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# Risk management in projects; Monitoring of performance indicators as element in the risk management process

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## Abstract

Throughout this master thesis a tool that has been developed and implemented in the risk module Statoil use will be presented. This tool is based on the use of KPIs, Key Performance Indicators. The tool has been developed for Quality & Risk Managers (QRMs) and other personnel that handle risk in Statoil on a daily basis. From the tool they get a good overview of how the risk picture in their project looks like compared to the performance indicators. Further, the KPIs give the QRMs information whether the requirements set to the risk management process are met or not. The KPIs are based on the parameters you find in the risk module.

Some theory of why a tool based on Key Performance Indicators could be valuable for the risk management process will be presented. This theory is based on standards and governing document Statoil uses. We will look into how the tool allows the managers in having better control over a project and how they can use the tool for monitoring the risk management process, making it more efficient and concise.

To get a good understanding of how the risk management process in Statoil works, it is beneficial to present theory on this process. This, together with some requirements for the risk management and the process, is presented in Statoil's own governing documents.

A selection of projects has been chosen to participate in a pilot project of the KPI tool. The participants have tested the tool over a 2 month period and given constructive feedback on their usage of the tool. Results from the pilot are presented and discussed in the master thesis.

## Preface

This master thesis is the finishing work done as part of my master degree, Risk Management – Offshore Safety, at the University of Stavanger. The master thesis has been written in corporation with Statoil ASA.

During the work on the master thesis I have been given the opportunity to learn about the risk management process in Statoil. I have also got to know the PIMS R3 tool, used by the projects in their risk management process.

I have been involved in the developing and implementing of a new tool in PIMS R3 that is based on the use of KPIs as an element in risk management. This work has been highly interesting and educational.

I would like to thank my supervisor at Statoil, Mads Hembre, for interesting discussions, guidance and all the help that lead to the completion of this master thesis.

I would also like to thank my supervisor at Omega, Arild Røksund, for helping me developing the KPI tool implemented in PIMS R3 and for all the good feedback I have received during the completion of this thesis. It has been very helpful!

I would also like to thank my supervisor at UiS, Terje Aven, for guidance and ideas regarding the theory of risk management and for all constructive feedback received.

Finally, I would like to thank all the projects that agreed to participate in a pilot project and test the new KPI tool. Without their participation the completion of this thesis would not have been possible.

I would like to dedicate this master thesis to my dad, who past away January 8<sup>th</sup> 2011. He was always so proud of me and I know he would have been very proud of me today.

University of Stavanger, June 15<sup>th</sup> 2011

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# 1. Introduction

## 1.1 Background information

Statoil ASA is an international energy company, focusing on oil and gas production. It has 60 % of the total production on the Norwegian continental shelf, making Statoil the largest operator here. Statoil also operates oil and gas fields in several other countries in the world.

Having high focus on safety and risk management is very important when part of the oil and gas industry. In Statoil there has been developed a tool for handling the risk management process in projects. In this tool the users can identify and assess risks, and create actions to mitigate the risk. It is the Quality & Risk Manager (QRM) or a similar role in the project that is responsible for ensuring the requirements Statoil has for the risk management process are met.

Different reports in the module can show an updated risk picture for a project. However, they do not get information on how they are doing compared to the requirements and guidelines Statoil has for the risk management process. There is a need for a tool that gives the QRMs information about how well they meet these requirements and at the same time gives feedback on the quality of the process.

KPI (Key Performance Indicator) are indicators to measure how you are doing compared to your requirements and goals. By carrying out a survey and monitoring of such indicators, one are able to perceive and then react if everything is not according to requirements or expectations.

## 1.2 Purpose of this master thesis

The purpose of this master thesis is to develop, present and analyze such a tool that gives the projects information on how they are doing in terms of the requirements to the risk management process. This information can help the projects getting an efficient and concise process and allows the QRMs in having better control over the project. The tool is based on KPIs and will be implemented in the already existing risk module in Statoil. Responsible for risk management then get an overview of the status in the projects and where actions should be taken to improve the risk picture. As part of the implementation of the tool we will look into what indicators could

be advantageous to implement as part of the tool. Having good indicators is important for the tool to have effect.

### **1.3 Content**

Some theory of Statoil's approach to risk is described in Section 2, as well as Statoil's own documents for risk management and the risk management process. The term KPI is defined followed by a discussion of why this could be valuable for the risk management process. Section 2 also includes a list over the KPIs used in this master thesis.

In Section 3 a brief description of the already existing risk module in Statoil is presented together with a description of the new KPI tool. The projects selected as part of the implementation of the tool and the results of this implementation is also presented.

Section 4 continues with a discussion of the result presented in Section 3. The discussion includes; feedback form the participating projects, a discussion of the KPIs defined for this master thesis and a discussion of the result form the implementation.

Section 5 sums up the discussion in a conclusion.

## 2. Risk management in Statoil

“Risk is variation from the expected outcome or targeted objectives, both positive and negative”. This is the definition presented in one of the governing document Statoil has; FR-08 [1]. The definition is in a constant development to get a definition that is well understood for all employees in Statoil, and to get a definition that provides a meaningful interpretation of risk. A new suggested definition for risk is out for consultation, and may be presented in the new version of FR-08 [1].

To understand this definition we look into three elements; expected outcome, targeted objectives and variation.

Expected outcome can be seen as the normal state. Take for example the oil price. When deciding on a budget for a project, you expect the oil price to be at \$100 per barrel. Then the normal state is “the oil price is \$100 per barrel”.

Targeted objectives can be seen as the profit one sets as a goal for a project. In the oil price example one may have as a targeted objective that the project will make \$ 40 per barrel, and this will then be the profit.

The variation can then be seen as the state you have when the outcome differs from the expected, or your targeted objectives are not met, i.e. normalcy is not maintained. Looking at the oil price example again, one can say that normalcy is not maintained when the oil price decreases and your profit is not as much as expected. This variation is then seen as one of the risks you have regarding the oil price.

In this master thesis the definition of risk described above will be the one applicable.

When the risk is evaluated the consequence and the probability to the risk is taken into account. This will be described in more detail in Section 2.2.

All the employees of Statoil should be familiar with the Statoil Book [6]. This book has a section on risk management. The approach towards risk management explained in this book is that risks should be identified, evaluated and managed according to the value chain Statoil has, so

that the objectives to the company are achieved. Further the risks should be managed to secure that the operations lead by Statoil are safe and according to their governing documents.

Statoil has developed several documents that explain how a risk management process shall be carried out. These are referred to as governing documents and they include general information about risk management, risk management in projects and the overall process.

The following sections will describe these documents in more details.

## **2.1 General risk management – FR08**

FR08 [1] gives a superior look of the main purpose of risk management. It also gives some pointers on how you can manage risks in an efficient way.

These pointers are:

- All significant risks, both the upsides and downsides, should be identified and assessed
- Ensure optimal solutions by managing all risks in a risk-reward perspective

The document also has a detailed table over different roles you find in the Statoil group, and what their main responsibilities are. It also has a list over the risk management areas in common work processes, with their related governing documents. The document continues with some details of what the requirements of the risk management are, both general and in the operating model processes.

## **2.2 Risk managements in projects – WR2365**

The purpose of WR2365 [2] is to define what the minimum requirements for implementation of risk management in projects should be. The document emphasizes that one of the primary tasks in projects are to manage risks, both threats and opportunities. The document gives more specific details on the risk management process in projects.

The first step in a risk management process is to define a context. This includes when to update your risk register, arrange a risk workshop and when to initiate a cost- and schedule analysis. A risk register is an overview of identified and analyzed risks [3].

The next step is to identify and analyze the risks. This can be done in many various approaches, such as workshops, facilitated meetings, using checklists, through interviews and use of experience databases. The most common approach is having meetings facilitated by the QRM in the project. WR2365 has many important points to consider during this step of the process. It emphasizes that risk identification in a project is a bottom to top continuous process, where it is important to work as a team. Further does it emphasize that it is important to identify and describe the risks as early as possible. In addition this step shall also specify what possible effects the risk can have on the project objectives. As part of this step, possible impacts and probabilities shall be discussed and then estimated for each identified risk.

The third step in this process is to evaluate the risks identified. The outcome of this evaluation should be a prioritized list of the identified risks, according to the combination of impact and probability. You shall also look into the risks towards a tolerance level. One of the tools implemented in Statoil for use in the risk management process, uses a risk matrix when assessing the risks. A typical matrix has a 5x5 dimension of probability and consequence. The probability is categorized as very unlikely, unlikely, less likely, likely or very likely. All these do also have a quantified percentage related to the probability. The probability can be named P1, P2, P3, P4 or P5, where P1 is very unlikely and P5 is very likely. Further the consequence is categorized as negligible, minor, moderate, major or huge. The consequence can be named C1, C2, C3, C4 or C5, where C1 is negligible and C5 is huge. Figure 1 shows an example of the matrix the PIMS R3 tool uses. The placement of the background color (red/yellow/green) has been set by the discipline advisor in Statoil. The matrix in Figure 1 is the one for the risks defined as threats. There is a similar matrix to the risks defined as opportunities, but this is however in different shades of blue.

P1/C1	P2/C1	P3/C1	P4/C1	P5/C1
P1/C2	P2/C2	P3/C2	P4/C2	P5/C2
P1/C3	P2/C3	P3/C3	P4/C3	P5/C3
P1/C4	P2/C4	P3/C4	P4/C4	P5/C4
P1/C5	P2/C5	P3/C5	P4/C5	P5/C5

**Figure 1: An example of a risk matrix used in PIMS R3**

When the risks have been identified and analyzed, actions should be carried out to mitigate the risk in one way or another. The purpose of these actions is to lower the overall negative risk exposure to a tolerable level or to pursue the opportunities.

There are defined different types of risk responses, such as:

- eliminate
- reduce threats or pursue opportunities
- transfer
- accept
- ignore

For all of these approaches it is possible to carry out appropriate actions which then can lead to decreasing/increasing in either probability, consequence or both. All of the actions should be assigned to a person that should be responsible and the action should have a due date. It is the Risk Owners responsibility to secure that the actions do not become overdue. Examples of possible risk response and its actions are showed in Table 1.

<b>Risk response</b>	<b>Action</b>	<b>The action aim to reduce</b>
Eliminate	Re-planning or Re-design	Probability
Reduce threat or pursue opportunities	Re-planning or Re-design	Probability
Transfer	Re-planning	Consequence
Accept	Development of contingency plans	Consequence
Ignore	No action	-

**Table 1: Examples of possible risk response and its actions [2]**

Further on it is important to follow up of actions and document the work that has been done. This is to secure an efficient and effective risk management process. Good monitoring is also important in order to have an updated risk register.

