" project and Operation organization in cases of crisis.

This time perspective of when one completes his/her job in a project is closely connected to his/her understanding of what the project success criteria are. The obvious example is the platform finishes earlier than Drilling and Operation and thus has different set of criteria than Drilling and Operation. That builder and user have different success criteria (including priority) seems to be valid. Case2 does not have the same challenge.

An example for CSF process model puts a light on a potential problem area in case2 is the different views in how to work with contractors. Many disputes with contractors could be avoided if technical and commercial functions in client organization work hand in hand. Project could have developed clear attitudes to limit potential problems.

Through the use of CSF process model, such "risk" can be discovered before real consequences appear.

### 6.3.6 Better documentation of project management process

We can also discover some important management decisions or guidelines that are not documented anywhere, yet which set premises for how the project work should be done. An example is the important guideline for business development function to base his work on the capacity being constructed right now in case1. They are part of the project management process that should be documented properly for later project analysis and learning.

We are given the chance to gain an insight in some concepts used by all, yet with different understandings. A typical example in case1 is the fact that both Operation and Platform is concerned with product quality. While the platform understands quality as meeting function specification and no more, the Operation is concerned with Operation cost and eventual modification cost after delivery. The conflicts between the two groups are mainly because of this difference in quality understanding.

### 6.3.7 Get to know how to improve company organization to better assist projects

That no one in the two projects regards that their project ends one year after the production start, which is defined in the governing document for project management in Statoil, also gives "outsiders" a chance to know what is really accepted by "insiders" and what needs improvement.

Actually the comments on interviewee's attitudes towards basis organization can also give us some hints in what should be improved in company organization or services from the basis. An example is the division of process owner and resource owner, where process owner is responsible for tools and quality control and resource owner is responsible for supplying project with human resources. The problem is how one can separate tools from the persons that are supposed to use them. The project requires qualified resources, not just a person with a head. A project can always turn to consultant market to cover for their needs. This will not contribute to competence enhancement in Statoil. In many cases, it is the consultants who get the "on-the-job-training" for many years so that Statoil is dependent on the their competence they have gained in Statoil projects. Better company wide resource management is strongly suggested from both cases.

Project management literature says that when project asks for resources, they should negotiate with the resource owner on the basis of project priority. However, projects experiences different situation: in Statoil, there is no such thing because higher management does not get involved. Project should therefore rely on their personal network in recruiting, just like any project problem they have to solve on their own. Someone in process owner says that resource allocation should be a task belonging to higher management, i.e. project owner. Maybe in the future this will be the case in Statoil.

During the interviews, come CT members in case1 claim that Statoil is not yet good enough in effectively using the time available in early phases and has to compromise on quality in design due to time constraints afterwards. Project in case2 has experienced 6 months delay, without anyone asking why this happened. If a project's production start is delayed for 6 months, it will be in newspaper already!

For projects in early phases, without final project sanction decision, there is often no exact formulation of project constraints. The mandate is normally to "optimize", or "maximize" with no clear definition of constraints of what to optimize or maximize against. Constraints could be size of capital investment, time for product delivery, strategic marked value, and supply etc. It is therefore a need to ask what the project objective and goals are.

Project owners should be actively involved in this process [Pinto and Prescott, 1988]. However, in many cases, it is the project core team

manager who makes a draft for the project task assignment, instead of by the project owner. Without a proper discussion of what the project goals and constraints are for the project, the project core team is more or less left alone to judge what the company values most, of which they may not have the proper information foundation for. It is unrealistic for a project to evaluate a project's strategic value at a portfolio level if higher management does not say it clearly. A correct understanding by the project in these aspects will decide what kind of solutions they will look for and if the best solution is really best for the company.

For the project in case2, one of the goals is to pass the next decision gate because the budget only last until the first coming decision gate. In this project, the core team regards investment size as a constraint and tries to minimize the CAPEX estimate from the last decision gate. It is project's understanding that the company has more projects than it has capital for at the present so that higher investment may force the company to drop the project and choose another project. The project regards it as their task to recommend the most cost efficient solution for the capital investment.

From case1 we also hear that project organization feels that the higher management who are mainly concerned with Operation activities in completed fields does not prioritize them. There are also other projects in Statoil complain that higher management does not give project enough attention [Minutes of meeting between project and process owner from the TEK PE PL arena database].

Åsgard B review [Åsgard B review, 2002] concludes that customers should be demanding, among other things: that they "should challenge the project organizations regarding HSE, cost, time and their quality philosophy; challenge, supplement and support". Here "customer" refers to the project owner, or Statoil higher management that assigns the task to the project organization. The case study also argues for use of project management techniques in company management.

### 6.3.8 Connect "insiders" and "outsiders"

Projects also admit that quality is an important yet a difficult parameter. That contractor is responsible for the quality of their product does not protect Statoil from huge total consequences of a failure. Too much quality control by client organization also cost a lot of money. Åsgard B review concludes the need to "develop appreciation for quality" in area of "development of leadership".

These insights gained through application of the CSF process model can connect the "insiders"--project managers in on-going projects and the "outsiders"--the experts standing outside who are responsible for development of tools and procedures closer. One can therefore keep an overview on a continuous basis, what are to be improved both within the project organization and in Statoil in general in terms of organization,

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higher management support etc. so that project can have the best chance for success. After all, this process model offers the chance for creative and lively exchange of ideas guided by a procedure that covers all aspects that can influence a project, and that this happens in safe environment where very competent management personnel are main contributors. CSF application aids an organization in its general planning process for strategic, long range and annual planning purposes. [Bullen and Rockart, 1981, p35]

### 6.3.9 *Connect practitioners and academic*

The CSF process model allows practitioner and academic come close through interviews where thoughts and knowledge are exchanged. Practitioner will get a systematic tool and CSF way of thinking that gives him results based on his own input, over which he has full control.

> "In far too many organizations, top management has given little time to pondering their own information needs. Rather, they have been concerned with the traditional areas of marketing, manufacturing, finance, etc." [Bullen and Rockart, 1981, p43];

Practitioner can also compare their results with the general academic results. For example, project in case1 exercises strict change control under construction phase, which is strongly suggested in academic results [Morris, 1998]. They can also learn from the latest advancement in general project management body of knowledge. For example: Project managers tend to have the tactics of making themselves independent of the factors that they do not have complete control for. However in many situations, this is impossible, like high management and basis organization. Pinto has first pointed out the role of politics in successful project management and offered some ways in which project managers can use politics in a positive and effective manner for project success [Pinto, 2000].

Extensive research on the relationship between project success and general critical success factors with project life cycle perspective [Baker, Murphy and Fisher, 1983] [Pinto and Prescott, 1990] can give practitioners several warnings they have to consider. Baker et al. parent company's heavy emphasis upon staying within the budget has some negative effect on perceived project success[60]. In Statoil, CEO asked if it was time to introduce a null philosophy with regard to cost overruns for development projects. Of course, the emphasis in cost reduction can also become incentive for better ways of execution [Tetlow, 1999]. It all depends on how this is handled.

Research also show that Planning factor are important in all phases of a project life cycle if project success is not only about project efficiency (time, cost), but also external effectiveness criteria: Client (user)

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[60] Definition is in chapter 2.1 Project Success Criteria

satisfaction and Perceived value of the project. Planning factors drives the tactical factors. Planning must be reassessed continually in the light of changing environmental conditions, client demands and top management objectives. "Mutual adaptation must take place between the project manager and the use, as client needs become a continual force for changing and reshaping the project mission [Pinto and Prescott, 1990]. Shell's Mars project [Shell 2000] is a successful project with this kind of adaptation. Practitioners, project managers and project owner in parent company, may benefit from some reflections in this aspect in their project. A company with emphasis placed mainly on the efficiency dimension of project success can only expect that project managers focus more on tactical factors rather than planning factors in project execution and takeover phase.

Academic may get the first hand data from practitioners to test academic findings and assumptions to develop the general project management body of knowledge, and incorporate the tested findings in this tool on a continuous basis. For example, we find out that the client project organization does not readily regard client satisfaction as a project success criterion, rather as a means for success. They consider it as a matter of course if they would meet the HSE, time, cost and quality. Academic have assumed client satisfaction as a separate project success criteria, for project in general [Pinto and Prescott, 1990]. What this understanding implies in project management in client project organizations, whether the client organization should begin to learn from contractor project organization in this aspect is subject investigation.

How project managers should treat business development opportunities under the execution phase for his project is also an interesting topic. Right now the project managers are heavily measured by predictability of the three traditional parameters: time and cost targets and delivering a product that works. How company equity[61] should be placed and whether the company has given its project managers the premises to take care of company's best interest is an interesting topic both for practitioners and academic.

HSE is especially mentioned as a separate goal or success criteria thanks to the emphasis in safety and environmental profiles in this industry, at least in Norway.

The educational effect for both practitioner and academic through application of CSF process model cannot be ignored.

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[61] Morris points out that project should be more commercially focused [Morris, 1998 Project management]. Profitability can only be shown after some time of stable Operation. The "builders" make the premise for profitability yet they will not be there when profit is realized. Thus it is not really feasible (although theoretically) to use profitability to measure their performance because conditions for final profitability are not totally under their control. In addition, the privatization of the company and listing on stock markets made the company to focus more on cash flow indicators than long term profitability

### 6.3.10 A project management tool

Both projects emphasize goal definition. Risk register is commonly regarded as management focuses at any time (dynamic) and the general management principles are described in project governing documents like PEP. However we have shown in the case analysis that risk register tends to be very task-oriented and it is only part of the management focuses managers have at each time. There is no established channel for discussion of the management focuses. They are left to each manager. CSF process model offers such a channel.

Neither of the projects in the case studies has an established management information system where project management focuses are clearly defined, explained, actions identified, and measures are set up to get the relevant information in order to give status for these management focuses. Except the traditional measurements like those in cost, progress and HSE, subjective evaluations are extensively used, and is on individual basis. Without clearly defined CSFs and measures, one may get different evaluations, even in the same issue, like the different evaluation of risk management status within the CT in case1. CSF process model offers a prototype tool for more discussion in management focuses (CSFs) at each time and how to measure the status in the CSFs, so that the team getting a common understanding on what is important for the project, how and what should be done.

### 6.3.11 Summary

We can now conclude that the claimed contributions are proved through this multiple case study and analysis. This study brings up a topic project management is interested in: have the right focus all the time. This is proved by the fact that this research study is accepted by the two real-time projects when they were first asked and that it is the core team that is involved in this study, knowing that management time is one of the most critical resources in projects.

The introduction of team approach into the CSF process model strengthens the project management and fits well for project organization (core team) for Statoil offshore development projects where knowledge span is large and specialization degree is high. The team approach also increases the ownership to management principles identified.

Introduction of interviewees' perspective section in the CSF process model offers a structured method for understanding their views of the world and improves interview quality.

Right now the communication and getting status of the management focuses are weak point in project management practice. CSF process model offers a structure of better communication, monitoring of project management focuses both horizontally and vertically.

CSF process model also contribute to better documentation of project management process by periodical collective review of management focuses for the whole project and document the important management evaluations and management principles.

Last but not least, the CSF process model offers a channel or bridge between "insiders"--"outsiders" and "practitioners"--"academic" that facilitate better development and application of project management body of knowledge.

# 7      Conclusions and future research

*For academic: All projects are not, in fact, similar. Rather, care must be taken to consider their underlying differences, lest on attempt to draw overly general conclusions.*

*For managers: while there are characteristic differences between classes of projects, there are also patterns of similarities within project types that may apply to their projects.*

[Pinto and Covin, 1989]

## 7.1   Conclusions

In this section, we will summarize to which extent the research objectives are met. As we have presented in 3.1 Research objectives, questions and process, this research has the following objectives:

1) Is there a need for structured and documented top-down identification, communication and monitoring of management focuses?
2) Can we develop a generalized CSF process model that can meet such a need if the answer to the first objective is confirmative?
3) Can we show that such a model has the desired benefits through its application in real-time Statoil offshore development projects in Norway?

The level of management we aim at in this study is project core team.

### 7.1.1   The 1$^{st}$ research objective is met

We feel that we can give a clear confirmative answer to the first research objective. This can be explained in the following text.

Through the case studies and literature review, we can confirm that goal definition and breakdown are common managerial lore also commonly practiced in real-time offshore development projects. They are well documented in project governing documents like project execution plan, which also includes description management parameters and execution strategies. However, this part of top-down communication is quite conceptual and independent of project events. They are also often in

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form of requirements with no measure mechanism to see if the requirements are met in a systematic manner.

Project managers focus also on definition of task, responsibilities and authority through position descriptions and emphasize that these three elements must commensurate with each other.

Beyond these formal tasks, project managers also points out the importance of open communication within the project. Open communication will naturally include both formal and informal contacts.

Formal contacts include most commonly formal reporting and meetings. Formal reporting is most likely in form of bottom-up reporting to higher level of management, especially in form of standard reports. However, what is interesting is that most project managers do not often read project standard reports. They expect that they have been informed before the reports are made. Reports are made for outsiders. Meetings, on the other hand, are the most commonly used top-down communication form. However meetings itself cannot ensure that structured communication takes place. Meetings are often more action or decision oriented than being systematic and managerial oriented.

All project managers regards informal contacts as the most important and indispensable source of management information to get the correct project "temperature" in order to know what will happen in the future. This demonstrates that project environment is so dynamic and complex that no standard reports can gather all the important information for the management. As a result, project managers often have implicit management focuses based on their individual evaluation of multi-sourced and unstructured information foundation. This unstructured and informally based project management focus definition also makes it difficult for external verification or help. There is neither any guideline for quality control in this aspect of project management. Much is left to individual managers.

Even with the information situation described above, managers tend to believe that governing documents, standard reporting, regular meetings and informal communication together can very much ensure everyone gets the correct and somewhat consensus understanding of the project status and can move towards the same goals. However, the reality is different. Not all project participants can all the necessary information when informal contact has such an essential position in project management. It will be more difficult for normal project participant to have a systematic view of project status and evaluation. In other words, project also needs a situation dependent and systematic definition, communication and monitoring of project status to ensure that the organization moves towards the same goals. This is also a management responsibility, which is a top-down communication.

