

Implementing regulations to a fleet of vessels

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Abstract

New regulations are a constant factor within the Maritime Industry. There are changes imposed from new legislation, implementation of new technology, economically motivated changes and changes driven by consumer behavior to name a few drivers of change in the Maritime Industry. However, onboard the ship, shipowners strive to keep crewmember numbers at a minimum, which allow for normal maintenance and running the vessel but limits the resources to keep up with the regulations. Simultaneously, economically motivated incentives, have made mixed nationality crews and sourcing of employees from all over the world the new standard. This creates a multifaceted challenge to implement standards from a shore-based organization to a fleet of vessels.

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1 Preface

I have chosen to examine the topic of implementations closer as I have experienced the troubles described firsthand for 8 years working as a Technical Superintendent. Interpretation and regulation work, including implementation is a big part of the day-to-day tasks. While performing these tasks I have been more and more convinced that it can be done in a better way, both from authorities and from the shore-based organization to the vessels. Ideally more effort may in the future be put on this matter. I hope that colleagues in similar situations may benefit from this thesis and possibly also regulatory bodies. My gratitude for assisting with this thesis to interviewees who came with valuable input to achieve the result.

2 Introduction

With each regulatory change in international or national rules, imposed or optional, it takes form in new regulation to consider for a shipping organization. The office team working with the change, will in most cases be quite familiar with the intended change and all its implications, they might even be the ones coming up with the suggestion. However, an area of concern is the implementation process of a new regulation from the shore-based organization and onboard to the vessels. Failure to comply with regulations onboard vessels become evident at port state controls, class inspections and charterer-initiated inspections and poses a negative effect on the whole organization. This thesis takes on figuring out what the challenges are, why they are there and also gives guidance on how to overcome them.

2.1 Compliance failure – a constant factor

The motivational and psychological difficulties are evident in implementing a complicated new legislation as the Ballast Water Management Convention or the ISM code for example. These are to be addressed in the study and tools researched to overcome them. Methods from other industries and areas will be considered. This will be the core problem to be analyzed; how to come up with a best practice of turning a complex generally written regulation paragraph, which is hard to grasp, into hands on specific instructions that motivate the crew to comply while also promoting sound values within the company.

Once the change is confirmed successfully implemented, it will need to be maintained over time. This poses another challenge as there will be constantly new changes to address and typically a new implementation process is commenced or already ongoing which requires the organization's attention. There is therefore a need for proper routines to avoid the risk of upkeeping already implemented changes being neglected. It is a challenge to not lose focus of one subject as you move on to the next. Rarely old legislation is scrapped, but instead more new rules add up on top of each other adding further difficulty to upkeeping all changes over time.

Failing to comply with regulations is potentially catastrophic both on a small-scale personal level, you might get fined or- fired if you fail to comply with regulations, or on a big scale it could cause a major accident. Less dramatic, but in many cases appreciated and highly

valued are the economic benefits of being able to implement and maintain best practice measures effectively throughout a fleet.

2.2 Who will benefit from this study?

How do you implement new regulations efficiently and with good results to a fleet of vessels from a land-based organisation? The purpose of the study will be to investigate the challenges surrounding implementation of regulation in a shipping organization. It will also look at guidance on a best practice approach of implementing new regulations from a shore-based office and out to the vessels and maintaining it over time. The study is to focus on the practical part of the implementation, with usable guidance as a goal which considers motivational and psychological benefits when designing the company's instructional model. Every shipping organization in the world faces this challenge when for example the IMO, the EU, Flag States, or charterers update and impose new regulations. The updates are frequent and increasing, with increased environmental focus.

Personnel assigned to implement the updates from the shore-based organization are generally Superintendents, Technical Managers, Safety managers or DPA's with little or no pedagogical training. Onboard the senior officers are typically in charge of implementing changes.

The interview study has investigated both the shore-based organization and the senior officers' experience of implementations on an international fleet of one or more vessels with foreign crew who are not English native speakers. The working language of the organization is English which is common in international shipping. The language barriers pose further challenges in the communication of regulations.

3 Research problem

The research in this thesis is aimed at identifying challenges for a shipping organization when a new regulation is to be implemented to a fleet of vessels. It also looks at why those challenges exist and gives guidance on how to improve the implementation process.

With each internal or external change to maritime regulations, either a mandatory or an optional change, it takes form in new regulation to consider and maintain for a shipping

organization. The office team working with the change, will in most cases be quite familiar with the details of it and all its implications, in some cases they might even be the ones coming up with the regulation. However, an area of concern is the implementation process from the administrative oriented land-based organization and out to a fleet of vessels where there will typically be practical changes. Often such a change is lead from the shipping company administration, but even before reaching them the change require implementation in several chained stages, e.g., from IMO to management of the shipping organization to a project team and then onboard to senior officers who further instruct the crew. Managing the introduction of regulations from the shore-based organization and onboard to the vessels is an area of concern. The organizational gap between ship managers and ship operators may cause a hindrance to the implementation due to lack of communication and understanding between them, the gap poses an increasing challenge for shipping companies (Dewan, Yaakob, & Suzana, 2018).

3.1 What are the consequences of failed implementations?

Human erroneous action represented 58 % of accidental events in 2018, and is the single biggest contributing factor, recorded within the European Marine Casualty Information Platform (European Maritime Safety Agency, 2018). The other major factor to accidents, ship failure, has decreased rapidly as a result of technical improvements and all-over higher technical standards on today's vessels (Gregory & Shanahan, 2010). Failure to comply with regulations onboard vessels due to the human element becomes evident at port state controls, classification surveys and charterer-initiated inspections and it poses a negative effect on the whole organization by causing accidents and decreasing performance (Gregory & Shanahan, 2010). Even a small improvement to the human element factor has the potential to make a large impact by de-creasing regulation non-compliance and accidental events.

Shipowners have invested heavily in upgrading the hardware, the ships, which has raised the standard. Simultaneously it is becoming an increasing concern that the software, the human element, is the cause of more and more accidents. To achieve an improvement in the human element factor the industry needs a better understanding of the social and organizational factors that foster professionalism in the seafarer, in both routine and emergency situations. When investigations of accidents identify the human element as a cause, it leads to increased legislation being imposed on the industry. But the imposed legislation has not assisted the industry to motivate the crew enough to willingly strive to raise the performance level and aim for operational excellence. (Bhattacharya, 2014) (ABS, 2014)

It is clear that compliance failures due to the human element onboard vessels have negative safety, economic, environmental and personal consequences (Johnson & Andersson, 2011) (Gregory & Shanahan, 2010) (European Maritime Safety Agency, 2018) (Bhattacharya, 2014). While certainly not all the human erroneous actions are to be connected to poor management of implementation and change procedures, certainly some of them are.

Part of the problem is that the shore-side management implementing changes normally do not possess neither pedagogical nor instructional skills (DNV-GL, 2014), while it could be argued that their position require such skills if they were put in charge of implementing regulations to the fleet. This suggested skill gap of the personnel in charge for implementations is made worse by the degree of difficulty of implementing a new maritime regulation efficiently with desired results. There are several barriers in place, hindering the implementation, financially, intra-organizationally, technically and by policies (Dewan, Yaakob, & Suzana, 2018). The outcome of studying this challenge for a shipping company is that it is complicated to implement maritime regulations efficiently and with good results. (Karakasnaki, Vlachopoulos, Pantouvakis, & Bouranta, 2018) (Gregory & Shanahan, 2010) (Dewan, Yaakob, & Suzana, 2018).

The typical shipping organization is built hierarchically, like the hierarchy onboard a ship, in such an organization differences in background, knowledge and rank may cause a hindrance in implementation processes due to lack of communication and understanding between the individuals in different layers in the organization. They might also strive to achieve different outcomes. The structural gap in shipping companies is recognized as one of the barriers for adoption of for example energy efficiency measures, a typical organizational gap can be found between ship managers based in the shore-organization and ship operators' who are part of the crews. (Dewan, Yaakob, & Suzana, 2018)

3.2 Measures to improve implementation procedures

This study aims at developing;

- easy to use guidance for time saving procedures
- guidance for managing implementations and changes efficiently

- methods to achieve desired results of implementations from a shipping company's office to a fleet of vessels

A best practice approach is used by considering the capabilities of the human element within the organization and to make the most use of positive aspects that are exploitable. But also considers vulnerabilities in the human element and lessons learnt from other industries. By implementing such measures, an organization would ideally manage to mitigate known difficulties associated with implementing new regulations to vessels with a decrease of human erroneous actions as a result. Simultaneously capabilities of the human element are encouraged. Ideally the outcome is improved safety, better economic results and reducing environmental impact.

4 Theoretical background to why implementation processes are difficult in the maritime industry

The main barriers to efficient implementations are in the studied literature divided into five main categories: Informational, financial, organisational, skill and knowledge and geographical. The categories and subcategories have been explored within the theoretical background studies for the thesis and are presented in short below. The impacts of these barriers are well known and researched within the maritime industry and evaluating all of them in detail is outside the scope of this thesis, but it is important to note that they exist and important information for those who manage implementation instructions to be aware of.

There are also other organizational circumstances that affect implementation processes, organizational culture, project management and management strategy for example. These parts of the organization are briefly mentioned, and they do play a part for the implementation, they are not evaluated in detail to limit the scope of the study. Another factor which plays a major role within most organizations are the values that guide how the organization is working. Sound values is a cornerstone in a healthy organization and it is a prerequisite to build a successful implementation management system.