**2.3 Risk management process – WR2404**

WR2404 [3] gives even more specific details on the risk management process, than the above mentioned document (WR2365). The process shall ensure that the risk management is consistent and predictable. In addition make sure that general requirements for the risk management and risk assessment process are established. The process shall also provide practical guidance related to both risk management and the risk assessment activities.

The document goes through step-by-step figures, the same steps described in Section 2.2, but more detailed on the different roles you have as a part of this step, and what type of activities you have. If this document is followed-up properly, the risk management process should be efficient and concise.

**2.4 KPI (Key Performance Indicators)**

KPI stands for Key Performance Indicators and they are a used as a way of measuring performance [7]. Looking at it from a projects perspective, examples of such KPIs can be

percentage of projects that are on time and on budget, percentage of projects with a high risk profile, number of risk response activities in a project etc.

The purpose of having performance indicators is so an organization can evaluate their performance and as a result always strive to be at their best [7]. The performance indicators can be a help for a project to achieve the objectives they have. By implementing indicators for measuring performance, one can at all time monitor if the objectives and requirements to a projects are met. It can also be used for making quick decisions, to help you stay ahead of your competitors. This master thesis will focus on the use of such indicators as a way of managing risks and improve risk management in projects.

The use of the KPIs can be compared with driving a car. You know how to use the tools that make the vehicle move forward or stop. In front of you there is a dashboard showing key information such as the speed you are traveling at, the level of fuel and other warning signs that light up if there is something wrong. You can at all time monitor your own handling of the car and respond to that. For example if the dashboard shows that you are having low fuel, you know how to respond.

To get the best effect of the KPIs it can be useful to look into some questions:

- Do the managers understand the KPIs and see the importance of why they should use them?
- Do the managers adopt the idea of using KPIs and transmit this idea in their organization?
- Do the managers have KPIs that are relevant for their organization and the personnel?
- Do the managers compare the KPIs to the goals they have set for the project?
- Do the managers follow up the reports with analyses and recommendations of where to go next?

These are all questions that need to be answered by the managers in their own organization. By presenting the KPIs in staff meetings, the managers can make sure the KPIs are well understood and the organization see the meaning of using them and why they are so important.

#### **2.4.1 KPIs as an element in risk management**

An updated risk register is very important in the risk management process. By having a tool that gives you a signal on how updated your risk register is, project managers can see where the shoe pinches and make some actions to follow up the results. Examples of such signals can be un-assessed risks, risks without action, update frequency on risks, actions that are overdue etc.



A KPI tool that gives a visual report on how a certain project is doing compared to given KPIs, can be powerful in the risk management process. The tool can set focus on the input and results of the risk analysis process. The tool also sets focus on having an updated risk register.

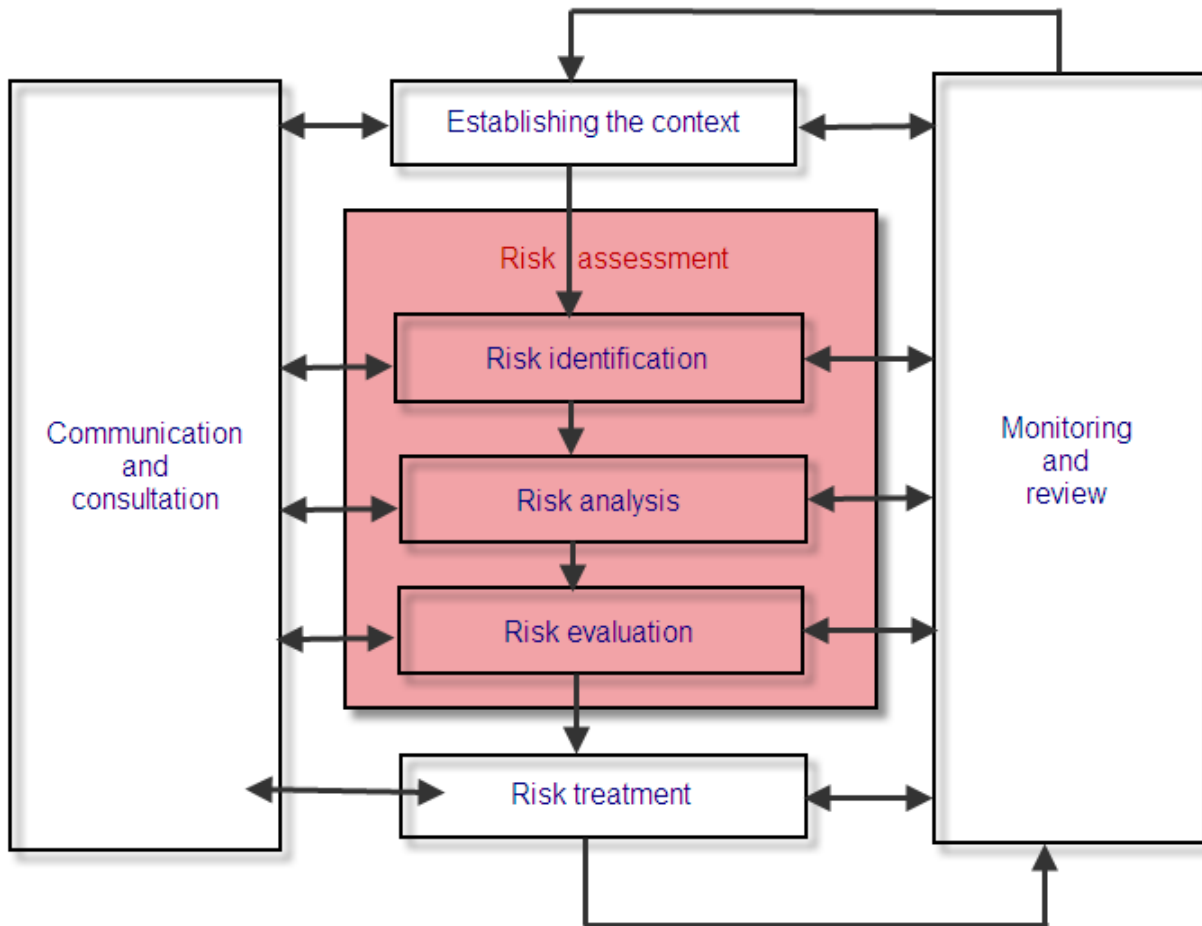
Lately there has been an increased focus on risk management and this leads to more people involved in the process. Having a unified risk management process may therefore be difficult and as a result the performance of the process decreases. Having a tool, such as a KPI tool, can help you make the performance of the risk management process better.

The setting of a target also gives the projects something to aim for and they can at all time track their own improvement from time to time. Statoil as a company can make changes to the targets. This can help them continuously improve the risk management process.

The visual effect of the tool, where a KPI is marked as red/yellow/green, also gives a good and clear signal of how the projects are doing on their risk management. It is also possible to see how close you are to getting a better result or worse in that matter.

To ensure that the risk management process in a project is effective, the managers should determine performance indicators for the risk management which adapt the performance indicators of the organization [4]. KPIs could be implemented as such indicators. The managers can then make sure the requirements set, in the organization for the risk management, are being followed. In that way the risk management performance is continually measured against the KPIs [4].

The risk management process in Statoil is based on ISO 31000's risk management process. Figure 2 shows the step of this process as presented in the ISO standard [4]. An important part of this process is the continuous monitoring and reviewing of the risk management. This monitoring part can also include monitoring of the risk management process, not only monitoring of the outcome of the risk management. The KPIs can then be used as part of the monitoring phase. Through the KPI tool the managers can see if the risk management process is properly carried out. Do all the risks have assessment? Are the risks missing actions to follow up the risk? Are the actions completed on time? All these elements are important for having a risk management that meets the requirements of an organization.



**Figure 2: The risk management process as presented in ISO 31000 [4]**

Good risk management in an organization is about identifying and treating risk in the best way possible. This can help the organization to increase the chance for success and also reduce the chance for failure. In addition a good risk management process can increase the chance of achieving the objectives to the organization [5]. To ensure all risks are identified, assessed and treated, it is important to establish a good framework for the risk management process. As part of this framework, performance indicators should be established to allow the managers to monitor this process.

An organization may have as a goal that their risk management shall be about managing their critical risks in the best way possible and on the other hand, identify as many opportunities as possible. When using a computer based application to manage risk, there is a danger for the risks being identified and then not properly followed up. If a project has several hundred risks, it can be difficult to know if the requirements to the risk management are met. Further there is a

chance of getting “lost” in the risk management if you do not have a good way of monitoring the process. This can lead to a negative attitude towards risk management and a negative attitude in itself could be a threat to the project. The focus of the risk management should be to identify, assess and treat the risks. This focus could easily disappear if the attitude towards the risk management process turns into something negative. A solution to this is to try making it more manageable so the process becomes a more positive thing. One way of doing this is to implement such a tool that is based on KPIs. The projects will know if their requirements regarding risk management are met, since this can easily be read out from the tool.

The KPIs implemented can be used as a measure to see how you are doing compared to other projects in the same organization. The projects coming out with good results on the KPIs can be examples to follow for other projects in the same organization. They may have other routines for the risk management process that ensure that all the requirements are met. Then these routines can be adopted as a best practice in other projects. In that way projects can learn from each other and the best practice for the risk management process are achieved.

An important part of the risk management process is to obtain a risk picture existing of as few high-consequence and high-probability risks as possible. By defining actions to reduce the consequence and/or probability, this can be obtained. Performance indicators measuring how the risk picture develops over time can be of great help when aiming for a risk picture centered in the left upper corner of the risk matrix, referring to Figure 1.

Further we can discuss why it could be beneficial to measure the performance in a risk management process. Morris A. Cohen, professor at the University of Pennsylvania, said “*You can not manage what you do not measure*”. This applies to risk management as well. How can you know if your management is in line with the requirements, if you do not have measures to compare the requirements to? By taking use of KPIs as a measure for the risk management process, one can see how the current performance is and then set goals for improvement. In this way one is more able to manage the process of risk management. Risk management in projects is often about having control. By gathering information that makes one able to measure, monitor and make changes to the process, you can achieve this control.

#### **2.4.2 KPI in Statoil**

As mentioned earlier it is important to find KPIs that are relevant for your business. This master thesis will focus on KPIs regarding the risk management in Statoil.

Up until now, Statoil have had a good tool for managing risks in a project, seen separately of other projects. This tool gives a very good picture over the risks in the project and what actions that can be taken to respond to the risks.

The focus in Statoil is now on a tool that can give a picture over how the risk management is carried out, so the QRMs can better follow up the demands from the managers in Statoil. By developing a tool that uses KPIs as indicator for this, the QRMs can at all time track how they are doing regarding the requirements described in the governing documents.