As far as we know, these exist no formal management tools in clearly formulating, communicating and monitoring project management focuses at each time beyond what have been mentioned here.

### 7.1.2 The 2nd Research objective is mainly met

The CSF process model further developed in this study offers such a structured tool. It starts with helping managers to *explicitly* identify their CSFs and then define measures that represent each CSF and identify information needs that can give managers CSF status. We focus on project core team, which is the highest management group totally dedicated to a project. Team involvement ensures exchange of opinions and utilization of group knowledge and experiences so that quality of management focus identification is improved. An equally important effect is its ability to generate ownership to the CSFs identified. Ownership will ensure that individuals focus on the right issues and take actions that are best for project totality. Decision criteria are clearer and decisions will be more predictable. Even if there is disagreement, it will be clear for everyone.

Each CT member's understanding of project success criteria (including priority among the criteria) is quite relevant information and therefore is incorporated into the CSF process model. The understanding will explain how managers manage their part of project work and how they will work with each other. Project success criteria can change with project phases: a new criterion can be added or deleted; or priorities among the criteria change. It is the project management, especially the CT manager's responsibility to clearly identify project success criteria as changes occur.

Having consensus on what project success criteria are is desirable. However, it is not always possibility. This is closely related to the kind of task and the relative dependency between each team member. If one finishes early and leaves the project, she will have no or less ownership to the success criteria that will first be evaluated long time after she has left the project, at least not with the highest priority.

We can only claim that the 2nd research objective is mainly met because we find out that project managers experience difficulty in defining meaningful measures for most of their CSFs. The measures are identified by author following the same principle suggested by Dobbins[62]. They are useable yet not optimal because they are not concise or representative enough. We doubt if pure interview method may be effective enough to solve this problem. We have therefore either moved on to define information needs to monitor the CSFs.

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[62] One identifies a measure for each constraint (important activities identified by project managers) within a CSF.

Extensive use of subjective evaluation or lack of properly devised measures for CSFs is a sign that CSF method is still new for project environment. Rockart points out in their research that "a small but significant part of the information concerning the status of CSFs requires subjective assessment on the part of others in the organization, rather than being neatly quantifiable… However, … many more of the measures at first devised were subjective. It takes considerable work to find objective measures, but in more instances than originally perceived, suitable objective measures are available and can be developed [Rockart, 1979, p92-93]."

### 7.1.3   The 3$^{rd}$ research objectives are mainly met

The model characteristic and the desired benefits are formulated in the research questions 2 to 4, see Figure 3-1 The four research questions in this study.  They can be summarized in keyword forms:

➢ Generalized CSF process model,
➢ Explicit CSF identification,
➢ Contextual CSFs,
➢ Based on project manager's intuition and skills,
➢ Existence of consensus team-CSFs that must rely on team effort
➢ A tool that improves communication vertically and horizontally.

The multiple-case study design shows the generality of this model, at least for Statoil offshore development projects in Norway. This is because the model is adjusted to the Statoil organization format for project and its support, i.e. the project will relate to a *process owner* who is responsible for model and tool development, establishing best practice, QA, verifications, decision gate check, etc. and a *resource owner* that supplies the human resource to the project organization in addition to the company internal project sponsor and license group, authorities etc. Now that this study has chosen only Statoil projects, it is beneficial to incorporate the Statoil organization format into the model to lower the application threshold. Application of this model to projects in other companies with different organization format will require some minor adjustment to ensure best information collection on project CSFs.

We have *explicitly* identified project *contextual* CSFs. The CSFs are purely based on the CT members' answers to the interview questions, based on their intuition, knowledge and skills, without interpretation by the author. In both cases, we have demonstrated that core team members can contribute to the formulation of the project specific CSFs, in addition to what CT manager could as a single individual. Although we have not gone that far as in reaching consensus team-CSFs in the first case, we did manage to demonstrate this in the 2$^{nd}$ case. The fact that different CT members have different understanding or evaluation and that consensus team-CSF are established shows that communication vertically and horizontally has been improved.

### *7.1.4   Other benefits from the CSF process model application*

In addition to these desired benefits from CSF process model, we have also found other benefits through the study:

The CSF process method fits manager's way of thinking, which ensures its low application threshold. Managers have full control over the process and the product from this model.

This method, based on identification and alignment of project goals, success criteria and incentives etc., can enable us to discover potential conflicts or problems before anything with negative consequences happens. For example, we can get early indication for how parent organization can better organize project execution by adjusting project organization format, performance evaluation mechanism and services for the project etc. In this sense, the method complements the common risk management, where technical issues are too often over represented.

The CSF process model offers extensive review of all aspects of a project, covering issues like strategic alignment, goal definition, motivations, organization, politics and human relationships etc. rather than just "hard" technical issues or problems that needs to be solved. "Soft" issues can sometimes become quite critical for projects. However, they are not always properly addressed before some "problems" occur. For example, a good project culture[63] is regarded as a foundation for reaching project goals. This is something many are concerned of, especially those with quite some years of experience. However project managers admit that they often prioritize working on technical issues instead, although they know that a project culture will gradually take its form whether one works on it or not and it's better to work on it early. In this sense, CSF can help project manager to gain a balanced overview of what are really critical areas of activity for his project independent of if they are "hard" or "soft" and become proactive in management.

This CSF process model is resource efficient. Comparing to a typical risk seminar, where everyone is encouraged to participate, for one day or two, the CSF process model will only need a few hours with each of the core team members. Even for early phase projects, when the project organization is not so large, this resource efficiency is obvious with respect to management time needed. This is clearly shown in case2 with a time use of 40 vs. 176 hours.

The two methods produce results that overlap with each other, yet with different focuses. Risk seminar comes up with risk elements that are mainly focused on technical solutions or areas that one can see having negative consequences. In other words, the focus is on uncertainty. CSF method focuses on project goals and identifies areas that are critical for

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[63] The project team members have open communication, challenge each other, complement with each other based on trust and respect.

achieving project success. In other words, it focuses on criticality. Preparation for major uncertainty is of course management focus and is naturally critical for project success. Here the CSF can overlap with the major risks. However, CSF is not limited to risks elements. CSF is at a more general level than pure risk elements.

When risk seminar or start-up help will involve everyone, one can naturally wonder how flexible it is in a hectic project environment. The time for this event will have to be scheduled some time in advance so that as many as possible can participate. The CSF process method uses individual interviews before group discussion on team-CSFs take place. It is more flexible. In addition, it gives everyone a chance to think about issues mentioned in the interview between the interviews, which is not very likely in a one-day risk seminar.

In addition, the result of CSF is presented with complete "description" (why, how and measures) for each CSF so that others not involved in the process can have a chance to understand what the CSF are. This is much better than list of risk elements with only keywords.

With the explicit CSFs identified and described, project management process with regard to management of project focuses at each time is clearly documented. This documentation can also strengthen the communication between project and outsider, practitioners and academic. With benchmarking more and more accepted as a useful tool, clear identification of project CSFs will make this effort more focused or purposeful.

### 7.1.5   Use of the model: External investigator and group discussion

When the question of whether to have an external person to carry out the interview process or let the core team to do it themselves, there are pro and con either ways.

1) With external person, this person can ask some untraditional questions that inspire the team to think from different perspectives[64].

2) An external investigator can bring the thoughts or experiences gained from other projects through asking relevant questions. This "spreader" effect is quite valuable for company and project. We can either under evaluate the training effect on the investigator through this process.

3) An external investigator can remain neutral because she does not have any personal interest in the project. She can therefore ask questions quite

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[64] This does not mean that this external person must have heavy industry experience either, as long as she is really interested in getting a "quality" product fro the CSF process. Normally the wish to be helpful for the project (that the core team regard the process has contribute somewhat to their thinking process and communication) is a strong enough incentive. Of course investigator must have much curiosity, some experience in interview techniques and be well prepared for the interviews.

freely. This is quite difficult for a person engaged in the project, especially when personal or "soft" issues are concerned.

4) Although CSF process model is time efficient with regard to management time needed, it does require considerable effort from the investigator during the process. Project personnel will seldom have that amount of time and energy for such task beyond their assigned duties.

5) However, the project knows best when the project needs a new update of CSFs and corresponding measures. It is the premise for CSF process model application that project is motivated for it. Requirement from outside at fixed point of time will jeopardize the effect of this process if project personnel themselves do not see the point of doing this.

We recommend use of external personnel to carry out the CSF process model when project feels it is time for it. The person should be thoroughly familiar with the CSF concept, the interview process and some basic skills in interview techniques.

Group meeting where all CT members are involved must happen to realize the full communication effect because people may have different understandings or nuance in their statements. At the same time, the meeting will increase each member's ownership and commitment to the CSF agreed, which is very essential for its effectiveness in project management.

### 7.1.6  Research design validity and reliability

We have discussed this in 3.4 Research design validity and reliability. Here we give a short summary. There are three relevant tests for quality of research design—construct validity, external validity and reliability for this exploratory study:

**Construct validity**: In this study, we use *several sources of evidence*: individual interviews with core team members so that they serve as different sources of evidence among them, project governing documents like Project Execution Plan (PEP), Plan for Development and Operation (PDO), project decision gate memorandum and project risk register. These different sources of evidence converge on the same set of facts.

We have established *chain of evidence* by describing explicit links between the research questions, the data collected and the conclusion drawn in the Interview Protocol in Appendix.

We have also had interviewees review the CSF reports.

**External validity:** Case study tactics for this validity is to use replication logic in multiple-case studies.

We chose two cases that represent totally different challenges in project management according to practitioners: one from project early phase and one from execution phase, which constitutes our application domain: management of Statoil offshore development projects in Norway. In addition, the two projects come from two complementary parts of Statoil business area: upstream and downstream with different project contextual challenges. The size of capital investment for these two projects is respectively large and medium. We can safely claim that this model is generalized, at least for Statoil offshore development projects.

**Reliability:** We use case study protocol, where we describe research purpose, research questions, data collection procedures and chain of evidence. We have also kept record of interviews on minidisk, made transcripts of these interviews and made notes on comments and thoughts underway so that we can trace the collected raw data.

## 7.2    Claimed contributions

We can summarize the contributions from this study into two categories:

Contribution to CSF method:
➢ First effort in testing a CSF process model in *real time* projects
➢ Introduce *team* approach to CSF process model focusing on communication and leadership aspects of project management
➢ Design of a structure for retrieval of interviewee's personal perspectives on the project environment and team dynamics
➢ Findings from application at *project* level: project managers experience difficulties in defining meaningful measures representing the CSFs they have defined. Other method than just interview approach is necessary.

Contribution to CSF application domain:
➢ Introduction of CSF method to project management of offshore development projects in Norway
➢ First concrete and structured tool for the critical management group-- project core team on management focuses
➢ Application of the CSF process model offers an initial step towards a documented management process that facilitates later project analysis
➢ The application of the CSF process model offers a better communication channel between "insider" and "outsider" and channel for mutual learning between practitioners and academic

## 7.3    Recommendation for future research

As we have mentioned above, there is still work to be done to improve devising CSF measures. Difficulty in defining representative and concise CSF measures indicates that pure interview approach is not good enough for CSF application at *project* management level. It seems that investigator need to offer managers a theoretical or conceptual

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framework on the measures for the project specific CSFs identified by the project core team. The questionnaire method[65] suggested by Bergeron and Begin sounds promising [Bergeron and Begin, 1989]. Now that the questionnaire should be adapted to the contextual CSFs, one cannot define a generalized questionnaire for measure definition.

An example is the measures to measure good leadership, which is part of project culture based on trust and respect. There are many literatures in leadership where we can find theoretical framework and possible measures [Slevin and Pinto, 1991][66], [Suman, 1999] [67], [Baker, Murphy and Fisher, 1983, pp682][68] [Bender, Cedeno, et al., 2000][69].

With measures clearly defined, one can then identify information needed for such measures. One may check if some of the information already exists in by-product systems [Rockart, 1979] or if new information is needed. The result from this will help us answer the question of whether to establish a complete project specific management information system (MIS) for each project studied. One has to weigh the benefits from such a system against difficulty and/or cost consideration, acknowledging that project environment is more dynamic than a normal corporate environment.

In this exploratory study, we have limited the application of CSF process model to project core team within a client project organization. Further exploratory study is needed to expand the application to:

➢ Higher line management right above the project
➢ Lower management levels in a client project organization
➢ Between contractor project organization and to the client organization

The first two application domains follow the thought that CSFs are hierarchical [Bullen and Rockart, 1981]. Different levels of management should have their own contextual CSFs that are in alignment with their immediate higher management. The application of CSF method at

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[65] Based on the CSFs identified by the organization investigated, investigator design a questionnaire based on extensive literature review on the issues around the CSF identified. Managers and investigator can then use this as a reference for CSF measure identification.

[66] They offer a conceptual model (decision authority vs. information, 4 leadership styles, 3 leadership style pressures; conclusion: match the leadership to the situation). "If subordinates' expectations are not met, morale can suffer. Decision process can be as important as decision outcome, especially from the standpoint of motivating subordinates.

[67] About human communication and leadership

[68] Baker et al. gave 19 sub-elements for the third most important contributor to perceived success. *Effective coordination and relation factor* covers team spirit, sense of mission, commitment to goals, team capability, unity between project management and public officials, client contact, human skills, progress reports, administrative skills, supportive informal relations of the team member, authority of project manager, change control, job security of project team, team participation in decision making, team participation in major problem solving, parent enthusiasm, availability of back-up strategies.

[69] Among 4 CSFs, teaming is one. Teaming is made of skill, experience and stability. Team stability was ranked the most critical in the quantitative analysis. These three teaming factors can be used as reference for measures.

different level of management will improve management communication among them and make the CSF method more effective. Real acceptance of CSF method should also start from the top so that lower management defines their CSFs accordingly and proper motivation incentives are designed and good performance will be rewarded.

