Risk assessment of introducing electronic logbook onboard

Jutta Majaniemi

EXAMENSARBETE

Författare: Jutta Majaniemi

Utbildning och ort: utbildning i sjöfart YH, Åbo

Inriktning: sjökapten YH

Handledare: Mikko Varpio; OSM, Peter Björkroth

Titel: Risk assessment of introducing electronic logbook onboard

_____

Datum: 18.9.2020   Sidantal: 28   Bilagor: 1

_____

Abstrakt

Syftet med detta lärdomsprov är att kartlägga vid införandet av elektronisk loggbok ombord och är skriven efter uppdrag av OSM Ship Management Finland Oy.

Riskbedömning är en del av modernt företag och säkerhetstänkande. Fartygsmiljön är ett stängt samhälle och ofta utanför räckvidd av extern hjälp eller stöd. Att vara medveten om risker är extremviktigt i sådan situation. Genom att identifiera risker i god tid, är det möjligt att undvika olyckor och incidenter, åtminstone mildra konsekvenserna.

Riskbedömning ligger i varje parts intresse. Besättningen känner sig trygg och vet hur man ser på olika situationer i termer av faror. Företaget kan lita på att personalen är så trygg som möjligt. Varje olycka har sina konsekvenser på egendom, person eller rykte. Varje olycka eller "nära miss" - situation som inte händer är en vinst.

_____

Språk: engelska
Nyckelord: riskbedömning, elektronisk loggbok

OPINNÄYTETYÖ

Tekijä: Jutta Majaniemi

Koulutus ja paikkakunta: merenkulun koulutus AMK, Turku

Suuntautumisvaihtoehto: sjökapten YH

Ohjaaja(t): Mikko Varpio; OSM, Peter Björkroth

Nimike: Risk assessment of introducing electronic logbook onboard

_____

Päivämäärä   Sivumäärä: 28   Liitteet: 1

_____

Tiivistelmä

Tämän opinnäytetyön tarkoitus on kartoittaa riskit sähköisen laivapäiväkirjan käyttöönotossa ja kirjoitettu OSM Ship Management Finland Oy:n tilauksesta.

Riskiarvio on osa modernia yritystä ja turvallisuusajattelua. Laivaympäristö on suljettu ja usein ulkopuolisen avun sekä tuen tavoittamattomissa. Tällaisessa tilanteessa riskien tiedostaminen erittäin tärkeässä asemassa. Havaitsemalla riskit ajoissa voidaan parhaimmillaan estää onnettomuudet ja tapaturmat, vähintäänkin lievittää seuraamuksia.

Riskiarvio on jokaisen osapuolen etu. Miehistö kokee olevansa turvassa ja osaa katsoa tilanteita vaaroja silmällä pitäen ja yritys tietää henkilöstön olevan niin turvassa kuin mahdollista. Jokaisella onnettomuudella on seuraamuksensa kohdistuvat ne sitten omaisuuteen, henkilöön taikka maineeseen. Jokainen tapahtumatta jäävä onnettomuus tai "läheltä piti" -tilanne on voitto.

_____

Kieli: englanti
Avainsanat: riskiarvio, sähköinen laivapäiväkirja

BACHELOR'S THESIS

Author: Jutta Majaniemi

Degree Programme: utbildning i sjöfart YH, Åbo

Specialisation: sjökapten YH

Supervisor(s): Mikko Varpio; OSM, Peter Björkroth

Title:

_____

Date   Number of pages: 28   Appendices: 1

_____

Abstract

The idea behind this thesis is to map out the risks when introducing electronic logbook onboard and was ordered by OSM Ship Management Finland Oy.

Risk assessment is part of modern business and security thinking. Work environment onboard is closed and often far away from outside help, that's why risk awareness is vital. By identifying risks in timely manner, accidents and incidents can be prevented at best, and at least mitigated.

The risk assessment is in the interest of each party. The crew feels safe and knows how to look at situations in terms of dangers, and company knows that the personnel is as safe as possible. Every accident has its consequences, whether it is on property, person, or reputation. Each accident or "near miss" situation that does not happen is a win.

_____

Language: English

Key words: risk assessment, electronic logbook

Table of contents

1   Introduction

The modern world is developing fast and shipping industries cannot fall behind. Over last decades vessels have started to put out off use paper charts and books on board. They rely on ECDIS, and books are found on databases on the computers. Logbooks are mainly still in paper form, but after the change in law in 2017 it is possible to use an electronic logbook (Sjölag 674/1994 ch 18 §2). There are different reasons to use electronic versions of things. Mainly it helps with the workload and minimizes errors. For example, books and charts need to be up to date and this is done manually and depending on the traffic area, this can mean hundreds of updates weekly. It is time consuming, and it the possibility of errors is always there. Faster and more secure way is to just download the updated version. In electronic logbook there is many other features combined than just the navigational logbook. It is a system that covers all the logbooks from MARPOL to navigation. This way everything can be found in one place when needed.

The world we live in is full of risks. When introducing new software to any workplace it includes opportunities for problems. These start from attitudes of crew to frailty of technology. For this reason, every responsible company does have an interest in assessing risks. Not only that, for any company practicing in European Union it is also requirement; "(a) avoiding risks; (b) evaluating the risks which cannot be avoided: (c) combating the risks at source." (89/391/ETY, Article 6 paragraph 2) There are no actual downsides of risk assessment or what would be the problem with avoiding threats to human lives, property, and reputation of the company. People will remember the good and the bad, mainly the bad. Less accidents and problems, the better. Risk assessment and acting according to the results is a cheap investment compared with the possible outcomes.

 Logbook is and has been for hundreds of years a part of navigational equipment found onboard and usually mistakes with navigation are serious, from groundings to collisions. Navigational mistakes are usually a combination of multiple errors made in previous stages such as resting periods or false courses. Meaning, the logbook is not an active part of these mistakes, but it is the source where they should be found. From the logbook it should be possible to trace back the whole journey vessel has made. This is the reason why logbooks are regularly checked in different inspections made by authorities, and it should also be

taken into lifeboat in case of emergency. Wrongly kept logbooks will have consequences, and less remarks the better.