4.1 Information barrier

To avoid being overloaded with information one tends to take a practical approach to making decisions. Information is simplified in the time available to support a decision. Our

preference is a working level of understanding of the situation rather than a search for an absolute truth (Lützhöft & Dekker, 2002). A robust and well-designed process is needed to mitigate these elements of the human nature.

4.1.1 Cognitive load

Cognitive load theory describes guidelines on how to prepare instructional design. The theory emphasis working memory constraints, these constraints are well-known and widely accepted. Working memory is capable of holding about seven elements of information at a time (Miller, 1956) and operate on two to four elements. Distractions and inadequate instructions increase the cognitive load. When learning a task, knowledge is constructed to the long-term memory with far larger holding capacity. (Sweller, Merriënboer, & Paas, 2019).

Below is a citation from “Cognitive Load Theory and Complex Learning: Recent Developments and Future Directions”, the citation describes this complicated matter well in a short manner:

“The theory emphasizes that these working memory capacity and duration limitations only apply to novel information obtained through sensory memory. Working memory has no known limitations when dealing with information retrieved from long-term memory (Ericsson and Kintsch, 1995; Sweller, 2003, 2004). In effect, long-term memory alters the characteristics of working memory. Long-term memory holds cognitive schemata that vary in their degree of complexity and automation. Human expertise comes from knowledge stored in these schemata, not from an ability to engage in reasoning with many elements that have not been organized in long-term memory. Human working memory simply is not able to process many elements. Expertise develops as learners mindfully combine simple ideas into more complex ones. A chess expert, for example, combines simple ideas about the best positioning of individual pieces to develop complex schemata of how several chess pieces should be positioned concomitantly. These schemata organize and store knowledge, but also heavily reduce working memory load because even a highly complex schema can be dealt with as one element in working memory.” (Merrienboer & Sweller, 2005)

Generic cognitive load is the biologically evolved critical skill of automatically acquiring basic skills that are indispensable to a wide range of functions for humans. It is generally

considered that this type of skill acquisition is non-teachable. One example of an automatically learned skill is problem solving. (Sweller, Merriënboer, & Paas, 2019).

Intrinsic cognitive load is determined by the expertise of the learner and the nature of the materials being learnt. For example, an expert might consider that the interacting element processed is a single one, but for a novice faced with the same situation the interacting elements processed might be a large number. The number of interacting elements depend on the particular level of expertise of the learner.

An extraneous cognitive load is not necessary for learning, it is increased when weak problem-solving methods are used, when searching for information needed to learn a task and when multiple information sources are all presented in the same form.

Germane cognitive load may also be described as “relevant mental effort”. It is considered beneficial to increase the germane cognitive load, as long as there is sufficient working memory capacity.

4.1.2 Using information correctly

Imperfect information is recognized as a major hindrance to efficiency measures in shipping (Johnsson & Andersson, 2011) (Dewan, Yaakob, & Suzana, 2018). The problem goes both ways, on one side it affects the crews, and they may perform inefficiently or by taking unnecessary risks due to imperfect information. On the other side the shore-organization might not have all required information to make the best decisions. An example of a consistent information gap is that poor relationships between the ship personnel and shore-based company personnel leads to a majority of seafarers feeling unable to tell the full truth. (Sampson, Acejo, Ellis, Tang, & Turgo, 2016)

An example of when information has not been used correctly is from studies that investigate the implementation and use of the ISM code. These studies have found that the information, or the instructions received on the subject has been a hindrance to the effectiveness of the implementation (Lappalainen, Kuronen, & Tapaninen, 2012) (Karakasnaki, Vlachopoulos, Pantouvakis, & Bouranta, 2018).

Information and instructions in the maritime industry are described as too cumbersome, bureaucratic, inaccurate, inconsistent, too detailed, having incorrect form and being

complicated. (Lappalainen, Vepsäläinen, Salmi, & Tapaninen, 2011) (Lappalainen, Kuronen, & Tapaninen, 2012) (Karakasnaki, Vlachopoulos, Pantouvakis, & Bouranta, 2018)

4.1.3 Cultural background

Cultural differences are particularly evident in the maritime sector due to the involvement of several major seafaring nations and world-wide trade crossing cultural, national and continent borders. There is also much evidence pointing at cultural differences as one cause of how professionals in the maritime industry view a situation differently (Gregory & Shanahan, 2010).

Some cultures prefer to stay attached and focus one thing at the time, preferably each task is reserved a specific time slot and follows a predefined plan. Problem solving is based on facts and logic. Other cultures prefer to be involved into several things at once and view a timetable as fluid, that may change as the several tasks at hand develop. Often, they may confront problems emotionally and demonstrative use of body language in communication is common. (Lewis, 2006)

These examples of cultural differences are quite opposite to each other and illustrate the need to design the implementation process to fit different recipients.

Typical challenges for multinational crews are that attitudes, and expectations differ from one's own, depending on cultural background we view things differently. Collaboration and cohabitation and the social interaction differ depending on the seaman's background. Language barriers are also a major hindrance which may bring communication down to a minimum and cause misunderstandings. (Brenker, et al., 2016)

4.1.4 Onboard workload and fatigue

The work and rest hour dilemma are a constant factor onboard vessels today. Not only do the crew have to keep up with tight sailing schedules, but also fulfil legal Maritime Labour Convention requirements of sufficient rest hours while staying alert and safe.

“Fatigue kills: careers, clients, crew. Fatigue amongst seafarers is recognised to be a serious issue affecting maritime safety. Objective evidence consistently shows fatigue to be a contributory cause of accidents, injuries, death, long term ill health, major damage, loss of vessels and enormous environmental harm. “ (Gregory & Shanahan, 2010) (Maritime & Coastguard Agency, 2014)

Fatigue originates out of two factors, one is the human biological factors, the second is external and environmental factors, both should be considered when addressing fatigue reduction (Maritime & Coastguard Agency, 2014).

We all view things differently and make up our own construction of reality, it is affected by personal needs, self-concept, experience, shared goals and plausible possibilities for action (Gregory & Shanahan, 2010). These personal priorities that all of us have are difficult to alter by instructions and information. For the shore-based management organization implementation of a new regulation could be of high importance and be distributed as such to the fleet, but a receiving vessel might be in a situation where their priorities are elsewhere, for example due to a heavy workload and many port calls lately or adverse weather conditions. The vessel might not prioritize the implementation in such conditions as they were intended to do by the shore-management. In addition to such differences in priorities a fatigued crew are not in the right setting to begin with to take in new information. The effects of fatigue on performance are many and a big disadvantage to the learning capability. Some of the effects of fatigue are:

- Communication difficulties
- Inability to concentrate
- Omissions and carelessness
- Slower comprehension and learning
- Slower information processing
- Mood changes
- Hallucination
- Muddled thinking
- Faulty memory
- Task complexity, easier tasks are prioritized over complex tasks.

(Gregory & Shanahan, 2010)

Naturally, none of above effects are beneficial during an implementation. In addition to that each organization should avoid or reduce fatigue wherever they can as a risk mitigation measure (Gregory & Shanahan, 2010). This chapter provide an example of a prerequisite for learning activities which needs to be fulfilled at the learners side to have a chance at being successful when instructing.

4.2 Financial barrier

A financial barrier typically means lack of a resource that hinder the implementation project, or the complete project. But it may also mean a organisational priority for short term gains which hinder investments and development activities.

4.2.1 Shipping key words; savings and efficiencies

Shipping companies are competing internationally, and they are typically looking for cost saving measures and generally avoid any non-critical activities that might raise costs, which is especially evident in low marginal markets like bulkers (Lee, 1995).

Implementation of a new regulation, like the ISM code is associated with spending significant resources to manage the implementation. Also, post-implementation costs occur annually. Costs are typically from human resources, project management, documentation support tools, travels, training and investments into new equipment. These implementation costs are particularly felt by smaller shipping companies as they typically have a small organization. The companies adopting the new regulation wants to see results in form of efficiencies, e.g. reduced incidents, lower accident costs, lower insurance etc. such results would be expected by the companies implementing the ISM code. (Lee, 1995) (IMO, 2005)

Financial barriers are recognised as a barrier to implementation of operational energy efficiency measures which involves a cost. For example, hull cleaning, anti-fouling hull coating and main propulsion performance monitoring tools typically offer more efficient use of energy but might not be implemented due to the cost of the measure (Dewan, Yaakob, & Suzana, 2018). Investments in energy efficiency improvements are typically a trade-off between initial cost and potential lower energy costs in the future (Johnson & Andersson, 2011). The higher the implementation costs are, adding to the initial investment, the lower the likelihood for such investment. Keeping in mind that the future savings are uncertain to estimate but the initial investment cost is not.

A general conclusion from studying the subject in research and as described in above examples, even for mandatory requirements and potential efficiency measures shipping organizations tend to keep funds for implementations as low as possible, if even considered at all.