When selecting the KPIs used in this master thesis, it was looked into elements that would get more focus on risk management in the projects. By going through the already existing risk module and see how these elements are defined, the KPIs were created. The focus has been on the KPIs that can measure the performance of the QRMs during the risk management process. Most of the KPIs are quantitative in the meaning that they give a quantification of how the requirements in the risk management process are met. This quantification is a straight forward number that is often easy understood and leading to a good picture of status quo.

The challenge has been on finding KPIs that focus on the quality of the risks identified. Still some KPIs have been created, that can give some pointers on how accurate the risk management has been done. One of these is the KPI regarding impact categories used. One wish to have a more precise risk description by saying that a risk identified in the risk module shall not be categorized with more than two impact categories.

In the next subsection a list over all the KPIs used in this master thesis is presented. These have then been evaluated to see which worked and gave a good result, and which did not. The result of this evaluation is presented in Section 4.

### **2.4.3 List over the KPIs used in this master thesis**

The reason for implementing exactly the indicators used in the master thesis, is because they are all parameters in the risk module. Since this module was the basis for the tool it was reasonable to implement KPIs that could be seen in the context of the risk module at least as a first step. Table 2 contains a list over all the KPIs used, together with a short description and why each was chosen to be a part of the tool. In this master thesis the term “Domain” is used about a projects risk register, this is the term the Risk management tool uses, it is equal to a project in this thesis.

<b>KPI</b>	<b>Description</b>	<b>Reason for implemented</b>
Red Risks with no actions	Percentage of open red risks with no actions in relation to the total number of open threats	When a risk has been identified and assessed, actions shall be identified to lower the overall negative risk exposure [2]. These shall be documented.
Yellow Risks with no actions	Percentage of open yellow risks with no actions in relation to the total number of open threats.	Same as for red risks, the reason is found in WR2365, that when a risk has been assessed, actions shall be identified.
Top Ten risks with no actions	Percentage of open Top Ten risks with no actions in relation to the total number of open Top Ten risks.	The top ten risks in a project shall serve as a milestone for the risk management process [2], and it is therefore very important that these have actions to follow up on the risk.
Percentage of risks not assessed	Percentage of open risks that are not yet assessed in relation to the total number of open risks.	For each risk identified, impacts and probabilities shall be estimated [2].
Number of opportunities identified	Percentage of open opportunities in relation to the total number of open risks.	All significant risks shall be identified to manage risks efficiently, and this also includes the opportunities [1].
Opportunities with no actions	Percentage of open opportunities with no actions in relation to the total number of open opportunities.	Same as for the threats, it is very important that actions are identified. These actions shall make sure that the opportunities are pursued [2].
Actions that are overdue	Percentage of open actions which are overdue in relation to the total number of open actions.	Each action shall have a deadline and it is the Risk Owner's responsibility to secure that actions are completed on time and that the deadline for the action do not become overdue [2].
Active users in domain	Percentage of active users in relation to the total users in the domain.	To achieve best practices for the risk management it is important that everybody that works with risks is familiar and pro-active in the risk management [2].

Impact categories used	Percentage of open risks that have been assigned more than two impact categories in relation to the total number of open risks.	To get the best out of the risk management it could be wise to not assign more than two impact categories for each risk, so you know what the main focus of the risk is and what the main consequences are. This shall be according to the defined impact descriptions.
Update frequency on assessments	Average of days between assessments is updated.	The risk register shall be updated minimum monthly [2].
Days until first assessed	Average of days from a risk is created and until it is assessed for the first time.	The risks shall be identified and described as early as possible [2] and as part of this identification it is also important to assess them.
Actions missing info	Percentage of open actions that are missing a deadline or a responsible in relation to the total number of open actions.	All actions shall have a responsible for the action and have a deadline [2].
Average duration of the risk	Average of days from a risk is created until it is either closed or cancelled.	The main reason for implementing this KPI is because it was desirable to focus on the fact that the risks sometimes last much longer than what it was meant for and this had focus on closing or cancelling the risks if you can.
Average duration of actions	Average of days from an action is created until it is either closed or cancelled.	Same as for the KPI for duration of risks, this also focuses on closing or cancelling actions if you can.

**Table 2: List over the KPIs used in this master thesis**

### 3. The new KPI tool

One of the tasks to a QRM in a project is to motivate and give feedback to the users on how well they are doing regarding the risk management. The QRMs shall make sure every part of the risk management process is properly followed. This KPI tool has been developed so this can be done to be more efficient and the QRM can take out reports on the performance of the risk management process in the project.

This section gives first a short description of how the tool was developed and then an introduction to the KPI tool and to the end, the result of the analyzing part of this master thesis. 16 projects were selected as part of the monitoring. 8 of them were aware that they were being monitored and got access to the KPI tool, the rest of the projects did not know. The reason why this was done was because to measure the effect of the tool and to see if the projects got a significant effect in the risk management performance compared to the other projects. By implementing the tool in a selection of projects one is also able to see if the tool has any other effect on the risk management process, such as; time saved, easier to extract information, increased focus on risk management, easier to meet the requirements set for the risk management process.

#### 3.1 Development

The tool has been developed in cooperation with the contractor that has created the risk module. Through meetings and discussions the KPI tool has been developed. To find out which KPIs that could be reasonable to include in the tool, it has been important to get to know the risk module and the demands Statoil have for the risk management process. The author of this master thesis has had the task to write the queries that select out the data used as basis for the KPIs and contributed with pointers of how the layout should be. It has been important to make a tool that is easy interpreted for the personnel that will be using it. A pilot of the tool was presented to the supervisor in Statoil and later on the tool was implemented in the risk module. The tool was opened for a selection of projects March 1st.

## 3.2 Description

The KPI tool has been developed and implemented in the existing risk module. The KPI tool is based on an already operating risk module. The risk module has been developed to be a tool for the personnel that handles risks accordingly to the risk management process. The users can define context, create risks, assess them, evaluate, decide actions, and follow-up actions. Since the KPIs in this master thesis are mostly based on the parameters in the risk module, it is important that the risk module is understood by the user. Then they can utilize more of the new tool. Figure 3 shows an input layout over how the risk module looks like. The window presented is called “Risk Lite” and is the input screen for risks in a project. The project used in this example is just a test, not real data.

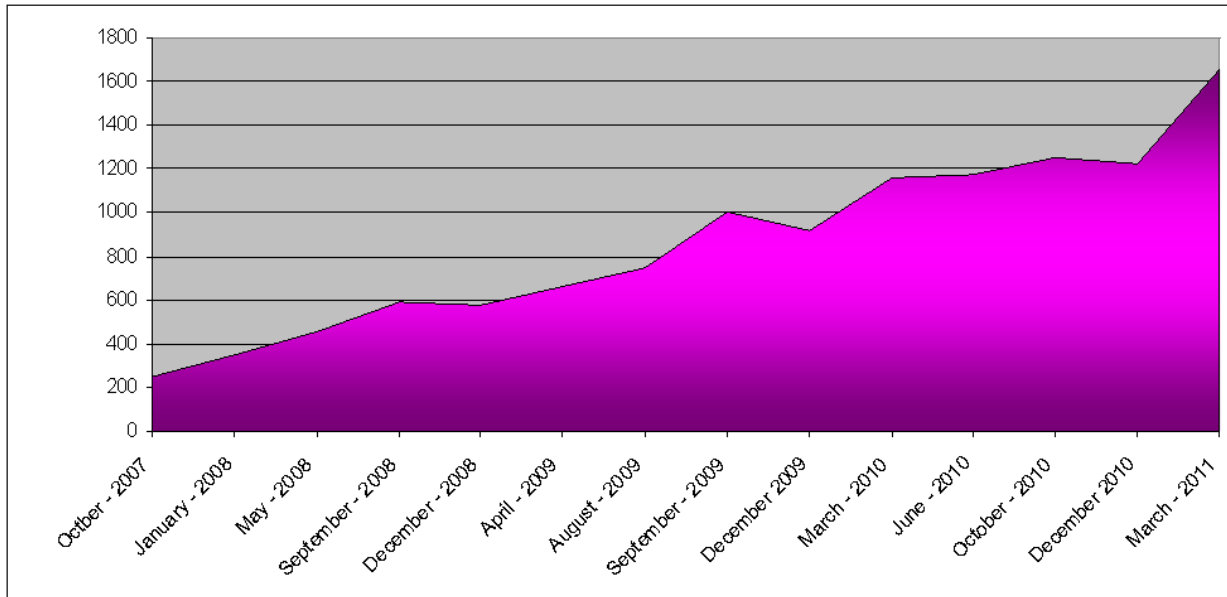
Action ID	Action Title	Responsible	Deadline	Status
162545	sjekk ut	Andersen, Hege Dybvig		Open
145977	Verify document control	Aase, Kjersti	15.10.2010	Open
167509	Monitorering av Løfteaktivitet		08.11.2010	Open
164959	Christer testing	Hellesnes, Jørn-Ivar	01.12.2010	Open
167510	Test Lift	Viengen, Ole	09.12.2010	Open
99269	Call Cement supplier before Sunday December 11th	Aase, Kjersti	01.01.2011	Open
176742	Test Sending		27.01.2011	Open
186633	Enda en ny aksjon		04.05.2011	Open
186635	Enda en		04.05.2011	Open

Figure 3: An example of how the risk module looks like

In Risk Lite you may search for risks and filter on the ones that are open, closed or cancelled. The risk module was initially developed in Lotus Notes back in 1995; the graph in Figure 4 shows the development in the usage of the web-based module from 2007. A modified version



was introduced during the merger between Statoil and Hydro to meet the need for a unified risk module.



**Figure 4: Graph for the usage in the risk module from October 2007 until March 2011**

There is a continuous process to improve the module and an ongoing dialog between the developer of the tool and the end users. The feedback from the users is that they feel the risk module is a good tool for handling risks and gives a good overview of the risk picture in their project. On the other hand, there will always be a possibility for improvements. To make the tool more user-friendly it has been developed in collaboration with other tools that Statoil have. This master thesis will not go in more detail on the already existing risk module, since it is not the risk module that is the essence of this master thesis.

When the users open the KPI window, they get a list over all the KPIs they have available. As part of this list they see the result of each KPI in percent and what the yellow and green targets are. The KPIs are either marked with a red, yellow or green color to indicate their standing. The reason for choosing these colors for the KPIs is because they are often well interpreted for the users. If you are on red level, this is seen as a warning sign and efforts need to be done to improve the risk management. Yellow means that you are still have some issues that need to be looked into regarding the risk management, but is it not as bad as the red level. Finally, the green color tells you that you are on the accepted level and your job is to keep up the good

work. Further the use of color amplifies the visual effect of the KPI tool improve user interface with respect to the various KPIs.

In a box to the right of the KPI list there is a description of the selected KPI and a suggestion field that gives the users tangible suggestions. These suggestions are given to serve as example for what effort that may be done to improve the risk picture in the project and also the KPI.