Now that CSF method was originally applied to corporate executives and majority of CSF researches have been done at different levels of corporate management, it should be reasonable to assume that Statoil corporate management will not have much difficulty in applying CSF method. It is therefore more interesting to further develop CSF method to project environment first.

The last application domain is more ambitious because contractor and oil companies have different interests and corporate strategies. However as MPE report recommended, more open *communication* and less positioning between companies (operators, contractors and service companies) is positive for future project success [MPE, 1999]. As a management communication tool, CSF method may be able to enhance communication cross company boundaries.

In the following we will mention some of the challenges that CSF method could help to solve in these three domains.

**Higher management**
Projects feel that their higher management (company internal project sponsor) prioritizes operation of existing facilities more than development projects. During the case studies, we got some indications of the need for more attention and active involvement from project's direct higher management. Some of the indications include the way project assignment is carried out; resources across projects are managed and clear definition of project success criteria.

It is not rare that project CT manager makes draft of project assignment on behave of its company internal sponsor. However, higher management should have used this chance to discuss thoroughly with the project what the company strategic goals the project should serve. Project may not have the complete information needed for this understanding. We know that even without such understanding, project can still come up with time and cost targets, which they think are the best for company.

Higher management should also have a balanced view of what they want their managers to realize through projects. Unconditional focus in time and cost adherence may give a too simplistic signal to project managers. Problems with product quality in some of the recent projects have demonstrated how easy it is to push a project manager out of balance based on a multitude of project success criteria. The success criteria that are important yet difficult to measure will suffer.

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Many may say that oil company has a simple project success criterion: the profitability of a project over the whole project life cycle. This seems simple and clear. However, profitability is a life cycle (typically 15-30 years) concept that cannot be measured until the facility is demolished. It is therefore unrealistic to use profitability as a success criterion to measure project performance in development phase (typically between 3-6 years). In addition, the profitability of a field is also very much influenced by the price on the market which can easily blur the picture of human effort.

Although short in duration, major investment is spent and product to be used for the whole life cycle is constructed and installed in project development phase. It is therefore quite important to have clear project success criteria so that a project manager has the incentive to take an proactive role in her work and avoid choosing sub-optimal solutions because such decisions will give the best corporate credit for her performance.

Higher management should also involve more in resource allocation across projects. Right now it is still mainly each individual project's responsibility to get access to qualified resources. This situation may not be optimal at a corporate level. A corporate resource development plan that can best serve the projects, at the same time using the projects for on-the-job training to enhance the intellectual value of corporate work force is also still far from a reality.

Application of CSF method will force the higher line management right above the project (both the project sponsor and the basis organization the managers belong to) to have explicit focus on structural issues based on a balanced consideration of the whole business area in the process of increasing corporate values. A team approach where a whole cross-section of the business area is represented, including project core team managers, can contribute to better quality of this management activity.

Projects are major form for value realization. Better project management involves also higher management outside project organization. Statoil, a privatized national company, quite small in the international market, has to go out into the world and manage to stand on its own feet in the long run. In order to remain competitive with limited financial strength, Statoil must be able to find its own way through focusing on the right strategies, actions (through projects) and management. This applies to all levels of management and they should be in alignment with each other. CSF method is a tool for this purpose.

In the recent years, people begin to talk about being a demanding client. The client relationship is relative and can be internal. A client project organization is a "contractor" for its higher management, or internal project sponsor. The application of client satisfaction as a project

success criterion in contractor organization [Pinto, Rouhiainen and Trailer, 2001] is an inspiration. Here it is the basis organization where project managers come from—PTT (Project technical services) who should be responsible for establishment of such a project management philosophy in cooperation with company internal project sponsors.

**Lower management levels**
Some practitioners suggest that those outside a core team will have their own understanding and priority different from those in the core team. It is then interesting to find out if the differences lie in different level of detail, or on totally different issues. The latter situation is obviously not desirable.

Inclusion of management level lower than core team will likely show more differences in understanding of project goals, CSFs and actions to be taken. Larger intersection of project organization will also increase the quality of the CSF process and communication effect. [Shank, Boynton and Zmud, 1985]. This may be useful at larger intervals or at project phase shift where new strategies and way of doing things are introduced. With risk register firmly in place in project organization, we have to remind our project that technical risks are not the only risks. We have to focus what is critical for project success, even though these factors may not be readily measurable or are "soft" in nature.

**Between contractor and client organization**
Research done by Pinto et al. shows that some contractor in petroleum industry has begun to add *customer satisfaction* as a fourth project success metric to the more accepted time, cost and specification adherence [Pinto, Rouhiainen and Trailer, 1998]. They are seeking long-term positive relationship with their clients based on their desire to provide better services. Better services are through analysis of clients' needs and what clients hold dearest, and analysis of the strong and weak sides of themselves and how they could have the best fit to be most competitive. They realize that they have to take a license group mentality with their subcontractor and let the customer satisfaction drive the project management process and get the "real-time" measurement data for possible correction. This principle is incorporated in contractor's quality assurance system.

Oil companies have long realized the importance of taking advantage of contractors' competence. Contractors are involved from early phases. Oil companies even cooperate with contractors in long-term research. However, a different situation appears when contracts are let. Even within a client organization, commercial and technical personnel will have somewhat different "strategies" with regard to how to work with contractors. Technical personnel are responsible for product quality and functionality. They want to use creativity and work with contractor to find the best technical solutions. Commercial personnel are more concerned with cost and time consequences and would rather that

contractors are left alone to do their job as far as it is reasonable so that introduction of changes is minimum. It is therefore very important that client organization manages to communicate explicitly within its own project environment and to the contractors what is most critical for the projects and monitor the project performance accordingly. "We want them all" is correct contractually. However, one should at the same time have a management mentality based on criticality. This should be communicated to the contractors so that critical information comes up quickly and decisions are made based on correct evaluation without indicating client's departure from "we want them all" principle.

This research done by Pinto et al. gives us the inspiration that even after contracts are let, the relationship between the client and contractor does not necessarily have to change to be "conflicting" because long term interest based on customer satisfaction will trigger more effort to find creative win-win solutions. However, this mentality may have to stem from higher management from client company organization because project managers are responsible mainly for short-term goals. Research in what client company should do corresponding to the research done by Pinto et al. can be very interesting. At present, what client project organization should do is to try to be explicit on what they really want from the contractors and try to create win-win situations.

## 7.4   Final words

This study has shown that project management has a need for structured communication of management focuses. Explicit identification of CSFs (documented with background and contextual premises and tactics) and definition of measurement for CSF in order to get reliable CSF status are the important steps recommended in this CSF method. Such method can help ensuring homogeneous understanding in the team on where to go and how they can work most effectively together.

Before this study, there is virtually no concrete management tool in this aspect in real-time project environment. This study is a first effort and introduction of CSF method in offshore development project in Norway. Some more research is still needed before this method can become an established tool in practical project management like risk management. The immediately development needed is development of method for identification of measures that can represent the CSFs identified. Other methods (for example, a questionnaire developed based on literature review on the topics around the identified CSFs) besides pure interview method are probably needed.

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# 9 Appendix

## 9.1 Definitions

Analytic generalization: Case study is not "sampling units" and should not be chosen for this reason. Rather individual case studies are to be selected as a laboratory investigator selects the topic of a new experiment. Multiple cases, in this sense, should be considered like multiple experiments (or multiple surveys). Under these circumstances, the method of generalization is "analytic generalization", in which a previously developed theory is used as a template with which to compare the empirical results of the case study. If two or more cases are shown to support the same theory, replication may be claimed [Yin, 1994, p31].

Benchmarking: Comparison of selected indicators for a project against corresponding indicators for compatible plants, normalized for relevant parameters e.g. resource basis, capacities, product(s) etc. (AR005)

Business unit: the line organization of a business area (BA). The level in the organization is determined by the current delegation of authority (AR005).

Client organization: the organization that sponsored, approved, and funded the effort [Baker, Murphy and Fisher, 1983].

Competence: Comprise knowledge, skill, personal attitudes and experience. [Morris, 1998, PMI]

Contingency (unspecified costs): Expected cost of unspecified elements. Does not cover changes in frame conditions such as concept changes or external occurrences (earthquakes, strikes etc.). (AR005)

Core team (CT): Temporary organization established to develop a business opportunity from the moment it is concluded ready for planning (BoK) to the completed plant is in regular Operation. The CT has total responsibility for all aspects of the business development (business, commercial, economic, technical and administrative) (AR005).

Core team manager: Manager of a core team that, through the project agreement, is given total responsibility for the planning and realization

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of a business opportunity, through all phases of the project development (AR005).

CSFs: key areas where things must go right in order to successfully achieve objectives and goals. Example: Obtain certification for higher-density routes; Develop bank financing for new equipment [Bullen and Rockart, 1981, p8].

Formal communication implies written communication, for example technical reports, memos, letters and/or communication that occurs during scheduled meetings or appointments [Pinto and Pinto, 1993].

Fully projectized organization: Project Manager had almost all of the employees who were on the Project Team under him [Baker, Murphy and Fisher, 1983].

Goals: are specific targets that are intended to be reached at a given point in time. A goal is thus an Operational transformation of one or more objectives. This is the level of overlapping between corporate and individual managers (refer to Bullen and Rockart figure 2 Hierarchy of management concepts and terms, p10) (CSF is related to goals, not objectives. p53) Example: Eliminate all routes with less than "N"% average seat usage; By year-end replace all "X" planes with "Y" planes; Provide stockholders with 10% ROI in 1981 [Bullen and Rockart, 1981, p8].

Informal communication pertains to oral communication that occurs over the telephone or in unplanned discussions, for example, in the hall [Pinto and Pinto, 1993].

Management control: is the process of (a) long-range planning of the activities of the organization, (b) short-term planning (usually one year), and (c) monitoring activities to ensure the accomplishment of the desired results. The management control process follows the development of major strategic directions that are set in the strategic planning process [Rockart, 1979, p85 footnote 6].

Measures: are specific standards that allow the calibration of performance for each critical success factor, goal, or objective. Measures can be either "soft", that is subjective and qualitative, or "hard", that is objective and quantitative. Example: Average % seat capacity used; % of cash requirements under written equipment loan agreements with banks [Bullen and Rockart, 1981, p8].

Objectives: are general statements about the directions in which a firm intends to go, without stating specific targets to be reached at particular point in time. Example: Develop profitable route structure; change over to more fuel-efficient fleet [Bullen and Rockart, 1981, p8].

Parent organization: the organization structure above the level of the project manager but within the same overall organization [Baker, Murphy and Fisher, 1983]. In Statoil it is the business area that is the parent organization for project.

Problems: problems are specific tasks rising to importance as a result of unsatisfactory performance or environmental changes. Problems can affect the achievement of goals or performance in a CSF area.
Example: Increasing price of fuel; Future competition from video conferencing [Bullen and Rockart, 1981, p8].

Project: A one off task with a given goal that is clearly defined and limited with regards to content, time frame and cost. (AR005)

Project agreement: A project agreement (PA) defines the task that is given to a project by the responsible business unit (AR005)

Project development: Term used to describe the entire process from the time when a business opportunity enters into feasibility studies (DG0) until start of Operation (DG4), but also including collection of experience data after one year of Operation. (AR005)

Project manager: Person who is responsible for the execution of a project (AR005)

Project management: The application of knowledge, skills, tools and techniques to project activities in order to meet or exceed stakeholders' needs and expectations from a project. (PMBOK Guide, 1996)

Project organization: Temporary organization established to carry out a task that is clearly defined and limited with regard to content, time frame and cost. (AR005)

Project owners: typically have two kinds of project roles: someone responsible for the business case for investing in and creating the project, increasingly known as the project sponsor, and a project manager for delivering the best project within those business case parameters (AR005).

The project sponsor is particularly responsible for ensuring that the brief (or project instruction document) accurately reflects his needs... and it is he who decides if the brief should change as the project unfolds. The project sponsor will also need to be kept informed of and may require approval for changes in the way the project is to be implemented, particularly if there will affect the owner's business or corporate responsibilities. One of the sponsor's major responsibilities is integrating the needs and wishes of Operations and users into the project management process. (AR005)

Project manager (and the sponsor) must explore many different options at the definition stage. ... Although the skills are still very similar-- integration, process and people management-- the project manager must still be involved sufficiently in the detail to be sure no mistakes are being made or options overlooked and that the recommendation will stand detailed scrutiny.... risk management should be a major preoccupation at this stage. The project manager should ensure that the sponsor is happy to bear this (AR005).

Project stakeholder: are individuals and organizations who are actively involved in the project, or whose interests may be positively or negatively affected as a result of project execution or successful project completion. (PMBOK Guide, 1996)

Projectized organization: project manager had most of the essential elements of the Project Team under him [Baker, Murphy and Fisher, 1983].

Pure functional organization--Project manager, if any, was merely the focal point for communication; has no authority to direct people other than by persuasion or reporting to his own superior [Baker, Murphy and Fisher, 1983].

Statistical generalization: an inference is made about a population (or universe) on the basis of empirical data collection about a sample. This form of generalization is commonly recognized because research investigators have ready access to formulas for determining the confidence with which generalizations can be made, depending mostly upon the size and internal variation within the universe and sample. [Yin, 1994, p31]

Strategic planning: The process of determining the major objectives of the organization and the policies and strategies that will govern the acquisition, use and disposition of resources to achieve those objectives (Steiner, 1969, p34 referenced in [Pinto and Prescott, 1990])

Strategy: is the pattern of missions, objectives, policies and significant resource utilization plans stated in such a way as to define what business the company is in (or is to be in) and the kind of company it is or it to be. A complete statement of strategy will define the product line, the markets and market segment for which products are to be designed, the channels through which these markets will be reached, the means by which the Operation is to be financed, the profit objectives, the size of the organization, and the "image" which it will project to employees, suppliers and customers. Example: Regional airline transportation [Bullen and Rockart, 1981, p8].