4.2.2 To achieve efficiency, rules may be bent

It is considered within many organizations that rules must be bended and sometimes broken to not slow down production, in these organizations it is indirectly viewed as necessary to break rules to reach set out results (Pagell, Veltri, & Johnston, 2016). The mindset in such organisation is also often that costs versus regulations. Managers may at the same time claim that safety and following regulations is a top priority for the company but look away when rules are tweaked if it benefits the result. These shortcuts, “to get the job done”, have been researched and the results suggest that more often than not, the case is actually the opposite. Companies that recognize that safe working practices benefit productivity in the long run do not see these two as opposites, it is part of the strategy to achieve good long term results. (Pagell, Veltri, & Johnston, 2016)

What’s even more important for the purpose of this thesis is that a culture allowing rules to be bent directly impact all rules and regulations, a culture is fostered that silently allows tweaking and bending the rules to achieve results. (Pagell, Veltri, & Johnston, 2016)

As a financial barrier it is assumed that the shipping company in this respect have a culture similar to what is described above; a silent promotion to tweak rules and achieve a perceived efficiency. One may argue that such culture is not a financial barrier but a company cultural issue, I have anyway chosen to present it here since it represents a perceived financial gain but may in the long run turn out to be the opposite meanwhile it is hurting all instructional efforts.

4.3 Organisational barrier

Organisational barriers that hinder changes is a wide concept and I have had to choose a limited amount to be presented within the scope of this thesis. Many of the core organizational values, culture and way of working are simultaneously key prerequisites to succeed with implementation projects and achieving company goals overall.

4.3.1 Motivation

Much has been studied about human motivation. Exploring this topic in depth goes beyond the purpose of this Master Thesis, but motivation is still at the core of a successful implementation. If you look at the very basics of motivation you find A.H. Maslow's Hierarchy of needs: A theory of human motivation, said to be the cornerstone of understanding human motivation. The theory makes up a prepotent hierarchy of our basic needs, where you cannot excel in a higher level before the basic needs are met in the lower level, or levels.



Figure 1 Maslow's Hierarchy of Needs

It is unreasonable to expect an implementation process to address all basic needs, but for the shore-based organization, it is a crucial consideration. A resource spent, aimed at any goal, without the proper pre-requisites, in form of human basic needs met, will not find a motivated subject and is therefore likely to fail. If there are basic needs not met, which the organization may affect, it should be a priority before going forward.

David McClelland, another famous psychologist, credited for developing the Achievement Motivation Theory, identifies three motivators which he believes we all have. A need for achievement, a need for affiliation and a need for power, depending on people's different characteristics they have a dominant motivator. The dominant motivator is not inherent but developed through culture and our life experience.

The dominant motivator is useful but should firstly be identified for each individual. When in a leader position you may then use this information to correctly motivate each one of your team members. This will also enable the leader to give individual feedback efficiently within the organization tailored to the team member's dominant motivator. Since an implementation process within the organization often is aimed at many employees, with different dominating motivators, the process should be designed so that it addresses all three types, or in such a way that the receiver's preferred motivator is known. (McClelland, 1961).

4.3.2 Goals: shared and clearly defined

Goals are commonly used at all levels in the organization. The overarching larger company goals should be known and connected to the department goals and ideally also to individual employee goals. This will make the sub-goals at lower levels meaningful, effective and motivate employees. If the employee does not know how the goals are connected to the larger company goals it is more likely that they will become disengaged. (Gallo, 2011)

When considering goals and goal setting it is also valuable to be aware that individual goals exist, which may or may not be in line with the organizational goals. These individual goals also vary depending on situation. One example of such variation may be that an employee has an individual goal to please senior management by performing well. This goal, set up in best of intention by the employee, could in worst case lead to fatigue and stress for the employee if not managed well. Which in turn may negatively affect the shared company goal of a high safety standard at all time. In this example the individual sub-goal is mistaken for an overall goal which negatively affect the actual shared overall company goal. The jointly agreed shared company goals give clues to which course of action one should take in most situations. (Gregory & Shanahan, 2010)

Goal setting in an implementation scenario is typically rather straight forward, in many cases the goal is already set up by the regulatory body introducing the regulation. For example when implementing a new IMO requirement, the typical goal is to be in compliance at the due date.

4.3.3 Leadership

Below are some key points presented on leadership, which are considered sufficient for this thesis.

Signs of effective leadership include motivating, involving and consulting your team members while jointly planning the activities. Assessing and developing your team members' knowledge and skills are also part of good leadership. (Gregory & Shanahan, 2010)

A good understanding of human factors like leadership is recognized as a competence requirement for Marine superintendents (DNV-GL, 2014).

In implementation scenarios specifically the hierarchically led shipping organization may be a barrier to implementation of energy efficiency measures. This typically occur when a energy efficiency measure is suggested from the vessel to the land based organization, but is then halted by for example either the technical inspector or top management (Johnson & Andersson, 2011). In such hierarchically led organizations one may argue that the leadership strategy and methods are of great importance. (Piispa, 2020)

4.3.4 Making decisions

When making decisions in a professional environment, it is always a trade-off between efficiency and thoroughness. We tend to favor efficiency of actions over thoroughness. Also organizations tend to favor efficiency even though they might declare otherwise. Motivation for efficiency comes from the fact that we have a finite timescale to achieve our tasks and experience tells us that it is for the better to have enough time to also deal with any additional uncertainties that might arise in the immediate future. (Gregory & Shanahan, 2010).

Making completely rational decisions are both extremely time consuming and highly dependent on meticulous thoroughness. In practice it turns out that making completely rational decisions is impossible. We never have sufficient time nor the ability to gather all available information. Therefore, each decision made is a tradeoff between available information and available time. (Klein, *Streetlights and Shadows: Searching for the Keys to Adaptive Decision Making*, 2009). Below citation describes how decisions are typically made in when we face a decision-making situation:

“We have found that people draw on a large set of abilities that are sources of power. The conventional sources of power include deductive logical thinking, analysis of probabilities, and statistical methods. Yet the sources of power that are needed in natural settings are usually not analytical at all but the power of intuition, mental simulation, metaphor, and storytelling. The power of intuition enables us to size up a situation quickly. The power of mental simulation lets us imagine how a course of action might be carried out. The power of metaphor lets us draw on our experience by suggesting parallels between the current situation and something else we have come across. The power of storytelling helps us consolidate our experiences to make them available in the future, either to ourselves or to others. These areas have not been well studied by decision researchers.” (Klein, Sources of Power: How People Make Decisions, 1998).

Gary A. Klein, a cognitive psychologist who pioneered in the Natural Decision Making movement is quoted above.

While the subject of decision making has been studied for decades in detail in cognitive psychology, some key points that are relevant and within the scope of this thesis are;

Cognitive bias, is a systematic thinking error. A typical example of a cognitive bias is only paying attention to information which confirm your opinion. Everyone exhibits cognitive bias from time to time. To identify if you are biased consider if you have strong own opinions in the matter and challenge your bias by questioning your information and decision. (Kahneman & Tversky, Subjective probability: A judgment of representativeness, 1972)

Replacing a difficult question with an easy one, “intuitive heuristic”, when faced with a complicated question we are drawn towards looking beyond all the implications answering the question implies, and instead we answer a simpler question, to which we have the answer.

Overconfidence, “Organizations that take the word of overconfident experts can expect costly consequences” (Kahneman, Thinking Fast and Slow, 2013). Experts in any organization are expected to give confident accurate predictions, when the matter actually is unpredictable by nature. “An unbiased appreciation of uncertainty is a cornerstone of rationality – but it is not what people and organizations want” (Kahneman, Thinking Fast and Slow, 2013).

Prospect Theory examine attitudes towards risk and suggest that risk seeking is restricted in the domain of gains and risk aversion. Attitude to risk, change depending on reference point,

for example; after a perceived loss, risk seeking is increased. Additionally, a principle of diminishing sensitivity applies to both sensory dimensions and the evaluation of changes of wealth. This is the explanation behind why turning on a weak light in a dark room has a large effect. (Kahneman & Tversky, *Prospect Theory: An Analysis of Decision under Risk*, 1979).

Expert intuition, while often a great tool when it arises from true expertise, this is not always the case. When facing a difficult question, the expert might intuitively have a shot at the correct answer, without previous experience of it. (Kahneman, *Thinking Fast and Slow*, 2013)

4.4 Skill and knowledge barrier

The lack of sufficient knowledge or required skills for a task may pose a barrier to implementation. An easy example is if an implementation is done in a language that the recipients do not understand but still they receive instructions in that language.

4.4.1 Roles and capabilities

Each professional's role, or change to a role, need to be addressed when discussing skill and knowledge barriers. The capabilities of each role need to be considered when planning the implementation process. Excessive risk-taking, due to for example complacency, among staff cannot be addressed without attention being paid to the organizational role in the reasons why people ignore or break rules. (Gregory & Shanahan, 2010)

A study on employee engagement levels of Indian officers in the shipping industry show that only one out of ten officers were considered engaged, compared to an average employee engagement level ashore of 35%. It also found a slightly higher engagement level for senior officers compared to junior officers. Engaged employees are more satisfied, have better wellbeing, are twice as likely to be top performers and achieve their targets, have higher productivity and profitability, less absenteeism and the safety is enhanced. Among the most common drivers of employee engagement are management practices, the immediate manager or supervisor, career development and advancement, recognition and appreciation of employee contributions, teamwork and a supportive working environment, the nature of the work, the pay, rewards and benefits. (Bhattacharya, 2014)

4.4.2 Risk and how we perceive it

How we perceive risk is not a calculation of probability, but rather influenced by the degree we feel in control, the amount of value a course of action has for us and the degree of familiarity we feel. (Gregory & Shanahan, 2010).

A well-designed implementation process should address the psychological aspects of constantly facing uncertainty. As a consequence of this we need tools to handle such risk of uncertainty to avoid the risk assessment being inadequate. Inadequate risk management is most commonly identified as both an immediate and a contributory cause of accidents (Acejo, Sampson, Turgo, Ellis, & Tang, 2018).