The biggest problem with any operation that can lead to any kind of consequences is always human error. More than 75 % of accidents happen with or because of it (maritimejournal.com, 2017). This is something that we are trying to minimize all the time by using electronic help methods. Still as long as there are people involved in the process there are risks and we cannot delimit the risks in electronic devices it selves. This to be said, there still is nothing in this world that is totally risk-free, and therefore assessing it is only logical and farsighted.

2 Problem

2.1 Assignment

This thesis is a request from OSM Ship Management Finland Oy. OSM Ship Management Finland was founded in 2014 when Neste outsourced their shipping operations. There are about 250 employees in the company which of nine are working at the shore office and the rest 240 onboard. At this moment, the company is managing six oil tankers and three tugs. Two new aframax tankers were built in 2021 and are both in operational use already. OSM is offering high quality ship management as it is taking care of the vessels' technical operations.

OSM Maritime Group is a Norwegian company founded in 1989 and with subsidiaries it is offering ship management worldwide. There is in total 15 000 employees at shore and onboard (Mikko Varpio, 2021).

Figure 1 Tug Ahti assisting M/T Jaarli on her first visit to Porvoo, Finland. Picture: Ville Virkki

Purpose of this thesis is to map and assess the risks of introducing electronic logbook onboard. This will include both technical and the humane side of the process. The important part is to figure out what are risks, when changing something that has been untouched for hundreds of years. Another important part is the future and us living in the world of technology that we trust, maybe even too blindly.

The big question behind everything is, what are the risks of introducing electronic logbook onboard? This thesis will not focus on all the risks or what the future and the process of introduction might bring. Purpose is to find out the risks by studying the functions of electronic logbook and try to figure out a reasonable solution for them. I also made a survey that got more answers than I was expecting that way I was able to look at the system in users' point of view. It turned out to be quite eye-opening and pointed out things that probably would have been otherwise overlooked.

There are a couple of different companies working on electronic logbook. When this thesis is written the only one with a software out on the market in Finland is NAPA. Therefore, I will be referring to NAPAs electronic logbook or logbooks just in general.

2.2 Method and structure

This thesis is a qualitative study as it does not have a simple hypothesis. The background will be found on different studies about risk assessment and problems with logbooks. Also, laws and different regulations were taken into consideration. The focus will not be on the survey even though it is helpful for understanding the humane side of the logbook as part of the officers' duties.

I used two older theses from Niklas Hellman (Elektronisen laivapäiväkirjan käyttöönotto aluksella) and Karri Lindholm (Laivapäiväkirjan käyttö vuoden 2017 lakimuutoksen jälkeen) and NAPAs website to get the idea of the basic function of electronic logbook. There were some things that were not all clear for me or I wanted to get a bit deeper into, so I wrote down some questions. As I had specified them, I was able to contact Lauri Heiskari from NAPA via e-mail. He was kind enough to help me and explain the operation of electronic logbook.

With help of two shipping companies Viking Line Abp and Bore Ltd, I was able to include a survey in this thesis. Focus was on the crew that is using or has used electronic logbook onboard and how they have experienced it. I was interested on both sides of the logbook and tried to get a good view of their personal experience.

3   Basics

Logbook and all different forms of it have been part of navigation for centuries. It includes all the different steps from the journey and information all the information from loading to discharging. Idea Is that everything happening onboard, that is relevant for the operation, is written down so it can be traced back. Navigational logbook is not the only logbook onboard. Depending on vessel there are books from engine logbooks to garbage record books, simply meaning that there are many different things that needs to be filled in and up to date. Seafaring nowadays is very regulated and supervised.

One starts easily wonder what the point of these books are. It might feel like this is some pettifogger's plan or one more reason for the authorities to complain. These books are there to help the crew to prove what they have done, and what not. Logbooks are written with a ballpoint pen, and it is not allowed to smudge over so that it cannot be read. Might

an accident or problem occur, steps before it can be found easily during the investigation. This can be very helpful to find out the reason for the accident, but also there is a learning opportunity and a possibility to avoid same kind of accidents in the future.

Idea with electronic logbook is that everything that there will be no need to write anything by hand. All logbooks can be found in the same software, in a nutcase; there will be no more different books wandering around the vessel. This makes it easy to browse them and it can be done almost anywhere using a desktop onboard, ashore or using the app (NAPA, 2021). The connection for all this information is also on the shore side of the company, persons working ashore can easily check out what is going on onboard and how things are working.

There will be individual user account for each who is required to fill the logbook. That way it is possible to know who has made which entry and limit the rights to use the system. Entries that are made and saved cannot be edited or deleted. This makes it impossible to alter what ones has been marked. Software can be installed in all the computers onboard and even as an app for mobile phones (NAPA, 2021).

Both systems are legal around the world. The electronic logbook is authorized in 22 countries, but there might be some restriction in some countries (NAPA). In Finland the electronic logbook has been authorized as solo logbook since the change in Finnish maritime law (Sjölag 674/1994 ch 18 §2) 2017.

4   Risk assessment

Risk assessment should be a priority for every modern company, and it is required by the European Union (89/391/ETY). The importance of understanding risks and studying them cannot be underestimated. Since we, usually, learn from our mistakes, accidents are a part of that process. Accidents tend to have consequences and sometimes not too pleasant, the importance of avoid them beforehand comes into picture. This is the part where risk assessment comes to question as "a process to identify potential hazards and analyze what would happen if a hazard occurred (ready.gov, 2021)." When we are aware of the risks they can be avoided and minimized. This can save lives, resources, money, and time. Everything that is valuable for the company and its employees.

As I wrote, risk assessment is something that is required by the European Union in their council directive (89/391/ETY). It is clearly written that employer must avoid risks, evaluate ones that cannot be avoided and combat the risks at source. This should make everybody understand the importance and the change to avoid future accidents that might even be fatal. It is time for mankind to learn from mistakes, not to repeat them.

4.1 Risk

First thing is to understand what a risk actually is. In spoken language risk is a synonym for failure or the likelihood of failure. In science this is not the case.