Strong matrix or partially projectized organization: project manger was the focal point for directions and controls; he may have had some

engineering and control personnel reporting to him on a line basis, while remainder of the Project Team was located administratively in other departments [Baker, Murphy and Fisher, 1983].

Successful project implementation: technical excellence and client acceptance and use, project team satisfaction, and commercial profitability denoting successful implementation. [Slevin and Pinto, 1986]

Tactical planning: the detailed deployment of resources to achieve strategic plans (Steiner, 1969, p37 referenced in [Pinto and Prescott, 1990])

Weak Matrix organization: Project manager was the focal point for controls; he did not actively direct the work of others [Baker, Murphy and Fisher, 1983].

## 9.2 Letter to interviewees

*Title of the dr. ing dissertation:*
*A general Critical Success Factor[1] process model for Statoil Field Development Projects in Norway*

**Who and what is this study aiming at?**
This study aims at <u>project core team</u>. We assume that core team leader and his/her team members are well qualified for their positions.

To have focus on the right issues all the time may be more easily said than done in a complicated offshore field development project. To have *agreed* focus on the right issues *within a group* may be even more challenging because different people often look at the same project from different perspectives. However agreed-focus is essential for effective achievement of project success. This is the issue this study is to deal with.

**Why choose this topic?**
This study is based on the following believes:
1) Clearly defined top management focus is absolutely necessary for project success.
2) A structural process is needed to realize what is stated in 1).
3) Team-based process will enhance communication and agreement on management focus and actions taken at different levels of management. This is the premise for many people working effectively towards the same goals.

**What to expect from this study?**
The products or benefits from this study are:
1) Each case study will generate a set of *project specific* Critical Success Factors and measures that can be applied directly in the project studied.
2) A general and easy-to-master *senior management tool* in defining management focus.
3) Improved communication and quality of decision criteria from top management.
4) Better understanding, agreement and commitment to project goals at lower levels of a project organization.
5) A step towards a documented project management process that will limit the negative impact of lost of key management personnel and facilitate experience transfer and analysis

This top-down management approach, together with the traditional bottom-up project reporting procedures, will constitute a balanced information flow cycle. This is the premise for a focused, proactive and dynamic project management and a committed project organization taking actions that are best for reaching project goals.

Lower levels of management can apply the same process with the premise that their focuses are in line with those defined by their higher management.

**What is not the topic of this study?**
The focus of this study is *not* development of a general project execution model like PROMIS in Statoil.

This study is *not* intended to come up with a set of *general* critical success factors like *top management support*, *clear missions and goals*, etc. that are valid for all kinds of projects.

This study is neither an investigation of key parameters/indicators commonly used in benchmarking or project evaluations.

**Practical information**
This work is part of a dr.ing study under the supervision of Prof. Asbjørn Rolstadås (NTNU) and Prof. Erling Andersen (BI). The interviewer is also a Statoil employee (UPN PTT PGF PS Plan and uncertainty) at regional office Hamang. Statoil TEK PE PROSJ (Process owner Project management) also supports the study.

Information gained and the analysis results will be confidential between the project core team and the interviewer if no other agreement is made. A series of interviews in a pre-designed structure are to be carried out in each case study. The initial interviews will last for about 1.5 hours and later interviews will be shorter in duration.

Core team members will be interviewed before the core team leader. It is preferable that the initial interviews with all are carried out within a relatively short period of time (for example within a week). Time before or after weekly core team meeting will be most practical for group interviews. It is ideal that core team leader be the contact person for his/her project.

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Recognizing the workload a core team may have, I am open for any time (including before or after normal working hours) that is convenient for the core leader and his/her team. I will be staying in Stavanger during the case study of your project.

The interview will be recorded on tape for data reliability. All information gained from the interviews will be confidential between the project core team and the interviewer. In case of personal sensitive information, individuals can require confidentiality between him/her and the interviewer or ways around this should be agreed upon.

I look forward to take contact with you in the near future for initial interviews. You are also welcome to take contact with me any time.

Sincerely,


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## 9.3 Interview questions

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### Interviewee's perspectives

**Your view on your job and this project**

1. What, in your opinion, are the most challenging element(s) in your present job?

2. What, in your opinion, should be the areas of activity that you focus most within <u>your</u> responsibility in term of managing the project from now on?

   What are the measures you use so that your project succeeds in these areas?

3. What, in your opinion, should be the areas of activity within the <u>whole project</u> that deserves project management focus with regard to achievement of the final project success? In Statoil AR005, project starts at feasibility study and ends at one year after Operation start. If you perceive your project differently, please explain.

4. Are these areas of activity you mentioned in the two questions above, clearly defined, documented, communicated, updated and quality-checked as project moves ahead?

   In case yes, how (by who, where is the documentation, how often updated and priority, etc.)?

5. Do you measure (quantitatively or qualitatively) the project performance in the mentioned areas of activity (ref. question 2 and 3)?

**Project success criteria**

Some contractors (for example: Aker Rauma Offshore Oy in Finland, a wholly-owned subsidiary of Aker Maritime) begin to introduce customer-based project success as a 4th project success criterion (in addition to the traditional success criteria in time, cost and quality) in order to best serve clients' need and to maintain long-term positive relationship with its clients[1]. They take the clients perspective in evaluating project success in order to encourage project managers to clearly define what customers hold dearest and to compare to what they can do best to make themselves more competitive in gaining new contracts. The process is continuous rather than just after project is finished.

6. Aker is a contractor organization. How do you think *project success criteria* should be defined for a *client* project organization like yours?

7. Who would you define as your clients in this project?

   In case project has several "clients" (for example: project sponsor, product user; your own company and licensees), list and rank them.

8. What are project's attitudes or strategies towards the following actors in this project in order to achieve this project success?

   Contractor/subcontractor_____

   Your project owners_____

   Statoil as a company with basis organization_____

   Others (politician, government, environmental organization etc.)_____

9. What are the evaluation criteria for your personal performance in this project?

   Whose interest (project, client, Statoil, direct manager, good working environment etc) will you weigh most in your daily decision-making?

**Your view on project core team**

10. How much (critical or not critical) does the core team contribute to project success?

    Which function(s) are most important for project success?

11. How are contributions from different core team members balanced in the core team?

</div>

How can one ensure that all sub-projects or functions take actions that best serve the whole project goals, knowing that actions by one discipline or function may conflict with other's interest?

12. What is most challenging to make your core-team work most effectively?

**Your information sources**

13. What are your major sources of information (*formal*: meetings, reports, documents, databases; and *informal*: conversation, email with no formal documents, telephone etc.) from **management** perspective? (Rank them in the order of importance)

14. Do you think you need better-structured and updated management information so that you know the status of your management focuses all the time and that your focuses are properly communicated to others?

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### CSF information collection through categories

**Critical Success Factors** (CSFs) are the few key areas of activity in which favorable results are absolutely necessary for a particular manager or a project to reach the goals. CSF is a level below the goals. CSF answers the question: "where should you place your managerial attention?"

Because these areas of activity are critical, the manager should have the appropriate information to allow her to decide whether events are proceeding sufficiently well in each area, i.e. measures that represent the CSFs and the information for such measures.

CSF interview method is designed to provide a structured technique that can help manager to zero in on their critical success factors -- and to determine the resulting information needs. CSFs are at a level lower than project goals.

What is the project mission and goal?

What is your mission in this project?

How many CSF do you think you have for your project now? (Give examples of CSF when necessary)

***************
I have here some predefined categories that can serve as a framework for searching for these critical areas of activities in your project.
Please **do not confine yourself to what was done or is being done, but what you believe should be done or should have been done.**

Refer to the 12 CSF categories discussed in Chapter 4 A generalized CSF process model.

**9.4    Case study protocol**

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**Case study protocol**

# Case study protocol

*A generalized CSF process model for managing offshore Development Projects in Norway*

## 1. *Purpose*

This study argues that project management team (in this study project core team) needs a structured way for identification and communication of their management focuses (the Critical success factors) downwards in their organization to better ensure that project participants have a common understanding of what are critical for the project success and work accordingly, although they have different functions and different contribution possibilities and that they have prioritization within their function too. Pure goal breakdown as management communication tool is not good enough.

In addition, establishment of measuring parameters can give management CSF status. "One cannot manage what one cannot measure." The measurement does not necessarily have to be quantitative. Conscious evaluation of the critical areas for project success is the main purpose.

Team-based approach is promoted in this study for better usage of knowledge in the management group and better quality of evaluation of management focus. Here we regard the first step towards better communication of project management focus, is to make them explicit first. We want to identify the critical success factors that are contextual for the project so that they are more meaningful for the project.

Full establishment of measurement for the CSF through application of the generalized CSF process model in the real time projects is beyond the scope of this study. A real time project must be given the time to digest a new tooling that involves different concepts and way of thinking. When the project is real time projects, the project managers are heavily loaded with project activities and decisions. It is difficult to them to find a lot of time to find out how to implement a new tool that is under prototype stage. This prototype tool needs more application in more projects to be ready for implementation phase.

In this project, we have concrete research questions and we ask concrete questions to gain subjective evaluation of the tool in addition to the observation we make. We talk about this later in section 6 *Research questions and how they are to be answered*.

## 2. *Background*

The analysis of oil industry projects between 1994-1998 in Norway, when there were large cost overruns and delays, pointed out the criticality of project core team and the decision quality [Aanstad and

Ravndal, 1999]. Literature review showed that communication is one of the important aspects in achieving project success [Pinto and Pinto, 1990]. Many practitioners also point out communication as one of the most difficult and important elements in projects. Still it is a fuzzy concept and is difficult to monitor.

Statoil was active in using information technology in effective project management through making information available for all and at the same time. Yet much of the effort is focusing on effective information sharing, registration and retrieval. Managers experience too much information than too little. However, information needs by project managers are not clearly marked out as an issue and managed accordingly in project environment.

Project managers rely on meetings, informal conversations and databases to gather information for "project temperature", although the information are scattered and not structured. Communication of management focus happens mainly in form of decision-making, project meetings, top-ten list in risk register (event focused, and reactive-toned), governing documents (system focused yet not updated often enough and lack clear prioritization under the project context) and informal contact like conversations.

If one asks a project manager what are his/her management focuses now, he/she will most likely mention the few elements in top-ten list in risk register or decisions that have to be made in the near future. Most of the risk is based on bottom-up reporting. We are not saying that project managers do not have a totality and future oriented view and is only good at reactive management. All good project managers have *implicit* critical success factors for reaching their project goals. However where the CSFs are not explicitly identified and recorded, they do not become a part of the project history and are not explicit elements of the management reporting process. The underlying constraints for the CSFs do not command attention and the CSFs are seldom measured. Change of managers will cause swing of management focus because of their different skills and backgrounds [Dobbins, 1999].

Because of this unstructured practice of communication of management focus, project managers emphasize very much relation building and establishment of the organization culture that makes it more likely that communication is good both internally and externally to the project organization. Common measures used are to try to recruit those they know well from before, team building, organization planning like definition of task, responsibility and authority for each position.

We hear jokes saying that project managers can nothing and do nothing. If a manager has clear strategy and focus all the time based on the total project evaluation and manages to communicate downward in his/her

organization, instead of just sit back and wait for others to come to him/her for decisions, he/she may get a different "comment".

Project is complicated involving many different specialties working towards ambitious goals. Better top-down communication is quite important to ensure that everyone is moving in the same direction and that actions are taken accordingly. Quality check at decision points is not enough. Goal and breakdown of goals may not be enough in communicating management focus in a continuous manner. We need the structural variables that can affect the project success or failure in the pursuit of these goals. These are CSFs [Bullen and Rockart, 1981].

In this research study, we have further developed a structured process tool in helping project core team identify project specific CSFs. There are new exploratory aspects: 1) It is the first time CSF process model is used in *real time* offshore development projects in Norway, at least in Statoil projects. 2) We are aiming at a *team-CSF* for a specific project rather than those for individual project manager only. This is to offer project core team leader a chance for comparing his CSF to his teams and gain contribution in management aspects from his team. This is a quality effect, which may contribute to better decision quality. At the same time, by knowing what the project CSFs are, which are accepted by the core team, everyone in the core team will get the positive ownership in these CSF and work accordingly. This is the communication and operative effect.

### 3. *Expected results from the case study*
We have specified this in the Letter to Interviewees.

This study does not intend to demonstrate the direct effect of this CSF process model on project success. There are several reasons. 1) This study is an exploratory study, with a tool at prototype stage. 2) Degree of success from the application of the process model is based on project managers sincere involvement and devotion during the process. This will demand much more time and energy project managers have in real-time projects. 3) The contribution to the project success depends on a lot of issues. This process model is a concrete tool with top-down management focus definition, communication and measurement as focus. It is difficult to estimate the model's direct contribution to project success. Besides we cannot say if a project is a success or not until it is completed. An offshore development projects will last longer than a dr.ing study.

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Some of the relevant readings are
1. **Aanstad, O. and Ravndal, J.,** Prosjektgjennomføring i Statoil, erfaring og anbefalinger, våren 1999. (Internal distribution)

2. **Bullen, C.V. and Rockart, J.F.,** A Primer on Critical Success Factors. MIT Sloan School of Management, CISR WP No.69, June 1981, pp16-19.

3. **Jannecke Rødseth and Åse Maria Lien** "*Practical uncertainty analysis in project work",* master degree thesis from NTNU, 2000

4. **Ministry of Petroleum and Energy**, Analyse av investeringsutvikling I utbyggingsprosjekter på kontinentalsokkelen, utredning fra Investeringsutvalget oppnevnt 29.august 1998, Avgitt 30.januar 1999.

5. **Pinto, J., Rouhiainen P. and Trailer, J.**, "Customer-based project success: Exploring a key to gaining competitive advantage in project organizations", Project Management vol.4, No. 1/1998, p6-11.

6. **Pinto, M. B and Pinto, J.K,** Project Team Communication and Cross-Functional Cooperation in New Program Development, J PROD INNOV MANAG, 1990; 7:200-12.