When considering these main risk factors in an implementation scenario, they all may affect one's perception of control. For example, the perceptual risk of experiencing an incident on a vessel is higher at the shore-side managing organization than for seafarers working onboard (Bailey, Ellis, & Sampson, 2006). While you may not be able to conclude on who's prediction is most accurate, the fact that a difference exists should be recognized and adhered to when designing a process involving both departments. This is just one example of how the degree we feel in control over a situation may influence the accuracy of our risk assessment.

Keeping in mind A.H. Maslow's Hierarchy of needs, if one's perception of risk increases it will affect the priority of needs. If a lower need, like safety which is the second lowest need, is not met attention to higher ranked needs in the hierarchy is not likely according to the theory.

We are routinely attracted to shortcuts as it is the easiest way to a desired goal, which inherently make shortcuts a course of action that we value (Gregory & Shanahan, 2010). When you value something as desirable, it will change your willingness to take on risk to achieve the high valued goal. This creates two matters of concern, firstly the perceived value of a goal will differ within the organization and secondly the willingness to take on risk will vary within the organization to achieve a goal as a consequence of the variation in value (Bailey, Ellis, & Sampson, 2006). What is desirable is also changing within the organization and to us on a more personal level. While the shore organization might desire time saving at one point, the crew might desire rest simultaneously. Naturally, what we desire is fluctuating, depending on when the question is raised.

If we feel a high degree of familiarity in our role or current situation our sensitivity to risk is palliated. Complacency is identified as a common cause in many marine accidents (The Marine Accident Investigation Branch, 2007) (The Marine Accident Investigation Branch, 2007).

4.5 Geographical barrier

The geographical barrier in place in shipping lies in the nature of a vessel. It is meant to trade and sail worldwide. Even in short-sea shipping and static routes you have a geographically changing position of the ship and it, hopefully, most of the time at sea and only stay a limited time alongside at quay. The difficulties this poses for communication are obvious, even with fast and reliable communication options available, it may be that it is not economically sound for the shipowner to use them. Even with good communications it is still not the same as meeting in person and since words are only 30% of the communication (Maritime and Coastguard Agency, 2016) part of the communication is lost.

Visits to vessels may also pose a challenge to coordinate when the vessel is staying alongside for usually rather short periods and with potentially changing schedules and itinerary. This also brings the fact that priorities need to be made on what to focus on during a short port stay visit from the shore side management. Needless to say, a pandemic like the COVID-19 changed the possibility to travel in ways unimagined.

Further to above geographical challenge of the ship sailing worldwide, so are the crewmembers. A rotational system of some sort is the norm in shipping which mean that you will at any time have part of the crew at home on vacation, they should also be kept up to date. The common practice for this is the hand-over procedure but it may be challenging to for sure say if the information provided to the crew member onboard is conveyed properly to his reliever, and the hand-over information conveyed will at any case be the crew members version. Mistakes during handover between staff has been identified by accident investigations as a cause to several major industry accidents (see Piper Alpha 1988, Texas City Refinery 2005; <https://www.youtube.com/watch?v=goSEyGNfiPM>). This illustrates the difficulty to manage handover procedures well.

5 Previous Research

Previous work about implementation of regulations in the Marine industry, for example concerning energy efficiency measures (Dewan, Yaakob, & Suzana, 2018) and the ISM code (Karakasnaki, Vlachopoulos, Pantouvakis, & Bouranta, 2018) have mainly focused on how efficient the implementation has been and which barriers that are present, the results have been oriented towards the goals of the regulation.

Dewan et. al. have suggested that training of the crew and office personnel, who are directly involved in the implementation of energy efficiency measures, is an option to eliminate four main barriers found to impede cost-free operational measures; *lack of information of the measure, lack of awareness, lack of competence of ship crews and operational difficulties* (Dewan, Yaakob, & Suzana, 2018). While this study addresses a specific implementation of a specific regulation, it could be argued that the barriers they have found in their study exist in some form during implementation processes in general in shipping companies.

Karakasnaki et. al.'s suggests from studying literature that critical factors to implementation of the ISM code is that all organizational members should possess high levels of commitment as well as adopt certain values and beliefs to be successful at fostering the safety culture in maritime industry the ISM code is aimed at. The top managers' commitment to continuous improvement endeavors are underscored as a key factor. This highlight the need for a solid base to start with and further insight to the required prerequisites before starting an implementation. Critical factors studied are trust between seagoing personnel and shore-based personnel, communication difficulties, long time at sea, fatigue, daily routine, boredom/laziness, leadership, bureaucracy, additional costs and training/education. (Karakasnaki, Vlachopoulos, Pantouvakis, & Bouranta, 2018)

5.1 Previous Research Within Other Industries

Do cadets within the maritime industry refrain from legalistic methods and adopt non-legalistic practices after a period of sailing? A study of police recruits in Sweden show strong stable support for the legalistic perspective during academy training but during on-the-job training the recruits become more positive towards non-legalistic practices; that is, achieving essential means by tarnished measures. The results indicate same tendency amongst the recruits irrespective of type of duty they are assigned and level of education. Young males

are most drawn to the autonomous perspective while women and older recruits holds somewhat less tendencies. (Fekjær, Petersson, & Thomassen, 2014)

An autonomous perspective, which pursue quick and concrete results, is adopted by the police recruits to resolve situations smoothly while avoiding unnecessary bureaucracy during the on the job training. A scenario much like the situation one can imagine a young cadet experiences during the first periods onboard a ship. The cadet's previous experience would in such a scenario come from the legalistic perspective of the education, but during the onboard training he adopts the same autonomous perspective the vessel's crew is potentially operating accordingly.

The socialization process is important in forming the professional's role and attitude towards work-related issues. Van Maanen has described this process in four phases; first phase is pre-socialization, which takes place prior to admittance into the organization and is influenced by the organization's presentation, media and insider's descriptions. Second phase occur during in-school training, the education is distinguished by a focus on formal rules and officially stated goals, it is in this stage that the recruits show strong support for a legalistic perspective. In third phase the newcomer experiences on-the-job training (sea-board practice in a maritime perspective, author comment) and the complexities of the profession of choice. It is likely to be a reality chock when faced with all the expectations of the professional role, making the newcomer feel inadequate and insecure. It is in this phase that attitudes of colleagues serve as a model and source of know-how for the newcomer. If the professional is dependent on skills that comes with experience (which many skills are in the maritime industry, author comment) the inclination to follow lead of colleagues is stronger. Behaviours internalized within the group are rewarded and other behaviours punished by the group, this quickly incorporates the newcomer into the group's norms. "If the work of the profession is characterized by unpredictable situations and/or hostility from the outer world this will strengthen solidarity and unity among colleagues" (a citation which describe both police work and a sailor, author comment). The fourth phase is the final phase and concerns the professional's relation with the role and its tasks, and their application in practice. The individual will have developed strategies to cope with conflicting expectations and the realization that it is not possible to meet all the expectations of the role. "The rules are seen as a means to obtain desired ends" (Rønnestad & Skovholt, 2003). (Van Maanen, 1973) (Fekjær, Petersson, & Thomassen, 2014)

Fekjær et. al. concludes that there are two major reasons to the adaptation towards a non-legalistic autonomous perspective being developed during on-the-job training of recruits; the first being the risk of violence targeted towards the police, strengthening the loyalty to the peer group as officers must depend on one another. When the newcomer displays loyalty to the group and its established norms, he/she will be accepted as a member of the group and receive its protection. The second reason is that the police profession is perceived as a trade of craftsmen, skills of a fully-fledged police officer cannot be learned through studies. Experience is highly valued within the police collective, creating a norm that recruits are expected to follow the example of more experienced officers. (Fekjær, Petersson, & Thomassen, 2014)

6 Methods and Procedures

The main research question studied in this thesis is: How do you implement new regulations efficiently and with good results to a fleet of vessels from a shore-based office? Follow up questions also arise when considering the main question, what barriers are present when implementing changes? And how do you overcome them?

In order to explore the research question, a literature review was conducted, firstly of the general problematics of the human element in the maritime industry and secondly into cognitive, psychological, motivational and communicational concerns when humans are facing changes. Lastly, methods to mitigate human erroneous actions in maritime and other industries were reviewed. A heuristic approach was adopted to pick out best practice methods and use them to suggest an efficient method to manage a implementation process of new regulations within a shipping company.

A qualitative study of the implementation process using quota sampling interviews was conducted to evaluate maritime professional's view on implementation procedures. Six interviews were performed during the winter 2020-2021 with senior shore managers, senior officers and senior engineers in a Finnish shipping company. I used a questionnaire which is available in appendix 2 as a interview guide and conducted the interviews onboard the vessels and at the shore-side office. The company is involved in Ro-Ro shipping in international traffic with a mixed crew. Four of the interviews were done with senior ship officers, both deck and engine rank. Two of the interviews were done with senior shore side personnel within safety and technical department. The semi-structured interviews gave the interviewees the opportunity to express their own opinions on the subject but also organized

the responses to be compared against each other and against the theoretical literature review that was done in advance of the interviews. A typical interview lasted for about half an hour.

The initial intention was to conduct a bulk of interviews during Senior officers' Day, which the company normally arrange twice annually, to make the event available to all crew members. But due to the COVID-19 outbreak these events were cancelled and therefore the research plan had to be re-made and tailored to meet the new stringent regulations.