RISK = likelihood of appearance X consequence

(Tuomala, 2010)

The threat usually origins from natural or human causes. If you spill coffee on your computer, is that a clear human cause. During winter your pipes freeze and that causes an accident is that most likely a natural cause. Both are scenarios that can be assessed and maybe even avoided.

Likelihood is a big part of assessment. When living in a warm country like Indonesia it is not as likely that your pipes will freeze as in Finland. This simply means that the risk is a lot smaller or even nonexistent. Coffee, that can happen anywhere anytime. This is something that need to be kept in mind when talking about risks and risk assessment.

Every action taken has consequences, that is something we have been taught us already as children. When talking about risk, consequences must be taken into consideration. They help us to evaluate the severity of the situation if it is worth it, so to say. There is a great difference in the end if the consequence is a loss of life or couple thousands of euros.

4.2 Formal safety analysis

There are different methods for risk assessment. The method used depends on the target that is analyzed. The basic idea in all of them is to figure out how likely a problem is to occur and the consequences of that. The final result is the impact and its severity on people, environment, property, and reputation. These can be distributed in even smaller segments, which makes it easier to prepare for the consequences.

Most used method in the maritime industry for risk assessment is formal safety analysis (FSA). Therefore, I will also be using this method in this thesis. It is a very clear method, and the information is easy to check again and re-analyze. To evaluate the hazards method uses experts, surveys, and interviews. It is also possible to learn from other industries that are somewhat similar, in maritime that would be for example aviation (Tuomala, 2010).

Figure 2, FSA Method (Tuomala, 2010)

FSA's method is quite simple as shown in the diagram above. First things first, the hazards must be recognized. If the one cannot pick them out there is nothing study and evaluate. Doing this requires for example help from experts, statistics and commonsense.

Found hazards need to be evaluated. In this process hazards are made into risks with likelihood of happening and consequences. Here different aspects, people – environment – property – reputation, are taken into consideration. A hazard is put to each aspect and studied if it has any affect to that.

Third step is quite important. This is the part of analysis where the critical change can be made to avoid the risk. The solution for the risk or at least the way to minimize it is the key to whole assessment. What would be the idea of pointing out the risks and then just let it be. Information we are able to get from this step is important for every person working with the risk.

Fourth step is a natural part of any assessment. There is not one company that is able to run with good will. Then of course, as the survey is returned the solutions and

recommendations are also part of that. Due to the nature of this thesis, I will not include these last two steps in it (Tuomala, 2010).

In the second step, a help tool I have is this table below. The colors for the risk analysis are coming from the table below. This makes it easier to follow. It a modified copy of one that OSM uses for their risk assessment. First horizontal column is for the likeliness of the risk happening. Impact is meant for people, environment, property and naturally on company's reputation. These combined give us numbers from each section. Heavy impact (4) x Possible (3) = Moderate to Major (12)

	1. Highly unlikely	2. Unlikely	3. Possible	4. Propable	5. Highly propable
1. No impact	1.	2.	3.	4.	5.
2. Light impact	2.	4.	6.	8.	10.
3. Moderate impact	3.	6.	9.	12.	15.
4. Heavy impact	4.	8.	12.	16.	20.
5. Massive impact	5.	10.	15.	20.	25

1-4 minor   5-10 Moderate to Major   11-25 Extreme

Figure 3, Table of likelihood and impact

4.3 Recognizing a risk

The first obstacle is naturally the biggest since one can does not do assessment of anything unless the risks are found. We are aware what a risk is and how the assessment works, but it does not help too far.

There are a few different things that can be done to recognize risks. As mentioned before in chapter 4.2 one can ask the opinions from experts as also done in this thesis, the expert being NAPA's representative Lauri Heiskari. Other one is to ask the actual users what they think, and luckily this was also possible as the form of survey. These two gives us a very good foundation already.

The rest is left for imagination, breaking down the big picture and imagination. One must go through the problem step by step, thinking what will follow if this happens. Part of the risk assessment is that you are pessimistic and try to think about the worst scenario all the time (clearrisk.com, 2021). This is later fixed with the "impact and likelihood" -table presented in chapter 4.2. Lastly the imagination, one must figure out how things would be working in such situation or with such tools given in the situation. Finally, one should have at least the most likely scenarios what could happen.

5   Risk analysis

Recognizing the hazards is the hardest part of risk assessment. There is always a possibility that some hazards go unnoticed. With the discussion with NAPA and the survey it was possible to figure some of them out, but one can never be absolutely certain when predicting future events. It is important to stay as objective as possible because everyone has their own motive and goals. There are risks with everything and they just must be dig up to daylight.

Risks with actual cyber and technology part will be addressed in chapter six since it is a quite extensive field.

5.1   Authorities

Since the Finnish government and all the biggest maritime countries have approved the use of electronic logbook there should be no problems with that (Sjölag 674/1994 ch 18 §2) (Marine Notice 09, 2020). The main thing that should be kept on mind is that there still are countries that have not approved it, or they have approved it with some exceptions.

When planning the voyage to new ports and countries it is important to take into consideration these things. Before entering any new port, the crew should be aware what the situation is in that particular country. No company wants unnecessary problems with authorities.

5.1.1 Vetting

Vetting is an inspection executed only on tankers. Meaning of the inspection is to make sure that the vessel and the crew are both fit to operate the cargo safely from port to port. Vetting is a requirement from the cargo owners, without a passed inspection there will be no cargo to carry and that is simply bad business. Since the inspections are nowadays done by independent surveyors most oil companies can agree to use same inspections results, vetting takes place approximately three times a year.

Intertanko has published a guide for vessels that are about to undergo vetting inspection. The guide clearly states that "must be written in ink (INTERTANKO, 2019)" Since this could have been the end for electronic logbooks on tankers, I decided to contact Intertanko directly via e-mail.

Turned out that Intertanko follows The Bahamas Maritime Authority (BMA) and its Marine Notices. They have given out Marine Notice 09 that "outlines the requirements for the use of electronic record keeping systems." This is something that allows a vessel to keep an electronic logbook, but there are strict rules that needs to be followed so that the authenticity of the hard copy can be proven. For example, if printed out, each and every page must be signed by the master "as a true and complete copy of the corresponding entries in the electronic record keeping system (Marine Notice 09, 2020)"

Talking about the backup the system should get its power from both main and emergency source of power. The system must be able to make secure copies, what type, one can choose by himself. Also, the data must be possible to recover after a system failure. Naturally the information from the system, must be possible to transfer into "removable storage device (Marine Notice 09, 2020)"

5.1.2 Assessment of authorities

Since electronic logbook is authorized in biggest flag states there should not be problems. There is still the fact that there might be some restrictions for the logbook and countries that do not approve it all. Finnish vessels mainly operate with countries that have approved, conclusion that restrictions should not be problem.

Entering a country with logbook not up to date or unauthorized one, has problems if there would be an inspection. Consequently, there might be fine or even detention for the vessel. These things effect reputation. The likelihood of inspections is quite small if we think how many times a vessel is in a foreign port. Still, it is a requirement to perform for example port state once a year. Impact to the reputation is minor, yet still there.

The Marine Notice 09 requires for example unique passwords for each officer, no possibility to delete anything and a backup. Something that NAPAs system is fully capable of doing. No information can be lost during the power failure; therefore, the record systems must be able to get power from the main source and emergency one also. Probably the biggest thing will be that when the pages are printed out for any reason, to be authentic and true the pages must be in same lay out as they were in hard copy, and each page must be signed by the master. There can be quite many pages as one can imagine, the reasons to be printing out the pages we will return in chapter six.

One way to avoid this problem is to keep double logbook. One in writing as we have always done and then electronic. One might question whether there is a point in that, but in the beginning it can be helpful. Also, when it is unknown where the vessel is heading and it has no permanent route, this method can be used.

5.2   Human factor and human error

Many experts have pointed out that the biggest cause behind accidents and close quarter situations is the human error (Tuomala, 2010) (maritimejournal.com, 2017). That means that a person made some mistake in some point of the process that led to the accident.

Human error is categorized into three different groups. First one is based on competence, meaning errors like action - and checking errors. Second is the error based on rule, including

retrieval errors and transmission errors. Lastly, the group of errors based on knowledge with diagnostic - and decision errors.

All these groups have their base in different human factors. Errors cannot be removed unless the factor is dealt with. A good example of human factor is stress, something we all are familiar with. Stress has many side effects like insomnia and that is something that starts to cause problems, if prolonged. Unfortunately, human factor is something that is not possible to eliminate, thing that makes it human.

The factors come from all the different things from stress, motivation, management onboard to company policies and standards. All directly connected to individual. Onboard there are people from different backgrounds with their own idea of vision of everything. Education and life quality are the key in fighting the human factor. Understanding the reasons for human factor is the only way to try to eliminate them. In a perfect world we would not have factors anymore, but that would also make it a world without humanity (Tuomala, 2010).

5.2.1 Human error

Automation first came to help and increase production. It minimizes the risk of human error and that should make workplaces safer. If we look back this is very much true, but we must keep in mind that the one controlling automation is human. Basically, we cannot take the human factor out of the picture completely.

I believe that the biggest problems arise with the fact that it is simply too easy. People often seek the easiest way out. When there is a machine doing the work for you, why would you bother. There is a lot of work to be done, besides of writing some remarks on a book. Another thing is attitudes. Seafaring is an ancient line of business. Technology changes quickly but attitudes do not always keep up with that. We have still onboard ones that believe women onboard are bad omen and ones that rule for autonomous vessels.

One good thing I want to point out that I came across in the survey was the markings themselves. Handwriting is something that makes us personal and is part of us, but it can give grey hair to our colleagues and inspectors. Markings should be legible and written with

computer, there should be no problem. Misspellings are part of life and those can be corrected after, by the rules of course.

5.2.2 Assessment

Likelihood of human error is magnificent. Over 75% of accidents and near misses happen due to human error (maritimejournal.com, 2017). This gives us straight forward answer for that part of likelihood, probable.

Electronic logbook is able to collect information straight from the vessels own systems. Positioning is something that should be cross-checked every now and then. The possibility of system failure is always there, but nowadays we trust the systems maybe too much. This is something that leads to misinformation and blind feeling of safety. This can be extremely dangerous if we think we are somewhere we are not. Not directly combined with logbook, but those positions, right or wrong, are written down in it. Let us say that after grounding we then try to figure out where we actually are, false positions make it hard and time consuming, when figuring out when did false information start.

Attitudes change all the time. We have generations working onboard and different nationalities. Different people kept in a relatively small quarters sometimes months brings it own spice to the table. Introducing new technology can be something that is not always only welcome. Poor attitude has many reasons, from older seaman "it has always been this way" to the lack of interest to learn something new again. Attitudes can be changed with positive reinforcement, depending on people it can be easy or almost impossible. All in all, this is something that must be taken into consideration. Crew can simply start to reject new innovations, leading to that only bad sides are found. Even though, there are grownups working onboard, it does not mean they are not childish.

The impact can be anything from none to massive, I decided to take the midway. Logbook is seldom an active part of the accident, but the human error is too extensive to be neglected. Midway impact is moderate.

Risk of human error rises, the longer one spends time onboard. This is natural and hard to avoid but keeping the environment positive and supportive is vital. When crew is motivated and in good spirits, work will be appealing and done properly. Everything starts with good management both onboard and ashore. This is the first step to fix any known or underlaying problem in company.

As in any other field of expertise older generations are retiring and younger ones are entering. Generations that are born to use technology as a sidekick, will demand on progress and changes. Is this a good or bad thing, is something else, but I believe that this will help with introducing electronic logbook.

What comes to the basic mistakes that are made when filling information in the logbook is another thing. Companies have different policies but each of them, at least the ones I have worked in, require cross checking the position occasionally. This is a simple solution to check GPS position and used with paper logbooks also. Crew must understand that technology can fail us, and we must be capable to use different methods to get our answers.

5.3 Operating system

Learning to use a new software naturally takes time. Some might need it more than others, but adapting new operating models is not going to happen overnight. Taking time for the transition process is necessary. NAPA will keep an introduction for the system, so one does not need to study the manual independently by heart before using the system (Heiskari, 2021). This will help the process since one can get questions answered right away. In the future there is a possibility that an independent person, not from NAPA, can teach how to use the system. To be kept in mind is that the introduction is not universal for all the logbook systems rather a type education as in ECDIS. NAPA also has an IT service to help.

But this naturally requires connection to shore and a well-known fact is that the Wi-Fi can be down for numerous reasons.

The software is available only in English at least for now (Heiskari, 2021). This might give some problems with crew that is not too fluent in foreign languages. STCW requires every officer to be able to write and speak English. This should out put the language problem and new vessels on Nestes fleet have English as working language. Pointing that there should not be any kind of problem, true story might be quite different.

The survey showed that some think that the system itself has some unpleasant features. Logbook is a daily tool, or necessary evil, for officers onboard. User-friendliness is an important part of pleasant work environment, and would the daily tasks be difficult to perform, they would most likely be slightly neglected. That is not a preferred outcome since every shipowner wishes that the vessel is taken good care of.

5.3.1 Assessment

Learning to use the new software can be difficult to some people. It can take time but with the help from NAPA and colleagues, I highly doubt that one would not learn to use it. This is something that might take practice and time, depending on the individuals' skills and motivation to learn, how much. With electronic systems there is the fact that they can change and upgrade with new features. The learning will, so to say, never stop if compered to paper logbook, but I highly doubt that is something that needs to be worried about.

What comes to the foreign, in this case English, language the problem should be almost non existing. STCW requires officers to be able to speak and write in English. On the four new vessels on Nestes fleet English is also working language onboard, meaning that language should absolutely not be a problem. Also, the overall skills in foreign languages are getting better if we compare for example 1980's.

Problems with operating the system are very unlikely and minor. In case no one would learn how to use the system problems would arise, but likelihood of that happening is basically zero. Impact of these is also minor since there likely is always someone you can ask if help is needed. Technology is that way simple that one can just try different ways until the result is satisfying, and only after that save it.

To avoid these risks, it is important to see that every officer does the training before using the logbook. It would be helpful that in every rotation there is someone who can use the software well, in cases there is no possibility to connect the shore personal. According to the survey NAPAs support is good, so that will also help a lot in the beginning.

6   Cyber security

The world we are living in today, depends on technology more than we can probably imagine. Technology is here to help with workload and make living easier. There is no need for as much resources as it was before since new systems makes every operation more and more precise. There is no field of expertise that can avoid it, since our society is completely depending on technology, and it is impossible to keep a company running without customers.

Unfortunately, everything meant to be good and helpful for the mankind has an ugly mirror image. We are all aware of the presence of hackers and cyber terrorists. They do have their own agendas, some do it only for simple greed and some might think they are serving a bigger agenda. No matter the purpose they try to take over the systems or even make them fall. A well-known attack happened in 2017 towards one of the biggest shipping companies around the world, Møller-Maersk (Reuters, 2017). It was probably the final eyeopener that made everyone realize that there is not one place or field of expertise on this planet that will be able to avoid the dark side of technology.

Technology has more limitations than just hackers. They might be the ones that can cause most serious problems, but there is more everyday problems technology has to offer. As we all know, development is fast, but we still suffer from same problems from freezing screens to total system errors. These can be a real buzzkill when happening at the wrong time in a wrong place.

6.1   Backup

Shore personal cannot read the information from a paper logbook directly. This is a benefit that electronic logbook has, when connected the systems information can be browsed on shore side. Naturally it also raises the question of "big brother watching", but it is good to keep in mind that anything happening onboard should not be a secret. Besides when the shore personnel are able to actually see what is happening and not always forced to ask, they can get a better picture of the whole operation and it can minimize misunderstandings. Crew onboard does not need to search for the answers, because shore side can do it by themselves.

Problems arise when the system does not save information or does, but due to some failure loses it. Keeping the records straight is important for company but biggest problems will probably arise during inspections or possible trials or when otherwise proof of vessels actions are needed. One cannot give blank pages to authorities and blame it on a download error. Everything must be possible to study after up to seven years after last entry (Marine Notice 09, 2020).

Everything in the logbook can be moved to an USB drive or printed out. The system can also be used offline, so the entries can be made even they are not shared with the shore side. This is something important since the Wi-Fi is not always working or fast enough to perform properly.

The endless backups and stress of having them up to date, easily makes one wonder if the system is worth it. Back up will be couple clicks away and not require any manual labor, but traditional logbook is way simpler. You write it down and it will be there, in case of emergency you just take the book and evacuate. Does first officer stay onboard and make hard copies of logbook while the rest of crew waits in the lifeboat? What happens if somebody accidentally uses one of the backup USB drives for something else and by doing that destroys all the material in there. Besides of being keelhauled, the amount of work for the officer will be overwhelming.

6.1.1 Assessment

I believe that these chances are pretty small if the working environment is organized, but since there always is a "but." Bringing new technology onboard should make the officers feel like it is helpful not a burden and doing the same work basically twice does not give that picture. Giving a good and helpful picture at the introduction, is important since the image will stay a long time in officers minds.

All the problems with back up are completely avoidable. The question is more about how efficient it is, but that is not directly the problem of this thesis. The problem is how to get the double work that officers need to do and how the backups should be done.

Viking Line is using both logbooks simultaneously. They do not depend on backups because they have a paper logbook to show for inspectors and to take with in case of emergency. This way there would not be problems in countries that do not approve electronic logbook either. This method eliminates the problems, but as said before, double work and efficiency. One way is to take a hard copy of the logbook on frequent intervals, daily or maybe even after every watch.

What comes to lost, damaged or any other way problematic USB drives is quite simple. The work environment should be that professional things like that cannot happen. Manufacture problems on USB drives cannot be blamed on the crew but if they are lost or swim in coffee cups, that is a different thing. A clear spot where they are kept and after use always returned.

6.2 Personal information

Logbooks are the only method to trace back ships actual journey step by step and it is an official document. Entries need to be traced back to the person who has written them. This is vital information if an accident would occur. There are two options: the old school

password or ID card. That way the inputs are signed like they would be in the paper version with electronic autograph. There is also no possibility to erase already written and saved information, at least for the most of us.

6.2.1   Assessment

I would say that this method is even safer than a paper logbook. Since almost anyone can forge a signature but stealing an ID card is harder. The risk of something like that happening, of course depending on the crew, minimalistic and the impact also small, since I believe loss of an ID card would be recognized quickly. Of course, one might wonder what the point of stealing something like that, but one might never know before actually dealing with it.

The impact would mainly be personal to who's ID is stolen or otherwise misused. They start when the crew is deeply unequal and focus on hiding the accidents rather than discussing and learning from them.

The only person we actually know onboard or anywhere in life is ourselves, some maybe have problems even with that. Point being, one should never trust blindly in anyone, but if we cross the line where people start to steal others personal belongings, we are in very deep waters. At that point the problems are something that are showing in many other situations also.

That is why likelihood should be closer to zero than one. This is also easy to eliminate by keeping your password only to yourself. One does not give out bank information or other passwords, so why this. ID-card should not be left unguarded.

6.3 Hackers and viruses

A well-known company in the world of shipping company Maersk was under cyber-attack in 2017 (YLE, 2017). It opened the eyes for whole world to understand that there is a great risk to be manipulated by third party. Systems and software's are ever developing so to be on top technology can be a struggle, more likely impossible.

Reasons for hacking can be from basic criminality to making a point to your own agenda, anything between heaven and earth. People tend to have in their opinion a right to "make themselves visible" to detriment of others. Professionals are considering the risk of cyber-attack higher and higher every day. Bigger the company more likely something like cyber-attack is to happen.

OSM is not the smallest company worldwide and in Finland only focusing on Neste Oils tankers. There is money in oil industry and fossil fuels are pretty parting as we seen in Finland, a great example of this kind of movement is Elokapina (YLE, 2021). As the green values are rising and people starting to protest to an increasing extent. The risk of becoming under attack I would consider major.

Well since it is only logbook we are talking about, what kind of damage it could do, that third party is checking it? Problem is that information on logbooks is considered confidential. On an electronic logbook, since you can put all the log – and record books under the same software, there will be a lot of information that should not be put out there. Depending on the area where the vessel is sailing everything can be sold. Just imagine a tankers information sold to rival company or even pirates. Also, the simple fact that someone is manipulating information in an official document is not good. Something that need to be kept in mind is that the computers have more information than the logbook alone, most work by the officers is done on computer nowadays.

6.3.1 Assessment

If there is not an actual person trying to mess with the vessels systems, it is time to worry about viruses. Computers are a normal part of the day onboard nowadays, so awareness of these tiny bastards is on a positive note. I believe I can say that everyone on the crew knows how they are able to get on a computer and that way how to avoid them. There is always a possibility of temptation and of course, these things do evolve and sometimes it is just bad luck, if you get a virus.

NAPA has not had problems with cyber-attacks or viruses, so far (Heiskari, 2021). I would say that this is something that is only waiting to happen. Where and when, I do not know, but since everything is not fairytale and glitter, the odds that they would never have to deal with problems like this is nonexistent. As an attack would likely be focused on all the systems onboard and not singly on logbook, I would say that it would take the likelihood down a little. The damage an attack or even a virus is able to do is significant. It can be anything from a funny joke of sending a virtual sheep to shutting down whole system for unknown time period and blackmailing.

Viruses are quite easily kept away but everything is developing fast, and we are not able to keep on its pace. It is important to work as safely possible and keep in mind if it seems too good to be true it most likely is, you did not just win around the world cruise. With hacker it is a bit different and more challenging. I do believe that if they want into the systems, they are going to do it and succeed. Being careful and realistic online and keeping work and spare time apart, will help a long way.

7   Survey

Since it is in NAPAs interest to have as many electronic logbooks as possible onboard, we cannot expect a totally impartial opinion from their side. When the possibility to ask the actual users arose, I knew it could be a gamechanger. Opinions of the actual users could show are my thoughts clever at all or am I reaching out for nothing. And it could show me things that might not even be considered.

The survey was open from the end of May until the beginning of October. I sent the survey for the companies' (Viking Line and Bore) representatives, and they send it forward to the crew onboard. Electronic logbook still does not have that many users under Finnish flag, so I really did not know how many answers I should expect taking in consideration all the aspects. But I was quite pleased with the results, even though one always hopes for more.

The survey was anonymous, so there would be no pressure whatsoever with the answers. I also kept the survey as short as possible since, the motivation to answer any survey goes down the longer it takes.

Since there are not too many vessels using electronic logbook under Finnish flag, sampling was quite small. That's why I was quite pleased with the number of answers I got, total 12.

7.1 Survey structure

The survey started with the most basic questions of age and position. I had a strong believe that age would be a great factor in, how it is to learn new systems and how well it is accepted. This also gives a good overview of the experience, keeping still in mind that some of them might have stated their carriers at the age of 16 even 15. Position was a natural continuum, for the first question. The first to question were the only obligatory questions. Most answers I got from ages between 26 and 35 (66,7%). This was quite expected, sadly there was none over 55. That way the oldest generation of seafarers was basically left out of the picture and that way some important experience and perspective.
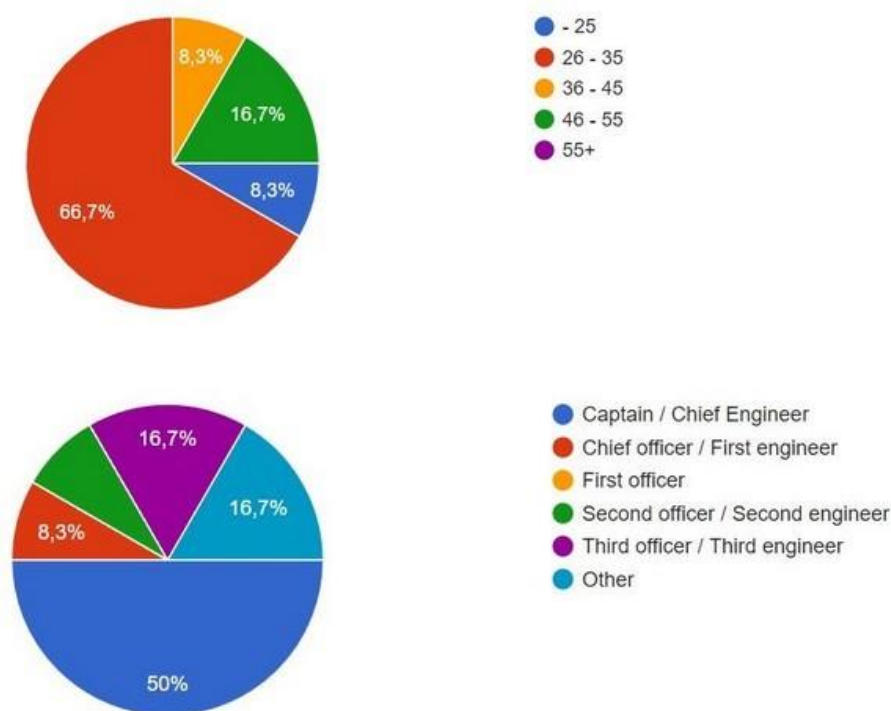

Figure 4, Age and position distribution

These were followed by the actual questions about logbook. Most of them were easily answered from a scale of one to five, one being very bad and five being very good. That made it easy to analyze them. There were still some questions that I wanted a real written answer for, such as advantages and biggest difficulties. Since the whole idea of the survey was to get their own voice out, it is important to have space to express oneself freely and write down opinions. This is one of the reasons why the survey anonymous, so no one would feel pressure while answering.

7.2   Results

The first thing one can see clearly is that the overall opinion about electronic logbook is positive. I believe that it is a part of natural transition to electronic systems all around the vessel. Paper charts are ancient, and books are mostly on the computer now, so it actually does not change that much if the logbook is also. I asked which one they would prefer to use onboard paper or electronic logbook, and the answer was clear. 75% would use electronic logbook rather than paper one.
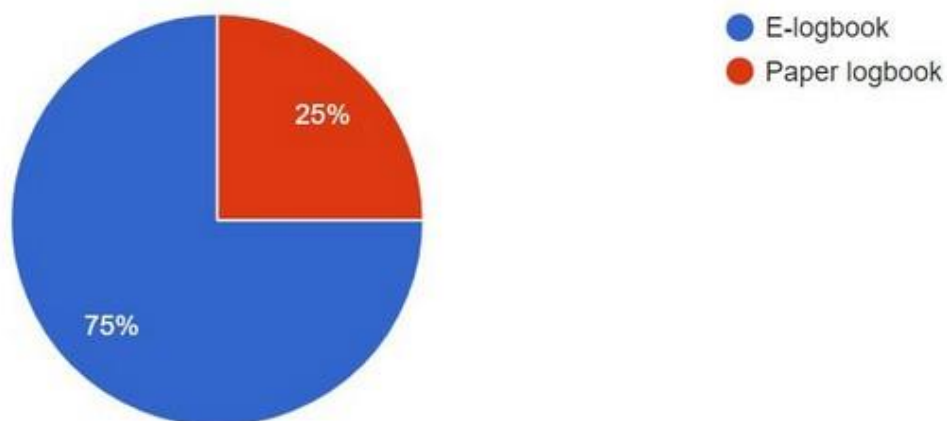

Figure 5, Preferred logbook

There were no big issues with anything related to the logbook. This is most likely one of the reasons why they would prefer to use it. It is hard to hate something, that one cannot find bad sides of.

Everyone had learned to use it without any bigger difficulties, and five answered that there were some difficulties. The system was found mostly user-friendly, on a scale from 1 to 5

the answers were divided equally from three to five. One mentioned that the layout was a bit tricky, but all in all everything was good. This is also something that depends on a person since it is a matter of taste. Fact is that time needed for learning a new systems will be longer if the layout is a rat maze made by Picasso (1881-1973). Technical support was found good, but it also did get the lowest scores in the whole survey. The one I was really interested about was whether there were problems with authorities such as port state etc. This is something that could affect the vessels schedule and even cargo. Turned out that only three of twelve had had some minor issues. This is something that can be depending on the traffic area, but still gives a idea that there should not be any kind of issues, when kept on mind that it is not uncommon that there are problems with paper logbook that has been used for ages.

As mentioned, part of the electronic systems is to help with workload. Since Viking Line for example is using both systems simultaneously, it is not reducing the workload. I found out that when one is used to do something manually, it will take time before electronic system will be beneficial due to the fact learning to use the system and all its tricks will take time. I would boldly state that every officer onboard knows what and when to write in a paper logbook. As it happens naturally with routine, it does not take that long, not even noticed amount of time.

The biggest advantages where quite similar to everyone answering. One funny thing I realized was that everyone has some problems with their own or co-workers handwriting. Electronic logbook has "strength in uniformity of entries" as one answered in the survey. In my own experience the biggest problems arise with numbers, when they are written fast or simply in different styles. Another common advantage was that the information is easy to access, collect and it gives good overview. There was also mentioned that all the logbooks are under the same system, so no more different books.

All in all, I would like to say that the response is good, since 75% is pro electronic logbook over the paper one. It would be quite a natural transition; everything could work very smoothly without any bigger problems. Transition requires naturally time and that must be taken into consideration. Depending on the length of the rotation onboard it will most likely take a few months until everything runs as it is supposed to. Also, when new officers are introduced to the system it will take some time of the familiarization, since they are most

likely not familiar with the system as they would be with the paper logbook. I asked the "all in all" -opinion and the results with the preferred one are quite clear.
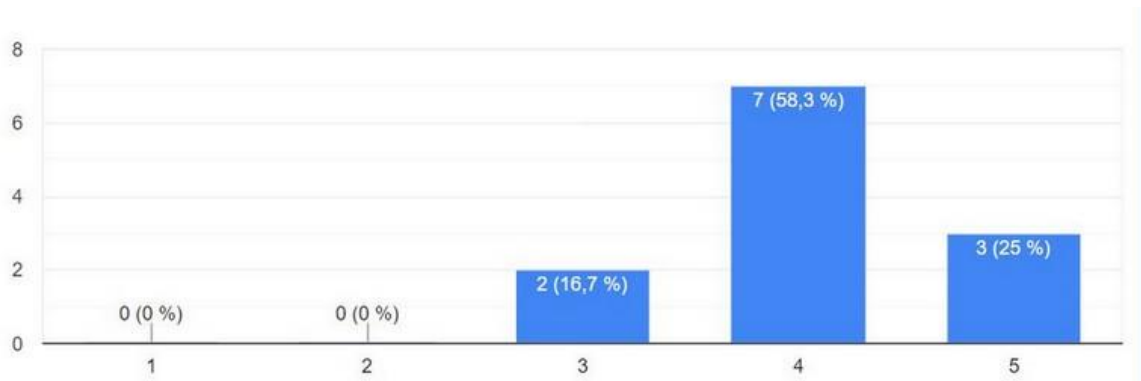

Figure 6, "All in all" -opinion about electronic logbook

8 Conclusion and self-reflection

In the world of risks, we cannot predict everything. Sure, it would be a safe world with some fortunetellers, but unfortunately that is not how it works. That is part of the reason why we need risk assessment in the first place. With good assessment we are able to make good choices and minimize hazards. Minimizing hazards is a key to safe work environment especially onboard.

The risks in introduction of electronic logbook are quite small. The biggest threats are coming from the cyber side of the system, and naturally of the human factor. Human factor is something that commercial shipping has dealt with hundreds of years. Cyber-attacks are a real risk, but also as the whole industry relaying more and more on the technology is a risk that needs to be faced with or without the electronic logbook. One more system is unlikely to be the cause of an attack.

The real question lying beneath the surface is, does the logbook do the work and is it the help method that it promises. The price of the system is quite high and company with many vessels it is an enormous investment (Hellman, 2020). As an investment it needs to have more beneficial sides than others, and maybe that is not the case.

8.1   Perspective

As I wrote this thesis alone, the reader can naturally see my priorities and opinions through the text. I tried to be as objective as possible it is impossible to not show the human side in one. I had quite clear in mind how I wanted to do and execute this thesis, it was not too easy.

The biggest struggle was that, how will I recognize a risk. Am I overanalyzing things and seeing a risk everywhere? On the other hand, maybe I am leaving something important out and not seeing the trees in forest? This is something that took time, and I will probably never be pleased with. There are different ways to recognize a risk, but nothing is perfect. The fact is that some risks are likely left out and some risks analyzed too far. As the field of electronic logbooks expands more and becomes more popular this task will most likely be easier as the risks will come reality for many crew members onboard.

8.2   Exclusion

The part of any research is to narrow down the field of interest. Without things will start to overflow and the result will not be good. The problem is that one can narrow it too much or too little. I had a quite clear field of interest. Thesis would be about the introduction of electronic logbook; I would write about NAPA's system only and vessels under Finnish flag.

Since there are not too many users in Finnish vessels, the results were exiguous. Yet I believe that this must be done, because trying to contact hundreds of people around the world would simply have been impossible. Question is, should I have taken all vessels in the Nordic countries or maybe Finland and Sweden. At least there could have been more comprehensive sampling.

8.3   Outleft

In my opinion there was nothing left out in this thesis. The sampling could have been larger for the survey to get a better view of the system. Otherwise, it answered the problem that it was supposed to.

Something that I would like to see is research about the actual introduction of the electronic logbook onboard. It would be interesting to see are there going to be problems

described and what more comes under the first half year of its use. Shipping in 50 years will be very different from where it is now. Compering shipping today to the 70's, should open eyes for everyone and make the fast development reality.

9   References

(24. March 2020). *Marine Notice 09*.

674/1994, M. (2018).

89/391/ETY. .

89/391/ETY, Article 6 paragraph 2.

clearrisk.com. (1. October 2021). Noudettu osoitteesta
https://www.clearrisk.com/risk-management-blog/8-ways-to-identify-risk-0-
0

Heiskari, L. (May 2021).

Hellman, N. (August 2020). *Elektronisen laivapäiväkirjan käyttöönotto aluksella*.

INTERTANKO. (July 2019). *INTANKOS Vessels' Practical Guide to Vetting 3rd Edition
2019*. INTERTANKO.

maritimejournal.com. (10. April 2017). Noudettu osoitteesta
https://www.maritimejournal.com/human-error-accounts-for-75-of-marine-
liability-losses/896283.article.

Mikko Varpio, O. (1. August 2021).

NAPA. (1. May 2021). Retrieved from https://www.napa.fi/software-and-
services/ship-operations/napa-logbook/

ready.gov. (1. October 2021). Retrieved from https://www.ready.gov/risk-
assessment

Reuters. (June 27 2017). Retrieved from https://www.reuters.com/article/us-cyber-
attack-maersk-idUSKBN19I1NO

Sjölag 674/1994 ch 18 §2.

Tuomala, V. (2010). *Merenkulun turvallisuus suomalaisissa kauppa-aluksissa.*
Innofirma.

YLE. (28. June 2017). Retrieved from https://yle.fi/uutiset/3-9693490

YLE. (9. October 2021). Retrieved from https://yle.fi/uutiset/3-12120282

Questions for the "Survey about electronic logbook"

- Age

- Position onboard

- Was it easy to learn to use the system?

- Has the system helped with the workload?

- Has there been any problems with authorities? (Port state etc.)

- Is the system user-friendly?

- How helpful is the technical support?

- The biggest difficulties with your own words.

- The biggest advantages of the system with your own words.

- Which one do you prefer?

- All in all opinion about the e-logbook?