Get more out of data

– comparing three cases using data in new ways

Master project MDO

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Title: Get more out of data – comparing three cases using data in new ways

Study: Data-driven organizational development

Study number: 20221737

Number of characters: 65.649

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Abstract

This paper investigates how Maersk Supply Service based on experience from three cases can increase the utilization of data and build a bigger 'tent'.

Introduction to Maersk Supply Service

Maersk Supply Service (MSS) got new owns and management in the spring of 2023 and the new management have made a new strategy. If to succeed it requires the company to become more profitable. To do that MSS need to work differently and increase utilization of data. MSS have large amount of data that is not being utilized. Especially in the company ERP system, where two of the cases will focus on the maintenance data from vessels.

Purpose

By analysis the three cases I want to identify how the preliminary results and experiences the organization have gain from working with data in different ways, and how this knowledge can increase be utilized towards 'making a bigger tent' for MSS. Part of the analysis is to reflect on my own role as change agent.

Method

The paper is based on a pragmatic approach in line with MSS's need for action and change. I will use a qualitative research approach and base the analyses on the material I have collect. I have collected workshop notes and transcriptions, pictures, and interviews. I have used Alvesson's at-home ethnography theory to reflect owner my own role as both participant and researcher in the three cases.

Result

In all three cases data is being worked with differently than before. In the first case it was a new user group – the offshore crews, who is working with finance data, that they have not be working with before. In second and third case maintenance data that have not been worked with before is being utilized. All three cases provided relevant learnings. The Design Based Research approach in the first case accelerated the development process and created valuable user involvement. In addition, the first case showed the importance of having a common language, and that it is necessary to give the users a basic understanding of the data. From the second and third case there were a learning about data quality, in the second case data quality limited the choices of data that could be used in the dashboard and in the third case we discussed data quality in relation to the dataset been incomplete. In the third case the participants in the work group were surprisingly open-minded in their approach to reviewing MSS's Maintenance strategy and willing to use an explorative approach when analyzing the fault reports. I had different role in the three cases, but the roles all were important to facilitate the change required to work with data differently.

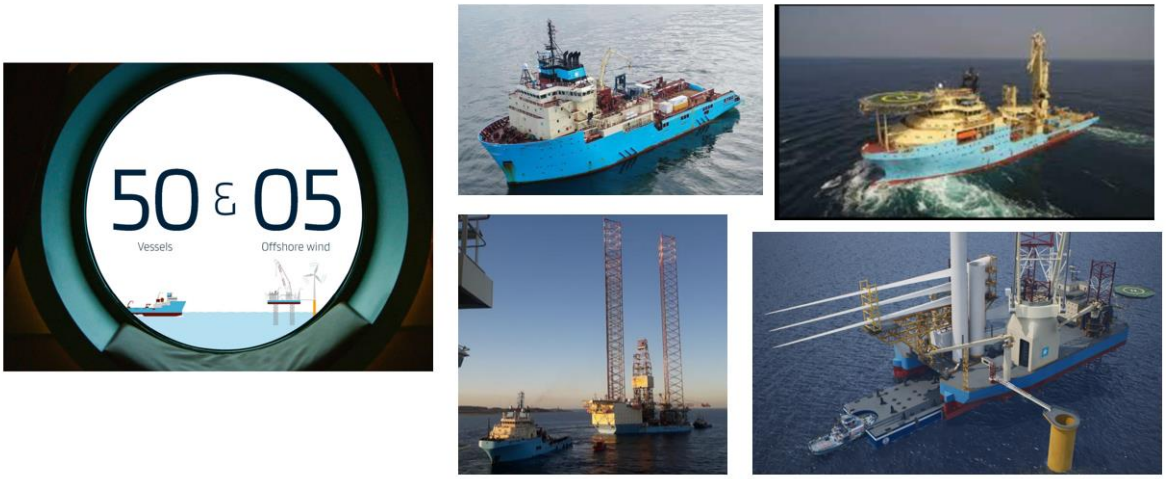
The analyses of the three cases gave valued learning to how MSS can increase the data utilization and build a bigger 'tent'. The analyses show signs that MSS already is making progress, and that the resistance is small and the readiness to work with data differently is higher than expected.

Contents

Introduction

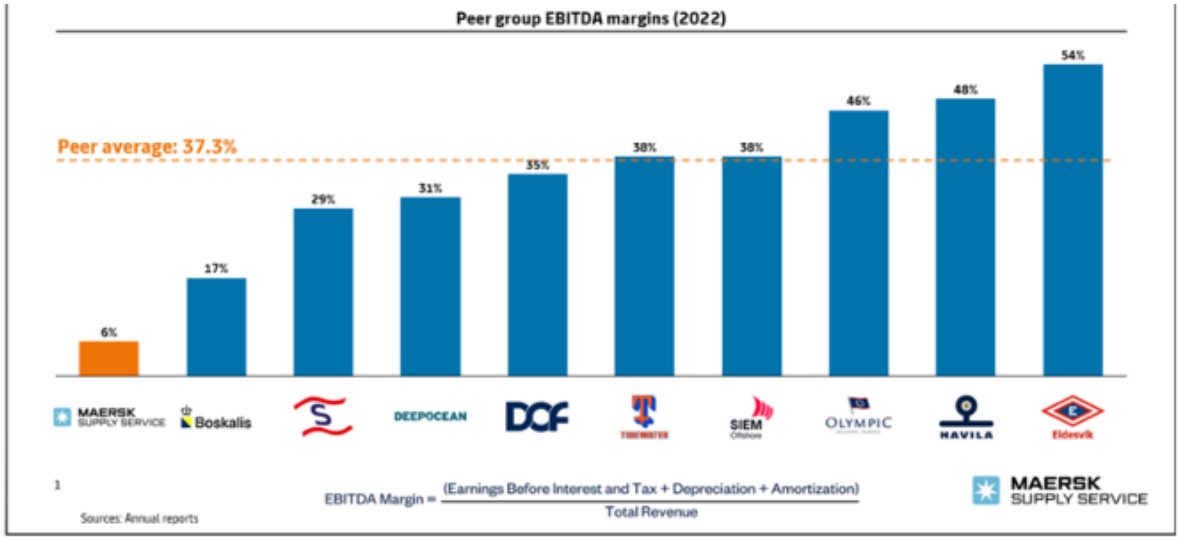
The past two year I have been on a journey into the marvelous universe of data and all the opportunities that it contains. Being a student at master in Data-driven organizational development (MDO) has been a guided tour into the world of unstructured data and the hidden knowledge that it contains, the seductive opportunities of network visualizations, and data interventions that pushes the data imagination of our organizations. This paper is temporary stop on my journey, where I will reflect on the data situation in my organization and my role in pushing us further and 'make the tent bigger' to use a MDO reference. I will do that by investigating three cases working with data in the organization. The three cases show potential for working with data in different way then today and give valuable learnings about creation of a common language and the importance of data quality for the future work with data. However, first an introduction to Maersk Supply Service, and the company's current situation to illustration why we need to get more out of our data.

50 -5, that is how simple one can summaries Maersk Supply Service (MSS) newly launched strategy 'Together Towards '28'. It means that the company want to increase the current fleet of 30 Offshore Support Vessel to 50 vessels and the one Offshore Wind Installation vessel currently being built to 5. An offshore Wind Installation vessel is a combination of a vessel and a Jack-up used to install offshore wind turbines, which are an important part of the green transition.



To meet this target heavy investments in the company are needed, in order to convince the company's board and investors to invest in MSS, the company need to show that it can become more profitable than it is today. In spring of 2023 the MSS was purchased by new owners, they initiated an analysis done by an external consultant company during the summer of 2023, which showed that the company is performing considerable below their peers in the industry.

This was measured by looking at EBITDA (the EBITDA margin is measuring a company's operating profit as a percentage of its revenue). In below graph one can see that MSS's EBITDA is significant below its peers. Main reasons for this are lower utilization and rates, and higher cost then the competitors.



That it is vital to improve performance and close the gap to the peers can been seen in the fact that one of the 4 Key Performance Indicators (KPIs) in the OSV (offshore support vessel) scorecard for 2024:

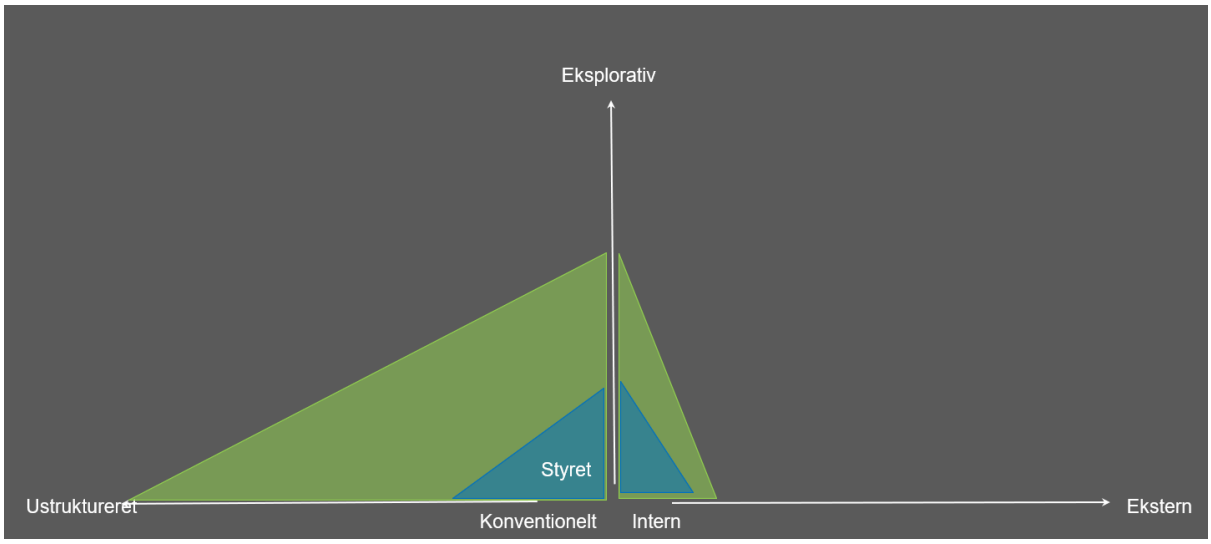
#	Value drivers	Description	Weight	2023 (Baseline)	Min	Target	Max
1	Financials	1. EBIT in 2024 (USDm)	50%	25	81	101	121
		2. Free cash flow in 2024 (USDm)[1]	10%	1	38	48	68
2	Partnership	1. OSV: Reduce EBITDA margin gap[2]	30%	34ppt	10ppt	20ppt	30ppt
3	Leadership	1. Safety (TRC-f)	10%	0.8	1.3	1.0	0.7

1) Free cash flow to be adjusted for any additional board approved investments/divestments, and timing of milestone payments for Solutions projects.
2) Peer group based on Solstad and SIEM. Assessment based on Q4-2023 to Q3-2024. 2023 Baseline: Q4-2022 to Q3-2023

The use of EBITDA as measure for performance compared to competitors and the table of KPIs as tool for measuring the company's performance are two good examples of how MSS are working with data following a classic modernistic view, where organizational results are analyses based quantitative methods and data analysis (Hatch (2020), p. 41).