7 Results and their interpretation

Interviews gave a mixed picture of how the implementation routines are perceived and how well the interviewee considered them to be working. The theoretical suggestions studied during the literature review were in some cases confirmed by the interviewees.

7.1.1 Results from implementation experiences in a Finnish shipping company

A general impression from the interviews is that there is a full spectrum of opinions on the matter from the interviewees. While they have experienced the same implementation processes, based on their personal opinions and experiences, their view and subsequent rating of the process widely differs. As expected, there is also a difference regarding viewpoints between vessel crews and shore personnel. The viewpoints and experiences expressed during the interviews are in line with the theory part. Personal preferences did however separate the responses regarding for example which barriers that are affecting them most.

7.1.2 Reflections from interviews

During interviews with shore personnel a common goal was to find the easiest solution to distribute information. To be clear it was the easiest solution in the context of shore-based organization efforts, not the easiest solution for the end-user (mostly crew) which was a desired goal. This is a rather clear situation where individual sub-goals potentially may hinder a shared company goal of a successful implementation as discussed in chapter 5.3.2 on common goal setting for the company. It is also deviant from Gregory & Shanahan's five team skill recommendations. As one of them are common goal setting for the team. Gregory & Shanahan also say that three glues are required to make a up a effective team, two of them; similar mental models and mutual trust specifically mention the team goal and contributing

to reaching it as a requirement to assure team success (Gregory & Shanahan, 2010). Preferable would be that the shore organisation have sufficient resources to strive for a common goal, potentially easy to use instructions for the crew.

The senior officers' goal with the implementation process was not consistent. One interviewee for example seemed to value that the crew found the implementation smooth and did not want it causing them discomfort. Effective tools, technical solutions and incentives were of high importance to aid them in achieving this goal according to his priorities. He said that "some reward is always good, PSC reward is a good example", the company has a policy where a zero remark PSC will trigger a payment to the ship's account as a reward. The interviewee brought this up as a good example of a reward based incentive to raise performance onboard. Another interviewee's goal with the implementation was more leaning towards avoiding legal consequences for either himself or the company. During the interviews it became clear that they also perceived the risk with a failed implementation differently, due to previous experiences of serious consequences in one's case and no bad experiences in the other's case. Potentially you could speculate that they may be at different levels in the hierarchy of needs. One being at the safety level, recognizing that a failed implementation may threaten personal resource needs and security. The other at the higher-level prioritizing belonging and valuing friendship within the crew. While I have not set out to define which mindset that is preferable it is valuable to note the difference in priorities.

The company's overall shared goal was not specifically identified for each implementation process. Instead, the company had adopted a more general goal "to be in compliance with all applicable regulations at all time". This is a very lean and convenient goal setting for the company, requiring zero effort to set up and do not require continued updating, which is a benefit in a small organization to stay compliant. The interviewees expressed a need for clear written procedures that were common for all departments and rooted from the managing director to aid in achieving this goal setting. Three of the senior officer interviewees considered such instructions to be missing completely. Looking back at Leadership in the hierarchically built shipping company structure discussed in chapter 4.3.3, the senior officers' experiencing this issue do not have required influence in the organization to commence adopting new practices as described by Dewan et al. as a structural gap (Dewan, Yaakob, & Suzana, 2018). This is in line with the identified barriers from similar research discussed to hinder effective implementation in chapter 5. To bridge this gap the company may for example adopt top management involvement to the implementation, goal setting for a team consisting of both crew and shore personnel, crew reviews of implementations and

more frequent visits both onboard and by senior crew to the office aiming at creating a stronger team.

The implementation process was generally considered to be working quite well from the shore-side personnel's viewpoint and they did not report that they had encountered problems due to failed implementations. There was no formal procedure to follow up implementation success rate, passing PSC inspections and Class surveys without remarks was generally considered sufficient. One raised concern from shore-side personnel was how to keep up with new rules being enforced from authorities. Regarding problems encountered in connection with implementation, one interviewee said that "Information is poor in all stages, also the information from authorities". Which highlight another concern; it seems to also be a structural gap between governing organisations, like IMO and national shipping authorities towards shipping company management. An assumption made in the beginning of the thesis was that shore-side personnel is well updated with regulations being enforced, a pre-requisite to manage the implementation, but how much effort does it take to sort out the regulatory information? During the interviews with shore-side personnel the authority information was criticised for being too complicated, bureaucratic and not relevant, much like the crew criticise information from the shore-organization.

The interviews with senior officers gave a mixed picture where one interviewee considered implementation to be working very well but another claimed it to not be working at all. I deemed the mixed result to be a product of personal experiences on the matter as the circumstances otherwise are similar. For example one interviewee had been rotating on several vessels and therefore taken less part in long term implementation work and another interviewee had bad experience with PSC as a result from a failed implementation, which set them apart on how they were looking at the questions. All interviewees had similar background within the company so the chance that the mixed replies originated from differences in implementation processes is minor. A common request was to have better follow up and more specific instructions for the scenarios they encountered. It was also noted that they shared the opinion that the number of regulations to follow are all the time increasing, a key point in the problem description.

One interesting viewpoint during the interviews where the request for a formal, common and customizable process for the implementation that should be sanctioned from the CEO. This was interesting as it correlates with the theoretical background studied for this thesis (Karakasnaki, Vlachopoulos, Pantouvakis, & Bouranta, 2018) and with the basic purpose of

this thesis. Potentially altering the procedure according to the requests of the crew is advisable since it is also in line with the theoretical studies. If such change would improve success rate of implementations is not studied, but there are good arguments at hand that it would. Based on the senior officers' interview results it is clear that from their viewpoint a lot of the implementation responsibility is placed on the crew, both in regard of interpretation of the regulation, establishing a procedure and follow up work, this was expected to find and also part of the management setup for the company.

7.1.3 Author's comments to interviews

My own reflections of the interviews conclude that they confirm several of the items discussed in the research problem. During the interviews we did also discuss topics from the theoretical background study, these were naturally brought up by the interviewees. This observation gives further support to the theoretical part to be transferred to actual implementations. But it should also be noted that each interviewee had a personal opinion into what the biggest issue was, and they differed between interview subjects. From this I conclude that all parts of the process must be managed well throughout the implementation to consider as many preferences as possible. No single factor could be identified apart from others as overall more important during the interviews. Instead a good approach seems to be to include as many instructional tools as possible to cover a majority of preferences. Another interesting finding was the need to also design a simple and time-saving process for the shore-based personnel or alternatively allocate additional resources to such tasks, as these positions tend to have limited time resources to spend at each subject and often have tasks with higher priority to attend to, according to their interview responses. This was a common request from their side.

It was also noted that if the interviewee had an experience of poor implementation which led to consequences, they viewed the matter as more important. While interviewees who had not experienced consequences of poor implementation viewed the matter as less important and graded the success rate of implementation higher. One interviewee who had experienced consequences from poor implementation rated the importance 7/10 and said that "A lot come back on you personally. In some ports you may get a personal penalty, not for the company."

There were some clear differences between the interviewed shore management and crew answers, for example replies from the crews mentioned that half the personnel are at home at all times and the need for a hand over procedure. This was something that they also

considered in regard of meetings; half of the staff will always miss them. This was something which shore-side personnel did not bring up. Shore-side personnel also considered set-ups including meetings, seminars, Q&A sessions, and online meetings, all which are easily arranged in an office environment but often difficult to arrange onboard due to poor internet connection and long trips to visit all vessels.

The first part of the interview focused on the general impression of the implementation process and if they considered it to be working. The average grade of experienced implementation processes from the interviewees was 5,6 (scale 0-10, 10 represent a perfect implementation). This result reflects my own reflections from the interviews well, that there were opinions on the whole grading scale.

In the second part of the interview, the questions were focused on time spent on implementations and how difficult the interviewee considered their part of the implementation to be. The interviewees have rated both the difficulty to implement regulations and their own implementations as average, mean value is around 5 from the graded replies on both questions.

The third part aims at finding out how the implementation process could improve, according to the interviewee. They rated their own implementation work as 4,3. The replies varied, but for example better follow up and improved instructions were mentioned. However, a common denominator was that none of the interviewees mentioned that they would like more training on the subject. Some of the interviews did also not reach a conclusion on this topic. When asked to rate the instructions they receive today from the company they graded them 4,6 (scale 0-10, 10 represent perfect instructions)

In the last part problems encountered due to failed implementations are discussed. A noticeable grading is that the average grade for how big problem poor instructions and poor implementation processes are to the interviewees is only 3,6 (0, represent no problem and 10 represent a big problem). This is interesting in the context of the other replies and the follow up from authorities and management, even though the implementation is average and some of the interviewees have mentioned dysfunctional processes, consequences at PSC and replied that they think the implementation is not working, they still do not consider it to be a big problem. My conclusion from this is that there is an acceptance in the industry for the difficulty to implement and follow up regulations.

Further to the above conclusions it has made me to consider how the organisation and authorities view a deficiency. For example, a deficiency found on the firefighting equipment during annual Class survey or PSC can be viewed as just that, a malfunctioning item for firefighting which should be replaced, and the matter is cleared. But one may also view it out of an implementation of routines viewpoint, where implemented planned maintenance routines should ideally find such deficiencies, preferably before the item become unusable, and for sure once it is unusable and routinely replace it. In this example the implementation of this routine has for some reason failed, a matter which may, or may not be, paid attention to when rectifying deficiencies. In short, one may choose to look at it as isolated events or as a system error where deficiencies slip the internal routines. The remedy is totally different depending on how you choose to view it.