Most of the KPIs also have a gauge that shows exactly where on the scale you are and how close you are to the other targets. Under the gauge there is some statistics related to the selected KPI. An example is the total number used as basis for the percentage and the number of users/risks/actions not meeting the target of the selected KPI.

Some of the KPIs also have a detailed list over suggested risks or actions which are relevant for the specific KPI level that can be looked into, since they do not meet the green target level. Other KPIs may have graphs that show some statistics on the KPI compared to the average in Statoil and to the target. Figure 5 shows an example of how the KPI window looks like. The example presents actions that are overdue. Further Figure 6 to 10 gives a detailed picture of each part of the window. The project used in these examples is a test project.

When an update in the risk picture is made, this is first shown in the KPI window the next day. The reason for this is because the KPI window is not updated before the system pushes the data into the result-set. This is done automatically every morning.

All of the numbers used as basis for the result are percentage of the total. Percentages are used because some projects may have 1000 risks and other projects may have only 50 identified risks. Following as an example, it is reasonable to use percentage of risks not assessed instead of the number of risks not assessed.

The KPI targets used in this master thesis were based on information from all of the projects and what then seemed to be reasonable as a target. The reason why these targets seemed to be reasonable is because an average of 10 percent of the projects using the risk module in Statoil was on these levels. The targets of a KPI shall be reachable, but at the same time it is important to know that it is possible to get there. Section 4 will discuss these targets in detail, with special attention to precision and validity, and deciding if adjustments are necessary.

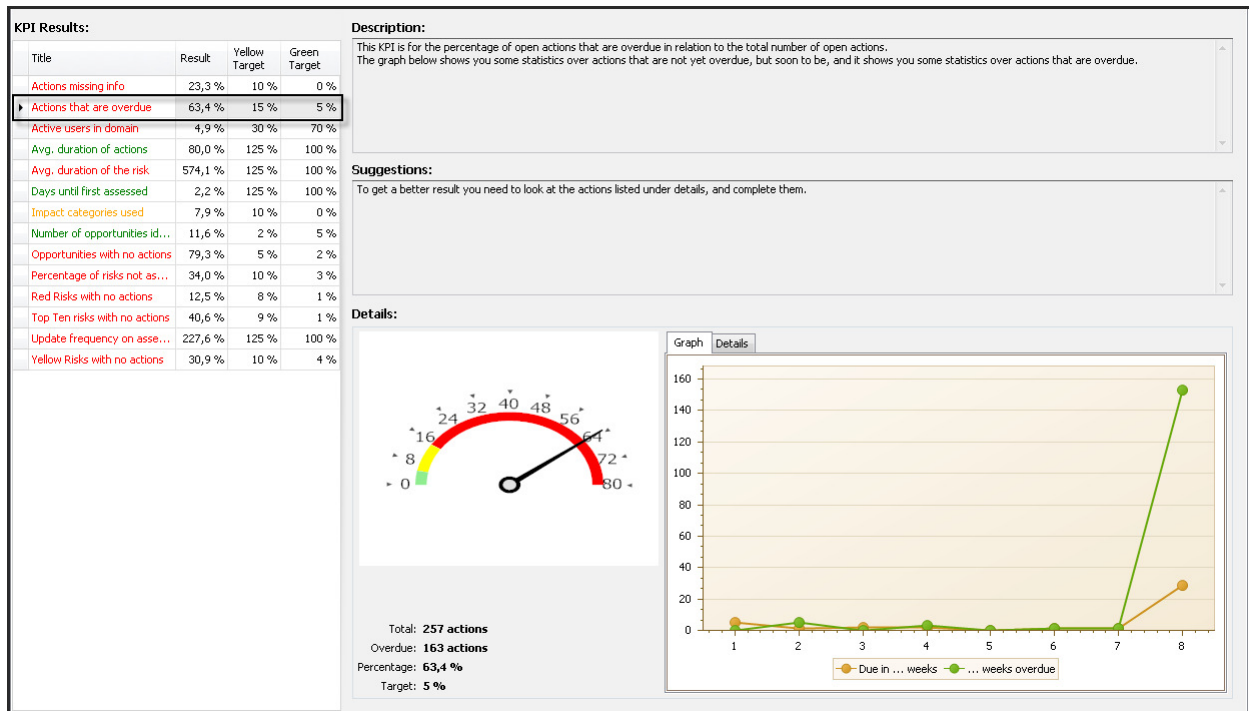


Figure 5: KPI window of actions that are overdue

**KPI Results:**

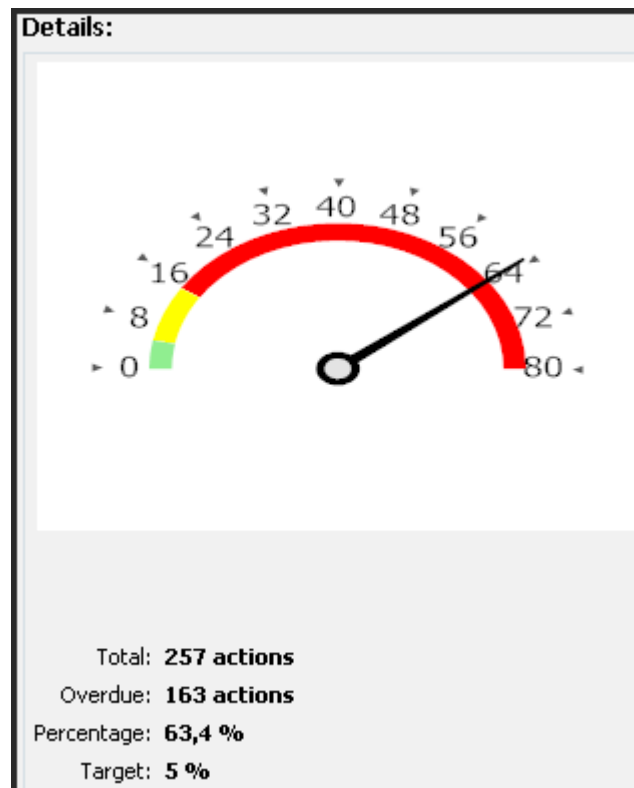
Title	Result	Yellow Target	Green Target
Actions missing info	23,3 %	10 %	0 %
▶ Actions that are overdue	63,4 %	15 %	5 %
Active users in domain	4,9 %	30 %	70 %
Avg. duration of actions	80,0 %	125 %	100 %
Avg. duration of the risk	574,1 %	125 %	100 %
Days until first assessed	2,2 %	125 %	100 %
Impact categories used	7,9 %	10 %	0 %
Number of opportunities id...	11,6 %	2 %	5 %
Opportunities with no actions	79,3 %	5 %	2 %
Percentage of risks not as...	34,0 %	10 %	3 %
Red Risks with no actions	12,5 %	8 %	1 %
Top Ten risks with no actions	40,6 %	9 %	1 %
Update frequency on asse...	232,7 %	125 %	100 %
Yellow Risks with no actions	30,9 %	10 %	4 %

Figure 6: All of the KPIs in the tool

**Description:**  
This KPI is for the percentage of open actions that are overdue in relation to the total number of open actions.  
The graph below shows you some statistics over actions that are not yet overdue, but soon to be, and it shows you some statistics over actions that are overdue.

**Suggestions:**  
To get a better result you need to look at the actions listed under details, and complete them.

**Figure 7: The description and suggestion field**



**Figure 8: The KPI gauge, with some statistics listed**

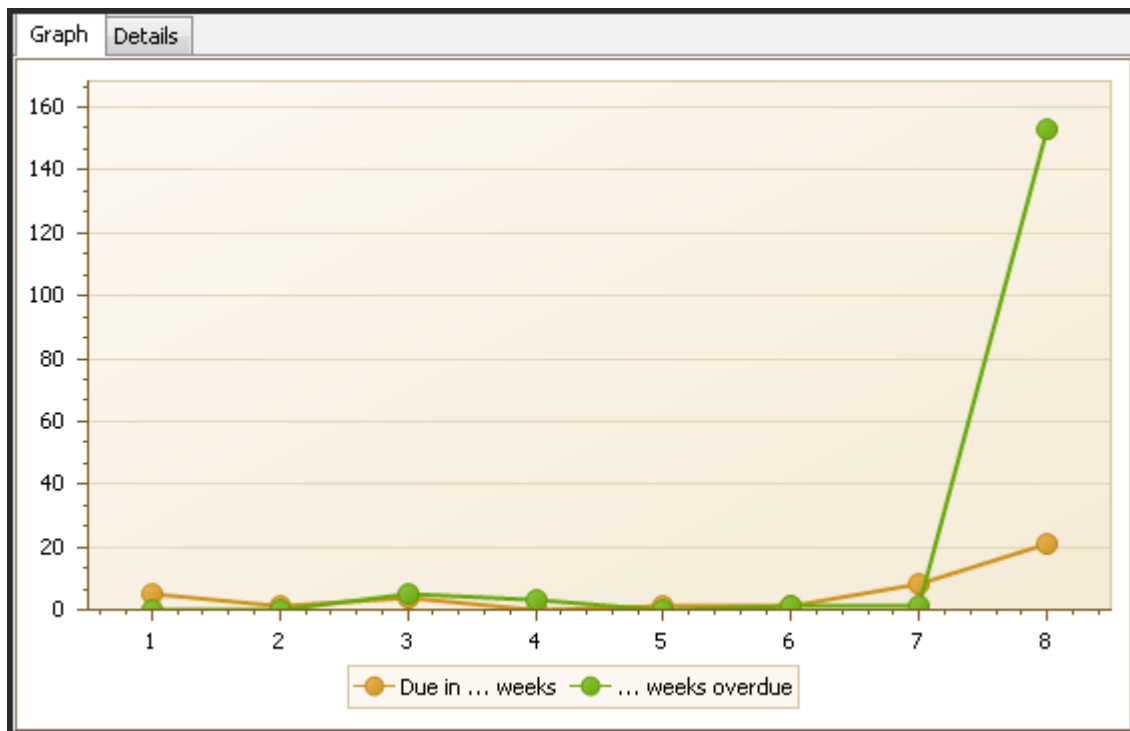


Figure 9: Graph of actions that are overdue or soon to be overdue

Actio...	RiskID	Description	Deadline
177749	1141	Action in MIS	31.03.2011
180157	1146	Sette opp ugjennomtrengelig gjerde	31.03.2011
180159	1146	Opprette ordning for umiddelbart fjerne overløpende sauer til ann...	31.03.2011
180160	1146	Verifisere at eksisterende gjerde er ugjennomtrengelig	31.03.2011
181828	1160	action 001	31.03.2011
184781	0962	General walk-through	22.03.2011
184347	1147	Define actions for concept selection phase	19.03.2011
184346	1150	follow up action A	18.03.2011
180161	1146	Møte naboen og fortelle om fremdrift (pleie naboforholdet)	04.03.2011
180162	1146	Vurdere tiltak som gjør sauene mindre lystne på å gå ut av eget beite	28.02.2011
181098	10104	ergregregerg	22.02.2011
175805	1138	Gjør en handling	08.02.2011
177214	1045	test	31.01.2011
176742	0633	Test Sending	27.01.2011
152528	0745	Test the Offloading capabilities	31.12.2010

Figure 10: The list referred in the suggestion field over all the actions that are overdue

### 3.3 Implementation

To select the different projects used in this master thesis, a selection from projects with activity in their risk module were investigated. Since the monitoring part of this master thesis only went on for two months, it was important to find some projects that had activity and active users. Further it was selected different types of projects, to have a variation. Some of the projects are in the early-phase and some of the projects are categorized as IT-projects, drilling-projects etc.

All of the projects in the group that got access to the KPI tool were contacted and asked if they wanted to participate in this monitoring. All of them were positive and they were asked to give some feedback on some key numbers in the project (like duration and sizes) and other information on the project. During the monitoring phase it has been an open dialog with the projects and they have been giving feedback on the KPIs and suggestions on other KPIs to consider.

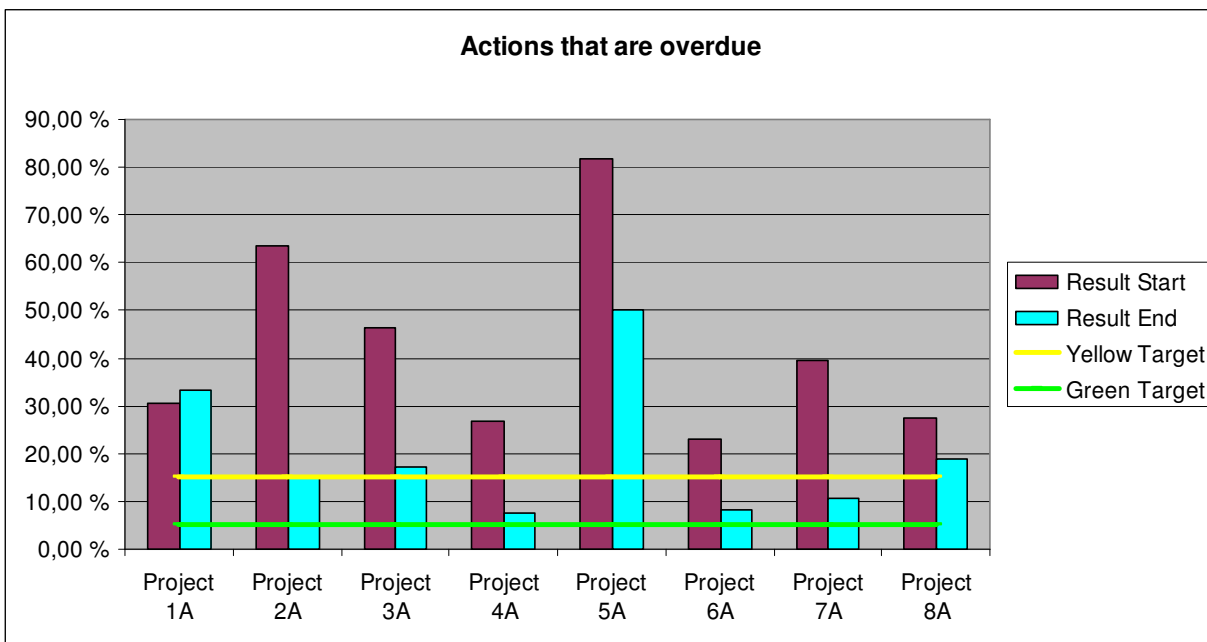
The projects were given access to the KPI tool and some information on how to use it was handed over. Half time in the monitoring phase, all participants got some feedback on how they were doing so far on the KPIs. This was done partly to remind them of using the tool, but also to show that some of them had gotten some good results already and inspire them to keep on using the tool.

All of the projects that have been monitored in this master thesis will be kept anonymous. They will be named Project 1A, Project 1B, Project 2A, Project 2B etc., where A represents the group that knew they were being monitored and B represents the group that did not know they were being monitored.

### 3.4 Results of the implementation

The first collection of data was done on March 1<sup>st</sup>. After this date, data were collected every other week, with the last collection April 29<sup>th</sup>. The reason why data were continuously collected is because one wish to see if the difference from the first data collection and the last is a trend, and not just a coincidence. This Section will present some of the results found in the collection of data.

One of the indicators that seemed to give an immediate result was the KPI regarding actions that are overdue. Almost all of the projects monitored in this master thesis had an improvement in this KPI, as seen from the start compared to the end of the monitoring phase. Even though the result does not show that the projects are on green level, it shows that efforts have been done to complete actions that are overdue. Most of the users knew they were being monitored and this could also have a positive effect of the result. A possible reason for why the result is not below the green target at the last data collection, could be due to the month break. Since many actions tend to have a due date at the end of the month, they may not be completed in time for the last data collection. A quick look at the KPI window for all of the projects shows that during the first week of May many of the actions had been completed and then closed, and the results for this KPI were improved. Figure 11 shows the graph for the mentioned indicator.



**Figure 11: Graph for the KPI Actions that are overdue**

Another indicator that seemed to have a positive outcome, are the KPI regarding risks that are not yet assessed. This one could be reasonable to see combined with the KPI regarding days until the risks are assessed for the first time. Figures 12 and 13 indicate that there is an improvement in this KPI as well. The 100 % green target for this is 14 days from a risk is created until it assessed for the first time. The data used to get the result for this KPI is an

average of a 90 percent interval of the data, so the best and worst 5 percents are eliminated from the result.

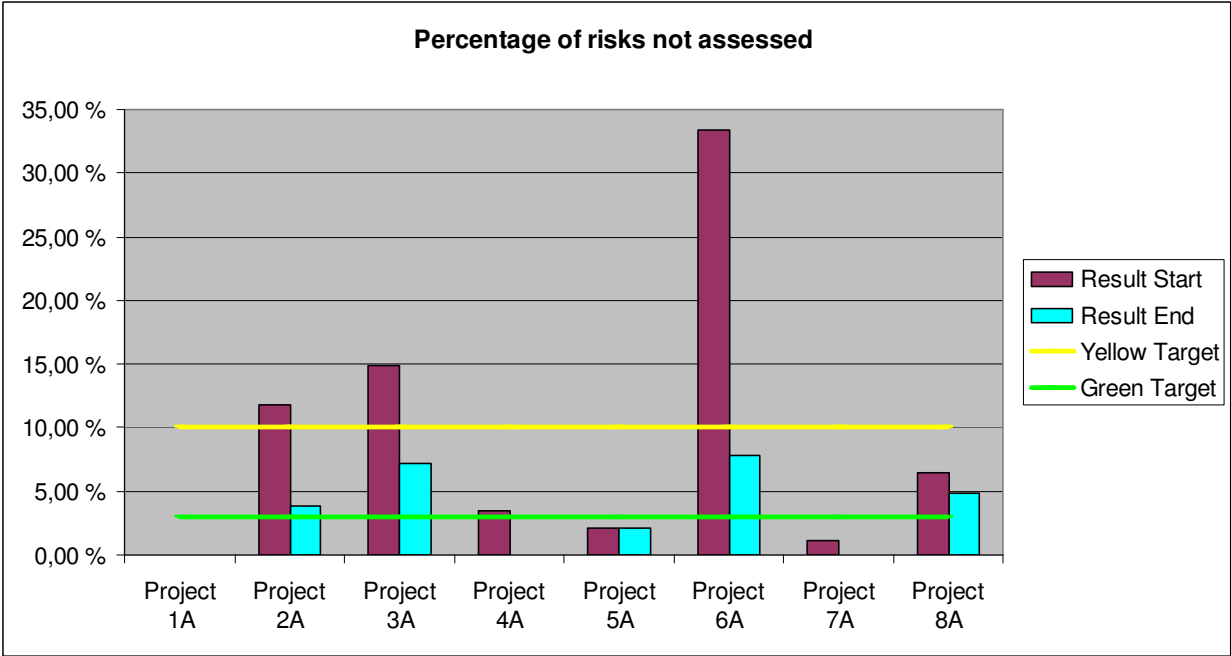
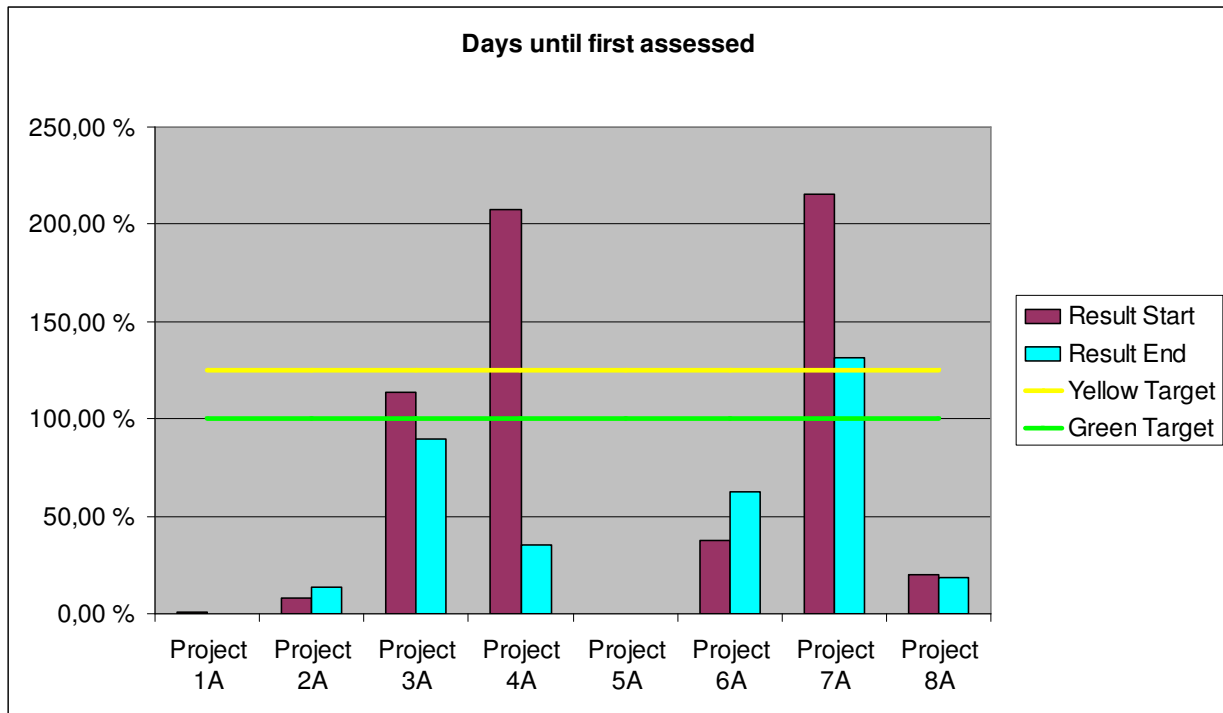


Figure 12: Graph for the KPI Percentage of risks are not assessed



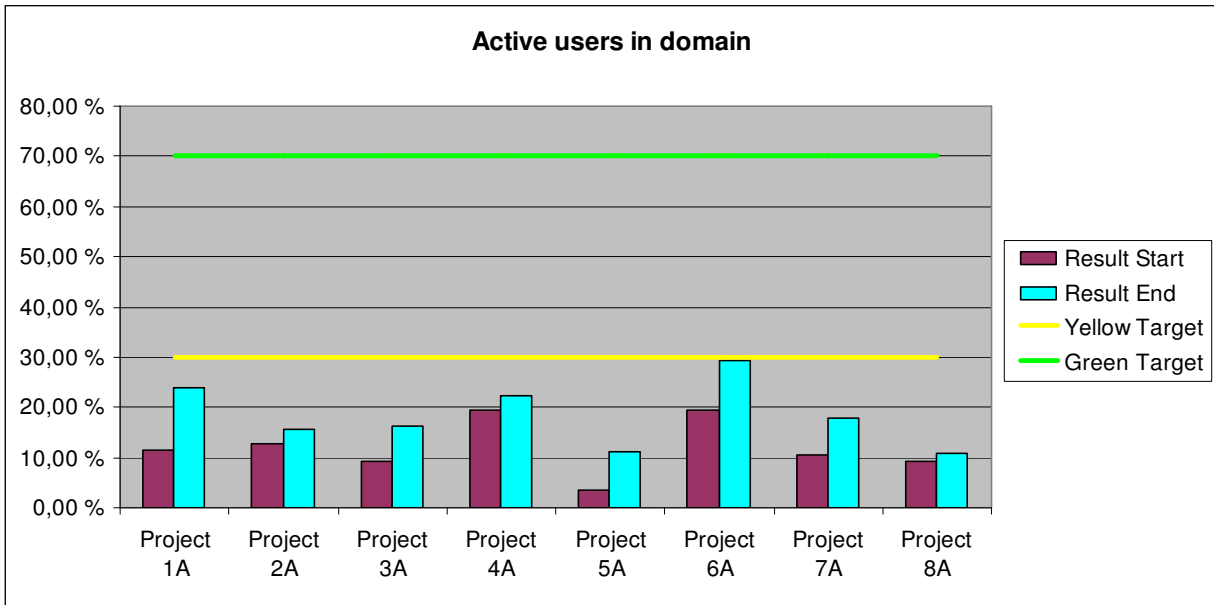


**Figure 13: Graph for the KPI Days until first assessed**

The only KPI that is green for all of the projects monitored is the one regarding red risks with no actions. This started green for all of the projects except one, but this project also finished as green. To keep the KPI on the targeted level is also desired for the monitored projects.

There are some of the indicators that do not seem to have a big effect or improvement in the result, and these KPIs are the ones regarding the duration of risks and actions. These are almost the same in the end as it was in the start of the monitoring phase. A reason why these do not show any big changes could be because of the length of the monitoring phase. Since data was only collected over a two month period, it can be difficult to improve these results for projects that are going on for possible several years.

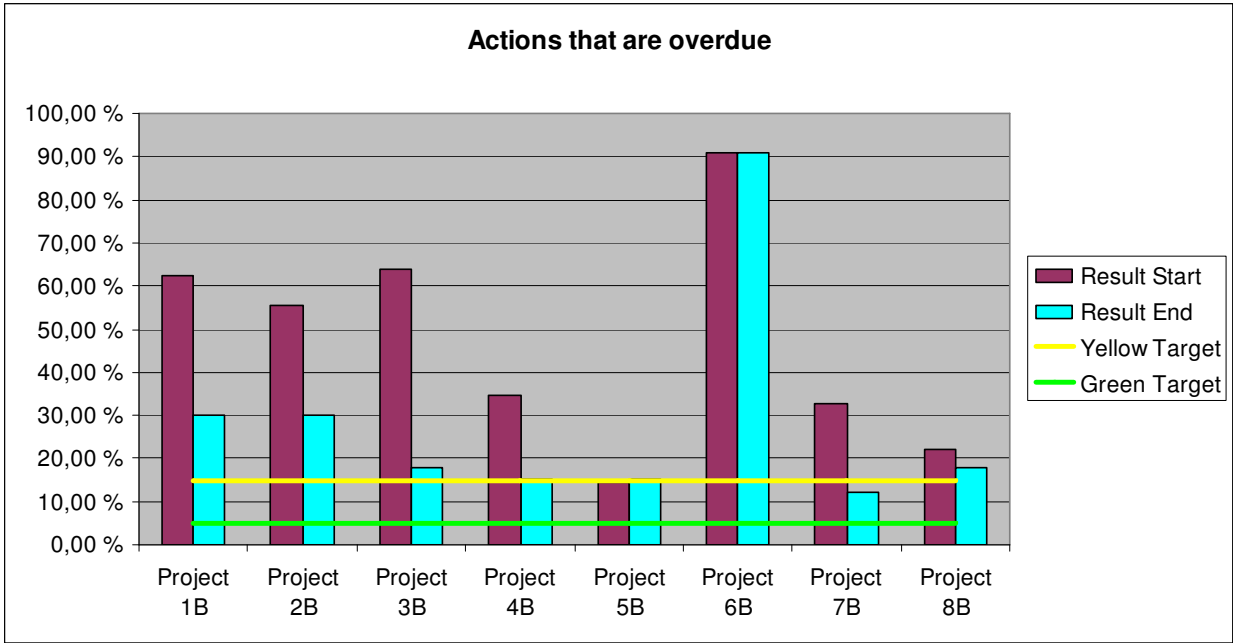
A KPI that seemed to have a good improvement across all projects is the one regarding active users in the domain. Even though the KPI did not reach the targeted level, all of the projects had more active users in their project, at the end of the monitoring compared to the start. Figure 14 shows a graph for this KPI.



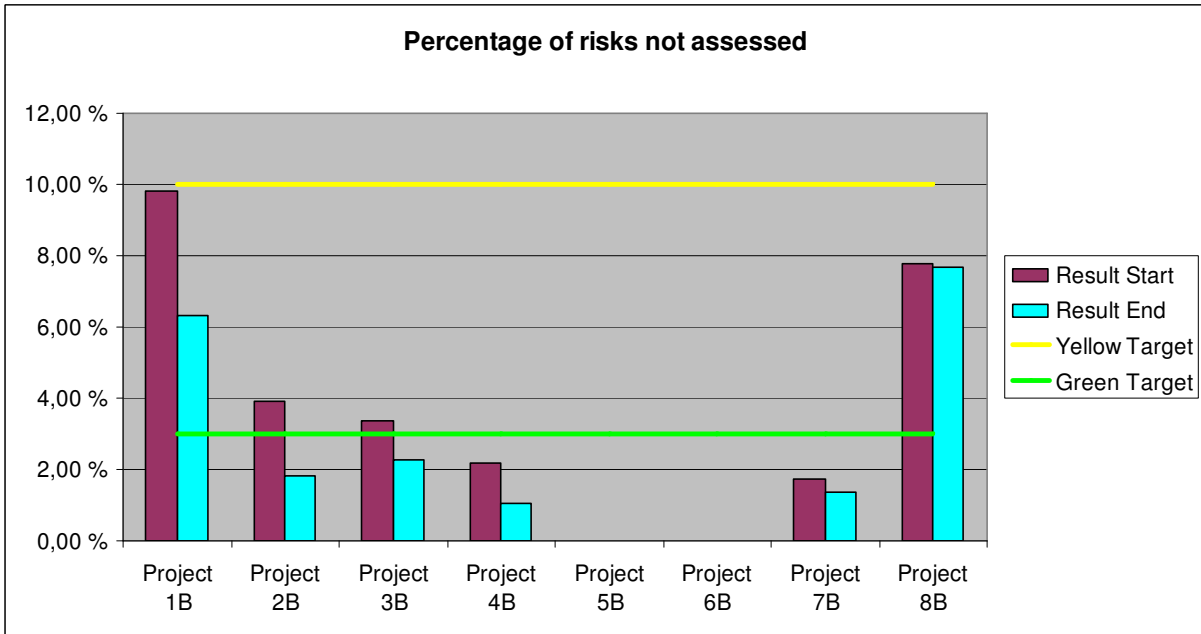
**Figure 14: Graph for the KPI Active users in domain**

The result for the projects not aware of they were being monitored are also quite good. This may be because there is a huge focus on risk management these days. Still, the end results are a little bit better for the projects using the KPI tool, compared to the ones not using it. The differences from start to end are slightly larger for the projects using the tool. Before the new KPI tool was introduced, it was complicated and time-demanding to get the same feedback as the new tool gives. The tool made it easier for the QRMs to know which areas to focus on and to motivate the users in his/her project in the risk management process.

Figure 15 shows the result for the KPI regarding actions that are overdue, for the projects that did not knew they were being monitored. Figure 16 shows the one regarding risks that are not yet assessed. The results are also here quite satisfying; but again the differences are slightly smaller than for the projects that knew they were being monitored.



**Figure 15: Graph for the KPI Actions that are overdue**



**Figure 16: Graph for the KPI Percentage of risks are not assessed**

## 4. Discussion

### 4.1 Interviews with a selection of the participating projects

Four QRMs in respective projects and one HSE manager were chosen for interviews. The reason why only some of the participating projects were chosen for the interviews was because one did not see the need to interview all. The projects interviewed were randomly chosen.

The responsibility for the HSE manager is to work as a coordinator for some projects in a certain part of Norway, and to also be a contact person for some of the Statoil contractors. Some of these contractors have projects that are also participating in this master thesis. This section will summarize up the feedback from the projects and the HSE manager. The questions asked were about the risk management process in their project and what added value the KPI tool provided for the process. Further they were also asked if they had any suggestions for changes to or new KPIs.

In the startup phase to a project, it is typical to arrange a workshop to identify risks. Not all risks are assessed and not all actions to follow-up the risks are defined during this workshop. This shall however be done not long after the risks are created, according to the governing documents. All of the projects have meetings every other week where they follow up the risk picture in their project. During these meetings it is the QRMs responsibility to present an updated risk picture and to give an update on how the risk management process is performed in the project. In addition to this, give feedback on the areas that needs more attention. Example of these areas could be risks that are not assessed, risks without actions, risks that are overdue etc. The KPI tool has been very helpful in these meetings, because now the QRMs have a good report tool that gives exactly the information needed. By showing the KPI module during these meetings, the project sees spot on how well they are doing regarding the risk management process in their project. They see the KPIs that are red and know that this is something they need to look into right away.

One of the QRMs did not show the KPI module to the users in his project, but after analyzing the information from the KPI tool, gave feedback to the users on areas which required special attention. Afterwards he could look into the KPI module once again and see if there were any changes in the risk picture. This way of using the KPI tool, had positive effect and in the future it

is most likely that the tool will only be visible for the QRMs and the super users in the projects. In this way the tool is helping the QRMs to fulfil one of the roles they have; to motivate and push the other users to improve the risk management process in their project.

All of the QRMs interviewed and also the HMS manager expressed that this tool was very helpful for the risk management process. It gave a good overview of the status in the projects and the information was easy to understand.

## **4.2 Discussion of the KPIs defined**

Most of the KPIs in the tool were useful for the users. In the following sections these KPIs will be discussed further, with thought of the feedback from the users.

### **4.2.1 Actions that are overdue**

As mentioned in Section 3.4 the KPI that had best result is the one regarding actions that are overdue, this is also the indicator the users found most useful. The plausible reason for this is because they could easily see the statistics for all the actions that are overdue and also see actions that are soon to be overdue. For a QRM it is then easy to know which actions that need attention and get the person responsible for the action to follow it up.

The information listed for this indicator is the due date, action id and title. One of the participants suggested that it would be good if also the name of the responsible for the action were listed. This is something that will be included in the KPI tool, because it makes it even easier for the QRM to follow up the actions. In WR2365 [2] some success criteria's for how to best implement risk management in projects is listed, one of this is to accept the responsibility for following up and owning mitigating actions that are added to risks. When it is easy for the QRM to see who is responsible for an action, he/she can then make sure this criterion is met.

The target set for this KPI seemed to be a good target, but one QRM commented that the target could be lowered. The green target is that you can have 5 percent of actions that are overdue, and the yellow target is that you can have 15 percent. Maybe the green target could be lowered to 2 percent and the yellow could be lowered to 10 percent. This way you would have more pressure on completing the actions on time. The focus is also to be on track with the timeline set for the projects, completing the actions on time is therefore an important element to achieve

this. The QRMs pointed out that even if an action is completed; it is not always updated in the action list and marked as closed. By having an indicator that tells you how many actions that are overdue, it is a reminder of closing these.

After the data collection phase was finished, a table was added to the system and this was populated with usage data regarding how many times each single KPI was selected by the users. This statistic was used to see which of the KPIs that seemed to be the most “popular”, i.e. the KPI selected the most times. The KPI that came out on top of this usage list was this KPI, actions that are overdue.

#### **4.2.2 Risks without actions**

The KPIs regarding risks without actions is also an indicator that the participating users found very useful. When a risk is identified and registered in the risk register it is very important that an action for following up this risk is defined. The risk management becomes useless if you have a risk register with many identified risks and no actions to handle them.

The target set for this KPI depends on the assessment made for the risk, i.e. what the consequence/probability the risk has. Red risks have a green target of 1 percent, i.e. you are allowed to have 1 percent of red risks without actions and still be on green level. The yellow target is 8 percent for red risks. For yellow risks the same green target is 4 percent and the yellow target is 10 percent. For the KPI “Top ten risks without actions” the green target is 1 percent and the yellow target is set to 9 percent. There is also a KPI regarding opportunities without actions. Since identifying opportunities is an essential part of the risk management process, it is important that these have actions to pursue them. The green target for this KPI is that you can have 2 percent opportunities without actions and the yellow target is 5 percent.

The reason why the targets were set, depending on the outcome of the assessment to the risk, was with thought of the degree of importance the risks got as result of the assessment. One of the QRMs gave some feedback that maybe all the risks could be included in one KPI. One negative side of putting all risks in the same category is that you miss the opportunity to focus first on the red risks without actions, and then to focus on the yellow ones. The green targets should however be set to 0 percent for red risks and top ten risks without actions. These targets have been 1 percent, but some of the feedback is that red risks and top ten risks are so important, that it is critical not to have actions to follow up these risks. The targets on opportunities without actions and yellow risks without actions can however be 2 or 3 percent.

Another reason why these targets were set to be higher than for the other is because this seemed to be obtainable targets for the yellow risks and opportunities without actions. The targets can in the future be lowered, if this seems reasonable.

#### **4.2.3 Percentage of risks not assessed**

The indicator regarding risks that are not yet assessed was also recognized as a good KPI. A suggestion from one of the projects was to lower to green target to 0 percent. This may not be favorable because of the fact that a risk may need to “mature” some more and therefore it could be difficult to assess it right away. Another positive feedback on this KPI was the information coming out of the KPI window with regards to statistic and the detailed information. The QRMs could easily see which risks missing an assessment.

A functionality they miss was the possibility of double clicking on the risk and then goes straight to the risk module for the selected risk. In the risk module an assessment for the selected risk can then be made. This is a functionality that will be implemented in the tool for all the detailed lists including risks or actions. This will make it even easier for the QRMs to pursue the risk management in their projects.

#### **4.2.4 Days until first assessed**

The KPI regarding days until first assessed was also a useful indicator. The feedback on this KPI was that it gave focus on the importance of assessing a risk when you have created it. The green target was set to be an average of 14 days from a risk is created until you should assess it for the first time. One of the QRMs interviewed, said that this target could possible be lowered to 7 days to as the green target and 10 days as the yellow target. This seems reasonable, since almost all of the projects have managed to get to an average that is lower than 7 days. The projects that did not managed to get below this average will then have something to aim for.

#### **4.2.5 Update frequency on assessments**

A KPI that gave one of the projects an “eye-opener” was the one regarding update frequency. Often when a risk is created and then assessed, it is not updated before there is a change in the assessment. Sometimes it can go months between an update of the assessment. If you want to give the impression that you have a continuous risk management process in your project, it is

important to update your risks' assessment. Update, even if there is no change in the assessment. This KPI sets focus on this thought. In WR2365 [2] it is also a requirement that you should aim for updating your risk register minimum monthly. However, the fact that some projects may have identified over 500 risks could be an issue in terms of this requirement. To update these risks every month, even if there is no change in the assessment, could bring to much extra work to the projects and therefore may be prioritized in the risk management process.

#### **4.2.6 Actions missing info**

The indicator showing actions missing info was mentioned as helpful for the participating projects. When an action is created to follow up the risks, there is a requirement telling that all actions shall have a due date and a responsible [2]. Therefore it is important that this is assigned right away, so no actions are neglected.

#### **4.2.7 Impact categories used**

The KPI regarding the number of impact categories used, was useful for only some of the projects. These categories tell something about where the risk could possible hit you, and it is a desire that no more than two impact categories are used when assessing a risk. This is to keep focus on what the main impact of the risk is. To improve the result of this KPI, the assessors should try to split up the risk in two. As a result of this, one is more able to create actions that follow up the risks in the best way possible.

There was a discussion in the targets set, and it was suggested to make a change in the green target and set this to 1 percent of risks that can have more then two categories. This is because there is a possibility for an exception from the rule of not having more then two impact categories.

One project pointed out that the way they do risk management in their project, this KPI became meaningless. They do often have many risks that are categorized as more than two impact categories, and the QRM in this project told that this was because they want the risk to cover all possible areas and focus more on the consequences of the risk. This feedback then leads to the fact that it should be possible for the projects to select the KPIs that seem reasonable to include as part of their risk management process. This is something that will be discussed more in



Section 4.3. Further, not all projects use this type of categorization and then this KPI will be meaningless.

#### **4.2.8 Number of opportunities identified**

Even though not all of the projects were good on identifying opportunities, they did all agree that the KPI regarding percentage of opportunities identified, sets focus on the fact that risk management also involve finding the opportunities in a project. They all did also agree on the targets set for this KPI.

#### **4.2.9 Duration of risks and actions**

Two KPIs the users seemed to have little use of were the ones regarding the duration of risks and actions. The reason for this could be due to the fact that there is a large variation and difference in the different projects using the risk module. Some projects are meant to last for several years and often many of the risks are identified in the start phase of the project even though they know this risk will not hit them in many years. Therefore it is pointless to have a KPI that tells them that the average duration of a risk should be no more than 90 days. The same issue is applicable for the duration of actions. A suggestion of a KPI that could replace these two is one regarding the average duration of how long actions are overdue.

#### **4.2.10 Active users in domain**

Another KPI that did not function as expected was the indicator regarding active users in the domain. This could be because of sometimes there are a lot more users having access to a projects risk register, than the ones that actually are meant to work with updating the risk register. Some of the people are meant to just know about the risk management in their project and be able to open the risk register to see what kind of risks they have. Their task is not to assess the risks. Therefore this KPI could show the wrong statistic, since the numbers used as basis are not always giving the correct picture of the reality. One suggestion is to rather show the information in this indicator as a list, where the QRM can see the statistics over all the users in the project and then see how many risks and actions they are responsible for. This list can also include the number of risks, actions and assessments they have updated. In this way the QRMs can keep track over how the users in his/her project are handling the risk management

process and make sure that everybody are familiar and pro-active in the risk management of the project. [2]

### 4.3 Suggestions of new KPIs and features in the KPI tool

Some of the feedback from the projects was suggestions of new KPIs that could be defined and also suggestions of new features in the tool. In this section these suggestions will be explained.

One suggestion for a new KPI is one that gives you information of how many red risks, yellow risks and green risks you have. After a while you will be able to see if this picture changes and in that way see the trends for the project.

A defined risk in the register can also have the status “On Hold” and from this it would be good to have a KPI that shows you numbers regarding how many risks that you have “On Hold”.

In many projects the risks should be assigned a certain WBS reference and a possible KPI could therefore be for all the risks that do not have a WBS reference set.

In many cases a project will not prioritize to update the risk assessment if there are no changes, but they rather have focus on closing risks and defining new ones. To have a KPI that tells you how many risks you close and open in a given time period could be a KPI of great value.

This KPI tool had focus on how each project was doing, only in the light of the project itself. The HSE manager had a suggestion that many of the same KPIs could be included in a tool that make it possible to compare different projects and see how they are doing compared to each other. This is something that could be very useful for managers and other personnel that are handling more than one project. By implementing this, the KPIs also works as indicators that can tell which projects are doing well on their risk management process, and seem to have good procedures for the risk management. Then other projects can learn from their projects, referring to one of the ways KPIs could be valuable in risk management (Section 2.4.1).

Another feature that could be implemented, in the already existing KPI module, is to make it possible to filter on a field called “Sub Projects”. Some of the big contractors work towards many different installations and these are marked as “Sub Projects” to the different projects. Then it could be helpful for the QRM to see how the KPIs look like if you filter on a single installation or Sub Project.