On first semester of MDO we were introduced to a 3. dimensional model that can be used to describe the data situation in an organization, when placing MSS in the model, MSS has a rather small tent – the blue scape figure in below illustration. However, the is a large potential in the organization for make the tent bigger as large volumes of both structured and unstructured data are being created and collected in our various systems and currently not used or analyzed other in then a traditional structured way with focus on financial data and statistics (Vind, 2022). I believe there is a potential and willingness to work with data

more explorative in the organization. My vision is for MSS to become an organization, where we work with both structured and unstructured data in controlled as well as explorative ways and utilize externally available data to a larger extend then today – the green 'tent' below.



The MDO education's basic illustration using the metaphor of a tent to visualize of what types of data organizations use and how. The 'small tent' - the blue field - illustrates organizations that use internally produced, conventional data to generate controlled/hypothesis-driven analyses. The 'big tent' - the green field - illustrates organizations that take advantage of the many new data opportunities by drawing on externally produced, non-conventional data for exploratory analyses.

In order to reach the KPIs set for MSS, three priorities have been defined for 2024: Partnership, Leadership and Ownership. When looking at them and the underlying initiatives one can see that there is a recognition that it not possible to govern and understand an organization only with numbers. Several of the 13 initiatives defined to support the priorities is about process and culture (see Leadership below and the other priorities and sub-initiatives in the appendix).

The three 3 cases that I will investigate in the paper are all initiatives that are part of the Leadership priority, and all have focus on vessel cost or to be more specific reduction in cost in common. Vessel cost consist of many elements, one of the larger cost buckets is the repair and maintenance of the vessels.

The repair and maintenance of the vessels is controlled and registered in MSS's ERP (Enterprise resource planning) system called IFS and based on the company's maintenance strategy. As part of scrutinizing MSS's vessel cost a review of MSS's maintenance strategy has been kicked off by Chief Technical Officer (CTO) Tommy Thomassen. A work group has been established, which I am part off, and two of the cases that I will investigate are part of the scope of work group. My role in the work group, is to increase utilization of the data generated in MSS's ERP system and challenge how we have and are using the data. Particularly the maintenance data has not be subject for analysis before. The last case I will investigate is one I have been responsible for since the fall, the aim of the project is to create a cost monitoring tool for the offshore crew onboard the vessels. This project was the topic of my 3. Semester assignment.

By analysis the three cases I want to identify how the preliminary results and experiences the organization have gain from working with data in different ways, and how this knowledge can be utilized towards 'making a bigger tent' for MSS. Part of the analysis is to reflect on my own role as change agent. The expansion of the tent will always be a result of an organizational learning process which will be affected by the actions and strategic efforts of individual in the organization, which why my own role is relevant as part of then analyses.

Background - road to defining the purpose of this paper?

As an organization MSS is producing a lot of data through our various system especially via our ERP system IFS. The majority of the data is not used, this is for example evident when looking at the reports available in our Business Intelligence (BI) system. The majority of the reports using data from IFS are based financial or commercial data. When IFS was implemented, there were many thoughts and ideas about how to use the maintenance data produced in the system (see Introduction to IFS chapter), however the maintenance data is largely unused except for monitoring compliance and investigation of ad hoc cases e.g. a generator break down that has also happened on a sister vessel. Having been part of the implementation team for IFS8 (as team lead for supply chain and overall solution architect) and heavy involved as Subject Matter Expert (SME) when the system was upgraded to IFS10 in 2020, I have had a long-standing wish to utilize the data available in the system better. I will relate to my own role as both member of the organization, that is the setting of my investigation, and SME on the system that central for producing the data the project that part of departure in as well as being the researcher by drawing on Alvesson and at-home ethnography as research method.

Inspired by my MDO studies my initial approach to this master project was to do an explorative analyses of the +24.000 fault report generated by the vessels over the past 4 years (these have never been analyzed). With inspiration Participatory Data Design (PDD), I wanted to design a data sprint with the participant in the work group established to do a review of MSS's maintenance strategy in order to open their minds to an explorative approach and identify areas relevant to investigate further as part of the maintenance strategy review. I wanted present the work group with visualization of the data from the fault reports. My intention was to create networks use Gephi's and via the visualizations explore the data without prior assumption and let hidden patterns become visible.

However, in working with the data in preparation of the data sprint I was not able to create the hoped eye opening, seductive, 'kicking in the door' networks, in fact the traditional analysis I also did in Excel using Pivot and visualization made in Tableau gave better more useful results. My conclusion was that likely the data set is more suitable for more traditional data analyses (this will be one of the cases in the paper, however with an explorative approach).

Still eager 'shake up' the work group and challenge their way of thinking I considered a workshop inspired by speculative design. In speculative design "what we are interested in, though, is the idea of possible futures and using them as tools to better understand the present and to discuss the kind of future people want, and of cause, ones people do not want" (Dunne and Raby, 2012, p. 2-3). I thought it would be good exercises for the work group share their ideas and reflection around a new maintenance strategy by making visualization of the present, future and the road. I wanted to use the speculative design to legitimize talking about a different approach to maintenance strategy then MSS currently have. Especially in relation to risk – current strategy is very much centered around eliminating risk at any cost. It is therefore important to explore a different view, if the new strategy is to be more cost efficient then currently.

However, while I was having these considerations the work group had its kick-off workshop, and it was a very interesting meeting (a transcript of the workshop is available in the appendix and is empiri for this paper). A clear observing was that I was trying kick-in an open door, the team was already open to viewing maintenance from a different perspective and use data to supports and justify decisions to do things differently.

This observation combined with an organizational eager for action and change and a believe that utilizing more of the data we have available will support MSS in reaching its targets for 2024 and the overall strategy. Instead of wanting to do a big leap and go straight for 'the big tent' this paper will focus on making unused data an asset and I believe this will also take MSS to a 'bigger tent'. The road will longer but there will be valuable learnings on the way, and I aim to find some of them in this paper.

Research question:

How can Maersk Supply Service build on the experiences from the three cases in this paper and thereby increase the utilization of data and build a bigger 'tent'?

Sub questions:

SQ 1: How are the three cases working with data in a different way than before?

SQ2: What are the learnings from the three cases?

SQ3: What have my own role been in the three cases?

Method

I will base this project on a pragmatic approach "Pragmatism is concerned with action and change and the interplay between knowledge and action. This makes it appropriate as a basis for research approaches intervening into the world and not merely observing the world" (Goldkuhl, p. 136, 2012). Action and change are also key elements in MSS together with an underlying impatience making a pragmatic approach a good match. An old story goes that if an applicant showed any sign of patience in his/her personality test they would not make it past the initial screening make MSS a company of impatience people. I will be an active part on my investigation and not an observant in line with a pragmatic approach.

I am using qualitative research approach. In line with qualitative research I am interested in investigation the contextual conditions (Tanggard and Brinkmann, 2015, p. 523) for increasing the use of data in MSS and not in organizations in general. I am using a combination of methodical approaches interviews, data interventions, and workshops (as participant and observant). To ensure the quality in my research I will use the quality criteria put forward by Tanggard and Brinkmann, 2015 especially transparency (how did I get to my conclusion), validity (am I doing what I say I will do), and recognizability (is this relevant for others).

I am an integrated part of MSS, where I have worked since 2009 in various positions. I will draw on my knowledge of the company and its systems in this paper. I will be aware of the challenges related to doing research in ones own organization. Alvesson uses the term at-home ethnography to descript this as a research method. In at-home ethnography the researcher-author describes a cultural setting which s/he has a 'natural access' and in which s/he is an active participant, on equal terms with other participants (Alvesson (2009), page 5). I will in Alvesson' words be an 'observing participant' (Alvesson (2009), p. 6) both in the interventions related to case 1 and as participant in the work group reviewing the maintenance strategy in case 3.

One of the challenges for at-home ethnography is the struggle to 'break out' from the taken-for-grantedness of particular framework that is already quite familiar (Alvesson (2009), p. 8) In my descriptions and analysis in this paper this will be a focus area for me and

I will try to argue and give examples to support assumptions and label them as assumptions and not present them as facts even though they to me appears to be so due to my background and organisational knowledge. Careful reflections are crucial in doing at-home ethnography (Alvesson (2009), page 13).