7.2 Developing sound implementation routines

When developing an instructional strategy, three aspects should be considered: organizational strategy characteristics, delivery strategy characteristics and management strategy. (Reigeluth & Stein, 1983)

During the implementation process it is important for the person in charge for the implementation to be aware of and have basic knowledge of the concepts and terms surrounding instruction, and in which of these areas one is currently working with. A good knowledge within these areas is not something I have noted during the interviews with either crew nor shore-personnel, and I was not expecting to do so either. This is not thought at any level of Maritime training and is not identified as an important Superintendent skill (Maritime Management Curriculum 2021, 2021) (DNV-GL, 2014). Education is used to describe all experiences in which people learn. Instructions should be focused at specifically delivering educational experiences in a certain area. Training refers to learning a specific task that may be implemented in one's skill set almost immediately. Teaching differs from instructions in this illustration by being delivered by a human being, opposite to instructions which may be written, from a web site, a movie or in pictures.

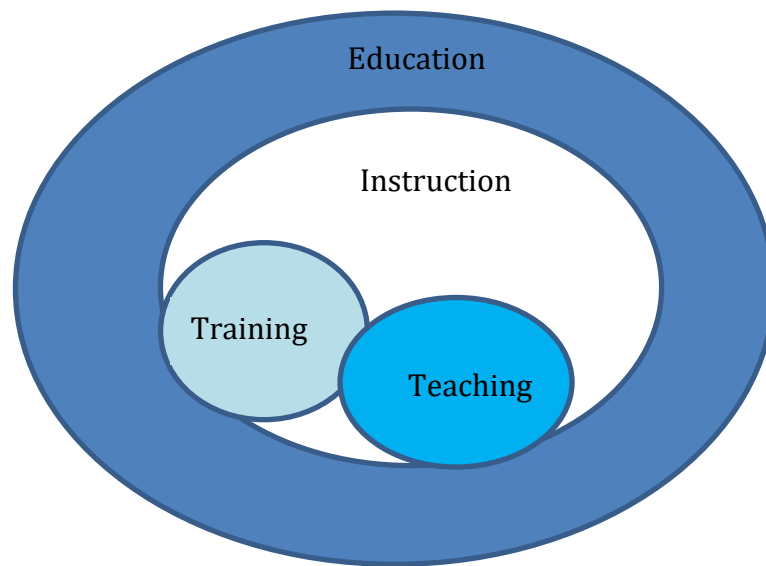


Figure 2 Relationship between terms associated with instruction based on (Smith & Ragan, 2005).

7.2.1 Organizational strategy characteristics

What content should be presented? How should this content be presented? What sequence should the instruction follow? These are typical questions to be answered when developing an organizational strategy at lesson level. Which strategy that is optimal to select has been researched extensively by instructional and cognitive psychologists and it varies depending on the type of goal, but it has been concluded that the lesson should generally follow below pattern (Smith & Ragan, 2005).

- Introduction
- Body
- Conclusion
- Assessment

Scaffolding is the cognitive processing support which the instructions provide to the learner, selectively aiding the learner where it is needed. Below table illustrates the learner's role to generate cognitive processes and the supplied instructions role to support the cognitive processing.

Table 1 Events of Instruction based on Instructional Design by Smith and Ragan (Smith & Ragan, 2005)

Student generates	Instruction supplies
Introduction	
Activate attention to activity	Gain attention to learning activity
Establish purpose	Inform learner of purpose
Arouse interest and motivation	Stimulate Learner's attention/motivation
Preview learning activity	Provide overview
Body	
Recall relevant prior knowledge	Stimulate recall of prior knowledge
Process information and examples	Present information and examples
Focus attention	Gain and direct attention
Employ Learning strategies	Guide or prompt use of learning strategies
Practice	Provide for and guide practice
Evaluate feedback	Provide feedback
Conclusions	
Summarize and review	Provide summary and review
Transfer learning	Enhance transfer
Remotivate and cease	Provide remotivation and closure
Assessment	
Assess learning	Conduct assessment
Evaluate feedback	Provide feedback and remediation

7.2.2 Delivery strategy characteristics

Choosing an appropriate delivery strategy for your implementation in shipping is sometimes easy as you may have limited choices, while in other cases it might be possible to choose from a variety of delivery strategies, like for example printed, web-based, interactive multimedia, video or teaching during a visit. One item mentioned during interviews was the need for an adaptable delivery strategy, so that it may be fast and easy for when implementing minor items and more comprehensive for major implementations.

When choosing the delivery method, one may use below methodology.

1. Decide on your delivery method. For example, teacher led, cooperative learning, group work, Q&A. Important to make a plan but also to be flexible if it isn't working.
2. Hook the students into the lesson. This is where you catch the attention of the learner, use for example video, a pre-test or an interactive activity.
3. Give clear directions. Make sure all students' attention is directed at the instruction. State your expectations for the lesson. Students may for example paraphrase the instructions or 1-2 students may model what you expect them to do.
4. Questions, allow wait time, use random selection. As the lesson progresses check for understanding, have a system in place to randomly call on students. Ask a question, allow about 5 seconds waiting time and the randomly select a student to answer, when the students know that any one of them may be selected to answer they all tend to put in an effort to figure out the answer.
5. Be aware of pacing, variety, and enthusiasm. Adapt the tempo in the instructions to the difficulty of the instruction and to the attention of the learners. E.g. If the topic is difficult and the learners are confused, slow down. Most importantly be enthusiastic about your instructions, this is an important part of a successful delivery, boring the learners will hinder the goal of learning.
6. Use formative assessment for evaluation and reflection. Every lesson you deliver has a teaching goal of some sort and you need to check that the students got it. One way is to ask all students questions or have them do a test. Another important part at this stage is to reflect on the effectiveness of your instructions, what worked? What did

not? To improve the delivery strategy, you should continuously reflect on its effectiveness and make adjustments accordingly to be re-tested.

Methodology for delivery method based on (Naugle, 2012)

7.2.3 Management strategy

In a management perspective there are two main areas of focus when developing your implementation routines. One area to consider is the management of the instructional design project and the second developing an instructional strategy. (Smith & Ragan, 2005)

Looking firstly at the management of an instructional design project it is much like managing other types of projects and requires a skilled project manager to make sure it is executed correctly within key areas. These key areas to be managed for the project typically are quality/performance, cost, time and scope of the task. I will not go further into the area of project management, as it falls outside of the scope of this thesis, but I conclude it is required, and should be of a certain quality, to make sure the implementation will be successful. (Smith & Ragan, 2005)

The instructional management strategy guides the implementation of the instructions. It should set the overarching strategy for the instructional events in all levels of instruction. Management should for example decide on a delivery system for the instructions and how and by who this should be used within the company. Same system should typically be used no matter the level in the company, for example both from top management to senior shore management and from officers to crew. The implemented delivery system should also include managing resources and documentation required surrounding the project. (Smith & Ragan, 2005)

7.3 The implementation procedure

The implementation template consists of three parts; preparations, implementation and follow up. They are part of the results and an extensive version of the methodology is available in appendix describing the preparations part as an example. Depending on the complexity of the initiating conditions the parts may be more, or less, elaborating. This chapter will describe the process and the steps in short. One part may be more, or less, demanding depending on what you are implementing.

Something that came up during the interviews and in line with the theory of the literature is the need to tailor the implementation procedure scope to the item being implemented, just like you also need to choose correct delivery strategy, depending on complexity. The full and most extensive procedure should be kept for the regulations which are of high priority and complicated, while minor items should be implemented with a less demanding procedure, to have an agile and smooth process. Some of the interviewees, asked for this in a standardized form, much like the Management of Change procedure used typically within oil and offshore industry. (ABS, 2013)

One risk with instructions in a standardized form is that they may be viewed by the user as stiff, not applicable to the scenario one is facing and unnecessary cumbersome. This further motivates the need to have a formal system that is also flexible and may be tailored to the company's need. The balance to get this at a correct level may be delicate and it is recommended to be prepared to adjust it regularly.

7.3.1 Preparations

To properly prepare the implementation it is recommended to analyse the learning context, the learner and the learning task.

Analysing the learning context may not be required for each implementation as the circumstances may be static. While it in other cases might be worth to review the learning context if circumstances change, for example if internet speed and communication possibility approves new methods might be implemented that up till then was not available. A good example in that is the recent adoption of online meetings on a broad scale during the COVID-19 pandemic.

When performing the analyse a good way to go about it is to use an existing model for each category you plan to examine. Below a table is presented which may be used to Analyse the learners, similar tools is available for each category.

Table 2 Four categories of Learner Characteristics (Smith & Ragan, 2005)

	Similarities	Differences
Stable	- Sensory capacity	- Aptitudes - Cognitive styles

	<ul style="list-style-type: none"> - Information processing - Types and condition of learning 	<ul style="list-style-type: none"> - Psychosocial traits - Gender, ethnicity & racial group
Changing	<p>Development processes</p> <ul style="list-style-type: none"> - Intellectual <p>Language</p> <ul style="list-style-type: none"> - Psychosocial - Moral - Other 	<p>Development state</p> <ul style="list-style-type: none"> - Intellectual <p>Other</p> <ul style="list-style-type: none"> - Prior learning - General - Specific

7.3.2 Implementation

Implementing new routines takes careful planning, great attention and big effort to have a chance at being accomplished successfully. Everett Rogers (Rogers, 2003) a professor in communication studies describes how people adopt differently to changes in the diffusion of innovations theory. While some are early adopters, other oppose all types of changes and most people categorize somewhere in between the extremes. To handle the implementation well one should be prepared to experience the full spectrum of these reactions. This was also something I noticed during the interviews as the responses varied widely as described in mentioned theory.