Monthly reports regarding the risk management are often used by the QRMs and presented at status meetings. For them it is important that the message they give on these meetings also can be expressed in the KPIs they have. To have KPIs that may not be in the projects focus and/or do not reflect the monthly report seems pointless. KPIs shall be something to reach for and shall reflect the focus areas to the project. Furthermore, different types of projects have different focus areas and are in different phases of the projects lifecycle. Then it would be reasonable that not all the projects have the same KPIs, but they could rather have a list of all the indicators available and then be able to choose the KPIs that are relevant for their project.

#### 4.4 Discussion of the result

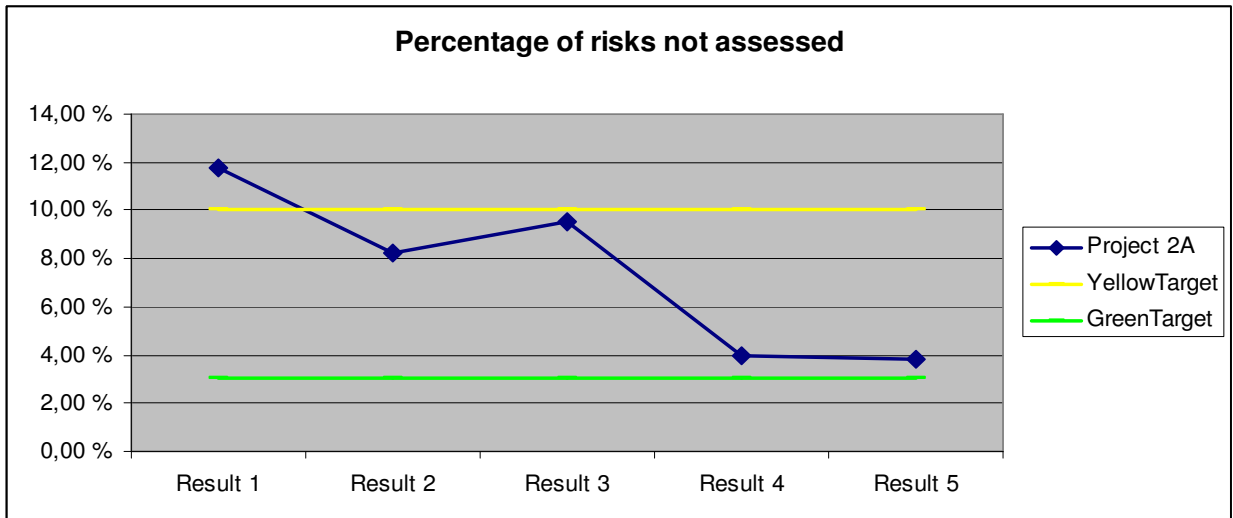
In Section 4.2 the KPIs in this master thesis have been discussed and it has been made clear which did work and which did not work. Why some KPIs worked better than other may be due to they were the easiest to understand and relate to when it comes to the projects risk management. Based on the good result for the KPI, we see it is favorable for a project to have an indicator telling you exactly how many actions your project has that are overdue and at the same time gives a list over all these actions. It surely makes it easier for the QRMs in a project to follow up the risk management process. This KPI along with the others that had a good result, are the ones that seemed to be interpreted in the same way for all of the projects. The KPIs regarding duration of actions and risks are, as we have discussed in Section 4.2.9, indicators that are depending on the size of the project. They are therefore often meaningless for the projects that are meant to last for several years.

In Section 3.4 the result from the implementation of the KPI tool in selected projects were presented and as the graphs shows, the tool had good effect on the projects that knew they were being monitored. However, the graphs for the projects that did not knew they were being monitored are also quite good. Does this mean that the tool had no effect considering improvement in the performance of the risk management process? When you look at the graph showing the results for the KPI for actions that are overdue, both groups of projects have good results. You see, however, that the graphs for the projects that knew they were being monitored are slightly better. This shows that the effect of knowing you are being monitored and also having a visual tool that tells you exactly how you are doing; do have some effect. The statistics over how many times the KPI tool were opened also improved after some of the projects were contacted with a question to participate in the follow-up interviews. A desire of wanting to be

good and also want to show this through the KPIs is clearly something that lays in human nature. After an update mail had been sent out half time in the monitoring process, there was also an increase in the use of the KPI tool. Some of the projects also responded the mail with some pointers of their thoughts of the tool. The open dialog with the users has been very important especially since they are the one using the tool. It is therefore important that they feel their needs are being met.

One of the QRMs that had access to the KPI tool gave some feedback that the tool had been very helpful. He had also shown the KPI tool to some other QRMs and their response was positive as well. This emphasizes the fact that having a tool that gives you visual feedback and tangible suggestions to what can be done to improve the risk management and how you best can control it, is something that is highly desired by the QRMs. The tool has made it easier for them to get the information they need and it has helped them in saving the time looking for it. Before the KPI tool was implemented, they had to use a lot of time in gathering the same information in reports and other window. They now get this information in one screenshot in the KPI tool.

The data collection was done over a period of two months. Figure 17 shows the development for one of the projects that knew they were being monitored. The graph shows that during this period the results have been variable, but the overall impression is that the project has improved from beginning to end. Since this tool only shows how you are doing at that exact moment, this will be the focus for the QRMs and not how the picture looked like 2 weeks ago. Maybe the picture was not that good due to the month break and not all risks and actions that should have been updated were updated. Looking at the same KPI the next day the picture may show a better result. It can be, however, interesting for the QRMs to see if the development in the results and see how overall picture changes over time. The target is of course to have all your KPIs green, but this takes time and is probably not done over night. One of the purposes of this tool is to help the QRMs setting focus on the areas needing it when it comes to the risks management process.



**Figure 17: Development in the KPI Percentage of risks not assessed, for Project 2A**

There is, however, a danger of using a tool such as this; that the focus of the risk management only involves a desire to reach the green targets and not care of how you got there. The focus of the risk management may change and no longer be about identifying, assessing and treating risks in the best way possible. The focus becomes just to identify, assess and treat the risks and there may be a possibility of lack of quality in the risk management process. The responsibility lies on the QRMs to make sure that the tool is used as intended.

The indicators defined as part of this master thesis gives little feedback on the quality of the outcome of the risk management process. Are the risks well defined? Are the actions defined to manage the risks in a proper way? Performance indicators for looking into these questions have been difficult to implement in the tool, but some of the suggestions for the new KPIs mentioned in Section 4.3 could give some pointers on this matter. By implementing such indicators, this could help with an improved quality of the outcome and make sure it is consistent.

## 5. Conclusion

After the implementation of the KPI tool in selected projects and after looking at the feedback the projects gave, one can see that this type of tool is something highly needed in the risk management process. The tool has given the QRMs a good and easy way to extract information about the risk management in their projects. This information surely helps the projects achieving control over the risk management process. The tool is also of great value in the risk management process, since the performance indicators established allow the managers to monitor the process and make sure it is efficient and concise.

When one is in the middle of a risk analysing process, there are great demands for compliance in relation to the standards that has been set for managing risks. These standards must also conform to the governing documents in the company. A tool such as the KPI tool can be of great help in meeting these demands.

The effect the tool has had on the risk management process is high. It has made it easier to know if the requirements set to the process are met. It has increased the focus on risk management, and made it easier to for the QRMs to follow up the risk management process in their project.

One should, however, have in mind that by using a tool where the aim is to reach a certain acceptance level there is a danger of the tool being used against its purpose. The focus of risk management may become to just reach the accepted level and not to identify, assess and treat risks in the best way possible. For this not to happen it is the QRMs responsibility to make sure the tool is used for its purpose.

The implementation of the tool has made it easier for the QRMs to pursue the risk management in their projects. Even though some of the projects that did not use the KPI tool also had positive changes in the outcome of their risk management process, one sees that the projects using the KPI tool had slightly larger difference in the result. The feedback from the projects also tells that this tool has helped them significantly with setting focus on the areas needing focus regarding risk management in their projects. The tool made it possible to easily report to the management on the issues concerning the risk management. There is however a lack of functionality in the KPI tool, an easy way for the users to take out reports in PDF format and this is something that should be implemented.

There is also a question of implementing a tool like this can be cost-effective. One often says that time is money and time saved equals money saved. This tool definitely helps in saving time for the QRMs and that is a surely a positive outcome of using the tool.

As a result of the interviews with some of the participating projects, the KPIs used in this master thesis have been evaluated. In Table 3 the indicators that will be wise to have as a part of the next version of the tool will be presented, together with the revised targets. The suggestions of the new KPIs mentioned in Section 4.3 will also be sensible to look into and include in the next version.

<b>KPI</b>	<b>Green Target</b>	<b>Yellow Target</b>
Actions missing info	0 %	10 %
Actions that are overdue	2 %	10 %
Red risk without actions	0 %	10 %
Yellow risks without actions	3 %	10 %
Top Ten risks without actions	0 %	10 %
Opportunities without actions	2 %	10%
Opportunities identified	5 %	2 %
Risks not assessed	1 %	10 %
Days until first assessed	7 days = 100 %	10, 5 days = 150%
Update frequency on assessment	31 days = 100 %	46,5 days = 150 %
Impact categories used	2 %	10 %

**Table 3: The KPIs implemented in the final version of the KPI tool**

As mentioned in Section 4.3 the difference in the projects makes it reasonable to give the different projects the opportunity not to have all the KPIs that are available, but rather choose the ones that are in line with their requirements and the focus areas they have. This functionality will be wise to implement in the next version of the tool.

The KPI tool have been available to all the users in the domain, but it will be wise to only have the tool available for the QRMs and other super users in the project. This is to make sure the usage of the tool is as intended.

Not all the features and functionality will be ready and implemented as part of this master thesis, but it will be sensible of Statoil to continue in the development of this tool and optimize it. Today most of the KPIs are focusing on the use of the risk module, but it will be a good idea to find more KPIs that focus on the effect of the risk module. Some projects also gave feedback that it would be good to implement a KPI tool in another module they have, a module that handles monitoring activities. This is also something that will be wise to look into in the nearest future.

Further it will be suitable to look into the possibilities of implementing the same KPIs in a module that compare similar projects. Then it will be possible for the QRMs that handle several projects to see how they are doing compared to each other. This is especially interesting for the QRMs that handles project with multiple contractors in Statoil.

For further analysis of this tool, it could be interesting to look into how this tool could help in an improvement of the quality of the outcome of the risk management process. Then it would be adequate to look into more projects and over a longer time period. The question asked for the analysis could be if this tool could be used for monitoring the risks identified, the assessment of the risks and the treatment of the risk, and not just as monitoring the risk management process.



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