7. **Pinto, M. B., Pinto, J.K.** *Antecedents and consequences of project team cross-functional cooperation*, Management Science, vol. 39, No. 10, October 1993.

8. **Yin, R** (1994), Case Study Research--Design and Methods, 2nd edition, SAGE Publications

*4. The interview process*

Interview will be organized in three merging paths: one for core team leader, one for the rest of the team and one for project documentation and investigator's observations. This division is implicit for the interviewee because this is of research interest only (The research questions are not shown to the interviewees). For project, it is the team-CSF that is produced and every core team member is equally involved. However, in reality, with regard to permission to go further with a case study, i.e. project management time, acceptance by the core team leader is essential. Result of a team effort (team CSF) is always discussed with the core team leader first.

It is also import to remember that this is a research study seeking for good management tools. It is not an evaluation of work performed by the project. The information on team-CSFs will remain within the core team and the interviewer. It will be core team leader's decision whether to publish the team-CSFs further in the project organization or not.

Investigator will analyze the information from the initial interview without adding new information out of that gained through the interviews. However information gained from other sources like project governing documents, risk register, plan etc. will be used to check if the information from interviewees are well founded. At the end of first interview, each interviewee is given a copy of Rockart's paper "*Chief Executives Define Their Own Data Needs*".

In the follow-up interview, investigator will present the analysis; confirm information and understanding of the recorded information with interviewee(s) and modify the results if necessary; interviewee(s) can also add additional information.

Comparison for the analysis results will then be made between the two groups. Any difference (identified CSFs, their priority, measures) will demonstrate the need for *team-agreed* critical success factors. The process of reaching final consensus of the project critical success factors will improve the communication among the team members and between the team leader and its members and thus improvement management focus alignment in the project organization at core team level.

The interview process is shown in figure 1. The research questions will be answered by this design.
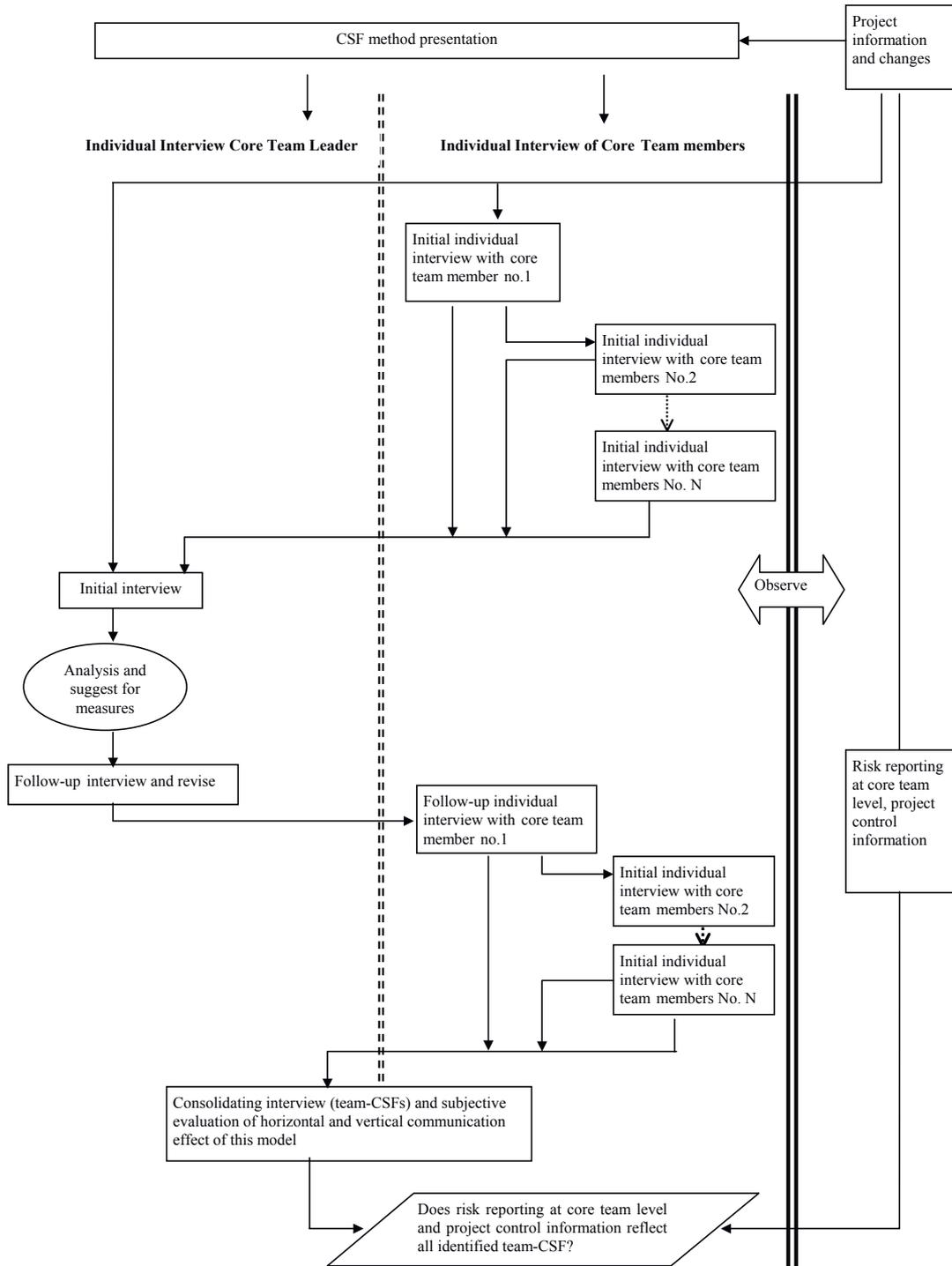
**Figure 9-1 Interview process for team CSF using CSF process model.**

### 5. *Procedures*

The general procedures are listed here. However, an investigator must be flexible in the concrete cases to be able to work in real time projects. Investigator must keep in mind the study objectives when making the adjustments.

1. Write *Letter to Interviewees*, get comments from Statoil and Advisors
2. Through Statoil TEK contact possible project core team leaders who are willing to participate
3. Apply for funding for case study
4. Get access to an office at case study location, portable PC, recorder and place to live at interview location
5. Choose the project core team leader that fits the case study design among candidates; Send the Letter to interview to the first project core team leader through Statoil process owner in Project management
6. Take contact with the core team leader to initial meeting. The most important is to win his/her interest in this study.
7. Make the questions beyond the CSF categories as questionnaire to increase flexibility of the case study of real time projects. Interviewee can choose to answer electronically or in face-to-face conversation. Control that the interview (CSF categories) lasts round 1,5 hours.
8. After receiving answer to questionnaires, send a short presentation of CSF and Rockart's article and summary of this article and ask interviewees to prepare personal CSF and project CSF asking them to concentrate on project-wide perspective rather than functional approaches. Agree on the time for the first interview.
9. During the interview, the interview questions will be asked and at the end of the interview, if there is time left, each interviewee is asked to describe his individual and project CSFs and then relate them. Agree on the time for the next interview.
10. Discuss the possible difference between the CSF from the category and the list prepared by the interviewee; Discuss the measures need to monitor the CSFs.
11. Evaluate the differences in opinion in CSF from each core team members and suggest measures for each CSF identified.
12. Present the CSF result to the project core team leader for his comments and revise.
13. The whole core team gathers together to examine and discuss CSF result and revise
14. Submit the final result to core team leader.

**Gaining access to cases**

The first job for scheduling field visit is to identify the qualified core team leader for interview. Any management tool or process should be matched to the skill level of the manager who will use that tool. Managers who are incompetent, driven by routine or are mainly reactive

are not proper candidates for this model. This model is intended for program/project managers who are selected due to the past proven practice. The process owner or higher organization can identify potential candidates.

Among the candidates that are willing to participate in the study, we can choose the projects that fit the strategy of this case study. Then we can take initial contact with the project core team leader for an initial meeting where the project core team leader will have the chance to know more about the topic of this study, the time frame for this study and process, and expected results etc. while the investigator can get the general information of the project to be investigated. The project core team leader will then allow the investigator for a case study presentation over his core team in the first coming weekly core team meeting. At this stage, the core team has allowed for case study with reservation that the core team will participate. The way of getting the final permission to start the study will vary depending how the project core team leader wants it. Investigator should be flexible here. Investigator should also be sensitive to the project core team leader's argument for participating in the study to best meet the project and this study's goals.

After receiving positive response from the core team leader under the initial meeting, investigator should ask for access for project information, for example database, PDO, organization chart, job description, etc. and start reading these. At the same time make an interview plan before the core team presentation. The letter to interviewees gives the main points that interviewees should know. It is important to point out what the project gets and what kind of resources in terms of time is needed for this study. Leave the contract information of the investigator to the secretary for later use.

After the acceptance of the case study, investigator can call each core team members for interviews. It is desirable that core team leader is interviewed in the end of each interview round to get the maximum preparation for the highest management. Time and place will have to be adapted to the time schedule for the interviewees. This is a real time project; make appointment with all before running interviews (time and location). Try to find a location where disturbances are minimum. Inform interviewees what kind of preparation they need to do if there is any. Ask kindly if they could turn off their cellular phone.

**External help**

During the interviews, it may become necessary to verify if some common practice claimed by the interviewees or simply to find out what are the normal practices because investigator has no practical experiences at project core team level. Example can be what are the normal responsibilities or challenges for project core team leader; what are the typical challenges in cooperation between platform and

operation, etc. External experienced project managers in Statoil can be of good help. Some other Statoil personnel have special experiences /competence like running interviewees, could also be very helpful with practical advises for interview process. This study has identified some sources for external help. When help is searched, the questions are general and the project information is not mentioned.

**Prepare for interviews**

It is import for interviewer to have as deep as possible an understanding on the following aspects in addition to basic interview techniques:

1. The information to know the *industry* for competitive forces, trends, and environment, current problems, issues and news makers—important to elicit CSFs and understand importance of each CSF: investment committee, Facts 2001, offshore project report
2. The information of *Statoil*: The company strategy, the organization, and the company requirements, its strategy, environment, current problems and opportunities, Internal company's political issues should be probed, the public external sources like wall street journal, business week, Forbes, and Fortune
3. The job being performed by the *manager* being interviewed: talk to some experienced persons on how the core team works
4. Major CSFs articles for conceptual framework and examples (Rockart, Bullen and Rockart, Dobbins)
5. Prior to the interview, assume the role of the interviewee and list, from all acquired knowledge, her probable objectives, goals and CSFs and measures (discuss with the experience person invited). Be aware not to force these CSFs on interviewee.
6. Brush up on interviewing skills (make guidelines for making CSF interviews).

Now that study environment is real time project, one has to know some basic frame information on project through:

1. Organization chart
2. The job description of interviewee,
3. Plan for Development and Operation (for goals, strategies)
4. Information on major licensees and contractor involved in the project
5. Project assignment form from higher line management if this is open for review
6. Cost and plan (baseline)
7. Risk register

Fill the following information before the initial interview with *core team leader* and let him/her verify the filled information:

**Interview time and place**
Date of interview_____ Place of interview_____
Time frame for this interview: _____
Actual duration of interview_____

Name of interviewee_____
Project position_____
Discipline background_____

**Project general information**
Name of the project: _____
Overall intended purpose of project_____

Licensees of the project_____
Organization format_____
When was the core team established_____
Planned duration of project_____
The phase your project is in now_____

Budget for this project_____
Main contract format_____
Major target deadline_____

The project owner/sponsor_____
Project user_____
Major contractor_____
Major subcontractor_____

The overall strategic goals have been
documented_____
The overall strategic goals are_____
Major modification of goals: _____
Strategic project goals determined by_____
Interface management strategy_____

Use of critical path analysis_____

**Initial interview**
Review the research questions again. Make a list of what kind of information is needed from the interviewee from this interview and what kind of information is to be verified with this interviewee (relevant when some interviews have been carried out). Prepare for possible reactions and avoid making the same mistakes in interviews already carried out.

Review the interview techniques, especially avoiding leading questions and bias.

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Review this interview's function description and his/her goals specified in project governing documents or databases.

**Take the following to the interview**:
- Standard forms to be used under the interview (interview part I and II)
- List of the kind of information wanted
- Letter to interviewees
- Project organization chart
- Rockart article on *Chief Executives define their own data need*
- Statoil organizational charts relevant for this project
- Recorder with double battery sets
- Calendar
- Clock
- Notebook
- Pen and pencils

Come to the interview location a few minutes before the interview. Install the recorder and test that it works fine. Make ready for the interview.

### 9.4.1   *Opening of interview*

It is important to explain what critical success factor method is with simple words. For example:

> CSFs are at a level below goals and are the areas of activity where good performance is absolute necessary for reaching these goals. CSF answers the question, where should you use your management time? Project managers should have adapted information (either subjective or objective) readily available to evaluate if project performs well enough in these areas.

In addition what you want interviewees do under the interview and important practical side of the interview. The following is an example for the latter:

> It is important to point out at the very beginning that this interview is about how <u>you</u> view the environment and what <u>you</u> think is important in order to achieve project goals rather than what you are supposed to. You should not confine yourself in what was done and is being done, but what you believe should be done or should have been done. You are given the freedom to think in a creative or innovative way if that is beneficial because this study is <u>not</u> an evaluation of you or your project in any sense, rather, it is an effort in making <u>explicit</u> your understanding of the project environment and your management focus.

> Information from all interviews will be confidential within the core team. Interviewee can also require part of the information from the interview be partially confidential between himself or herself and

interviewer. Core team leader decides whether to distribute the analysis result within his/her organization. Academic presentation of analysis result will make project anonymous.

### 9.4.2 *Analysis of initial interview*

This is based on Dobbins' work. However, we added a "why" part under each CSF to increase understanding with the participants. The other two parts are " how" and "measurement". Interviewer enumerates all activities and groups them according to subject and topic.

1) Activity in each group are analyzed for internal consistency

   If consistent, check criticality of CSFs: if interviewer identifies an activity that on its faces seems to be irrelevant to success, it is flagged to bring to the attention of the manager during the follow-on interview to see if it should be discarded.

   A candidate CSF that exemplifies what that full set of common activities is advocating is determined for each group of activities. The grouped set of activities on which the CSF is based is the set of constraints for that particular CSF.

2) Total consistency check for all the CSFs.

   That is if one constraint for CSF1 is in conflict with one constraint for CSF2, then it may not be possible to do both CSFs. Manager must again examine the activities he or she has deemed critical to determine the root cause factors needed to resolve this conflict.

3) The interviewer examines each set of CSF related constraints to determine a candidate set of measures and considers how the measurement data should be presented for effectiveness in knowledge communication. Each individual constraint is considered for measurement and measure can be either quantitative or qualitative.

**Follow-up interview**

Investigator should ask for additional information especially in case of inconsistency of measures or constraints. Before presenting the results, investigator should explain the data collection and analysis process to the interviewees so that they know what has happened and how the result has come up and been presented. The interviewee will have the opportunity to examine the results, make any modification he or she feels necessary.

In addition, what they can do in this interview: comments on the truthfulness of the information presented (all information in the CSF result are based on core team members statements), CSF identified and measures suggested by the investigator. Here investigator can choose to

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send over the CSF result to interviewee before the follow-up interview or collect comments afterwards.

It is recommended to ask the following four questions to each interviewee:
1. Are all of your CSFs included in the results?
2. Do you regard all the listed CSF as project CSF?
3. Do you think that it is helpful in making these CSF explicit and make them available in clear text so that they are clear for everyone?
4. Have there been any changes in CSF since the last interview?

The investigator should also ask interviewees on whether they regard the expected product from this study specified in the Letter to Interviewees as been realized:

1. Is the CSF identified specific for the project so that they are not too general to related to?
2. Has the application of the CSF process model improved communication (between core team members and between core team leader and rest of the team) and quality of decision-making criteria?
3. Has the application of the CSF process model improved understanding, agreement, and ownership of the project goals at lower level of project management through agreement in actions that are necessary for achieving the goals?
4. Do you agree that this is a step towards a documented project management process that does not exist today? In other words, the CSFs identified, although important, cannot be found in its totality in any project documents?

**Consolidation after review**

This process is not relevant for CSF method for individual managers. For team approach, this process is desirable to maximize the communication through the project core team because they will then have to chance to give more precise description and background for their evaluation to each other so that others in the team will understand it better if they do not have that background. This could be very beneficial when core team members are made of experts in each field with limited experience from other's discipline.

However, to get full communication effect, this process will need time and the managers must also be used to strategic thinking. Not all projects are in the phase that allows so much time adapting to this new way of thinking.  The background for CSF from each core team member can be based on several ten years of experiences each and completely different education. To get full consensus on CSF is challenging. To get one's prioritization or nuance within each CSF understood by others may be even more challenging. That this study is a dr.ing research work with

limited resource will also make a project reluctant to devote so much time to unproven tools. All in all, two conditions must be in place before a real implementation of the CSF process tool can take place: 1) more test and development of the tool (especially in how effective measurement can be defined to give status for each CSF) is necessary. 2) Commitment to this tool from higher management above the project organization is needed.

### 6. *Research questions and how they are to be answered*

The four research questions will be answered through a multiple-case study. Semi structured (also called *focused*) interview, where the interviewer introduces the topic, then guides the discussion by asking specific questions [Rubin and Rubin, 1995, p5], is the major form of investigation in all cases. Statoil real-time offshore development projects are used.

These 4 questions are not questions to interviewees. They are questions the investigator seeks to answer. Here we talk about how the questions are to be answered.

1. *Does senior management (project core team) need anything more or better than what existing monitoring and control tools can give them today in Norwegian Offshore Development Projects to achieve project success?*

Besides the literature review and the practical challenges that call for better communication of project management focuses (refer to main text, introduction), we can have some operational measures or observations from case studies to demonstrate this.

We can ask each project manager what his or her management focuses are directly (Set 2). We can get to know the top-ten risk list for the project (Set 1). Risk management is commonly used as a management tool in projects, many project managers will claim that their top-ten list in risk register shows their management focuses.

We get also the critical success factors through the CSF process model application (Set 3). According to definition, CSFs are few key areas where "things must go right" for the business to flourish. It is therefore natural that CSF should be management focuses.

If we see that the 3 sets of "management focuses" are not the same, it will show that the management focuses are not explicitly identified and thus doubtfully clearly communicated.

We can also check if the CSF identified is documented in the project governing documents. In addition, we can ask the interviewee if the CSF are documented somewhere in the project. If the CSF identified are not clearly stated anywhere, they are not documented.

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When we see that the CSF identified by the real time projects are not measured, we can naturally ask the question whether the status for these CSFs are properly evaluated and if they were evaluated in the same manner by all the management team; if they were not measured, how are these CSF managed? The answer to these questions will give us an answer to this research question.

2. *Whether a CSF process model can be used as a generalized method for explicit CSF identification, analysis and monitoring of contextual CSF, based on managers' personal intuition and skills in Norwegian Offshore Development Projects? Manager in this study is at project core team level*

We use the same interview questions. We choose two offshore development projects from two different business area, responsible for two complementary parts of Statoil value chain (UPN and NG). These two cases can best represent Statoil offshore development projects in Norway. If we get a set of project CSFs that are explicit, contextual and team CSFs for both cases, we can say that the process model is general.

We keep the investigator's suggestions or opinions completely out of final CSF result, which are solely based on information from the interviewees. We can compare the CSF identified with the general CSF identified in literature to see if the CSF is contextual. When we see that the CSF results are not documented anywhere in project document and core team members regard all the identified CSF as critical for achieving project goals, we can say that we managed to make CSFs explicit.

3. *Whether the CSF process model can be used to determine if there exist consensus team-CSFs, which must be accomplished through the project core team working together?*

We ask each core team members if they will regard all the identified CSFs as critical and if all the CSFs are included. If they do, they also agree to the CSF results. If all core team members are confirmative to the question, we have achieved team-CSFs.

We can then identify what are the contributions from the core team leader and what are the contributions from the rest of the team. We can then conclude that team CSF exists that cannot be replaced by CSFs identified by the core team leader.

4. *Whether a CSF process model can be used as communication tool for management focus among different levels of management (vertical communication) and among management at the same level (horizontal communication)?*

That different core team members have different CSF or have different priority among the CSFs can indicate a need for communication. We

also ask for interviewees' evaluation and observe concrete changes in interviewees' opinion or actions (changes in project documentation, typically project risk register in connection with what was said in the interviews) before and after the interview process. Different statements from different core team members can be brought up in other interviews to confront the other statements during the process. The group discussion before the final CSF result is agreed upon is also a demonstration that communication exists.

### 7. *Analysis and Case study report*

Refer to main text

## 9.5 Core team CSFs for case1

The project name is omitted her and refer to as the project. The year for major milestones are also written as year N. This is to make the project anonymous as was promised in the case study. In addition, who suggested what is also taken away from the result.

Each CSF was formulated with *background* and *measures*. In background, which is the text before measures, the situation that makes the CSF critical is explained. The concrete tactics for how the project should do in each CSF are also documented in this part. The measure part is what the project has already been doing or some actions that CT members regards as important and that project should do to achieve high performance in the CSF. This structure was later improved and organized into three distinct parts: why, how and measurement, in the second case. We present the result as CT manager was presented and which he commented.

### *Case1-1. Impose strict cost and progress control and change control*
The project has a relatively long period for platform engineering, which is now about 70% complete. Core team has recently decided that all changes should be brought up to core team level and decision will be made on individual basis. This is to avoid unnecessary and costly changes. Necessary minor changes may be postponed to commission phase to avoid variation orders where contractors will include disturbance cost.

Two major milestones in the future are August 1$^{st}$, Year N (Platform is installed and production Drilling starts) and October 1$^{st}$, Year N+1 (start production). The project has as a goal to complete onshore commissioning 100% before offshore installation. Due to the problems with material and equipment delivery for Deck and drawing availability for Drilling Module (DM), both construction of Deck and DM are behind schedule at the moment and they constitute two parallel critical paths.

*The project was built with extra capacity because of lack of processing and transport capacity in the area. In other words, the project is to be used as a connection point in the area. Right now under the intensive construction period, business development function realizes that it should protect the project from being disturbed by newer business opportunities that may cause large changes in the part of project already under construction. Business opportunity is thus based on using existing extra capacity.*

Measures:
1. Strict change control with clear scope of work communicated to all disciplines

2. Clear decision routes (e.g. changes should be brought up to core team) and rules (when decision is made, one should not come back to it)

3. Close follow-up of delivery from Statoil frame contract suppliers by Statoil project personnel

4. Report physical progress rather than traditional project control progress that includes management, engineering and procurement etc. which may show misleading measurement due to different principles from different companies.

5. Verification of progress for critical (e.g. long lead time) item deliveries

6. Regular verification of correctness of contractors cost and progress reporting

7. Cost visibility. Use forecast and identify rectification work if necessary

8. Establish good relationship with contractor personnel so that information (e.g. contractors' activity level and use of resource, facility and their priority etc.) will come up earlier than formal reporting.

9. Allocate project contingency according to the risk picture in different disciplines to avoid the disciplines that finish first eat up contingency for others.

10. Prevent impact from newer business development opportunities that will cause significant changes for construction

11. Honest cost and progress update

12. Add contract personnel to contracts with the highest possibility for cost overrun, for example Deck

13. Focus in quality of plans (sequence and feasibility) to avoid waiting

### *Case1-2. Plan for personnel transition and movement of Reservoir, Drilling and Operation to Bergen.*

The project was established at the time when there were few projects, oil price was record low and Statoil was downsizing its work forces. The project got the chance to recruit some of Statoil's best-qualified personnel to its organization. There are several conditions that may change this favorable situation:

Statoil, in the middle of project execution, has made the decision to move the project's Reservoir, Drilling and Operation organization from Stavanger to Bergen to ensure Operation synergy of high-temperature and high-pressure (HTHP) fields with NN project and ensure stability of Operation expertise in Bergen. Some of the project personnel choose (or consider) not to move or commute to Bergen because of personal reasons. This will cause loss of project knowledge due to discontinuity.

As a consequence of somewhat uncontrolled downsizing process in Statoil, some disciplines like Reservoir, Drilling, procurement, and quality assurance etc. lack competent personnel; the oil price has been

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high in the last two years and general activity level has increased. Persons that do not want to commute or move to Bergen may find other projects in Stavanger instead.

One of the present Statoil strategies is to gain international operator-ships. There are several projects ongoing. Statoil seems to prioritize to allocate the more qualified personnel in these more challenging positions. Experienced personnel may want to or be encouraged to work in international projects. Several core team members (Reservoir manager is included) are leaving the project within the next 3 months.

The project has a HTHP field. The decision of building out this field was based on two exploration wells in neighborhood of each other. Reservoir uncertainty is thus quite high. Reservoir uncertainty is built in design and backed up with several commercial agreements. Production start is relatively early. Drilling in depleted Reservoir is a new technology. Reservoir and Drilling is thus critical to ensure project profitability target and knowledge of project history may be very important in making good decisions in the future.

The project in general depends on having competent personnel that have the ability to identify critical areas and control these areas. Otherwise, there will be more holes in the system because of limited project resource.

Measures:
1. Find candidates for core team members that are leaving in the next few months especially for sub-project managers.
2. Track mobility status of personnel in Reservoir, Drilling disciplines and recruit persons from Bergen that are willing to commute to Stavanger before moving. Recruit Bergen based personnel for Operation organization.
3. Experience seminar for the interested in Statoil while the project is ongoing to attract others to the project
4. Measures to make the project a good working place for all (team building, help persons who have finished their tasks in the project to come into other projects, project road show)
5. Be flexible with personal relocation, yet arguing for keeping key project personnel to higher management.

6. Require that the project personnel warn the project *before* they apply for a new job, not *after*.
7. Establish good relationship with Statoil competence center for resource support. The project should sell itself to competence center so that we get qualified rather than B-team members. Personal relationship may be important.

***Case1-3. Proactive risk identification and scenario analysis***
The largest uncertainty lies in Reservoir (volume, product quality-$CO_2$ and $H_2S$ percentage, communication of the field with the neighboring field etc.). The project has done thorough analysis of the Reservoir data available up to the end of (year N-3) in connection with the submission of supplement to the original PDO (Plan for Development and Operation). Further significant improvement in Reservoir understanding will have to wait until one gets the stable production data after production start some time in year N+2. Right now one can only concentrate in detail planning of HTHP Drilling.

The concept chosen is jacket with integrated Drilling module that results in a higher CAPEX than the initial design in order to handle the Reservoir uncertainty. Project has also negotiated commercial agreements to cover for possible late start production. Therefore milestone for start production is important yet not the absolute target anymore. Cost will be a more important decision parameter.

The major sources for possible large cost increase are commissioning offshore and production Drilling.

The project has identified interfaces early and set up organization accordingly (user group in design phase and user-platform integrated organization under platform management in construction and commissioning phases). Risk register, interface matrix and change control databases are parts of the established project structure. The present system has functioned well and the project has no cost overrun yet up to the present CCE3. Everyone in the project is confident in meeting the cost and schedule targets. However there are minor delays in DM and Deck construction. Frame contract suppliers are making troubles for progress because of late delivery. To spend enough energy in predicting and preparing for future scenarios may also become more challenging for Platform as the construction activity is at the highest level now. Personnel transition will also impose discontinuity in project knowledge in some positions, including project key personnel.

Pipeline sub-project started late (detail engineering from August this year). Contract for the project Gas pipeline material procurement contract was entered early based on prediction of heated market and resulted in savings compared to estimate. There are still some other major contracts not entered yet. Making procurement strategy (decisions based on risk analysis) that fits market is still a management concern.

Measures:
1. Clear definition of goals and responsibilities and management handles the interfaces in between subordinates.
2. Still focus in active and effective use of risk management structure established in the project
3. Commissioning preparation has already started.

4. Market analysis of pipeline contracts like laying vessels, pipes etc.
5. Use of <u>management plan</u> to get people to look ahead in time at the same time as they try to solve the problems in front of them. (For example: Begin scenario analysis in case of large carry-over work offshore)
6. Technologies are applied in a controlled manner (with enough float and budget for development or use proven technology).
7. Active experience transfer with other Statoil projects, external projects, projects where contractors are involved, platforms using similar equipments, Statoil networks, personal networks
8. More effort in risk communication to other disciplines that have different tasks, culture and background; Active evaluation and communication of impact of decisions from other disciplines on ones own.
9. Somewhat connected risk management across disciplines? There are no systematic cross-discipline links between risk abatement actions in risk registers. Each discipline is responsible for its own register although the register is open for anyone in the project.
10. Pre-engineering work as complete as possible before entering into contract
11. Ensure real internal-user involvement in design, construction and commissioning (regular meeting to fresh up user groups' missions, ensure user group have information access in integrated organization, change of personnel if necessary when taking over the product to ensure quality)

***Case1-4. Establish good relationship with higher management so that we understand each other and their decisions are made in time***

Statoil CEO Olav Fjell's message to all Statoil project managers is clear: when PDO is approved, it will not help to come up with new solutions that will reduce OPEX at the cost of increased CAPEX, although this may give a higher present value. Predictability of project execution is extremely important for Statoil.

Statoil director, Henrik Carlsen is a leader with energy and decision capacity. However he is responsible for all Operation in Norway. Everyone fights for his attention. Much of his attention will be in fields already in Operation. However, he has been involved in many decision-makings for the project due to the frequent change of the leader immediately above the project.

The project director got a new leader last month, which is the 5th leader in a period of three years for this project. The project director insists that the only right thing to do is to always go through ones direct manager in decision process involving higher management. Therefore it is important to establish a good relationship with ones direct manager so that he understands what is important for the project and supports the project. Several examples show this:

The project business development:

➢ The decision on whether field X's oil pipeline goes through this project and we should install a larger pump than designed. We have to do parallel engineering for two alternatives
➢ The decision in building out NGL facility at Kollsnes will influence field Y's decision on whether to go through this project or not.

This project is imposed to use the Statoil frame contracts:
➢ This project is imposed to use the new contract format NTK2000 due to the pressure from outside-TBL
➢ This project is imposed to use Statoil appointed frame contract supplier to reduce number of suppliers in order to reduce Operation cost
➢ The follow-up of frame contract supplier has been proven to be difficult in case of late delivery: contractor will come back to us with claim because we impose them to use this supplier; the Statoil responsible for frame contracts are not effective in follow-up; The project has to use its own project personnel to follow up and cope with the consequences.

Measures:
1. Clear definition of decision level and approved decisions are clearly documented and traceable
2. Establish good relationship with the new line manager to get him understand what is important for the project and support the project
3. Clearly communicate the importance of higher management's decision timeliness; our difficulty and project status to higher management
4. Establish good relationship with Statoil process owner, competence center to avoid negative comments on the project to our line organizations
5. Understand clearly what the upper management wants

***Case1-5. Ensure that product meets the function specifications***
The project has been consistent in the principle: *make a product that meets function requirements and not more than that. This may be a somewhat different criterion from Life Cycle Cost (LCC). The first will want to build a product that meet the function specifications to the minimum cost while the LCC consideration will weigh OPEX and CAPEX at each decision. With the clear message from Olav Fjell and somewhat open OPEX budget in practice (update each year and is beyond the project scope), it is clear that the first will win if there is no very obvious and huge negative impact on OPEX.*

Everyone regards quality as important. The common denominator, in the understanding of quality regardless of which of the two principles one supports, is that the product should function as it is designed when delivered. There should not be large modifications or significant downtime when product is put to use. In other words, platform regularity is important for the project. *However the production regularity at the*

*beginning of production is not absolutely critical due to the establishment of commercial agreement with Troll and low demand in the summer season in year N+2, which give the platform opportunity to do modifications. In this sense, cost and time targets for production start are more visible than absolute production regularity, which is an indicator for quality. It may become a challenging task in keeping a correct balance in terms of quality, cost and time, for example when modification/change should be done in construction phase.*

Technical personnel ensure quality through thorough engineering and follow-up on construction sites. The project is divided into many contracts. Some of them are firm price contracts. It is then a challenge in quality assurance. The QA expert in this project was moved to another project with no replacement yet.

Measures:
1. Close follow-up of product quality according to function specification, especially in lump sum contracts
2. Verification plan connected with risk register and involvement of users in verification
3. External verifications with competent personnel
4. Test Drilling on land before offshore installation to ensure the whole Drilling module system functions.
5. Strict change control to avoid changes being made without complete multidisciplinary check.
6. Close cooperation with Statoil process owner and competence center for technical support with expertise, procurement strategy, market evaluation and information, etc.
7. Active experience transfer (including recruiting personnel from relevant newly finished projects) with other Statoil projects, external projects, projects where contractors are involved, platforms using similar equipments/designs, Statoil networks, personal networks
8. Technology verification: gaining Operation experiences with new system equipment, research in new methods for Drilling in depleted Reservoir, qualification of connecting between the two parts in Jacket including riser connection, fractures in steel for Jacket
9. Satisfaction of project internal product user should be promoted under clear evaluation criteria

### Case1-6. Maintain the honest, proactive and open project atmosphere based on safe foundation, respect, trust and competence

The project has established a constructive atmosphere based on trust and respect during the past few years and people feel safe with each other. This is regarded as one of the main contributors for the achievement up to now: reliable estimates, flexible commercial agreements, no cost overrun, and good control structure and trust from license group and government etc.

The current situation is:

- Coming into an intensive construction phase (thus unbalance of activity level in different disciplines);
- Instability and discontinuity of personnel (change of core team members, potential of personnel leaving with short notice due to movement to Bergen or other job opportunities, new personnel coming in both from Statoil and contractors);
- Procurement organization for Pipeline and Drilling are totally or partially matrix organizations with large difference in technical background and culture, with no contact with each other otherwise;
- The project has used a relatively long time to optimize the design and at present imposes a strict change control;
- The project has done very well so far and everyone feels the pressure to keep it that way
- The project has clear goals in PDO with both cost and time; the platform must work when it is installed. Quality is difficult to measure.

The project still need the honesty in updating estimates, making plans and relies on warning for risks come up early enough in the time to come. This is also the premise for good relationship with government and others in the license group.

Measures:
1. Measures of making the project a good working place; ensure good chemistry (complement and challenge each other based on trust and respect) in an organization
2. Clearly and repeatedly reminding that there is no winner or loser in decision cases in core team. Decisions are not personal related
3. Core team manager points out the balance between one's own responsibility and contribution to the team in participant's performance appraisal
4. Everyone in the project has the possibility of marking out a top-ten risk element
5. Keep weekly core team meeting; Core team manager functions like a true leader and team works without dominance of few functions. Core team manager is responsible for effective cross-disciplinary information exchange.
6. Get everyone realize what is the most important of the important, i.e. what is the goal one really wants to realize. Project meeting is an important measure for this.
7. It is favorable that Core team manager continues in the position after the platform is installed
8. Management makes timely decision on interface conflicts in the core team (offshore commissioning, Drilling wants to come in June 15th with some personnel and platform will not give bed capacity until July 15th. If it is not planned, it will not happen either)
9. Ensure balanced management attention and follow-up of critical areas with relative low activity level.

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10. Management should have clear strategy and make the strategy known in the organization
11. Disciplines should try to solve conflicts in between them first.
12. Encourage honest communication and do not punish messenger with realistic, yet bad news. This will ensure realistic and honest cost and schedule estimates and risk management with early enough warnings.

## 9.6 Core team CSFs for case2

### Case2-1.Establish a project culture based on trusts and respect

**1.1 Why**

It is important to keep a balanced focus in both technical and human/organizational challenges in the project. Project participants come from different units and have different technical and social experiences and background. They do not necessarily know each other from before. At the same time, project requires *creative teamwork*. It is impossible to define each individual's responsibility and information flow with 100% accuracy because of changes and that the task is unique. It is therefore decisive that project participates, including contractor organization[70], knows each other and project totality, and have clear "ground rules" and cooperate. Good working climate generates comfort and creativity. It is also the project success criterion that is most meaningful for project participants.

Project culture (ground rules or the way we work together) will take its form as the project organization is established, independent of whether we want to or not. It is wise that project makes a conscious effort in establishing a positive project culture. Maintain a positive culture will be much easier than trying to change an unfortunate culture already established.

**1.2 How**

In addition to establishment of project formal governing principles and systems (ref. CSF2), the project must do several other things:

Core team, as the project highest dedicated management group must
- Ensure that project goals in time and budget are realistic
- Identify and establish common understanding of what are the most important/ dangerous and the biggest opportunities all the time, so that they can make early enough and large enough decisions.
- These evaluations and decisions must be communicated downwards the organization.

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[70] One CT member says that a Dr.ing dissertation concludes that project success depends on the relationship between the company representative and contractor. In other words, sole contract formulation cannot ensure project success.

- Have control over interface and totality;
- Ensure communication and agreement with Statoil higher management and license group.
- CT must be visible[71]
- Core team must be open for good ideas.

CT manager must be
- Clear in what he wants and be able to make decisions
- Be structural and keep overview and general direction for project
- Good at asking for information, coaching, backing and pushing subordinates for development
- Gather people in the same direction through common commitment;

All: Everyone should be
- Loyal to project ground rules and decisions
- Everyone should be able to express his or her own opinions. Avoid dominance of few
- Conflicts should try to be solved at the lowest level first
- All functions should know enough of other functions roles (e.g.: technical personnel should know enough of the contract and take consideration of commercial consequences in their daily work).
- Single point of contact: do not over steer a management level. Show respect for others authority.

Rules are not enough. One should use time together and care for individuals, both on professional and social aspects. Get to know each other's personality, competence, network etc. and establish respect and trust so that we are able to sought for advices and use each other's competence. We will be willing to listen to arguments when negative responses come, rather than being hurt, so that discussion is professional and not personal. Informal information exchange is as important as formal meetings.

With contractors: We should
- Tell contractor what our expectations are, what are critical for us and how we intend to work together with them: Close cooperation with contractors.
- Be as open in communication as possible (e.g. the project is pressed in time and it is therefore critical that contractor does everything right the first time. If not, inform us early.)
- Consistent management according to contract. (Contract review twice a year. require contractor do the same);

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[71] It is the management's responsibility to find out if the report and reality correspond to each other and what are to be happening (take temperature of the project). People give the indications and warnings while report gives history.

Give information and communicate so that everyone has a common understanding what the total task is and sees one's own contribution in it:
- Monthly bulletin that informs what's going on; Intranet web page, where one can seek information.
- If there is a decision that touches many, there will be a process around that
- Decisions should always come with explanations so that people know why
- Structured information system: Information technology is there. However information tends to be too much. Structure is important to be able to find information.

## 1-3 Measures
- ➢ Project specific questionnaire[72] that represent the project desired culture every six months. Result is presented and corrective action identified and implemented.
- ➢ Personnel continuity: percentage of newcomers and percentage of transitions
- ➢ Degree the project organization sits in the same location.
- ➢ VO/VOR status; the trustworthiness of contractors prognosis; communication with contractor

### Case2-2 Establish ownership to the project governing principles and systems

### 2.1 Why
Statoil requires establishment of project governing systems[73] at decision gates. There are templates for these documents. However, it is first after the project has made a genuine effort in defining and deciding its own management parameters fit for this project that these documents have values and that everyone will act accordingly. The most challenging is to ensure that the project really is managed according to these principles and systems.

### 2.2 How
*The whole CT* involves in making these governing documents to ensure ownership to them.

The project maintains an overview of external parties that can influence the project and influence them in favor of the project to the degree possible. Such parties can be Statoil basis (process owner and resource owner), the project owner in Statoil, Statoil upstream unit, Gassco, Government (especially in Norway and Holland, License group and environment (European gas market, environmental organization and

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[72] Refer the attachment as an example

[73] They include project assignment, Project execution plan, procurement strategy, project control basis (plan, budget, risk management, interface management, change control), quality assurance (including safety management) and design basis

regulations). These parties can influence each other. To which degree Gassco will act like an operator in early phase project is still unknown.

<u>The project should have a clear strategy for carry out the project tasks at each time</u> -- CT regard time as a critical factor for the project and decides to concentrate on the best concept concluded from the last decision gate so that resources can be concentrated in finding the best technical solutions under this concept and that the solution is 100% executable. Other concepts will be kept as options. The project will choose the technical solution that 1) give the largest additional gas capacity vs. investment[74] 2) Ensure that in Oct. 1st year N. 3) without lost of gas sale due to tie-in Operations.

<u>Project should have clear understanding or strategy on important management aspects,</u> like project goals[75], estimate[76], LCC[77], Quality control [78], procurement strategy[79], weighting between environment/safety with time and cost; uncertainty[80], interfaces[81], long-lead-items[82], CT[83], government[84] etc. Project should carry on the decisions from early phases unless there is obvious mistakes or big opportunities. Ensure that everyone knows what is decided with good documentation.

### 2.3 Measures
- Does the project have enough contact or information about other actors or environment that they feel that have comfortable overview?
- Has everyone in the CT involved in the process of defining management principles and systems?
- Are these principles quality assured by Statoil basis, higher line management and license partner?
- Are the project goals clearly defined and updated?

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[74] Investment and gas capacity has stepwise relationship in this project

[75] Project should establish project goals; break them down to partial or annual goals so that it is possible for measure against.

[76] Project should have a as accurate estimate as possible. Have strict control in execution phase

[77] Use LCC principal in choosing critical equipment like valves, not the cheapest can cause start-up problems

[78] Quality control of services from basis if they are not of stable quality; No double control; use concern revision; Use Statoil own experts in approval of important procedures or work from contractors

[79] Identify risks (Contractor market, delayed government approval etc.) and opportunities early (use scenario analysis) so that they will be incorporated in procurement strategy. It includes the mechanism for ensuring contractor's incentive for good quality and keep up main milestones.

[80] Everyone real use the risk register risk and opportunities. Core team manager enforces the use. The register should be simple to use; remember the opportunities not just risks; Ensure that contractors have a correct understanding of risk at contract let.

[81] Interfaces must be defined early with cost estimates. Interface should be as simple as possible and quality assured. Everyone should participate here.

[82] Commit long lead items early enough, to the right time for market and keep overview of delivery time. Close follow-up in progress and quality by persons with good practical competence from function specification to installation

[83] All core team members are equally important. Everyone has a shared responsibility for quality of project governing documents

[84] It is very important to have a good relationship with government to achieve project success.

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> ➢ Has the project procurement strategy taken consideration of the possible scenarios that are significant with regard to achieving project goals?
> ➢ Does the project identify risk and opportunities early enough and take actions or make decisions early enough accordingly?
> ➢ Is the interface well defined and updated?
> ➢ Has project good enough change control to avoid late design changes?
> ➢ Are the governing documents regularly updated? Do project personnel regularly check them up as guidelines? Make a counter for the web page for these documents.
> ➢ Has the core team encouraged project personnel in discussing the management principles and systems and come up with comments?

***Case2-3 Clarify which government regulations are relevant for this project***

**3.1 Why**

It is very important to have a good relationship with government and have complete overview of their requirements on the project early. Exemptions should be applied early, different understandings clarified early so that government approvals can be obtained to the right time.

Clear overview of government requirements is premises for project work from now on. The project is a Norwegian project with installation in Land X. Government requirements from both countries must be met. Other countries are also touched. $CO_2$ emission is a central topic. The project has good knowledge on the Norwegian regulations, yet not that in other countries[85]. It is also a question on who gives the final approval. The time needed for gaining government approval is highly unpredictable. Government contact can be extensive and complicated if the detail regulations (for choice of concept) in the two countries are different.

The present project execution plan assumes minimum time for government approval allowed under the Norwegian regulation.

Ministry of Petroleum and Energy (MPE) wants to lead the initial contact with the counterpart in Land X. At present, the project experiences slow movement. As soon as MPE says go ahead, the project will take over together with Norwegian Petroleum Directorate (NPD).

**3.2 How**

Contact government early and gain an overview of requirements for this project and which of them needs long time for approval (for example emission permission). Establish a plan for formal meetings for periodic orientation and commitment for each other in the time to come. Open for

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[85] Some core team members worked with the pipelines the platform is tied in to earlier.

informal contact via personal contact so that professional questions can be solved more effectively.

The project could be benefited from hiring persons from consulting company in Land X who know the system in Land X best. In addition, they also know what the topic the media in their country is interested in. Contact those who have knowledge in government contact in other countries relevant for this project.

### 3.3 Measures

➢ Is the communication plan with the input to and output from governments and time this information should be needed established?
➢ Are all CT involved in making this communication plan?
➢ Status for progress and changes in this plan available? Corrective actions identified?
➢ Is there enough resource with right competence for government contact?

### *Case2-4 Lobby activity towards the license group to ensure approval at the next two decision gates*

### 4.1 Why

There are two license groups for the two pipelines the platform is to be tied in to. The gas directive imposed by the European Union and the company based gas sale makes the decision in building out new infrastructure complicated. The partners can have different strategic interests that not always favor this project. Lobby activity in order to ensure enough vote for this project happens at higher management level than the project.

Ownership structure for this project is also likely subject to change in the near future[86]. Voting rules are naturally an unknown. The new ownership structure will become operative from Year (N-2). Whether Gassco is to be operator for this project also under design and construction phase is also unspecified.

This project has good profitability for Statoil, who can cover the gas delivery required alone if necessary. The project suggests the higher management to consider sole risk option. However Statoil has more projects than the company has capital for at the present. Market can also change quickly. Therefore the direct higher management works actively in ensuring enough vote by partners so that the project can go ahead to the project sanction.

### 4.2 How

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[86] Gasled2 is under approval process with the government. Result will likely come in April.

- Project direct higher management works with ownership structure: establish a sponsor group with at least 4 partners to ensure project sanction according to voting rules.
- The project prepares a good and thorough technical solution so that license groups will approve. Partners can be strength in this process because many of them are large international actors.
- Orientate license groups frequently on project development. They are not expected to make decisions. However, the project will appear trustworthy and partners will not refuse to make decisions at the decision gates with the excuse of knowing too little about the project.

### 4.3 Measures
- Is the communication plan towards License groups and Statoil higher management established?
- Is the project getting updated information from higher management on the development at the partner front?

### Case2-5 Ensure project resource access and contribution from basis organization

#### 5.1 Why
Because of the time press both in early phase and execution phase, the project must ensure best possible planning and engineering in early phase. Competence of project personnel is therefore very critical, no matter if they are from Statoil or contractors.

Statoil has not enough resources at the present. It is therefore difficult to get qualified personnel[87] and get them engaged 100% in the project[88]. The project establishes clear recruiting criteria[89] best fit for the project situation and make the best out of that project gets. At present, the contractor market still has extra capacity for engineering.

The Norwegian standard contract NTK2000 must be adjusted for Land X. Basis organization must contribute in this. Project must take an active role in involving basis organization here.

#### 5.2 How
- Identify need for resources early enough so that resource owner has better time to mobilize candidates.
- Parallel recruiting via Statoil basis and personal contact to same time

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[87] The project experienced difficulty in getting personnel in instruments and Operation

[88] Both pipeline and project control functions in the project CT is part time.

[89] Project has consciously chosen those with experience in execution phase in the CT so that they know what must be done to avoid problems in execution and commissioning. At the same time CT should ensure variation in background to avoid single-track management.

- Profile the project for outsiders so that the project is considered as an attractive working place: newcomers join the project and stays
- Involve contributors from basis or matrix organization so that they have the feeling of belonging and prioritize the project
- Resource is about prioritization between projects. The direct higher management for the project should prioritize resources for the project[90].

**5.3 Measures**
- Time between resource need is identified to the person is in position (Project control function keeps an overview, yet all in project is responsible for identification of needs)
- The percentage of part time and full time participants in the project
- To which degree does the project has an overview of resource situation with basis

***Case2-6 Careful planning and controlling of the decision process toward the first coming decision gate***

**6.1 Why**

The core team's establishment was delayed for six months. Project suggestion to loosen the requirement for decision gate: provisional project sanction and goes directly to the next decision gate: project sanction was rejected. However the Operation start is still Oct. 1st, year N because of the enormous potential profit from gas sales. The time for the two decision gates are moved forward and the project must meet the all the Statoil requirements for project development, especially for uncertainty in estimates.

The project has the opinion that the main concept from the last decision gate is the most cost effective solution with regard to increased gas transport capacity, which is practical for execution within the Oct. 1st, year N. The time available now should be use to come up with the best technical solutions (tie-in to operative system without lose of gas sale, choice of compressor etc.) so that the time for project implementation phase is not further reduced. There is no time to look into other concepts except to take them as options. The project will base on proven technology (tie-in with pipelines filled with water). The project will ensure that their way of thinking is approved by decision maker and the quality assurance personnel in process owner. The final goal is to ensure that higher management is able to make clear decision at the decision gates and no further delays become necessary.

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[90] Higher management does not practice resource allocation based on project priority yet in Statoil. Project depends on personal networks.

**6.2 How**

Get overview of Statoil requirements and apply for exemptions early to ensure approval at decision gates.

Make decision plan and communicate it to decision makers and QA personnel to ensure decisions are made in time. The CT must agree on a decision plan where points of time when important decisions (e.g. for design parameters) have to be made are clearly marked out. The project uses this plan to communicate what is critical for the project to outsiders so that they understand the consequences and contribute in time to ensure project quality and progress towards the decision gate. The project should also ensure that everyone understands what has been decided and they are behind the decisions afterwards.

Continuous consultation with basis organizations: The project develops concept in cooperation with profession groups in the basis organization, especially the HSE in Operation from the project owner organization. Project should also consult the chief engineers to ensure that way of thinking is in line with Statoil requirement.

Inform decision makers all the time: Inform license groups and Statoil higher management on what the project has done and is to do what so that they are prepared for decision gate.

Book time with the QA personnel early for decision gates: Make communication or QA plan so that time QA work needs to be done is identified early so that decision happens in time.

**6.3 Measures**

➢ Degree the resource the project got compared to what project wished for
➢ Has project established decision plan and communication plan?
➢ Progress in decision plan
➢ Is the feedback from QA personnel and basis general good?
➢ Has there been enough brainstorming section involved in product development?
➢ Has project got the complete overview of internal and external requirements for the project?

***Case2-7 Ensure good product quality in early phase with regard to smooth implementation in the execution phase***

**7.1 Why**

Late establishment of CT team and the Operation start as planned makes the project have little float. Delayed Operation start will cause economic lost in terms of loss of gas sale. Changes or rework will quickly make the plan start-up unrealistic. Therefore the project should try to identify all the possible pitfalls and make corresponding contingency plans so that project can be executed as plan as much as possible.

**7.2 How**

<u>Involve actors with activities after the decision gate for provisional project sanction early so that their requirement can be incorporated in the design and implementation strategy</u>: Operation from day one; Commission and testing responsible early so that their requirements are passed on to contractors through contracts; Planning for time window for tie-in Operation; Labor union will be heavily involved if it is open for staffing the Operation organization with foreign workforce. This will be a principle matter with long discussions.

<u>Realistic plan and budget:</u> Have certain robustness in the plan and budget. 1.10 year N can be delayed for a couple of month if it is economical. Uncertainty must be clearly documented in decision notes. Project should also consider in which degree the project should use parallel activities and how project could organize accordingly to meet the project goals. Use contractors' competence[91].

<u>Experience transfer early</u>: Experience transfer in use of certain equipments, suppliers, follow-up methods etc. directly with other projects that just finished, Operation group in Kårstø, similar platforms, terminals and related platforms.

<u>Procurement strategy:</u> Good technical concept in early phase is essential for good procurement strategy. Project should decide on how much flexibility to be built in the design together with project owner.

7.3 Measures
- Number of disciplinary and cross-disciplinary brainstorming done
- Has all relevant functions and important stakeholders commented on the product?
- Has project done scenario analysis to prepare for different outcomes?
- Has project done experience transfer with others on critical issues?
- Have actors from later project phases got involved before contract let?

***Case2-8 Work for positive image in the outside world (including media), meet the expectations from license group, Statoil internally and government***

**8.1 Why**

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[91] Project should have control on cost estimate, not just base the budget on bid from contractors.

There is no absolute project success. There is only perceived project success. Project must tell others what has been achieved by the project in the process toward project success.

Good environmental profile is very important for attaining government approval from government.

## 8.2 How

The environmental questions must be handled correctly: CO2 emission is the major issue for this project. Project needs competent personnel with good ability to communicate. In case of conflict with different stakeholders, these personnel could communicate the project intension and make necessary adjustment for compromises.

Trust from license group and government: The project should establish trust through deliver what is promised. Inform correct actors early in case of deviations and changes.

Use the competence from partners: We can recruit personnel from partners after (provisional) project sanction so that project uses their competence and they can pass the project status to their organization.

Avoid being an anonymous project: Establish project profile and communicate with outsiders.

## 8.3 Measures

> ➢ Register formal and informal coverage of the project from Statoil internally, media, government and license groups.

*Case2 Appendix: Project specific questionnaire on project culture*

1. Goals
- Does project have realistic goals in HSE, time, budget and quality?
- Are the task, responsibility and authority clearly defined and they are in conformity with each other?

2. Actions
- Has project the decision plan with identified products, point of time needed and interdependence between the tasks all the time?
- Do the project managers have enough focus on interface and totality?

3. Communication
- Do project managers have clear and common understanding of what is most important and what is most dangerous for the project all the time?
- Has management communicated these to subordinates?
- Are the managers open for good ideas?
- Have managers understood higher management and works actively in ensuring decision made in time by higher management?
- Is the management clear in what they want and able to make decisions?
- Are all the decisions well founded and explained?
- Is project management at Core team level visible in the project organization and take "temperature" through contact with project participant?
- Do managers ask individuals how they experience teamwork on regular basis?
- Do managers give complements in front of others and critics individually with trust?
- Have managers given subordinate the opportunity to do their best through on-the-job training, change of tasks and coaching etc.
- Are the managers good at step in to solve conflicts between subordinates in time?
- Degree you are over steered by your manager or others in your responsibility area.
- Do managers have clear recruiting criteria?

Information and communication
- Is there enough information for project totality?
- Has everyone enough knowledge in what others do so that different disciplines work coordinated?
- Is information exchange across disciplines good enough?
- Is the project information structure structured and easy to locate the information needed and has good traceability?

- Is "what is most important" and "what is most dangerous" a routine entry for CT meetings? Does project use teambuilding to discuss important issues?
- Is the documentation for important meetings good enough-documentation for decisions?
- Is meeting structure good and information exchange horizontally and vertically good?

Project ground rules and cooperation
- Is everyone loyal to the project ground rules and decisions
- Everyone tries to solve conflicts at lowest level first?
- Is there dominance of few individuals that it is difficult to express different opinions?
- Is it easy to get advices from others?
- Is the cooperation with basis good?

Contractors
- Has Statoil project organization explained clearly what we wants and how we intend to work together with them from the very beginning?
- Has contractor understood what we want and keep an open dialogue with us?
- VO/VOR Status
- The reliability/trustworthiness of contractor's prognosis

Office location and social activities
- Is the office location nice?
- Are there enough social activities all the way so that you can get to others and their competence and network? Project get-together twice a year at least?

Improvement
- Has the core team tried to improve communication and cooperation through concrete actions, for example, hire some "teachers" and give advices after project observation?