For the shipping company looking at adopting or improving implementation routines an efficient approach is to look at available strategies, two available tools are Management of Change typically used in oil and offshore industry or the CBAM – the Concerns-based adoption model. To create an implementation routine from scratch might be overwhelming for the organization unless it already has extensive experience into the matter. However, the implementation strategy chosen may and should be tailored to the needs of the company. These types of concepts that are readily available to adopt would highly likely also be better than a “home-made” option.

For some shipping companies the question might also be at the level of having organizational implementation routines at all. In that case the theoretical part of the thesis and the interviews supports the need for such routines for the company.

7.3.3 Follow up

Follow up including adopting and integrating changes and new regulation to the day-to-day work is an important part of the implementation and the shipping industry poses inherent difficulties to manage this part. These difficulties are described in the theory part regarding geographical barriers and in the interview results regarding handover difficulties and half of the crew being always at home. Therefore, solid measures to mitigate these barriers are needed to have a successful implementation.

At a lesson level the follow up should include conclusion, summarize of the context and a review part (Smith & Ragan, 2005). As a minimum these summarized conclusions can be shared with colleagues who are not present during the lesson.

At an organizational level the follow up of regulatory changes are automatically verified and followed up typically by the Recognized Organization. For the shipping organization this external expert review of the implementation may constitute both a quality verification of the change being implemented and a project goal to pass the initial survey. The standard form for the Recognized Organization to continuously follow up regulatory changes is to verify it during annual surveys.

This model for follow up is already existing in shipping and well known, therefore it is an option for the shipping organisation to follow the same model for internal changes being implemented. But in that case the external expert is replaced by an internal expert, for example the DPA or a project manager who performs the verification and subsequent follow up annually.

The same general guideline applies for the follow up as for the general implementation process that it should be in a standardized common form that the personnel recognize and are familiar with but flexible on how extensive the process is tailored to the specific change.

7.3.4 Miscellaneous variables

The answers to poor performance of a task within an organization may many times be found in poor instructions related to the task, but the designer of the instructions should not

immediately assume that is always the case. There are additional reasons to why learners may not perform well. Non-learning factors as motivation, incentives, design of tools, design of facilities, working climate, interaction with colleagues, efficiency over thoroughness, perceived risk, policy decisions, organizational changes and the hierarchy of our basic needs are known to affect employees performance and their learning ability. (Smith & Ragan, 2005) (Gregory & Shanahan, 2010) (McClelland, 1961)

In organizations where it is stated by the Management that safety and following applicable rules and regulations is a top priority, but simultaneously rule breaking is common when necessary to reach set out results, a mindset forms in the organization that all rules may be bended and statements from the management are hypocritical (Pagell, Veltri, & Johnston, 2016). With such mindset in place in the organization when issuing instructions, one may not trust that the instructions are followed. It could also be argued that it would be wasteful to improve the implementation processes before an organizational culture is in place that emphasis to follow the rules in all situations.

From studies in other industries a tendency towards an autonomous non-legalistic perspective of new personnel has been concluded during on-the-job training (Fekjær, Petersson, & Thomassen, 2014). Several similarities could be adopted to the maritime industry, a similar loyalty to the group, or the crew, may likely exist considering the dangers the crew face while at sea. Much of the maritime skills required onboard are not achieved from study, but from experiences, much like within the police collective. This could create a norm that maritime cadets are expected to follow the example of more experienced colleagues as it happened within the police force. This may be a hindrance to achieving compliance to instructions from the office and the personnel in charge of the implementation should be aware that such an attitude may be present. It could also mean that office personnel implementing regulations adopt poor instructional habits from their more experienced peers.

To have an effective instructional culture within the organization these factors should be paid attention to and strived to keep well maintained or no matter how good the instructions are they may not have desired effect.

8 Critical examination and Discussion

An interesting viewpoint I reflected on a while after the interviews, when my own perspective changed somewhat and I looked at the results from a new angle, one could ask

if an improved procedure is actually needed? As neither the personnel involved, nor authorities seem particularly concerned about the matter and the day-to-day operations are working. From an organisational and economical viewpoint, it would be wise to question if this is the first area to improve or do the organisation have more to benefit from putting effort into another area of concern?

While that may be the case for general shipping there are also exceptions, in the oil industry the customer driven vetting procedures of the vessels put totally different demands on the shipping company's capability to implement regulations efficiently and correctly. So, at the other hand in such scenarios the company may benefit rapidly and greatly by improved implementation routines. It seems like a wise strategy would be to not only tailor the implementation to the regulation, but also tailor the extent of the implementation routines to the company needs.

8.1 Future research

The theory part in this thesis studied the background and barriers to implementations in the shipping industry and it gives solid support that there are inherent difficulties to succeed. In this part of the study, I missed data on differences between shipping branches, for example implementation success on passenger ferries compared to bulkers or chemical tankers. While these differences surely exist, I was unable to find suitable data supporting such suggestion. Finding out which shipping branch, or which shipping company, that have the highest success rate within this topic would be valuable as those routines may be copied to other less successful shipping branches.

Another interesting circumstance for further examination is the setup of the ship management. The shipping companies are working widely differently from each other, on one end you might have the family-owned company who manages all aspects internally with ships only trading at a spot market with same class of ships, while on the other end you have a listed owner company that outsources all management activities with vessels on time charter for several different customers and with different ship types. Both should comply to the same set of rules. Add to that a variety of crew set ups and geographical differences and one may conclude that the basic conditions varies greatly between companies. Also, in this respect I have been unable to find data on which management set up that is preferable from a regulatory implementation and compliance perspective.

Lastly further empirical data from regulatory bodies, shipping companies and crews is recommended to establish a conclusive result on the extent of the problem. As my own study suggest a mixed result, depending on who you ask, it gives rather weak indication on how the industry view the matter. Are for example IMO and recognized organizations happy with the end result of how the regulations are continuously being implemented?

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10 Appendixes

10.1 Appendix 1 Implementation preparations, based on the book *Instructional Design* (Smith & Ragan, 2005).

Analyse of the learning context, the learner and the learning task

For the Superintendent or PIC of implementation at the office side.

Analyse Learning Context

To analyse the learning context a needs assessment is made and a description of the environment in which the instruction will take place.

Step 1: *Needs assessment*, choose the model that fits the initiating condition best.

1. Problem-based

There is a problem.

2. Innovation-based

There is something new that learners need to learn.

3. Discrepancy-based

No big problem is apparent, but the organization wishes to evaluate if it's goals and reality are congruent.

Step 2: Once the needs assessment is established, *procced with the evaluation* according to the chosen model.

1. Problem-based

- a. Determine whether there really is a problem. Goal of the investigation is to clarify the problem and to determine how serious it is.

Ask questions; Who says there is a problem? Why do they say it is a problem?

Do others perceive it as a problem? Who does not agree that there is a

problem, why? When was the problem first noticed? Who is affected by the problem? How pervasive is the problem? In what way and how seriously does the problem affect the mission of the organization?

- b. Determine whether the cause of the problem is related to employees' performance in training environments or to learners' achievement in educational environments.

Ask questions; How does employees' performance relate to the problem identified in a.? Is this relationship correlational? Does performance appear to be impacted by another factor that causes both the problem and the performance or achievement deficits?

- c. Determine whether the solution to the achievement/performance problem is learning.

Ask questions; Could they demonstrate that they have achieved the learning reflected by the goals if their lives depended on it? Is there evidence that achievement/performance problems may be caused by motivation, incentives, facilities' design, tools design, the climate of the agency, the interaction with peers, policy decisions, or other nonlearning factors?

2. Innovation-based

This process typically involves adding or changing goals within the organization.

- a. Determine the nature of the innovation or change.

Ask questions; Has there been a significant change in the tools, policies or organization? Has there been a significant change in the educational/training philosophy of the organization? How will the innovation affect the mission of the organization?

- b. Determine the learning goals that accompany this innovation.

Ask questions; How will the innovation or change affect what is expected in learners' achievement or employees' performance? Does this effect significantly change what learners or employees must understand, know, or do? Can these new understandings, knowledge, or actions be taught?

- c. If there is a choice, determine whether these goals are appropriate and high priority in the learning system.

Ask questions; Are the resources available to support this new instruction? Are they adequate to design and develop this instruction? Do these goals conflict with existing goals? How will these goals be interpreted by affected groups (e.g. students, teachers, trainers, managers, administration, parents, clients)? Do these goals represent partisan positions or vested interest groups? Are these groups that may object to these new goals?

- d. Begin learning environment analysis design activities; Proceed with next phase of instructional design.

3. Discrepancy-based

When using this model, it is presumed that the learning goals are already identified and that instructions are currently offered.

- a. List the goals of the instructional system
- b. Determine how well the identified goals are already being achieved
- c. Determine the gaps between “what is” and “what should be”.
- d. Prioritize gaps according to agreed-upon criteria.
- e. Determine which gaps are instructional needs and which are most appropriate for design and development of instruction.