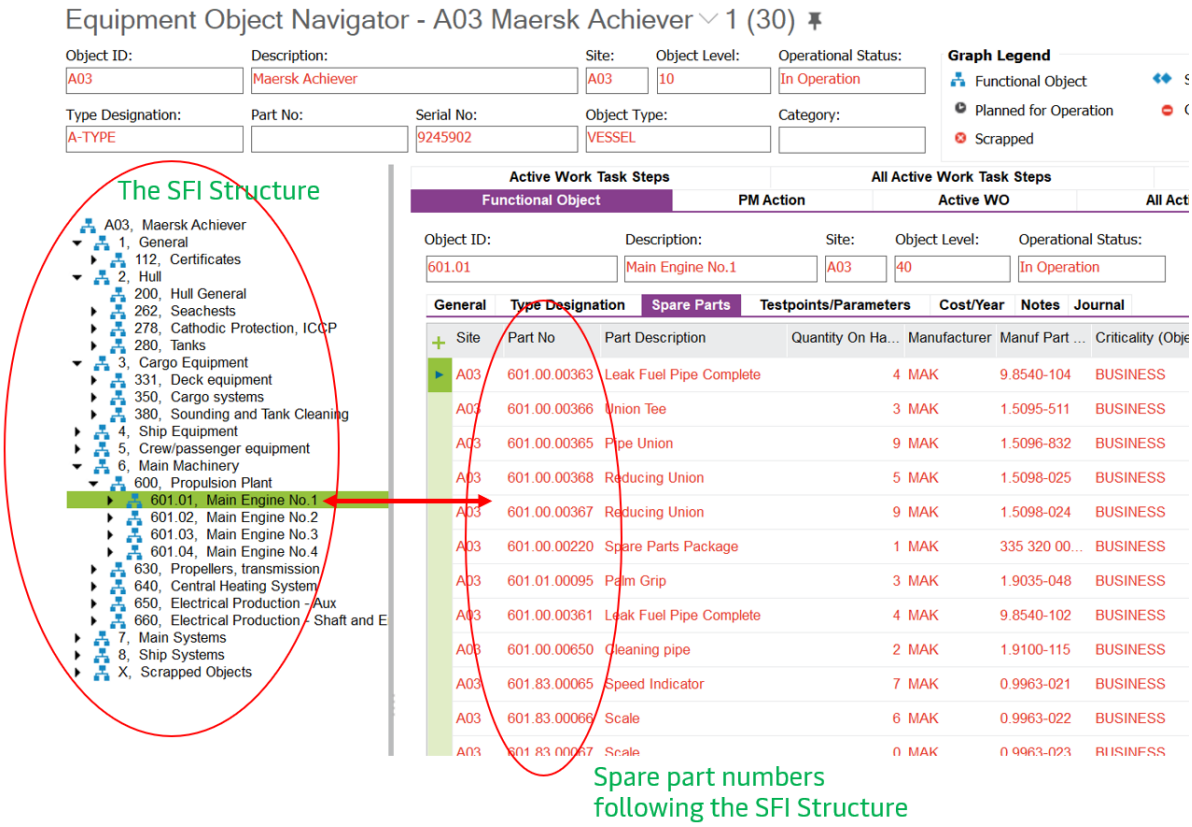
The material that I have collected about the three cases and will base my analysis come from different sources and different forms. I have made two interview (transcript available in the appendix) one with CTO Tommy Thomassen for background on MSS Maintenance strategy and one with Head of Maintenance Hans Rasmus Skytte about the second case where he is main source. For the first case my exam paper from 3. Semester is part of the documentation it is based on notes and pictures from the data intervention conducted in the fall 2023 supplemented with notes for the data interventions held in the spring 2024 and pictures/screenshots of the various versions of the cost monitoring tool being developed. The material for the third case is two workshops with the work group for the maintenance strategy review, the workshops are recorded and transcribed (transcript available in the appendix). Additionally, the project charter (PowerPoint one pager) made be the sub group in it first meeting after the workshops. I will analyse the three cases and answer the research questions based on the collected material supplements with own knowledge as descript above.

Introduction to IFS

Before I begin the analyze of the three cases I what to provide some background information about IFS (it is the name of the supplier of the ERP system), which is the system that the data used in the cases are produced in. I build on own knowledge (as mentioned I was team lead for Supply Chain and overall solution architect, when IFS was implemented and heavy involved as SME when the system was upgraded in 2020) as well as interviews that I made in connection with examen paper on 1. Semester, where I documented the company's data situation.

IFS was implemented in 2014 and was the company's first ERP system. It links together transactions from when a part is purchased, to where it is used onboard the vessel, to which account the cost goes on and from a contract is signed, to an invoice is send to the money is in our account. It created an infrastructure for the company and created a platform that controls processes and dataflow. The system was upgraded to a new version in 2020 – a lot of customizations were removed, but the basic principles of the system stayed the same. One of the most fundamental principles is the central control of the maintenance of the vessels. Before the maintenance set-up was de-centralized which basically meant that each vessel made its own structure, standard jobs and part numbers, making it impossible to compare across the fleet. The centrally controlled maintenance set-up means that all vessels are set-up the same way in the system. The vessels are set-up according to the SFI structure (Ship Fixation Initiative) which is an international standard for classification of ships, oil platforms and other maritime structures. The SFI structure is a hierarchical structure that

enable splitting of a complicated structure, like a vessel, into different systems and sub-systems which makes it possible to keep track of for example maintenance and cost.



In the above picture you can see the SFI structure on the left. I have expanded some of the sup-categories to illustration how all equipment onboard is mapped in the structure. For example, each of the four main engines are marked separately, which make it possible to register on which one there is a failure, and it is possible to track the maintenance done to each one of them (it is not the same maintenance being done to all of them as most maintenance is determent by the running hours of the engine and that can be different for the four engines).

The spare parts we use for repair and maintenance are coded using the SFI structure, thereby it is possible to see directly from the part number what type of equipment the part is for. We have two other types of parts in the system: consumables and service parts. The service parts also follow the SFI structure e.g. S60100 Service for Main Engine. The consumables have a 6-digit running number e.g 306191 Hand Soap Bar, each 15 GRM. There is no logic attached to the consumables part numbers. It is not possible to purchase anything without a part number, this way it is ensured that the things we purchase are accounted to the right account in order to control and monitor spend. There are +70.000 spare part numbers in the system, +20.000 consumables, and +400 service parts. Before IFS all spare parts were ordered as 'Free text' which not only meant, that there was a lot of wrong deliveries, but also that we had no overview of how many items of a spar part we had purchased (the suppliers knew our spending pattern better than we did). We also could not

see if an urgently need part was onboard another vessel as the vessels would have numbered them differently using their own system.

Then maintenance of the vessels is controlled via standard jobs, a standard job is a description of something the crew need to do keep the vessel operating and prevent any equipment from breaking down. The standard jobs are based on recommendation from the makers of the equipment, from regulatory agencies e.g. flag stat of the vessel or class society or company requirements. The standard jobs are running hour or calendar based. Running hour-based means that that something must be dome for example a filter change has to take place every time a pump has run for 100 hours. Calendar based mean that a task comes up once a month or every 6 months. The system created a work order based on the standard job, when it is time to perform the task. The crew then performs the task and completes the work order. The system of standard jobs are called preventive maintenance because you take action before something breaks down. This has been the standard approach in the offshore industry for safety reasons and to avoid down-time and off-service (period where the vessel cannot work) which means loss of money (the vessels operate at day rates between USD 15.000 – 100.000). However, preventive maintenance is expensive as crew spend time servicing equipment that works (sometimes things even break when you take them apart to check them) and spare parts are changed before they have to. Therefore, there is a large interest in the industry, and MSS, to look at how we do maintenance and a shift toward predictive maintenance (historic data and sensor measurements are used to predict when equipment is about to break down and then do the maintenance) and concepts like 'Run to failure' where equipment is left alone until it breaks down before your do anything.

When IFS was implemented, there were many ideas and high hopes for how a centrally controlled maintenance system could optimize the maintenance of the vessels for example MPR (material resource planning), where based on the standard jobs it can predict how many spare parts you need and when, and stock control e.g visibility across the fleet, min/max stock, automatic re-ordering points. The fact is that the system could do all that and more, but our data and work processes could not. It has taken MSS close to 10 years working with the system and our data and our work processes to get to a point where we are getting closes to utilize the potential of the system. It took years to face out 'free text' parts as not enough coded parts were created in the system from the beginning (at go live there were less the 20.000 spare parts and now there is +70.000). When the parts were there the work of connection them to the standard jobs began and nudging (via KPIs) the crews to register the spare parts they used on work orders and fault reports. Validation of stock onboard was done by designated teams travelling to the vessels with the only purpose of doing stock count e.g. controlling the quantities registered in the system and making sure all spare parts are registered (many vessel still had old parts from before IFS and parts ordered as 'free text' in the early years to make sure the stock we see in IFS is correct.

The work is paying off – based on that stock count and the ability to see stock across the fleet a saving on +1,5 million USD made over 2 years by getting the spare parts from another

vessel instead of purchasing them from the supplier. About 80% of the standard jobs have spare parts connected. Connection of parts to fault reports will be the focus of case three,

Analyze:

In this chapter I will present three cases of data work in MSS and answer the research questions for each of them. I will discuss and compare them in the following chapter.

Cost monitoring tool for offshore crew

In the following I'll introduce my first cast. The case takes point of departure in the data intervention I did as 3. semester examens assignment. I will first describe the data intervention, then what has happened since the first data intervention and finally, I'll answer the research questions.

I am largely the source of the information used in this section myself (my 3. semester exam paper is included as reference) I planned and conducted the data intervention. I'll used reflection from a member of my team, who was part of the data interventions and are involved in the development of the cost monitoring dashboard. I will include various stages of the dashboard to illustrate the iterations in the development of the dashboard and pictures from the first workshop.

I used Design Based Research (DBR) as research approach and framework for the data intervention. Design Based Research (DBR) is a research approach where new knowledge is created through processes and at the same time develop, test, and improv a design (Christensen, Gynther & Petersen (2012), page 3). The basic principles for DBR are to intervene in practice, the design process is iterative, it is collaborative, it is theory-oriented and pragmatic and application oriented (Christensen, Gynther & Petersen (2012), page 5). DBR is a research approach within the pragmatist ground (Goldkuhl, 2012). This is in line with the situation in MSS where there is need for action and new approaches to 'how things are done' to live up to the strategy of the new management.

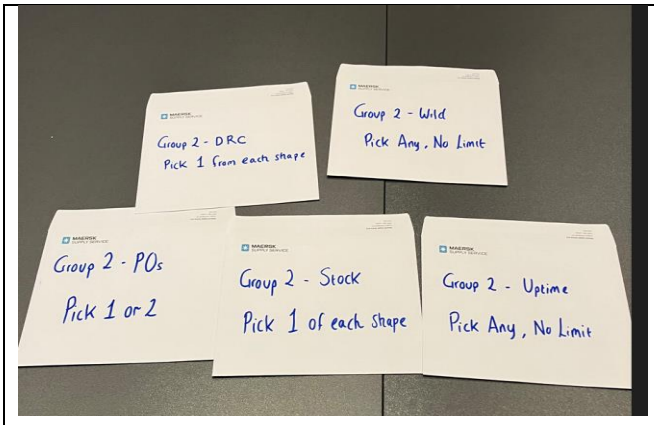
The reason for wanting to develop a cost monitoring dashboard for offshore crew was to enable the crew to take ownership of their spend, in the past 5+ years the ownership has been centered onshore with the operations manager. This was in an attempt to control the cost as the offshore industry was going through a massive downfall and money has been very tight. The success has been limited and the new management has a strong wish to push responsibility and ownership to the vessels. However, the vessels did not have access to their spend data, other than a monthly reports that their ops. manager shared with then. I was therefore given the task to create transparency of their cost for the offshore crews. To do that a new tool had to be developed.

As working with data and particular financial data is new for most of the crew, it was not possible just to ask them: what do you need to see and how should we present and visualize it? As they would not be able to tell us. Therefor we (myself and one of my team members)

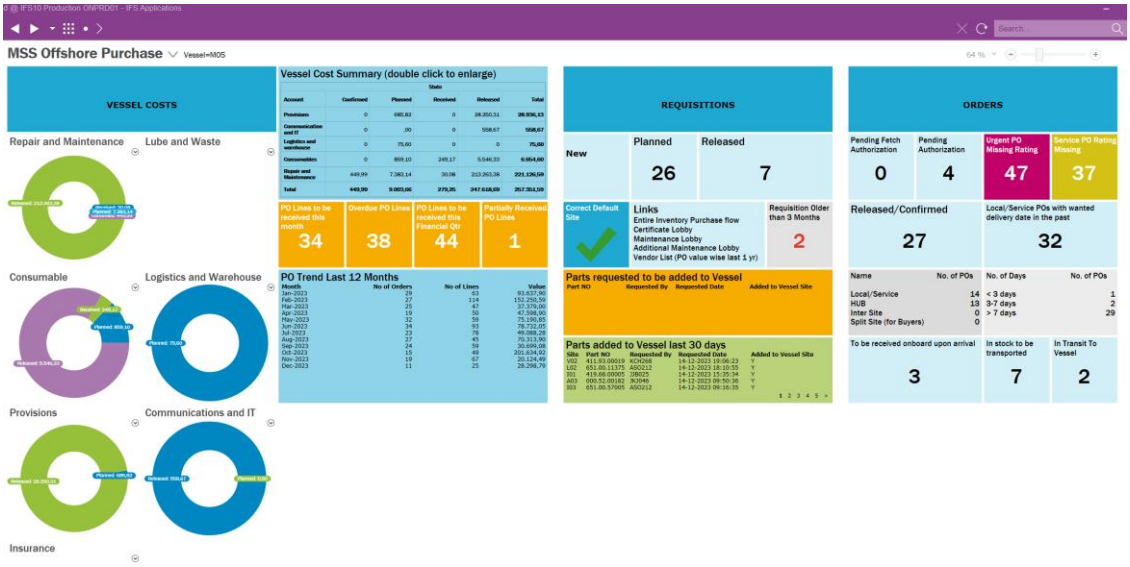
planned a workshop where we first did a vocabulary exercise matching word in three groups (finance terms, visualization terms and BI terns) with definitions. We did this to create a common language to talk both the information/data that they need to see, and what visualizations to use in the tool we were to build for them. This proved very needed and helpful in the further process.

The main exercise was to 'build you own' dashboard. We had prepared visualization of information that we thought would be relevant for them for controlling their cost and some other information related to vessel performance in general as well as some cards they could fill in themselves. We then asked the teams (3 teams of 4 person) to pick the information and visualizations they liked. Finally, the teams presented their choices. Luckily, they were very similar.

Below pictures from the workshop.

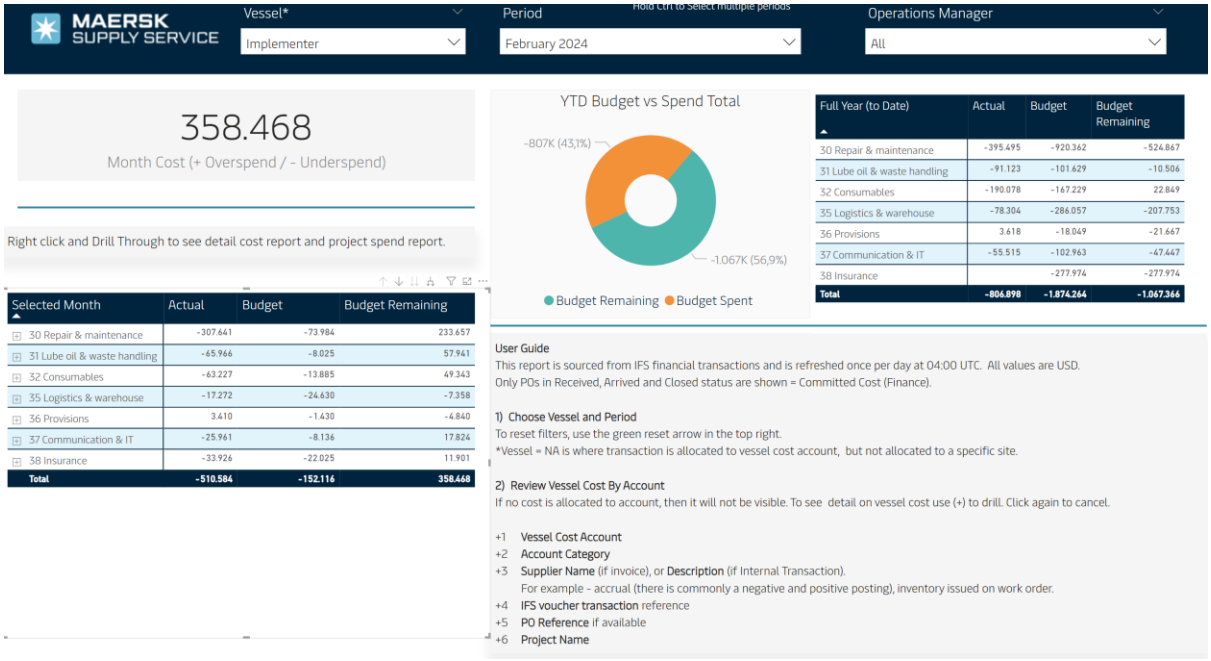


To get a tool to the crew as soon as possible in order to begin to collect experiences, we use an option in IFS called a 'Lobby'. A lobby is a navigation screen where it is possible to display information from the system, generally it is fixed searches. Apart from being used to give an overview, it is possible to drill down to the underling information by clicking on the search result. Below a screen shot of the lobby we developed. First, the lobby called 'MSS Offshore Purchase', was pushed to the vessels of the participants in the workshop and adjusted based on their feedback, then it was shared with the fleet. This was done in the end of 2023.

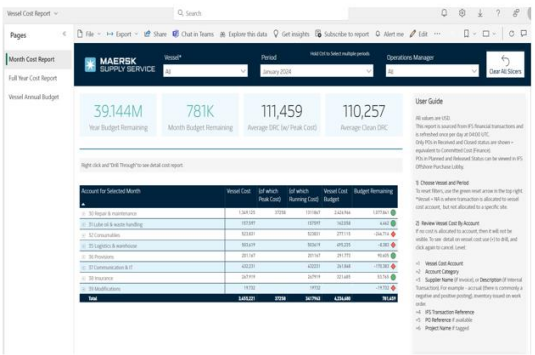


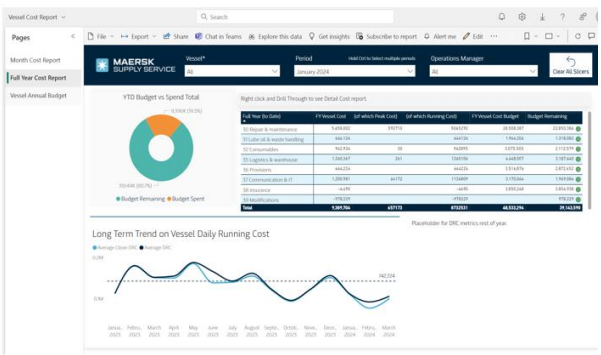
The inisial workshop was with 5 captains and 5 chief Enginers, in Janauary and March 2024 MSS helt 2 officers seminar with 50 participants on each. Participants were a mix of mainly captains and chief enginers, but also some officers in lowere ranks. At the seminars we had a 'fishmarked' where the participants were split in three groups and rotaed between 3 workshops. One of the workshops was conducted by one from my team and I – we did the termonology exercise (as in the first workshop) then we asked for feedback to the 'MSS Offshore Purchase' lobby.

Almost all feedback we received was related to not being able to see their budgets and how much there was left, but only their spend. We knew this would be a challenge from the beginning as the budgets are not available in IFS only in our BI set-up, where they are uploaded manually by Finance. Therefor we had worked on building a dashboard in PowerBI, where they could see there spend compared to budge. We were able to show them the first version at the seminars. See picture below of the first one-page dashboard that we presented. It was a challenge to build because budget and spend information had previously only been used by finance and all available reports were built in XL-cube, which is not available for the vessel. In addition, most of the report had a much higher detail level and complexity then relevant for the crews. We basically had to begin from scratch.



We received feedback at the seminars and later we circulated improved version of the dashboard for feedback to selected vessels and operations mangers. The main feedback was that the dashboard only showed actual cost. A purchase order (PO) becomes actual cost, when the PO has been received. However, for several reasons (long lead-time, consolidated shipments, and challenges with importation ect.) there can be a long time between a vessel places a PO and when it is received. Therefor it is important for them to know what they have coming. Relevant are POs that have been authorized and send to the supplier. Their IFS status is released and confirmed. Information about them is not available in the BI set-up at this point, because finance has been defining the data available in the finance cube and they have not found this information relevant. We are now working on getting the data included, but it is not easy due to the current PO flow in IFS. Therefor the vessel still needs to combine the dashboard in PowerBI with the lobby in IFS. Below pictures of the current version of PowerBi dashboard. It is now three pages and contain additional information and visualizations compared to the first version.





The dashboard is available to all vessel, but we have made a soft launch without promoting other when mentioning it is a mail about the vessel scorecard as we want to find a solution for the committed cost before we do a big launch. When we have that the cost monitoring dashboard will be launch to the vessel supported with introduction calls to all vessels.

How is data being worked with a different way than before in this case?

Actually, the financial data is properly the data in MSS that has been worked with the most. Finance do a lot of reporting, both what the MSS is legally obliged to do and to our owner. However, most of their reporting is centered around the companies that own the vessels and not the vessel themselves. It has mainly been the operations manager that have been working with cost at vessel level. In this case the different way of working with data is not that it is new data being worked with, but that it is a new group of people who is working with the data. The crews have a different point of departure then both finance, who focus on company level and the operations manager who generally manages 5-6 vessels, they only have to focus one vessel – their vessel! Meaning that they notice the smallest detail and look for explanation for amounts that would likely have drowned or been unnoticeable when looking at company level. This case shows that a new user group of data will create new needs and requirements for data. For finance a PO is a committed cost, when the PO has been received until then the cost does not exist (this is of cause a bit caricatured – finance do of cause want to know if high value items that will affect cash flow have been ordered, and when we expect to receive them) for the vessels, however, it is as earlier described, important to know what they have in the pipeline and for them the cost is committed when the PO has been authorized and shared with the supplier. Because finance have not been using this information, the data have not been included in our data cubes that are the basic for report building.

What are the learnings from this case?

The ones who uses the data decides what data is available. Since it has mainly been finance, who has been using the financial data, they have been defining the financial data available in the data cubes. MSS have the principle that only requested data has been added to the data cubes in order to keep them manageable and not slow them down with too high volumes of data. That is why the information about the POs is available in IFS, but not in the data cube. As this case shows: new users create demands for new data.

A common language needs to be created before you can begin to work and talk about the data. Both in the first workshop and at the officer seminar the participants were very clear that this was new ground for them and even though they were eager to take on the new responsibility and take control of their spend data, they need knowledge about financial data and a new vocabulary before they can do so. This also applied for language for using PowerBI and ‘reading’ visualizations for example what does ‘drill down’ mean and what is a ‘slicer’?.

It is easier to show people something (a prototype) and for them to tell you what they like or don’t like and what is missing, then showing a blank piece of paper and asking them what

they want. The DBR approach has been very useful, and each iteration has brough new knowledge and a better next version of the cost monitoring dashboard. As an added benefit the coming uses have felt included and been very helpful in giving feedback, thereby also getting an ownership of the tool, so that it is not just something 'coming from onshore'.

What have my own role been in the three cases?

I have had a central role in this case, first by being given the task of creating a cost monitoring tool for offshore crew. The task falls naturally within my area of responsibility as Head of Operations performance. In Operations performance, we are working with vessel performance for example the vessel scorecard with vessel related KPIs and customer feedback. Operations performance is the focal point for vessel and operational related data and the owner of data cubes, reports and PowerBI dashboards within this scoop. Therefore, a cost monitoring tool for offshore is a natural addition to our activities.

In my 14 years in MSS I have been working closely with the offshore crews, especially the captains and chief engineer, most of whom I know by name, and I have weekly if not daily contact with our offshore crews. I have been involved in many implementations over the years systems e.g. IFS, processes e.g. catering set-up and hardware e.g. tablets. My previous experiences and learnings have been an advantage in all phases of the DBR process. Especially in understanding the requirements and needs of the offshore crews. Another advantage has been my personal credibility – over the years the crews has come to trust that I have their best interest at heart, and they trust that I take their feedback seriously and will do my best to fulfill their requests, and that if they reach out with questions they will be taken serious and get an answer. Have this relationship with the crews have been a big help when introduction something completely new and out of their comfort zone for them. Especially in the first workshop with only 10 persons it was important that they felt safe and comfortable speaking up about the words they did not know the meaning of or visualization they did not know how to read. Their input is key to preparing the roll-out of the cost monitoring dashboard to their colleagues.

In this case I have a very practical role as organizer (of workshops), facilitator (of the workshops), and developer (of the of the tools). I will also going forward have an active role in roll-out of the cost monitoring dashboard and as owner of the dashboard. Thereby being responsible for the continues development of the dashboard and ensuring that the dashboard is being used (the experience from other PowerBI dashboard is the usage does not come by itself).

Unplanned Maintenance dashboard

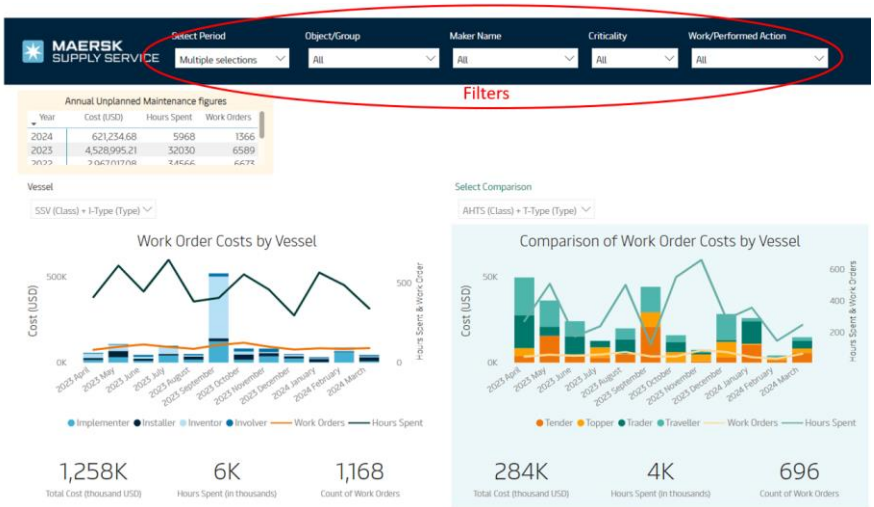
In this section I will first describe the second case and then answer the research questions. This section is based on interview with Hans Rasmus Skytte, Head of Maintenance. Hans has a background as second engineer in the fleet and has been involved in the two IFS implementations (IFS8 and the upgrade to IFS10) as trainer of the offshore crews. After the IFS10 implementation he joined the office permanently as part of the Technical Organization, where he has had different roles. He is the owner of the Unplanned

Maintenance dashboard, the one who had the idea for the dashboard, and have been responsible for the development. I will supplement with own knowledge about IFS and the organization.

The reason for developing the Unplanned Maintenance dashboard was to address several needs. First, to be able to get an overview of unplanned maintenance activities being performed onboard the vessels e.g. maintenance activities not originating from a standard jobs (the preventive maintenance) this could be fault reports, repair specifications, modification or upgrades. The relevant data is scattered in IFS as it covers multiple tables and screens. The data could be presented in a Quick Report, which is an in-system option of building reports of fixed searches in tables and screens a cross IFS. However, in this option it would only be possible to review the data in a 'raw' version without option for filters or visualizations. Second, we have had audit findings during in differed types of audits for example OVMSA (Offshore Vessel Management and Self Assessment), which is a framework that our customers, mainly the oil majors, use to assess potential suppliers. The finding has been that we do not sufficiently monitor trends in our unplanned maintenance in order to avoid them in them in future. Finally, there is a need to have a tool that can provide input to the ongoing review of the maintenance strategy.

The aim is to create a tool that will give transparency by allowing the Technical organization (TO) (that Hans is part of), the technical and operations mangers (who sit in the regional teams, and are responsible for the daily operation of the vessels), and the vessels to review data that as point of departure is not readably available in IFS. Due to technical constrains IFS is set-up so that the vessels can only see their own data, except for the inventory (parts in stock) that is visible across the fleet. The dashboard's purposes to enable the vessels to investigate not only their own data, but compare the data to the rest of the fleet especially their sister vessels (vessel that are the same e.g. build after the same specifications). In addition, the plan is to utilize the dashboard during the monthly 'Technical Management Global Follow Up' meetings. Which is a knowledge sharing meeting between TO and the technical managers.

Below the dashboard for Unplanned Maintenance made in PowerBI as it looks now in the first version.



I asked Hans why he had picked the 5 filter in the dashboard out of the many fields available with information in IFS? He picked the 5 filters (period, object/group, Maker Name, criticality and work/performed action) for different reasons.

Period (when the maintenance toke place) in order to look at trends over time. Object/group relates to the SFI structure and is the sub level that is detailed enough to tell what type of equipment the maintenance has been performed on, but not so detailed that there will be too few records in each category e.g. this level has 90 categories, where for example the category object ID have more than 3000 categories. Maker name is the name of the manufacture of the equipment, and this is relevant in order to compare performance of same kind of equipment from different manufactures e.g. for Dynamic Positioning systems we have makers Eaton and Kongsberg Maritime. Criticality shows if the equipment has been identified as critical (equipment onboard that in event of failure, may result in a hazardous situations) or business sensitive (equipment that based on customer requirements are essential for the operation of the vessel in relation to the task the customer wants to have performed). It is relevant to investigate unplanned maintenance on critical or business sensitive equipment as break down on those can potentially have large safety or financial impact. Last category is what type of action has been performed e.g. repair, replaced with new, cleaned ect.

Common for all 5 categories is that we know the data quality is good as it either controlled by the system (period) or the central master data team (object/Group, Maker Name and criticality). Hans had considered other types of information for example discovery reason e.g. functional testing or operational abnormality or symptom e.g. abnormal noise or leakage, however, some initial checks show a lot of inconsistency in how the categories are use and also 'Other' is a very popular choice. In order to get useful knowledge from analyzing these fields work need to be done to improve the data quality. Generally, it has been difficult to improve the data quality, if the data creators, in this case the offshore crew, cannot see that the data is being used, which have not been the case with this data before.

Hans has introduced and used the dashboard in two 'Technical Management Global Follow Up' meeting. Feedback is positive and the participants find it interesting, however he has not received any suggestion for improvement or questions and his felling is that the technical managers have not really looked at the dashboard outside of the meeting (which the PowerBI usage Metrics report confirm). Although being a bit disappointed Hans recognize that the technical manager's main focus is the daily operation and that they appear to thrive by 'fire fighting' the pressing technical problems at hand rather than looking at dashboards for trends to avoid them in the future..

The dashboard has not been launched to the vessels yet. The expectation is that they will find the option of see data from other vessels very intriguing. Beside technical interest many seafarers have a nosey part and I not meet an occupational group who gossip more than seafarers. I believe that they will not be able to resist looking into what is going on other vessels. Being serious, it is the hope that they will use the unplanned maintenance dashboard in combination with the cost monitoring dashboard in order to explain their

spend as well as seek information about technical matter they have by looking if other vessels have experienced something similar.

How is data being working with in a different way than before in this case?

In this case data is not being worked with in a different way then before, as the data in this case have not been work with before. Since the implementation of IFS the maintenance focus has been on establishing the centrally controlled set-up and improving and building master data. Data has been monitored to ensure compliance e.g. that there are no overdue critical work orders or certificates that expires. The maintenance date is not the only type of data that have not been worked with, on the contrary as an organization MSS has more data that have not been worked with then data that has. This was one of the findings, when I mapped the organization's data situation in my 1. Semester exam paper. The Unplanned Maintenance dashboard as an important step as in making MSS 's tent bigger as it makes the beginning of utilizing the large volumes of maintenance data that has been building up without having been subject for analyses. I believe that utilizing and analyzing of maintenance data will reveal valuable information that will support the overall target of MSS becoming more profitable.

The unplanned maintenance dashboard enables offshore crews to see information from other vessel then their own that is a new opportunity for the crews. Until now it has only been onshore who have been able to look across the fleet. By giving the crews this option the amount of people having the access to this data increases dramatically from 15-20 persons (TO and the technical managers) to approx. 150 person, if we only count captains and chief engineers but likely more as other ranks will be interested too. More persons having access to data increases the likelihood that someone will begin to work with the data.

What are the learnings from this cases?

There are two key learnings from this case. First, usage do not come by itself just because the data is made available in a user-friendly way. Especially not if the users (the technical manager) do not normally work with data and likely is a bit unconfutable with this kind of work and prefer to work on finding out why a shaft generator as a crack or pump is leaking. It will take time and training for them to see the dashboard as a tool in their toolbox that can help them solving their practical/physical problems. We know that the same is the true for offshore crew from other dashboards (customer feedback and HSEQ) that we have made for them. The learnings from those are that it is important to communicate the why and the purpose otherwise they will not use it.

The second learning is that data quality is a factor. In this case data quality limited the choices and data available for the dashboard. When beginning to work with data we (MSS) have in almost all case identify quality issues e.g. missing, inconsistent or wrong data as part of the data set. Generally, the experience is, that minimum the first 6 months of working with a new type of data is focused on improving data quality rather the doing actual analysis. Another aspect is that when beginning to work with data often more data is requested to enlighten other aspects of the analysis. If lucky the data is already available

unused or used in other parts of the organization, but it can also be that the data collection needs to be started from scratch.

What have my own role been in this case?

My own role in this case have primarily been supporting Hans on the sideline in his ideas and considerations. We have over the years had many talks and discussions on how to utilize the maintenance data in IFS, as this is of great interest to us both. We have often identified problem with data quality, when we have tried to execute some of our ideas. Improving data quality have been a joined focus. Hans, who in addition to being Head of Maintenance, is IFS SME and solution architect for the maintenance part of IFS, have made changes to the system e.g. mandatory fields, and I have from Operational performance made for example KPIs on the vessel scorecard to enforce a certain behavior that would improve the data quality.

To be able to build the Unplanned maintenance dashboard in PowerBI developments needed to be made to the BI set-up in order to make the required data available. To govern the BI set-up and control the cost MSS as a BI Governance board, who need to approve development over a certain threshold currently 20 hours. The changes required for the Unplanned maintenance dashboard was about that threshold, and there for a BI request form had to be submitted to the BI governance board for approval. The BI governance board consist of 3 persons who evaluate the requests and put forward a recommendation to the two SMT members who owns the BI set-up, who make the final approval. I am one of the 3 persons in the BI governance together with Head of IT and Head of FP&A. This can be seen as a role of power in relation to this case as I could have objected against approving the required BI development, and since this development request come from my business area my opinion weighed heavily in the discussion with the two others. Instead I talked strongly in favor of approving the development request.

Analyses of Fault reports as part the Maintenance strategy review.

This section is based on the first two workshops that the workgroup that have been created to review the maintenance strategy in MSS have had. As well as the first meeting a small sub group have had on the topic and my own reflections and ideas for the analyses.

The work group has 8 participants and in addition the Head of Technical Organization (TO) participated in the two workshops. Except a Senior Procurement Manager and me the other participants have different positions in TO - Head of Marine Governance is lead on the project. The other participants are Head of Docking, Head of Maintenance, a Mechanical Specialist, and an Electrical & Instrumentation Engineer.

The first workshop was kicked-off by the Head of TO, who gave the background for the maintenance strategy review and the targets set by management. The review should contribute to meeting the company's KPI of closing the EBITDA gab to competitors (in 2024 there is a budget of USD 20 mill. for repair and maintenance (R&M) incl. peak cost e.g. main engine overall or wire change). The consultant report that was made in the summer 2023 after MSS got new owner and CEO suggest that it should be possible to reduce the R&M

cost with 10% and reduce the man hours spend on R&M with 10%. These targets gave quite a lot of discussion, as it is unclear what the consultants have based their assumption on and whether the targets are achievable. However, there was consensus that it is possible to achieve savings, and it was made clear from Head of TO that the important part is that we begin reviewing and working with the strategy and how we have been doing R&M. Whether the saving then land on 5, 10 or 15% is less important. This statement had a positive effect on the group and created a good atmosphere for the further discussion.

In the rest of the first workshop the work group sharing opinions on what a maintenance strategy is and whether we have one in MSS, different approaches to maintenance and potential areas for investigation. My main take aways from the dialog was that there is an open-mindedness to see and do things differently, then I have experienced before. MSS's current approach has been to follower makers recommendation for maintenance and to try and avoid break down at all costs e.g. preventive maintenance as governing principle. In the dialog there was a willingness to challenge maker's recommendation and accept the risk of breakdown as long as the consequences of a breakdown has been identified and accepted. This opens up for having equipment that we 'run to failure' meaning that you do no maintenance of the equipment, not even checking it, you let it run until it breaks down, thereby saving man hours and likely parts used for when check and maintenaning. Due to the good and lively discussion we did not agree on actual actions in this meet. Making a maintenance strategy review is a big task – the head of TO used the metaphor of an elephant – you cannot eat it in piece, one have to take in splices, same for the strategy review we need to take it in pieces and it will likely run over more than one year.

In the second workshop we agreed on 4 work steams:

- Service providers. Aim here is to look at our spend with service providers (which is a significate part of the R&M spend) to see, if possible, to reduces it by for example have our crew do the work, employ service team ourselves, negotiated better contracts with key supplier etc..
- Equipment categorization. The objective is to optimize maintenance cost associated to critical and business sensitive equipment and document that the maintenance on critical equipment is correct
- ABS – Condition Based Program – I will discuss this initiative in the perspectivation chapter.
- Analyses of fault reports

The work group who will be working with analyzing the fault reports consist of myself, Head of Maintenance, the Mechanical Specialist, and the Electrical & Instrumentation Engineer. My justification for being part of, not only this group, but the maintenance strategy review group all together is to push for utilization of the data available in IFS that we have not used before. Especially to have a more explorative approach and not only look for confirmation of hypothesis. This gave some debate both in the work group, but also late with the larger group especially the lead, Head of Governess, was challenged because this approach makes it impossible to say what the outcome and expected benefits will be and when you will be done. This is challenging in organization with high focus on results and progress.

We agreed to focus on the parts used on fault reports e.g. the parts the crew had used to repair the equipment. As part of the discussion, we talked about the available data and some quality and quantitative challenges with the data. First, we likely do not have record of all parts being use on fault report. Connection/registering the used part on work orders (WO) (fault report is a type of work orders) did not become a focus area until the implementation of IFS10 in 2020 before that it was do very limited. Even though there was focus on this in the training that the crews have had as part of the roll-out, it was not until it was made a KPI on the vessel scorecard that we saw an increase in the connection of parts on WO. Despite connecting parts to WOs being the easiest way to maintenance correct stock level onboard, as part when having been connected automatically is being removed from stock instead of the crew having to do a stock count e.g. going through the stock and update quantity in IFS. Another benefit that we have been promoting is that the connection of parts gives us knowledge of what the parts are actually being used for and it has eased the work of connecting part to standard jobs, which in turn enables us to do better predictions of what parts we need in the future. Regardless of these good arguments we still come across crews who think that connection of part only should be done for the benefit of a good KPI score. This attitude combined with more parts being purchased, then connected to WO confirm that there should be more parts connected then there is. From a quantitative perspective the challenge is that we have both have a lot of equipment that the parts can be used on and also many parts, that equals many possible combinations which will make it difficult to identify trends (this was the problem I experienced when trying to network analyze). Aware of these challenges we identified some approached to parts in fault reports that we want to explore:

- Identify and analyse the 50 or 100 most used parts.
- Identify and analyse the 50 or 100 most expensive parts.
- Look for trends with sister classes.
- Link between running hours and reason for fault report and how it has been discovered.
- Compare parts use on fault report with stock (do we have the right parts in stock).

We have not begun the work with the fault reports yet, and as mentioned we will keep our minds open and have not set-up defined targets for the exercise. We do have some hopes for example to be able to identify parts that we used in large amounts that procurement then can then do targeted negotiation for. Our previous approach has been to get full catalogues priced from suppliers, but the idea is that instead of doing that we should focus on the 5-10 parts that we buy the most from a supplier and by being able to say approx. how many of a part we need and have the supplier come with ta good price on them instead of them having to spend time pricing a lot of other parts. I am very excited about the approach and the work we have ahead of us in the team and optimistic that this explorative approach will pay off.

How is data being working with in a different way than before in this case?

Similar to the pervious case this case is working with data that have not been worked with before. In addition, the approach to working with the data will be different from how data is generally worked with in MSS as the work group will take an explorative approach and be open-minded to where the data will lead us.

What are the learnings from this case?

My personal learning from this case is not to underestimate your colleagues and their ability and willingness change and embrace new approaches. I was expecting them to hold on to the old preventive maintenance approach and not to be open to work with acceptance of risk. However, they all accepted that risk is a factor and that it does not necessary have to be avoided at all cost, if the risk is accessed and mitigating actions are planned. This attitude is key if repair and maintenance cost is to be reduced because elimination of risk and as point of departure trying to avoid break down is very expensive.

A learning is that the group is not affright of data on the contrary data was seen as an enable of the ideas that the group had for example the fault reports can be used to document that a certain piece of equipment never breaks down which can be the steppingstone to discuss reduction the preventive maintenance being done or try a 'run to failure' approach.

The case show that taking point of departure in an explorative approach working with data is not automatically dismissed. Presented with the possibilities and unthought of outcomes of an explorative approach the team excepted the approach. However, as described above not with out a bit of convincing. If the approach pays of remain to be seen.

I think the willingness to think 'out side box' and follow new idea comes from the new management of MSS, they themselves have made some bold moves for example a new organizational structure, a business area where large investment had been made was discontinued, and an ambitious new strategy. This kind of actions shows the organization that it is time for change and that risk and thinking differently about how we do things is acceptable and encouraged.

What have my own role been in the case?

The reason I became a member of this work group, despite my lack of technical knowledge, is my approach and knowledge about data and I used my MDO study as a ticket and validation of my competency to be accepted. This acceptance was needed as technical people can be a tough crowd, who do not like to take input from non-technical persons when it come to the maintenance of the vessels. I asked the Head of TO, if I could be part of the work group as I thought I could contribute with an outside perspective and different way of thinking. He agreed and thought, like me, that it would be difficult to get the core team from his department to think different and that they would need someone in the team to push them. We have both been positively surprised by the attitude of team and have high expectation as to what the maintenance strategy review will bring.

I may not have a lot of technical knowledge, although one can not help to have picked-up a little over the years, but I have a lot of experience implementing changes to our

vessel/crews and this competence is recognized by the work group and seen as useful when the project at a later stage comes to implementation of the changes identified as part of the strategy review.

Discussion

In the following chapter I will discuss my findings from the previous chapter. I will reflect on my own role, what was the most useful findings, and the largest challenges identified.

In below table I have collected key findings from answering the three sub questions for the three cases

	Case 1: Cost monitoring tool	Case 2: Unplanned Maintenance dashboard	Case 3: Analyses of fault reports
How is data being working with in a different way than before in this case	• Offshore crew = new user group • Trigger new data needs	• New data is being worked with • Enables offshore crews to see data from other vessels then their own	• New data is being worked with • Explorative approach
What are the learnings from the three cases?	• DBR approach works. • Create a common language. • If the user group do not understand the data they cannot work with it.	• Usages does not come by itself. • Data quality can create limitations.	• Kicking an open door • Data as argument • Willingness to explore
What have my own role been in the three cases?	• Responsible • Credibility • Facilitator	• Supporter/sparing partner • Approver of development request	• 'The odd one' • MDO • Change agent

In all three cases data is being worked with differently then before. In the first case it was a new user group – the offshore crews, who is working with finance data, that they have not be working with before. Which triggered requirements for expanding the available data as the crews had different requirements working with the data then finance. In both the second and third case data have not been worked with before is being utilized. Additionally in the second case the building of a PowerBI dashboard enables the offshore crews to see data from other vessels then their own, which will allow them to investigate not only their own data, but also the data of sister vessels. In the third case the work group will have an explorative approach to investigate the data, which is a new way of working for MSS, when it comes to data.

All three cases offered good and useful learnings. In the first case the DBR approach of user involvement, prototyping and iterations proved very useful and allow for getting a tool to the crews faster then what would otherwise have been the case. The first case shows the importance of having a common language, and that it is necessary to give the users a basic understanding of the data, they will be working with. From the second case it is clear, that you can take the horse to the water, but you can not force it to drink. Just because data is being made available in an easily accessible way, it does not guarantee that people will use it. In both the second and third case there were learning

around data quality, in the second case data quality limited the choices of data that could be used in the dashboard and in the third case we discussed data quality in relation to the dataset been incomplete. The third case had, for me, some very positive learnings about my colleague, they proved open-minded in their approach to reviewing MSS's Maintenance strategy and willing to use an explorative approach when analyzing the fault reports. Finally, there was consensus around that data could and should be used as validation and be a valued argument for changes.

I frankly found it a bit uncomfortable to review my own role in the three cases, however, have been 'forced' to do so I could see that even though I had very different roles in the three cases my I involvement have been important for the outcome of the three cases. In the first case, if had not been for my MDO studies, I would not have used the DBR approach, and we would have made a first draft of the dashboard based on an old report (the Vessel Captains Report – see below) made by finance and not appealing to other the finance persons. Because the first draft would be fare from what the crews what, and they would not have the language (created in the workshops) to talk about what they do want it would have taken much longer to get to where we are today.

Vessel Captain Report

Choose Vessel	Choose Period
	Latest month

(USDk)	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	Last 3M avg.	Last 12M avg.	Next 3M avg.	Next 12M avg.
Hedging gain and loss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Agency, port & other	-1,411.5	-955.7	-880.2	-978.8	-790.5	-1,059.4	-1,485.7	906.6	-736.8	-709.6	-635.7	-1,122.7	-822.7	-821.7	-1,049.9	-612.7
Misc contract related	-2,383.6	-2,118.2	-3,174.9	-1,767.2	-2,989.5	-2,234.8	-1,774.2	-1,464.9	-898.4	-2,963.2	-5,045.4	-2,354.1	-3,454.2	-2,430.7	-2,743.6	-2,106.3
Bunker	-656.3	-1,457.5	-523.3	-429.4	-932.1	-133.3	-998.5	-1,217.9	62.7	-1,284.3	-7,049.3	-1,013.4	-3,115.7	-1,302.7	-214.4	-304.2
INS expenses	-3,449.5	-3,447.6	-5,605.3	-8,629.3	-6,207.4	-4,303.2	-5,900.1	-3,948.3	-1,773.6	-1,297.1	-2,936.8	-3,802.3	-2,678.7	-4,275.0	-7,555.1	-2,586.5
Provision reserves & revenue taxes	-443.0	14,338.9	-2,088.9	-1,788.6	-2,071.4	-2,088.9	-1,089.2	-1,751.8	-1,238.4	-1,047.3	-561.0	-1,098.4	-902.3	-77.3	-1,252.3	-844.2
Debtors loss	-123.0	149.7	133.0	-273.6	-2.7	-108.0	-335.6	-15.5	-86.3	-229.5	-44.8	-253.4	-175.9	-99.2	0.0	0.0
Cost of revenue	**-8,466.9**	**6,509.6**	**-12,139.6**	**-13,866.9**	**-12,993.5**	**-9,927.5**	**-11,583.4**	**-7,491.7**	**-4,670.8**	**-7,531.0**	**-16,273.1**	**-9,644.4**	**-11,149.5**	**-9,006.6**	**-12,815.3**	**-6,453.9**
Repair & maintenance	-2,942.6	-2,816.4	-1,976.3	-2,757.3	-1,749.7	-844.1	-1,572.2	-2,102.2	-1,349.1	-1,760.3	-2,223.7	-2,117.8	-2,033.9	-2,017.6	-2,414.5	-1,584.1
Lube oil & waste handling	-177.1	-43.0	-190.2	-77.4	-37.5	-44.1	-103.2	-271.1	-157.6	-203.0	-320.6	-125.2	-216.3	-145.8	-166.2	-110.6
Consumables	-743.3	-397.6	-421.1	-178.0	-208.8	-90.0	-320.6	-377.7	-523.8	-42.1	-401.9	-246.1	-230.0	-329.3	-266.1	-165.8
Logistics & warehouse	-688.0	-187.4	-756.2	-882.3	-717.2	-782.7	-585.6	-564.4	-503.6	-441.8	-395.3	-608.8	-482.0	-592.8	-372.2	-224.3
Provisions	-503.9	-699.5	-160.4	-600.4	-403.9	-393.8	-330.0	-328.2	-201.2	-309.1	-200.8	-391.1	-300.4	-376.9	-296.7	-197.5
Communication & IT	-487.8	-507.6	-521.6	-285.7	-47.6	-440.5	-517.8	-638.3	-432.2	-371.5	-335.7	-418.1	-375.1	-417.0	-267.9	-178.4
Insurance	-332.8	-318.1	-308.6	-277.1	-269.8	-296.5	-289.5	-285.6	-267.9	-539.1	11.3	-258.3	-262.0	-286.0	-324.1	-215.7
Modifications	-55.9	-5.5	-103.5	-220.1	54.5	-73.3	5.8	-548.2	-19.7	1,000.0	-2.0	-1.1	332.3	2.6	0.0	0.0
Vessel cost	**-5,931.3**	**-4,975.1**	**-4,437.9**	**-5,278.2**	**-3,380.0**	**-2,965.1**	**-3,713.1**	**-5,115.7**	**-3,455.2**	**-2,666.8**	**-3,868.6**	**-4,166.6**	**-3,567.4**	**-4,162.8**	**-4,107.7**	**-2,676.4**
Crew wages	-11,520.4	-9,766.3	-10,564.4	-12,219.6	-9,549.5	-9,323.2	-9,220.4	-6,720.2	-9,802.7	-9,922.4	-8,216.4	-9,643.9	-9,260.9	-9,705.8	-8,950.7	-6,087.2
Shiftings	-1,378.4	-1,280.8	-1,524.6	-1,399.8	-1,377.7	-1,082.5	-1,456.2	-1,174.9	-899.7	-968.0	-1,038.3	-1,139.8	-1,048.7	-1,226.7	-1,116.5	-752.5
Crew overhead	-32.7	-55.5	-64.5	-61.9	-133.5	-110.4	-127.0	-111.0	-136.3	-183.7	-324.6	-178.1	-228.8	-126.6	-137.1	-91.4
Crew training	-354.4	-278.7	-108.4	-396.0	-221.1	-185.6	-388.4	-186.8	-266.4	-246.2	-263.0	-153.9	-221.0	-254.1	-336.4	-224.3
Crew cost	**-13,286.0**	**-11,381.4**	**-12,261.9**	**-14,077.3**	**-11,281.8**	**-10,701.6**	**-11,192.0**	**-8,192.9**	**-11,105.0**	**-11,320.3**	**-9,842.2**	**-11,115.8**	**-10,759.5**	**-11,313.2**	**-10,540.7**	**-7,155.4**
Operating Cost	**-27,684.2**	**-9,846.8**	**-28,839.4**	**-33,222.4**	**-27,655.3**	**-23,594.2**	**-26,488.4**	**-20,800.3**	**-19,231.1**	**-21,518.2**	**-29,984.0**	**-24,926.9**	**-25,476.4**	**-24,482.6**	**-27,463.6**	**-16,285.7**
Cost of revenue per day	-273.1	217.0	-391.6	-447.3	-433.1	-320.2	-386.1	-241.7	-150.7	-269.0	-524.9	-321.5	-375.8	-296.1	-422.5	-212.2
Vessel cost per day	-191.3	-165.8	-143.2	-170.3	-112.7	-95.6	-123.8	-165.0	-111.5	-95.2	-124.8	-138.9	-120.2	-136.9	-135.4	-88.0
Crew cost per day	-428.6	-379.4	-395.5	-454.1	-376.1	-345.2	-373.1	-264.3	-358.2	-404.3	-317.5	-370.5	-362.7	-371.9	-347.5	-235.2
Operating Cost Per Day	**-893.0**	**-328.2**	**-930.3**	**-1,071.7**	**-921.8**	**-761.1**	**-882.9**	**-671.0**	**-620.4**	**-768.5**	**-967.2**	**-830.9**	**-858.8**	**-804.9**	**-905.4**	**-535.4**
Deployment Status																
On Contract	678.5	719.9	675.4	769.7	733.9	833.7	711.3	642.6	698.1	657.4	685.3	689.2				
Mobilization	3.7	13.0	0.0	0.0	0.0	0.0	12.6	0.0	0.0	14.3	23.3	0.0				
De-Mobilization	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Positioning	27.7	0.0	20.4	16.6	0.0	31.1	34.0	20.7	6.3	51.3	41.9	29.8				
Idle	147.1	173.5	187.7	168.1	182.4	90.1	123.1	163.9	129.2	59.5	65.3	90.1				
Layup	124.0	120.0	124.0	115.0	81.0	62.0	49.0	31.0	31.0	29.0	31.0	17.0				
All	**1085.0**	**1050.0**	**1085.0**	**1076.0**	**1011.0**	**1023.0**	**979.0**	**956.0**	**930.0**	**870.0**	**930.0**	**900.0**				

Inr the second case I could have used my power as part of the BI governance board to block the required BI development required to build the dashboard, instead I supported it and argued for it approval towards the two other members of the board. I also believe that my many talks with Hans, the Head of Maintenance, about maintenance data, data quality, utilization of data and IFS in general have been contributing to him forming his opinion and the development of the Unplanned Maintenance dashboard. I will continue to have a supporting role in promoting the usage of the dashboard, mainly toward the offshore crews where the dashboard will be included in the portfolio of PowerBI dashboard available for them, that my and my team promote and demo when ever we have a chance e.g., seminars, office visits, News app articles etc..

In the third case, I think my presence as 'the odd one' not having a technical background, and with my MDO thoughts and ideas in the backpack enabled a free and open-minded discussion in the work group as someone (me) was also already taken a different stand and challenging the traditional preventive maintenance approach making it easier bring up the thought and ideas that they were having. Secondly, I convinced the fault report work group to use an explorative approach in our investigations, which is not the approach they would otherwise have chosen.

For all three cases, I think there are some common factors that allowed me the take the roles and have success in them. I have a high seniority in the organization (14 years), and +5 of them in a managerial position, just below senior management in the company, which give me credibility and rank to speak with a certain level of authority. Having been involved in many cross-functional projects e.g. IFS implementation, process mapping tool, and new country entries means that I know and is known by many in the organization, I also have a knowledge about most of MSS's IT systems and many of our processes. One of the key areas of responsibility for my team (Operations Performance) is process optimization and simplification, which means that the organization in use to me proposing to do thing differently and that the suggested changes generally become improvements. Therefor, when I suggest doing things differently in relationship to data, the same expectation and positivity is perceived. I strongly believe that my MDO study added to my credibility only around data but in general. People have been very interested in hearing about MDO and the things I have learned especially IA and the possibilities that come with it. In addition, it gives respect to have 'gone back to school' and learn new skills and still doing ones 'day job'. The combination of seniority, credibility and MDO have provided me with a unique platform for succeeding as change agent when it comes to data work in MSS.

Looking at the three cases the most useful finding are common language, user involvement, and data quality. The success of developing the cost monitoring dashboard, and I believe it will also be important in the implementation, is the creation of a common language to talk about the data e.g. the financial terms and the BI and visualization terms e.g. to talk about how the dashboard should look. Initially the terminology exercise was thought as icebreaker or warm-up exercise before the 'build you own' exercise, instead in turned out to be creating a crucial fundament for both the next exercise and the further development of the dashboard. When doing the terminology exercise the offshore crews were struggling with, we thought as being basic knowledge, in all the three categorical. Looking back, I don't think we would have succeeded without this exercise and the creation of the common language.

The first and the second cases showed that user involvement is important for several reasons. The first case shows the benefits of user involvement e.g. input and feedback to the design, ownership (being co-developer and providing input creates commitment). In case two the Unplanned maintenance dashboard was developed without involvement from the Technical Manager and as a result they do not feel obligations towards using the dashboard or even provide feedback.

In case two and three data quality plays a significant role and it is a key finding that data quality will play a role when beginning to work with data that we have not worked with before. Date quality does not come by itself, working with the data is vital for first accessing the data quality and second improving it. In this area MSS has a big task ahead of us.

Data quality and getting the users to the use the data and the dashboards (closely linked to user involvement) are the biggest challenge I found. Data quality will be a challenge for a long time as so little of our data have been worked with and first need to be assessed and likely improved before we can work with it, The data quality of our data will likely slow us down in the utilization process as well as limit analyzation possibilities initially.

Getting users to use dashboard etc. is a challenge as it takes time to learn to do some thing new, and even if it will help you long term persons often do not feel they have the time. This is a difficult challenge and can not be solved only with user involvement (being an effective tool for this) as one cannot involve all end users in the development process. My suggestion is to communicate and make the benefit of using the dashboard as big as possible in order to persuade the users to give it a

try. I have previously MSS had luck with make a competition that requires using the wanted dashboard to kick start the use and lure in the users with a price.

Conclusion

Based the analysis of the three cases, where MSS is working with data in different ways and the answering of the three supporting research questions for each case I will in the following answer the research question of this paper:

How can Maersk Supply Service build on the experiences from the three cases in this paper and thereby increase the utilization of data and build a bigger 'tent'?

In all three cases MSS is working with data in different ways then before, either a new user group is working with the data or data that have not been utilized before is being worked with. Thereby MSS is building experiences that are important to increase the data utilization and build a bigger 'tent'. The learnings from the three cases are that to increase the data utilization it is important to build a common language both for the content of the data, but also for the data work. Because without a language, it is not possible to communicate needs, ideas and feedback. The cases show that MSS must work with data quality before the actual data analysis work can begin. Data quality can be an obstacle, if not addressed. All cases, but especially last one, showed a willingness and open-mindedness to working with new data and try new approaches to the data work. The three cases show that MSS is already making progress and is pushing the scope of data work being performed in the organization.

A learnings from my role in the three cases are the change does not happen by itself, and it is required to have change agents to push and introduce new approaches. In the first case the DRB approach was instrumental in increasing user involvement, the second case show that managerial support (in form of the BI governance board) is important as without it the new data work would not have been enabled. In the third case, I introduce and argued for an explorative approach to the analyses, which the work group would not have chosen themselves.

The cases show that MSS is capable of moving further out on the axis of the MDO model, in the cases in this paper mainly the axis of controlled vs. exploratory analyses. The cases, however, clearly show an interest and a capability to move, which will be a key enabler in increasing the utilization of data and building a bigger 'tent'.

Perspectivation

As part of the maintenance strategy review a pilot project with MSS's class society ABS (American Bureau of Shipping) is about to be kicked off. The project will push the boards for how MSS has been working with data. ABS will by using AI to process MSS's data as part of their Condition Based Program. ABS will get access to all historical work orders (both planned and unplanned), oil sample results, and live sensor data from the vessels. They will combine the data with data from other similar type vessel from other clients. In the pilot project ABS will get access to data from the 4 I-class vessels in out fleet.

ABS is an external partner, and it is the first time MSS give access to such a comprehensive amount of maintenance data to an external partner. There have been minor trials, mainly related to fuel consumption, but it is the first time that an external is allowed a 360 view of our maintenance data. Having an external partner not only given access to MSS data, but also using AI to analyses it, forces MSS get an opinion about data ownership and what we will allow an external partner to do with it e.g. share with other clients or train AI.

It is the first time that that all historical workorders are being reviewed. For comparison, there are, for the 4 vessels in the project, 4.665 fault reports (which is the scope for our own investigation) and there are 184.359 historical work orders. In other words, a data volume that we are not capable of handling ourself, at least not currently.

Getting data out of IFS and made available to ABS is the easy part of the project. Getting access to the sensor data from the vessels is more completed. MSS is in the process of implementing a system called Fleetdata. Fleetdata is a platform that can collect data from different sensor installed on different equipment onboard the vessels and send it onshore. With Fleetdata you only have to set-up one connection, as all data onboard is collected in one place. Whereas before connection to onshore had to be set-up for each type of equipment, which is not ideal neither from a technical nor from an IT security point of view. Main challenge for ABS will be that the majority of the sensor data, that they will receive, have not been worked with before meaning that it has not been validated before e.g. if sensors are working correctly. There may be data collected, but we have experienced that for example fuel flow meters were not calibrated correctly and there for their measurements were wrong.

A lot of firsts in this project, which is very exciting, and it will be interesting to see what ABS comes up with of recommendation to optimize our maintenance. This pilot project is breaking new ground on all fronts and a sign the MSS is ready to move forward in approach and work with data – Let's go get a bigger tent!

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Appendix

The appendix is available as separate document. List of the available documents below.

Appendix 1: 2024 Priorities OSV

Appendix 2: Interview with CTO Tommy Thomassen

Appendix 3: Interview with Head of Maintenance Hans Rasmus Skytte

Appendix 4: Transcription of Maintenance Strategy – Kick off Meeting.

Appendix 5: Transcription of Maintenance Strategy – Optimization Meeting.