Step 3: Describing the *learning environment*

Consider below questions;

- a. What are the characteristics of the teachers/trainers who will be using these materials?
- b. Are there existing curricula into which this piece of instruction must fit? If so, what is the philosophy, strategy or theory used in these materials?
- c. What hardware is commonly available in the potential learning environments? Are there video playback machines, in what format in that case? Are computer

stations available? If so what kind, how many, and in what configuration and networks? What about slide/overhead projectors? What software and other materials are available?

- d. What are the characteristics of the classes and facilities that will use the new instruction?
- e. What are the characteristics of the school system or organization in which the new instruction will take place?
- f. What is the philosophy and what are the taboos of the larger community in which the organization exists?

Analyse the Learner

In the analyse of the learner, start with defining characteristics of individual differences and similarities. Both are important to consider. Also consider if the characteristics are stable or exhibit change over time. All the characteristics do not have to be analysed, for example physiological characteristics may be very important in some cases but neglectable in other. Use below outline to conduct the analyse.

1. Cognitive Characteristics	General characteristics	General aptitudes	Rate 0-10 or (N/A)
		Specific aptitudes	
		Development level, such as Piaget's levels of cognitive development level	
		Reading level	
		Level of visual literacy; ability to	

		gain information from graphic	
		Cognitive and learning strategies	
		General world knowledge	
	Specific prior knowledge	Specific prior knowledge into the subject	
2. Physiological Characteristics		Sensory perception	
		General health	
		Age	
3. Affective Characteristics		Interests	
		Motivation	
		Motivation to learn	
		Attitude toward subject matter	
		Attitude toward learning	
		Perceptions of and experience with specific forms of mediation	
		Academic self-concept	

		Anxiety level	
		Beliefs	
		Attribution of success	
4. Social Characteristics		Relationships to peers	
		Feelings toward authority	
		Tendencies toward cooperation or competition	
		Moral development	
		Socioeconomic background	
		Racial/ethnic background, affiliations	
		Role models	

Below instructional strategies should be adopted to the result from the learner analyse, which will elevate the experience of the instruction for the learner.

- Speed of presentation
- Number of successful experiences learners should have in practice
- Types of statements to convince students of the relevancy of the instruction
- Techniques for gaining and focusing attention and the frequency of use of these techniques

- Context of examples and practice items
- Amount of structure and organization
- Medium/media of instruction
- Level of concrete/abstraction
- Grouping of students
- Size of instructional chunks
- Response mode (written, oral, etc)
- Number and difficulty of examples and practice
- Types of feedback given after practice items
- Level of learner control
- Reading level
- Vocabulary and terminology used
- Amount and types of reinforcement
- Amount of time allowed for instruction
- Amount and type of learning guidance, cues, and prompts provided

When describing the learners, the designer should include implications that the characteristics of the learners have for the instruction. These may be easily identified or require in depth research to determine which adjustments to the instruction that are needed.

Analyse the Learning Task

The primary steps in performing a learning task analysis are outlined below.

1. Write a learning goal.
 - a. Learning goals are statements of purpose or intention.
 - b. The goal may be very direct, or it may vary in the context of application. This is established in the Needs assessment.
 - c. The more focused the goal is, the easier the design and development of instructions will be.
 - d. Example of a sufficiently unambiguous and specific goal to guide further instructional design: When given a broken tool with one of four possible malfunctions, the learner will be able to locate the malfunction and repair it.
 - e. The designer of the instructions must have a precise knowledge of the intent of the goal.

2. Determine the types of learning of the goal.
 - a. Declarative knowledge; requires a learner to recall in verbatim, paraphrased, or summarized form facts, lists, names, or organized information. Learners are not required to apply the knowledge merely recall it.
 - b. Intellectual skills; The predominant objective skill in schools and training settings. Can also be described as procedural knowledge or “knowing how”. A intellectual skill is applicable to a class of problems, not just a single recalled one. Concepts, principles, procedures and problem solving are subcategories for intellectual skills.
 - c. Cognitive strategies; A tool to manage one’s own learning. Organized by Weinstein and Mayer(1986) into five categories, rehearsal strategies, elaboration strategies, organizational strategies, comprehension monitoring strategies and affective strategies.
 - d. Attitudes; Attitude influence learning across content and domains. It is a mental state that predisposes a learner to choose to behave in a certain way.

- e. Psychomotor skills; Coordinated muscular movements that are typified by smoothness and precise timing.
 - f. Learning enterprises; A purposive activity that may depend for its execution on some combination of declarative knowledge, intellectual skills, and cognitive strategies, all related by their involvement in the common goal.
3. Conduct an information-processing analysis of that goal.
- a. The simplest and most time efficient technique is to go through the steps that are necessary to complete the task and document them.
 - b. This is in many cases sufficient for simple tasks.
 - c. A more detailed analysis might be necessary if the task is complicated since all individuals might not go about things the same way you would do. If that is deemed necessary, it is recommended to follow the recommended procedure for such an analysis.
4. Conduct a prerequisite analysis and determine the type of learning of the prerequisites.
- a. Convert the goal and tasks into a hierarchy.
 - b. What must the learner know, or be able to do, to achieve this step?
 - c. Continue to ask this question until each step has been broken down into everything the student must know to achieve the learning goal.
 - d. Cease analysis when it can be assumed that all of the students have the desired knowledge and skills.
5. Write learning objectives for the learning goal and each of the prerequisites.
- a. Convert prerequisites and goal statements into learning objectives.
 - b. A learning objective is a statement that tells what learners should be able to do when they have completed a segment of instruction.

- c. The most critical part of a learning objective is the description of the observable action. The statement should include action verbs such as; select, identify, list, solve, repair, write etc.
6. Write test specifications.
 - a. Instruments designed to assess competence or identify gaps in learning are termed criterion-referenced assessment instruments. Such instruments are good in determining who is “competent” and less effective in comparing or ranking learners, which is suitable for this model for the marine industry.
 - b. Different types of assessments; entry skills assessment, preassessments, postassessments.
 - c. Characteristics of assessments; validity, reliability and practicality
 - d. Develop specific assessments targeted to particular objectives.

10.2 Appendix 2, Interview form

Review of regulation implementation within a Finnish shipping company

The review is anonymous and will be used to improve the company's internal procedures and in a master's degree Thesis at Novia University of Applied Sciences. It is voluntary to participate.

Age:

Gender:

Rank:

Nationality:

Crew/Office:

Implementation process in this review is defined as for example a new IMO regulation entering into force and being implemented from the office out to the vessels. It could also be implementation of a new internal regulation, for example a fuel saving policy, procurement routines or safety advice.

Part A

1. What do you think about the implementation processes you have experienced to date? Rate it 0-10 (0 being not working at all and 10 represent working perfectly.)

0 1 2 3 4 5 6 7 8 9 10

2. Where problems you encountered (if any) typically related to any of below:
 - a. Lack of information about the new regulation
 - b. Lack of resources (for example no budget to live up to requirement)
 - c. Lack of motivation to follow the regulation
 - d. Lack of skill and/or knowledge
 - e. Lack of time
 - f. Something else:

Choose several if needed.

3. Do you consider the implementation to be working?

YES or NO

Part B

1. Which part of the implementation is most time consuming?

- a. Preparations
- b. Implementation
- c. Follow up

Choose several if needed.

2. Do you consider the time spent on regulation implementation to be;

- a. Too much
- b. Suitable
- c. Too little

Choose several if needed.

3. What is causing most difficulties with implementing regulations?

- a. Poor instructions (bureaucratic, incorrect, or complicated to follow)
- b. Poor design of the instructions
- c. Motivating oneself and the crew
- d. Working climate onboard
- e. Lack of time for the implementation
- f. No sufficient training on the subject
- g. Language barrier
- h. Cultural differences
- i. Fatigue

Choose several if needed.

4. Rate the difficulty of implementing regulations 0-10. (0 being very difficult and 10 represent very easy).

0 1 2 3 4 5 6 7 8 9 10

Part C

1. How do you rate your own implementation of new regulations to your colleagues? To crewmembers/other officers/to vessels.
(0 being very poor implementation and 10 represent perfect implementation).

0 1 2 3 4 5 6 7 8 9 10

2. How could this implementation process improve for you?
- Better training on the subject
 - More time for this purpose
 - Better resources
 - Increased motivation some reward is always good.

Choose several if needed.

3. What would you like to see in the instructions from the company?
- Better instructions
 - Better design of the instructions
 - Motivation incentives
 - More training on the subject
 - Better follow up

Choose several if needed.

4. Which problems have you noticed in the instructions from the company?
- Incorrect information
 - Too bureaucratic
 - Lack of follow up
 - Too time consuming
 - Poor design
 - Too complicated
 - Not specific enough for your situation

Choose several if needed.

5. Rate the instructions from the company 0-10

(0 being very poor and 10 represent perfect instructions)

0 1 2 3 4 5 6 7 8 9 10

Part D

1. How would you prefer to receive instructions from the company?
 - a. e-mail
 - b. pictures
 - c. video
 - d. link to webpage
 - e. references to regulation
 - f. circular letter
 - g. Audio
 - h. Seminar
 - i. Meeting in person
 - j. check lists

near miss reports from the industry good. Problems with meetings, half the crew are home. Crew changes, but ot always same crew returns.

Choose several if needed.

2. Have you had problems due to poor instructions or poor implementation procedures? For example with;
 - a. Class
 - b. PSC
 - c. Internal inspections
 - d. Charterer

Choose several if needed.

3. How big problem is poor instructions and poor implementation to you?

(0 being very small problem and 10 being a very big problem)

0 1 2 3 4 5 6 7 8 9 10

Other comment:

