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ENHANCING IMPROVISATION IN CRISIS MANAGEMENT onboard ships

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ABSTRACT

This thesis concerns enhancing improvisation in crisis management. It has been established during literature studies and interviews of naval officers that managing critical situations is not only depending on contingency plans and technology but also the crew`s ability to improvise. This due to the very nature of most crises; chaotic surroundings with limited time to act and shortage of vital and relevant information and possible escalation of initial incidents.

The study reveals the importance of engineering knowledge, skills, experience and intuition during everyday operations on board. This is obtained by a mix of experienced crew working together with less experienced ones. Building and maintaining safety attitude will contribute to such development. Rotating or alternating roles are one option to achieve crew`s ability to perform tasks outside their initial profession when required in an emergency.

Involving the whole ship`s crew in risk assessment and contingency planning are vital to the understanding of safety and how things and systems work. Participation in contingency exercises will also be of importance to achieve skills and knowledge, especially if exercises are performed with a reduced crew requiring the remaining to take charge of tasks not initially committed to.

The use of shore-based simulators for contingency exercises are also discussed in this thesis. It is said to be an excellent tool for training crisis management and improvisation.

The thesis also contains two real-life examples of improvisation in emergencies.

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CONTENTS

INTRODUCTION

Prior to incidents or accidents most organizations have worked out two main sets of plans[1] in order to avoid or manage unfortunate events or accidents. Plan one is to organize the daily operations to avoid dangerous incidents or accidents to occur. This includes systems, equipment, procedures and training, also named barriers. However, thinking that one can secure one-selves one hundred percent from incidents or accidents is not realistic. This is stated by James Reason: *"The procedures necessary to guide the preparation of, say minestrone soup, can be conveyed in a few sentences. But the procedures necessary to guarantee that this task will be performed with absolute safety could fill several books, and even then, it is unlikely that all possible scenarios would have been covered".*[2] Hence contingency-plans are made to handle unfortunate situations. This is plan two. Such plans are often developed based on risk-estimates (what we imagine may go wrong and named *risk - assessment* and/or experience and mainly consists of various procedures as well as the use of different kinds of safety equipment. Training procedures and use of equipment are very often or mostly drills and performance of these procedures based on anticipated incidents or accidents. In the real-world incidents seldom follow estimated paths, they tend to have their own life depending on various circumstances. An example on this would be the fire om board the MV Nordlys[3]. Equipment may fail, human resources may be reduced or not available due to severe casualties or loss of life. This calls for the remaining crew set to handle or manage a situation to improvise to cope and achieve a successful outcome. In this thesis I aim to look upon to what extent and how contingency includes improvisation and hopefully provide the readers some advice or recommendations on the topic.

My interest of this topic originates from my experience as abled bodied seaman[4] and officer at sea, on-shore based operations in the Norwegian Coast Guard and as lecturer in contingency and crisis-management subjects at Bodin maritime college and North University in Bodø, Norway.

My first experience on improvisation in crises-exercises took place in 1984 when I served on board a ship in the Norwegian Coast Guard. Up to that year, all exercises I had taken part of

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[1] See more detailed description in sections: "Contingency and crisis-handling/management in general" and "A preliminary view on the topic – improvisation" in this thesis.
[2] Reason 2016 p. 74
[3] See AIBN report 2013/02
[4] Able bodied seaman (AB): Fully experienced deckhand

involved all crewmembers in exercises and drills aiming to train tasks specified in the alarm instructions and contingency plans. In `84, based on the lessons learned by news-reports and statements made by participants during and after the battle between UK an Argentine over the Falklands (Las Malvinas), we changed the organization of contingency-exercises on board my ship. The UK fighting ships found that not all resources were available after an incident. Equipment were inoperative due to damage and crewmembers were either injured or dead and therefore unable to contribute to the handling of incidents. Hence the remaining crew had to improvise to manage crises. This led to exercises where parts of the crew were withdrawn, leaving the remaining to improvise using less hands and limited access to contingency tools. Rather than just training drills and procedures this became the usual way to perform exercises.

Some weeks later this way of training contingency paid off on a Coast-guard ship on which I served. After midnight a fire started in the front-section of the ship while in port. Several crew members were still ashore; many of them assigned to our contingency-plan to deal with such an incident in the specific section of the ship. The crew at hand on board had to cope and did so successfully by improvising. Drills and training on improvisation of the whole crew had made all of us understand the nature of a fire and how to extinguish it. Hence the situation was managed into a successful outcome.

A different outcome is the fire on board the Norwegian coastal steamer the MV Nordlys where key emergency actions failed to be executed due to loss of key personnel whose tasks were to carry out these actions. The AIBN[5] blamed the ship leaders and the company for not having performed exercises emphasizing loss of crew-members[6], and recommend the company to establish procedures to ensure such on board-training.[7] The self-experienced incident as mentioned above and the recommendations made by AIBN after the case of MV Nordlys shows the relevance and necessity of training crew and staff `s capability to improvise in crisis-situations.

Contingency demands human resources and time and may be hard to organize within a ship`s or an onshore organization`s schedule. Hence drills on procedures might be the only available way to perform exercises. Contingency has been, is prevailing, and will probably always be a matter of cost vs benefit.

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[5] AIBN: accident investigation board Norway
[6] AIBN: Report sjø 2013/02 p. 98
[7] AIBN: Report sjø 2013/02 p. 113

The purpose of this study

In this study I aim to explore how improvisation is enhanced concerning crisis-management in the maritime domain (on board ships). I also focus on ways to implement improvisation in the training of sailors, both ratings[8] and officers. The latter will concern training and exercises on board and by using simulators onshore. A specific outcome of this work will be a chapter concerning improvisation in crisis management and contingency in a new textbook for maritime studies I intend to write during the spring and summer of 2019.

Research question

How may improvisation be enhanced in contingency and crisis-management on board ships?

Scope

Due to my insight on the topic as former naval officer and instructor this study is limited to the maritime domain; ship-management on board. Remoteness is also an item special to ships when it comes to contingency and crisis-management. Weick and Sutcliffe points this out as follows: "*Maritime organizations are accustomed to resilience because most of their operations consists of blue-water cruising away from land, rescuers, spare parts and expert diagnoses. If a rudder breaks, if the power goes off, the crew is dependent on its own resourcefulness to do something right now*".[9]

The informants are or have been serving on board cruise-ships, off-shore vessels and High-speed crafts. References to legislation are based on national Norwegian maritime regulations. This legislation, however, is based on international conventions developed by the International Maritime Organization (IMO)[10] and ratified by the Norwegian government. European (EU) maritime legislation, developed by the EMSA[11], is also implemented in national regulations due to Norway`s agreements with the EU – the EEA[12].

Structure

This thesis contains a theory chapter presenting theory on the topic including some recent studies on the topic:

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[8] Ratings: Crewmembers other than officers (AB`s, OS`s, Motormen, Oilers to name some)
[9] Weick and Sutcliffe 2015:95,96
[10] IMO: United Nations council for developing conventions and standards on the maritime domain.
[11] EMSA: European Maritime Safety Association, a counseling organization to the EU.
[12] EEA: European Economic Area linking EFTA (European Free Trade Association) countries to the EU

Contingency and crisis management in general: Developing contingency plans, training exercises and drills.

A view on the topic improvisation: When a crisis occurs, human and organizational behavior, planning for improvisation when a crisis occurs – a real life example, efficiency and financial requirements versus safety

Method used to perform this survey is presented in the a chapter divided in categories: Design, sampling, selection of significant informants, analysis, quality, reliability validity and generability

Findings and analysis are the next section. this chapter is divided into categories containing statements from informants in comparison to theory:

On contingency, on improvisation, on exercises, on debriefs, on reduced resources, on time to perform exercises, on alternating jobs and roles, on competence and experience, on experience versus procedures and on safety attitude. This is followed by a real-life example on improvisation in a crisis.

Conclusions are given in the following chapter divided in categories: General, enhancing improvisation in everyday operations, enhancing improvisation by contingency-exercises onboard and impediments to improvisation. Followed by a suggestion as to further research.

Under Enclosures on will find: Bibliography, interview guide, list of figures and original statements from informants in Norwegian translated into English.

THEORY

This section brings some definitions of special terms commonly used concerning contingency, it seeks to give a brief description on how contingency-plans are developed, brief descriptions of what may go wrong, some common human errors and behavior and thoughts on improvisation. The topic of efficiency and financial demands versus safety is also mentioned in this chapter. In addition to books and papers on the topic, relevant marine casualty reports containing analyses and safety recommendations are referred to.

Contingency and crisis management in general

Within safety management built on culture [retrospective], both scientists and practitioners ask themselves what has happened in order to identify new hazards and how to manage them. Safety management built on Resilience Engineering, on the other hand, view upon the possibility of unfortunate events to occur, Hafting[13]. Contingency to manage crises nowadays are most commonly built on both statistics and likeliness of various incidents to occur and also assessment of the specific risks or hazards one faces on board the actual ship; *risk-assessment*.

Risk-assessment and the following planning demands a considerable use of resources and time to secure that organization, systems, procedures, equipment and training turns out to be useful tools for managing or handling incidents or accidents.

In order to justify the relevance of contingency, plans and the process of developing such, to this thesis, I will refer to Hafting[14] where it is stated that new plans [developed during the management of crises - improvisation] are usually intentional actions based on former contingency plans[15]. General Dwight D. Eisenhower apparently stated during WWII: "*A plan is nothing – planning is everything",* which I find supportive to Hafting[16].

To give the reader of this thesis some deeper insight in contingency planning I will try to describe the development of such plans in this section.

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[13] Hafting (red) 2017:38
[14] Hafting (red) 2017:38
[15] Hafting (red) 2017:39
[16] Hafting (red) 2017: 38,38

Developing contingency plans

To manage various unhappy incidents, crisis or unfortunate events organizations, such as a ship`s crew, must be well prepared in order to handle such events. A vital tool for engineering such preparedness would be contingency plans. Due to the scope of this thesis I find it useful to describe how such plans may be developed. This is stated by IMO conventions; SOLAS[17], MARPOL[18] and STCW[19]. Developing contingency plans are mandatory based on various prescriptions which states how and when risk-assessments should be performed and the frequency of revisions.[20]

Prior to contingency planning one will have to perform an assessment of specific risks as a base for the work on contingency-plans. This would contribute to increase the possibilities of successful crisis – management. A risk-assessment starts with browsing known and probable risks and vulnerabilities concerning all ship operations. Findings are sorted out in limited sections as; various deck and engine-operations, risks of fire and/or explosions, risks of grounding, collision etc[21]. Assessment to be performed by the ship`s crewmembers with special expertise on each area accordingly in cooperation with a company`s land-based organization[22].

Such assessment may start from scratch not taking in account existing barriers[23] (organization, personnel, procedures and equipment) to limit the risk of accidents or unpleasant incidents; known as a naked assessment and recommended by Bestia Risk Consulting[24]. Naked assessment may lead to a better understanding of how systems work and why existing measures are formulated as they are.

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[17] SOLAS: Safety of Life At Sea
[18] MARPOL: Marine Pollution convention
[19] STCW: Standards for Training, Certification and Watckeeping
[20] FOR-2005-01-01-8 – «Forskrift om arbeidsmiljø mv. på skip», FOR-1993-12-22-1239- «Forskrift om risikoanalyse for flyttbare innretninger», FOR-2014-07-01-1019 – «Forskrift om redningsredskaper på skip», FOR-2014-09-05-1191- «Forskrift om sikkerhetsstyringssystem for skip m.m».
[21] FOR-2005-01-01-8 – «Forskrift om arbeidsmiljø mv. på skip», FOR-1993-12-22-1239- «Forskrift om risikoanalyse for flyttbare innretninger», FOR-2014-07-01-1019 – «Forskrift om redningsredskaper på skip», FOR-2014-09-05-1191- «Forskrift om sikkerhetsstyringssystem for skip m.m».
[22] Skipssikkerhetsloven [Law on Ships Safety] § 7.
[23] See the «Swiss Cheese» - model, Reason 1997 p. 12
[24] Bestia Risk Consulting, hand-out 2016 p. 20: https://www.bestia.no

A more common practice has been to perform the assessment starting with already established barriers. Barriers are, as described by Reasons "Swiss Cheese Model"[25], special systems and equipment to manage crises, organization such as safe-operation procedures and plans as well as the skills, knowledge and experience of the crew. Such barriers aim to prevent unfortunate events or accidents to occur. What is crucial here is to use crew- or staff members to look upon operations on the actual ship or company to secure an efficient and safe outcome of the work. This is also stated by international (SOLAS, MARPOL and STCW- conventions) and national regulations. The Norwegian "Skipssikkerhetsloven" § 7 states that the company shall ensure that the master and crew are given the opportunity to participate in the establishing, performing and further developing of the safety management system[26].
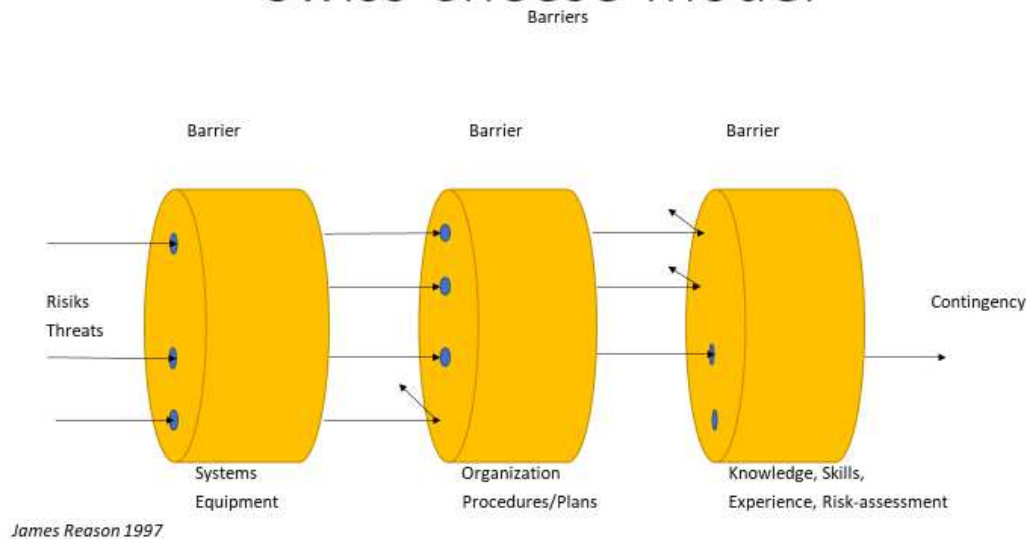
Figure 1 – Swiss Cheese-model

Nevertheless, as pointed out in the introduction of this thesis, a state of one hundred percent safety is acknowledged to be impossible to obtain. This fact leads to the term commonly named "residual risk" and described not only as risks not taken into account, but also risks considered prevented (barriers) within acceptable limits, Lunde[27]. Acceptable limits - ALARP[28] – meaning creating barriers to reduce risk to a reasonable and possible extent

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[25] Reason 2016:9
[26] IMO: Safety of life at sea (SOLAS) chapter IX, International Safety Management – code (ISM-code), and the Norwegian "Skipssikkerhetsloven" § 7 (National legislation based on SOLAS/ISM-code by ratification of the SOLAS convention)
[27] Lunde 2016:34
[28] ALARP: As Low as Reasonable Possible. Based on a cost vs. benefit- analysis

regarding cost versus expected gain. The residual risk represents all what may go wrong in spite of safety routines and equipment. Lunde names some of these[29]:

> Wanted human actions: Acts of terror, sabotage or other criminal acts. Human errors: Lack of competence, [*experience*] or consciousness. Material failure: Failure of materials, equipment, systems or transferring. Other impact: Extreme weather conditions, catastrophic nature-events, epidemic outbursts or attacks by animals or other live organisms. Unidentified incidents: Risks not taken into account or not foreseen, "Black Swans[30]". In this thesis I find it appropriate to mention a few central factors.

Using routines from sources as other companies, or ships or general guidelines or neglecting to perform proper risk-assessment may turn out fatal pursuant to AIBN (2013/03). An investigation made by the *Accident Investigation Board Norway* (AIBN), following a fatal accident on a chemical tanker, discovered that the company had failed to perform a proper risk-assessment for the actual vessel. The assessment had been performed by the master and head of company, not engaging the crewmembers of the ship. Operational procedures were had been developed based on recognized standards (ISGOTT[31] and Tanker Safety Guide, Chemicals). This was criticized by the AIBN:

"*In the AIBN's view, the factors addressed by ISGOTT and Tanker Safety Guide, Chemicals are relevant to the safe operation of vessels, but it is nonetheless necessary to carry out risk assessments and implement necessary company and vessel-specific measures.*"[32]

In the aftermath of the assessment, procedures and instructions are worked out as well as securing the availability of equipment necessary and mandatory for safe operations and crisis-management. Mandatory requirements based on international and domestic regulations will be crucial when performing this work. All aiming to avoid unfortunate incidents or more serious accidents. Following the above, contingency plans to manage what is known as the residual risk to be established.

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[29] Lunde 2016:34,35
[30] See section "Definitions"
[31] ISGOTT: International Safety Guide for Tankers and Terminals
[32] AIBN: Report sjø 2013/03, English version, p. 46

Training, exercises and drills

Plans as described above are useful tools, but to be effective as such organizations will have to practice the performance to see if they work and to improve them if so needed.

Training, exercises and drills serve to benefit the handling or managing and probability of successful outcome of all kinds of anticipated situations, including crises. Among other authors and experts on the subject, Lars Weisæth and Ragnar Kjeserud[33] holds training in managing of unexpected situations [crises] to be important to deal with such events. Contingency is formalized in alarm plans and alarm instructions outlining tasks and procedures for each member of the crew and staff to handle various unwanted incidents or accidents. These tasks and procedures are to be objects for mandatory exercises stated by both International and national regulations[34] pursuant to SOLAS chapter III[35]. As to instructions, Regulation 8 in chapter III of SOLAS states that for every person on board there shall be clear instructions to be followed in cases of emergencies. These instructions shall be written in English or in the language required by the flag-state of the ship. Alarm- and emergency-instructions shall be placed at easy-to-see locations on board. The contents of such instructions are stated by Regulation 37 of SOLAS chapter III.

Rule 19 in SOLAS chapter III sets mandatory requirements to emergency training and drills and apply to all ships;

> - Knowledge of safety installations and practice prior to mustering. All crew-members with dedicated duties in cases of emergency shall be familiar to their duties before the sea-voyage commences…Exercises shall, to the extent of practical possibility, be carried out as if it was a real state of emergency. Each crewmember shall participate in at least one abandoning ship drill and one fire drill every month. Such drills shall take place within 24 hours after leaving port if more than 25% of the crew have not participated in drills on board the actual ship the previous month.

Regulation 19 also describes the minimum content of abandoning ship- and fire-drills. Further-more this regulation states requirements as to when education/training and instruction on board shall take place and the content of such training;

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[33] Weisæth & Kjeserud 2008:17
[34] IMO: SOLAS chapter III, regulations 6.4.1, 8, 19, 26, 30 and 37
[35] Translation of SOLAS requirements into English by author based on Norwegian regulation-text

- Training in the use of the ship`s safety equipment shall be performed as soon as possible, not exceeding two weeks after the crewmember embarked for service.

For RO-RO passenger-ships (ferries) there are special mandatory provisions, mainly related to safety-equipment and frequency of exercises. These are to be found in Regulation 26 of SOLAS chapter III.

Pursuant to the above-mentioned regulations, there are four common ways to exercise or types of exercises described by Løvik:

- Drills:
  - Crew and staff (or parts of them) drills on using safety-equipment, procedures and systems to make sure they are able to handle these automatically in an emergency. [36]

- Table-top exercises:
  - Relevant participants from the crew and/or staff handles various emergency scenarios in an "round the table"- simulation. Intercom, cellphones and other means of communication may be used to make the simulation as realistic as possible. Safety-equipment are seldom used, but procedures may be evaluated.[37]

The purposes of these two types of exercise are to prepare crew and staff for the next step – full-scale exercises pursuant to Løvik[38]. They also have the advantage of saving time so that schedules may be overheld. In the maritime industry schedules are very tight so as the financial margins. The term "time is money" is an everyday challenge in this branch.

Leaders must weigh the costs of developing a safety culture, which may be considerable, against the financial demands of the trade. It is claimed by Perrow[39] that leaders emphasize efficiency over safety

- Simulations:
  - Simulations are central means within crisis- and contingency-training. Research indicates that simulations may provide better learning, increased motivation and improved performance. A simulation is based on a scenario aiming to present real

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[36] Løvik 2017:93
[37] Løvik 2017:74
[38] Løvik 2017:75
[39] Hafting (red) 2017:25

phenomena. Participators are given defined roles, available resources etc. prior to the exercise starts[40]. The development of simulator-technology over the last years and continuing, have made such training more common and preferable. This may also be due to less expenses in training and the possibilities of increasing the severity of scenarios without running risks. Naval-officers serving certain trades[41] are regularly attending maritime training-centers to train and retrain contingency using navigation-simulators. Boin and McConnell points out benefits of simulation and exercises: "*There is much to be gained from the prior specifications [planning for emergencies and crises]of roles and responsibilities; the allocation of materials, equipment and information systems; and the testing of systems under `trial`conditions through simulations and exercises*"[42].

➢ Full-scale exercises:
- The whole crew and/or staff (or parts of them) handles various emergency scenarios. This includes to follow procedures, handling equipment and organizing available resources. Often a ship-shore (company staff, authorities and various organizations concerning contingency) interaction is a part of such exercises[43].

A full-scale exercise requires a certain amount of use of human resources and time. Hence such exercises are not very often performed, especially when ship and onshore staff are participating in common scenarios. Improvisation may be emphasized in all three types of exercises. As to drills, they might be most useful to train unexperienced crewmembers in various techniques for handling safety-equipment. For the latter three types, more experienced personnel will be forced to use their creativity.

Pursuant to Løvik[44], exercises may be a combination of those mentioned above. What is important, he underlines, is that exercises must be planned to secure optimal learning. In addition to this, it is important to be aware of and clarify the level of an exercise. One must consider whether it is only one level or more to be included in an exercise. (Strategic,

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[40] Eriksen 2011:144,145
[41] Mandatory training and retraining for officers serving on HSC (mandatory requirements) and ferries (company policy)
[42] Boin and McConnell 2007:52,53
[43] Løvik 2017:75
[44] Løvik 2017:75

operational or tactical level)[45]. Løvik[46] defines the different levels. These are focused on society as a whole, so I have tried to translate into an onboard ship setting. The strategic level would be the shipboard, that is the leaders of the ship (Master, chief officer and chief engineer). Their tasks, pursuant to Løvik[47], are to get a view over the situation, assemble knowledge and information, interpret states of the situation, coordinate information to crew, passengers, company and external aids, Løvik[48] Operative level will be leaders of each section or domain-specific teams, for example leaders of fire-fighting teams, evacuation teams etc. (Junior officers, quartermasters or other personnel pointed out to lead specific teams.). Their tasks should be in situ coordination, communication and advice upwards and downward in the organization, distributing resources in situ and cooperation between teams. For both levels above, leadership should be emphasized. Tactical level or 1. Line consists of those performing the responses in situ. (Ratings, junior officers and others, often with special training as to handle different tasks as firefighting or maneuver lifeboats etc.). They are to perform the practical tasks in fighting a crisis both concerning manual work, making in situ decisions and handling safety-equipment. In this level, pursuant to Løvik[49] knowledge and practical skills are trained and learned [experience being engineered].

A view on the topic - improvisation

Contingency-plans may be developed and exercised to the best of the organization`s ability and knowledge. One can however never anticipate all possible hazards or combinations of these [50]. Hence there will be a need of improvisation to manage some incidents or accidents.

Hafting [51]state that when managing crises the leadership will meet situations not foreseen in plans. When the crisis occurs, the situation is chaotic and difficult to follow, and there is a great need of information[52]. During a crisis both leaders and operative personnel must act and make decisions based on insufficient oversight. Even if such decisions are not optimal, it is better to initiate actions to reduce damages caused by the crisis. The personnel must

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[45] Løvik 2017:71
[46] Løvik 2017:30-32
[47] Løvik 2017:30
[48] Løvik 2017:30
[49] Løvik 2017:30-32
[50] Reason 1997/2016:74
[51] Hafting (red) 2017:38
[52] Hafting (red) 2017:38

improvise to find solutions while in the midst of the situation. Improvisation is crisis management as it develops[53].

In this section my intention is to explore theories describing and explaining the foundations of improvisation. I have divided this section in five sub-sections: When a crisis occurs, human and organizational behavior, planning and efficiency and financial requirements vs. safety.

Browsing available literature, books, articles and papers, has shown me that not much have been said on this matter. Nevertheless I have been able to find some enlightening and interesting thoughts on the subject though. Webb and Chevreau[54] clarifies some aspects of improvisation: Initially they claim improvisation to be present in all social settings, including both routine and non-routine. Routine, they say, requires a minimum of improvisation, whilst in crises the demand to improvise increases dramatically. Crises disrupt, breach or challenge social orders because no existing routines are at hand to cope with it. If there was no demand for improvised actions, they point out, there would be no distinction between a crisis and a normal situation[55]. They describe routine and crises to be situated along a continuum. "*At one end of the continuum lie routine social settings that involve purely conventional activities, and at the other end lie crisis situations[56]*". They continue to explain: "*Routine settings involve higher degrees of conventionality and lower degrees of improvisation, while crises involve higher degrees of improvisation and lower degrees of conventionality*"[57].

When a crisis occurs
Weisæth and Kjeserud[58] defines a crisis as a situation of deviance which develops in such manner that it represents a serious threat to life and personal safety or threatens a company`s commercial interests. Ordinary problem-solving and routines will not be sufficient to handle the situations. On the use of computers where all contingencies and rules for response are programmed to make decisions, Dreyfuss & Dreyfuss states: "*The frightening prospect with the `Star Wars` defense system, which requires that all contingencies be anticipated and rules for response be programmed into a computer, is that the expert`s ability to use intuition will be forfeited and replaced by merely competent decision-making. In a crisis competence is not*

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[53] Hafting (red) 2017:38,39
[54] Webb and Chevreau 2006:68
[55] Webb and Chevreau 2006:68
[56] Webb and Chevreau 2006:68
[57] Webb and Chevreau 2006:68
[58] Weisæth & Kjeserud 2008:21

good enough"[59]. Webb and Chevreau[60] support this by claiming that technology may serve as supplement s but not as substitute for humans.

Weisæth & Kjeserud[61] continue by describing different particulars or signs of crisis-situations: Serious threats to humans, organization or society. One or more values are at stake for persons, environment, material or reputation. Not all these values may be object to equal importance, which lead to the necessity of making priorities and facing dilemmas. Such dilemmas stress the decision-making process. Minor manageable incidents occurring simultaneously or leading to a chain-reaction may cause new situations or crises. This may strain the decision-maker`s capacity to handle a certain number of different situations simultaneously. Common incidents have shown several times to trig accidents and catastrophes. A high degree of uncertainty when estimating [or understanding] a situation that initially looks insignificant or harmless but may turn into a crisis. Especially in the time immediately prior to a crisis denial to acknowledge sign of danger occurs. This phenomenon is also described by Weick and Sutcliffe[62], as "Reluctance to Simplify", where early signs are diminished concerning their potential hazard.

Other stressors when an incident or accident occurs might be: Reduced information and a high degree of uncertainty, signs at hand shows that something is wrong demanding decisions to be made based on limited information, reduced control and steerability; management might find themselves unable to influence the incidents leading to a crisis, a total lack of control tends to create a feeling of helplessness among leaders and scare them, escalation of the crisis either produced by initial management or by the crisis itself, denial of the critical situation drives the leader further on to a painful self-recognition, swift changes of the situation demand flexibility and smoothness by management, limited timeframes as to make decisions based on limited information or oversight, group- and media-pressure as disagreements within the leader-group and/or media demanding information and explanations may influence leaders handling capacity, long workhours may also reduce the capacity as to sound judgement[63].

Hafting also describes the crisis-situation to be chaotic and complex and there is an urging need of information[64]. The crisis seems to be new and often occurs inconvenient pursuant to

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[59] Dreyfuss & Dreyfuss 1986:31
[60] Webb and Chevreau 2006:70
[61] Weisæth & Kjeserud 2008:21,22
[62] Weick and Sutcliffe 2015:62
[63] Weisæth & Kjeserud 2008:1-24
[64] Hafting 2017:38

Weisæth and Kjeserud[65]. Contingency-plans are upheld by these authors to be based on yesterday`s crisis. Hence a need of creative problem-solving in a stressed situation were surroundings are complex. As a leader one might therefore be taken by surprise and be paralyzed by the amount of information and the dynamics of an ongoing crisis[66]. Webb and Chevreau states on crises: "*They have the potential to…create ambiguity and confusion.*"[67].

To make decisions when crisis occurs
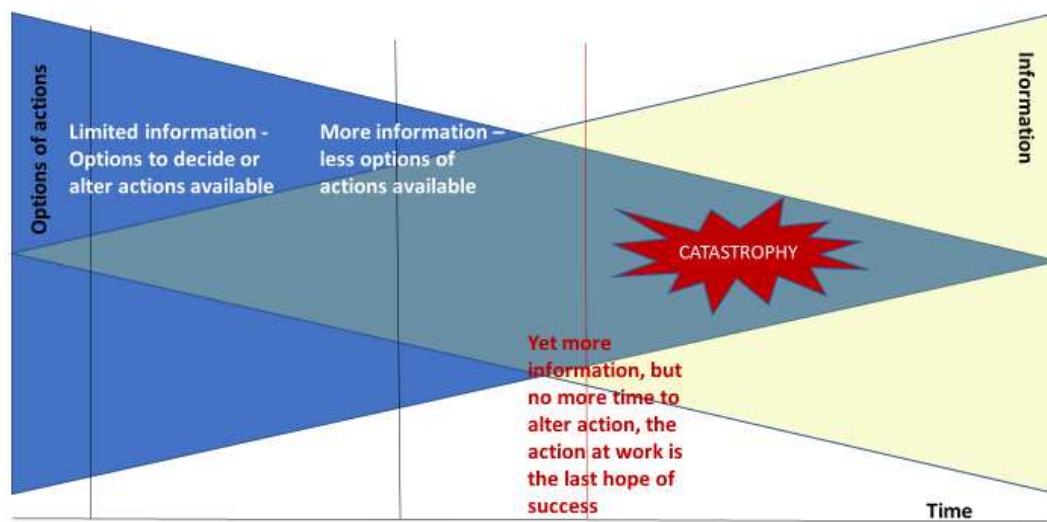
Figure 2 – Time versus Information (FalckNutec 2010)

As the figure above aims to illustrate some of the particulars described by Weisæth and Kjeserud above[68]. Decisions on what actions to be taken shortly after an incident or accident has occurred, will most probably have to be made based on limited information. Time to gather further oversight of the situation will diminish the time available to make decisions and to execute them. There will also be limited space to alter actions that proves inappropriate to handle a situation as time passes by. The more facts on the situation one gets, the less time to act or alter actions to use. Escalation may create new situations or other obstacles, such as loss of crew or material resources, may occur and demand new decisions to me made and eating more of the time at hand to prevent ending up in a disaster[69].

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[65] Weisæth & Kjeserud 2008:23,24
[66] Weisæth & Kjeserud 2008:17
[67] Webb and Chevreau 2006:67
[68] Weisæth & Kjeserud 2008:17
[69] Weisæth & Kjeserud 2008:17

This element is also regarded by Mendonca et.al.: "*The on-scene commander and support staff gather and analyze data, make decisions, and monitor their implementation and consequences. The activities required to respond to an incident are often dangerous and must be carried out under time pressure. Activation of emergency plans is based upon assessment of the potential impacts of an accident and the courses of action needed to eliminate or at least mitigate this impact*"[70]. One must also consider the occurrence of unanticipated events arising during response operations[71]. Boin and McConnell[72] also have some thoughts on this issue in their article. They enhance that crisis leaders will experience constraints in their effort to manage response actions due to lack of reliable information of the situation or the state of response network. Communication are mentioned as a typical fail, in the manner of technical break-down.

Two real-life examples of crisis management:

The onboard management in the aftermath of the Costa Concordia accident has been object to many comments world-wide and may have had some impact on the company`s reputation. Especially the master`s behavior during the rescue-operation was not regarded as an example to follow and he was later prosecuted and sentenced to imprisonment for his acts or lack of such. According to the casualty report on the accident presented by the Italian MIT, the master`s performance where affected by errors. He omitted procedures, mainly the Decision Support System, he left the bridge as the first person and after a while he left the ship at an early stage of the emergency and when this was still going on. He failed to pay attention to the seriousness of the situation and hence disoriented his staff and DPA[73] and lack of know-ledge of vital equipment.[74] This report also criticizes the master and crew for not following the ships SMS and used it as the tool it is meant to bee to help facing serious events[75]. [Violation; referring to Reason`s term *misvention[76]*].

Another example on crisis management, is the case of the Norwegian coastal steamer the MV "Nordlys" after a fire outside the west coast of Norwegian. Most sadly, two of the crewmembers perished and another two members of the crew suffered severe injuries during

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[70] Mendonca et.al. 2001:31
[71] Mendonca et.al. 2001:31
[72] Boin and McConnell 2007 p. 54
[73] DPA: Designated Person Ashore
[74] Italian MIT report 2013 p. 162
[75] Italian MIT report 2013 p. 8
[76] Reason 2016 p. 75

the accident. In their casualty report the accident investigation board of Norway (AIBN) stated: "*The management system lacked procedures for training to deal with loss of personnel. The personnel also lacked training for such situations, which to a certain extent explain why safety-critical tasks were not attended to in connection with the fire. Among other things, the air supply and fuel supply were not shut off*"[77]

The AIBM casualty report 2013 continues: "*…This accident has highlighted challenges relating to the performance of manual actions and compliance with procedures in an emergency situation, especially in the event of loss of personnel in complex, chaotic situations…If the supply of fuel and air had been shut off, the fire would probably gradually have died down by itself. The decision-support system on the bridge included a checklist in the event of fire that, among other things, entailed shutting off the fuel and air supply. The chief engineer was to muster to the bridge in an emergency situation, and he would normally be the one to follow up the checklist. However the chief engineer was put out of action as a result of the fire, and the fuel and air supply were not close off […] The main fire-extinguishing system did not […] work as a barrier in relation to preventing escalation of the accident. The captain was responsible for deciding whether to release the system. The situation on the bridge was hectic and challenging in the minutes after the alarm was trigged. The fire caused å blackout, and the loss of engine power was assessed as critical because Nordlys was near Steinvåggrunnene (shallows) at the time. The AIBN believes that the focus on clarification of this situation may have led to a postponement of the decision as to whether the CO_2 system in the engine room should be released. When the situation had been clarified, and the captain was able to address the issue of whether to release the CO_2 system, however, he did not know whether there were any crew in the engine room. He therefore chose not to release the system. In the AIBN`s view, this is a difficult, but safety-critical, dilemma that will often be relevant in such situations…In the event of fire, it is up to the captain to decide whether to release the CO_2 system to limit the extent of damage or not release the system to avoid endangering the lives if anyone could still be in the area.* [The release of CO_2 in confined spaces may be lethal to humans in situ]. *Not only does this impose mental strain on the captain. It is also a dilemma that can reduce or remove the focus on making other decisions and carrying out required actions. Several actions that should have been*

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[77] AIBN casualty report 2013 p. 5,6

implemented were not initiated from the bridge were not initiated during the fire, such as closing of fire doors[78] and watertight doors[79]…"[80]

Human and organizational behavior

Pursuant to Webb and Chevreau, another important point is that both individuals and organizations are engaged in improvisation. Individuals responding to a crisis "…*often short-curcuit or bypass established procedures, assume responsibility for things over which they have no authority, violate broader community norms, use makeshift tools or materials and perform their roles in new places*"[81]. Referring to Kreps et.al. (1994), Webb and Chevreau[82] say that roles are more likely to be improvised within the first twenty-four hours after an accident has occurred, actions by individuals having former disaster-experience and in newly formed organization. As to organizations, referring to Wachtendorf (2004), Webb and Chevreau suggest that: "…*in responding to disasters organizations sometimes reproduce old structures and processes, continually adapt to changing circumstances and in some cases create new structures and processes in performing necessary functions*"[83].

Pursuing the statement of James Reason[84] in the introduction of this thesis, he continues by presenting the terms "bad rule – situations" or "non-rule - situations". There will always be a possibility of circumstances, both when concerning normal operations and the occurrence of unfortunate incidents or accidents, where established plans, instructions, procedures cover nor being applicable to the actual situation[85]. Hence improvisation will turn out to be a necessity for the successful outcome of the management of crisis-situations. Improvisation have been said to consist of:

Combining existing procedures or plans or creating new plans underway. This is;

- ➢ Adjusting existing procedures in accordance with prevailing and/or alternating circumstances
- ➢ Deviation from existing procedures

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[78] Fire doors: Doors between sections on ships preventing fire from spreading
[79] Watertight doord: Door between sections on ship preventing water from passing
[80] AIBN casualty report 2013 p. 91,92
[81] Webb and Chevreau 2006:68
[82] Webb and Chevreau 2006:68
[83] Webb and Chevreau 2006:68
[84] Reason 2016:74
[85] Reason 2016:74

> ➢ Creating new procedures – underway – considering prevailing and/or alternating circumstances[86]

I find this view exemplified in an article by Mendonca et.al.: "*In certain situations, no planned-for activities may be feasible, leading to the need to revise the plan. An unexpected event may evolve; so that implemented plans are no longer applicable. An unexpected event may be multi-faceted, requiring emergency response organizations (EROs) to combine many plans in unexpected ways*"[87]. And supported by Hafting[88] that states, by referring to Pine e Cunha, Miner & Antonacopoulo (2017 p. 560), that to improvise means that plan and initiating actions overlap in such a way that a new plan is adjusted in accordance with the situation. A new plan is usually based on a previous contingency plan in a way that improvising consists of intentional actions.

This is also emphasized by Mendonca et.al.: "*These response plans can rarely be executed as expected, … Flexible approaches to emergency management are therefore required. Any such approach must be able to deal with uncertain and changing environment and allow for revision of planned courses of action. Moreover, the approach must be able to support emergency managers in improvising when no standard operating procedure can alleviate the catastrophe*"[89].

Monitoring within teams are described by Endsley[90] as taking over or assist whole or parts of other team-members tasks.

> ➢ Reorganizing resources at hand to handle a situation (Use of substitutes)

Each individual of a team has their specified roles or tasks pursuant to their personal skills, knowledge and references. These are expected to be shared with the other members of the team so that individuals can survey, assist or take over tasks performed by other team-members pursuant to Endsley[91]. In their article, Rankin et.al. [92]. points out three ways of improving a team`s performance. One of these is taking responsibility for tasks or roles outside one`s specialized domain They also introduce the term resilience as the ability to deal with changes that goes outside the system tolerance which it is designed [planned] for. A

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[86] Hafting (red) 2017:38,39
[87] Mendonca et.al 2001:31,32
[88] Hafting (red) 2017:38,39
[89] Mendonca et.al 2001:31
[90] Endsley 1995
[91] Endsley 1995
[92] Ranking et.al 2011:79

resilient system, referring to Hollnagel (2009), they claim to have the ability to anticipate, monitor, respond and learn. Furthermore, by referring to Lundberg and Johansson (2016), they define resilience not as a state but an adaptive process in which improvisation plays a part[93].

Weick and Sutcliffe presents three definitions to the term resilience[94]:

> *1.The capability of a system to maintain its functions and structures in the face of internal and external change and to degrade gracefully when it must. 2.The amount of change a system can undergo (its capacity to absorb disturbance) and remain within the same regimen-essentially retaining the same function, structure and feed-back. 3.A resilient system is able effectively to adjust its functioning prior to, during or following changes and disturbances, so that it can continue to perform as required after a disruption or a major mishap and in the presence of continuous stresses.*

On resilience they claim that most systems are trying to anticipate errors or incidents (trouble-spots) but higher reliability systems in addition to such anticipation also pay attention to their capacity when it comes to investigate, learn and act not knowing what trouble ahead to act upon. Reliable systems are, pursuant to Weick and Sutcliffe[95], spending time on improving their ability or capacity to perform quick studies, developing swift trust, enhance just-in-time learning, imagining next steps in detail, recombining parts of relevant previous experience[96]. An HRO, they point out, is not free of errors. The clue is that errors cannot disable the HRO[97].

In this thesis, shipping organization is regarded as High Reliability Organizations, a understanding I find to be supported in the following statement by Weick and Sutcliffe describing resilience specific to the maritime domain:

> "*Maritime organizations are accustomed to resilience because most of their operations consists of blue-water cruising away from land, rescuers, spare parts and expert diagnoses. If a rudder breaks, if the power goes off, the crew is dependent on its own resourcefulness to do something right now*"[98].

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[93] Ranking et.al 2011:79
[94] Weick and Sutcliffe 2015:95
[95] HRO- High Reliability Organization
[96] Weick and Sutcliffe 2015:94
[97] Weick and Sutcliffe 2015:94,95
[98] Weick and Sutcliffe 2015:95,96

Mindful organizing is a term used by Weick and Sutcliffe[99]. This term states that both anticipation and resilience are needed to manage unexpected disruptions. As this focusing on improvisation in crisis – management I find this term highly useful to explain my topic. To avoid incidents or accidents, it is crucial to create defences or barriers as described by Reason to catch up and stop minor incidents or failures to evolve or escalate into hazardous situations. "*All defences are designed to serve one or more of the following functions: to create understanding and awareness of the local hazards* [understand how things work to benefit improvisation]…*to restore the system to a safe state in an off-normal situation* [understand systems]…"[100] Weick & Sutcliffe[101] divides the five elements of mindful organizing in two main sections. The first three are named anticipation and can be looked upon as means of such barriers:

1) Preoccupation with failure[102]: To avoid failure we must look for it and be sensitive to early signs of failure.
2) Reluctance to simplify[103]: Labels and clichés can stop one from looking further into the events.
3) Sensitivity to operations: Systems are not static and linear, but rather dynamic and non-linear in nature. As one result it becomes difficult to know how one area of the organization`s operations will act compared to another part[104]

In my opinion mindful operation demands a certain amount of experience and skills, or what I prefer to label as expertise. "*An expert generally knows what to do based on mature and practiced understanding. When deeply involved in coping with his* [or her] *environment, he* [or she] *does not see problems in some detached way and work at solving them, nor does he* [or she] *worry about the future and devise plans*"[105] These items have also been studied, described and presented as "Three levels of performance"; knowledge, skills and experience by James Reason. A modified figure based on James Reasons[106] "Three Levels of

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[99] Weick and Sutcliffe 2015:94,95
[100] Reason 2016:7
[101] Weick & Sutcliffe 2015:45-93
[102] Weick & Sutcliffe 2015:45-61
[103] Weick & Sutcliffe 2015:62-76
[104] Weick & Sutcliffe 2015:77-93
[105] Dreyfuss & Dreyfuss 1986:30
[106] Reason 2016:68-70

Performance" may be enlighten what is a foundation of improvisation:

The fairway toward IMPROVISATION
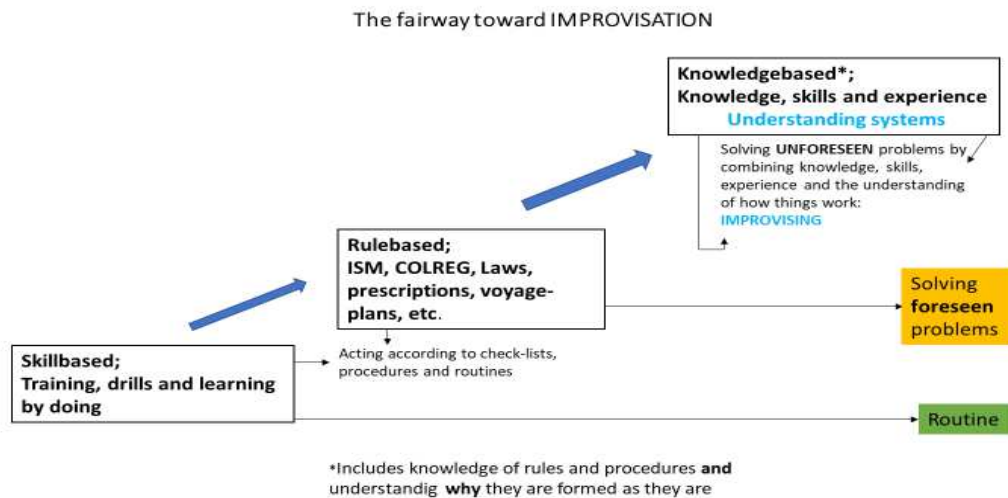
Figure 3 - Modified based on Reason 1997/2016

Pursuant to Reason[107], the skill-based level consists of routine and highly practical tasks per-formed automatically, only checking progress now and then. He claims that people are doing well on this level most of the time. The rule-based level is described by Reason[108] as a state where preprogrammed behavior needs to be modified due to changing situations. These modifications may be based on problems previously experienced, incidents trained to handle or ruled by procedures. The label rule-based arising from the need of using memorized or written rules to automatically respond to various signs and signals. Consciousness is used to consider whether actions taken are appropriate to serve their purpose. The third level of this model – knowledge based - is one Reason[109] claims that people are reluctant to come to, while it demands some effort. Effort to think through things on the spot, a slow procedure useful given available time and in a forgiving environment and, trying, failing and considering options requires both time and mental effort. In a state of emergency people are not at their peak and time to act may be limited. Understanding of problems may be patchy or inaccurate or both. Consciousness will also be limited in capacity to hold information. Also fear represent a limiting influence concerning the issue here. It is important to notice that Reason[110] point out that these three levels of performance are not mutually exclusive. They may appear simultaneously. This, I believe would support the validity of the figure above.

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[107] Reason 2016:70
[108] Reason 2016:70
[109] Reason 2016:70
[110] Reason 2016:70

(Fig. nr. 3). Even if there is limited time at hand to decide and lack of information, I believe that one also need to make some considerations based on knowledge, skills and experience to be able to improvise in an emergency in spite of people being reluctant to use effort in deciding.

The theory of Reason[111] above I find supported by Grech et.al. [112] describing different kinds of human behavior: <u>Skill-based behavior</u>: Due to skills, most tasks are well mastered causing performance by reflex. Mental resources are minimally in use or set to other activities. This kind of behavior is said by Grech.et.al to be sensitive to routine-errors and may lead to a low state of attention. <u>Rule-based behavior</u>: Tasks or operations are performed following at set of rules, instructions or procedures. Personnel in training situations to gain skills and experience focus very hard on what they are doing causing lack of attention on the surroundings. Another negative aspect here according to Grech et.al.[113], is that these performers are exposed to work overload [and fatigue] and may tend to use the wrong rules due to limited understanding of the system they are supposed to handle.

After the "Maxim Gorkiy" - incident in 1989[114], the master of the rescuing coast-guard ship KV "Senja" said: "*The crew of the KV "Senja" was working incredibly efficient, and were rapid in finding solutions when the situation demanded such... (I guess we had good training from numerous inspections, exercises and rescue-operations)*"[115]. This statement support what is described above as it shows the foundation of improvising.

Giving a more detailed description of this subject, Reason[116] points out two different modes of ways in which people control their actions: <u>Conscious mode</u>[117]: A slow, sequential, laborious or error-prone way of action, although a possible smart approach. This approach may lead to that the focus on or paying attention to specific items or issues causes ignorance or missing other important ones. This mode also restraint or reduce the mental capacity of the individual(s) facing the need to make decisions. It is, however, suitable for problem-solving in general. <u>Automatic mode</u>[118]: This mode is unconscious and not aware of the process leading to a certain perception, idea or action. It is virtually limitless in capacity, fast, multitask-

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[111] Grech et.al. 2008:53-55
[112] Grech et.al. 2008:53
[113] Grech et.al. 2008:53
[114] See more detailed description of this incident under sub-section *planning* in this thesis
[115] Hovden 2012:111
[116] Reason 2016:68,69
[117] Reason 2016:68,69
[118] Reason 2016:68,69

friendly, it does not demand much effort and is essential for the purpose of handling everyday recurrences. Not suitable as a general problem-solver mode though, as it is highly based on special knowledge structures[119].

Similarities to Reason are described by Grech et.al [120] is Automated behavior[121]: This kind of behavior is a necessity in many operations to be able to perform correctly and make the right actions in due time. A fall-pit is that auto-mated actions may be executed due to wrong perception of a situation or expectation bias. Such behavior has a potential to threaten safety.

A second dimension, still referring to Reason, is the immediate situation as to where there is a need to solve a problem. The extremes of these dimensions are familiar everyday situations and entirely new ones. In between one can find problems especially trained for or solutions written down in procedures[122].

Supporting both Reason[123] and the master of the KV "Senja", I will refer to Robin M. Hogarth who has formulated some thoughts on the issue comparing expertise with intuition. He defines the content of intuition as a stock of knowledge and experience, and that intuition is like expertise in the way that intuition is acquired by domain-specific or relevant experience which may be improved by instruction and practice[124]. Rankin et.al. states: "*Improvisation can be seen as a range of different behaviors – at one end as small deviations in intended courses of action and at the other end spontaneous actions based mainly on intuition*" [125]. Pursuant to Rankin et.al. [126] I believe to see the importance of intuition related to improvisation and the resemblance to expertise. Based on the statement above I find Hogarth[127] as a relevant source to the understanding of how expertise can be engineered.

In defining the term intuition, Hogarth[128] refers to intuitive understanding, containing the expressions: immediate understanding or cognition, knowledge or conviction gained by intuition, the power of faculty of attaining to direct knowledge or cognition without rational thought and inference (lack of deliberate or rational thought process), quick and ready insight

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[119] Reason 2016:68,69
[120] Grech et.al. 2008:53-55
[121] Grech et.al. 2008:54
[122] Reason 2016:68,69
[123] Reason 2016:68,69
[124] Hogarth 2001:23
[125] Ranking et.al 2013:80
[126] Ranking et.al 2013:80
[127] Hogarth 2001
[128] Hogarth 2001

(speed of knowing). Insight being defined as the ability or act to seeing into a situation and apprehend the inner nature og things or seeing intuitively[129]. In addition, there is the notion of knowledge built up through previous intuitions and insight. The process of intuition is characterized by a lack of awareness of how outcomes have been achieved or what judgements made during the process. Perception of a situation is acquired by [automatically] taking into account various cues in the surroundings. "*What is meant is simply that non-intuitive processes are deliberate and can be specified after the fact. Logic and analysis can be made transparent. Intuition cannot*"[130]. In my view this compares to what Dreyfuss & Dreyfuss[131] call expertise and what Reason[132]. name automatic mode of control, an effortless and fast way of solving problems Even though Reasons[133] third level of performance includes deliberate considerations, he states that people reluctantly use the effort to perform such considerations. In an emergency there might not be time to much consideration either[134]. The intuitive process described by Hogarth[135] above is a quick and effortless one. Hogarth[136] also states that intuitive judgements are based on looking both backwards and forward in time. Backward-looking he describe as interpreting experience and forward-looking represents predictions inferred from hypotheses or beliefs, both using a stock of knowledge. Such knowledge may, in some cases be domain specific. "*Intuition can also represent a stock of knowledge on which a person can call if necessary.… The basic idea here is that we all know many things intuitively and, when questioned, can provide a response without really knowing where it came from*"[137].

For the purpose of the topic of this thesis, I find domain-specific knowledge to be a necessity, to solve complicated or complex problems. So, how do one reach such knowledge? Once again I turn to Hogarth`s[138] thoughts and ideas on educating intuition in my search for answers. Being aware that the art of teaching or education have been discussed by several scientists and authors, I find Hogarth[139] to give both sufficient and relevant insight to my

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[129] Hogarth 2001:12
[130] Hogarth 2001:6,7
[131] Dreyfuss & Dreyfuss 1986:19-36
[132] Reason 2016:69
[133] Reason 2016:70
[134] Reason 2016:70
[135] Hogarth 2001:8
[136] Hogarth 2001
[137] Hogarth 2001:8,9
[138] Hogarth 2001
[139] Hogarth 2001

topic, given the topic of this thesis and the resemblance I mean to see to Reason`s[140] and other authors covering contingency and emergency ideas. On this basis I intend to refer to him on the matter of understanding the engineering of crewmembers to reach the knowledge-based level of performance as described by James Reason[141], a level I believe to be most fortunate concerning the ability to improvise.

Hogarth defines intuition as quick and ready insight[142]. Based on this definition I find intuition to be very useful or a necessity when unfortunate incidents occur or in an emergency where time is a key issue, as described above. Hogarth continues by explaining the label; insight, as "*the power or act to seeing into a situation apprehending the inner nature of things or seeing intuitively […] people suddenly become aware of the solution or part of it, to a problem with which they are confronted.*" [143]. Such insight, he claims, demands knowledge as a necessity to solve problems. Insight may also occur, he states, when looking at a problem from a certain angle[144]. Pursuant to Hogarth the information-processing systems of an organism [or human] are engaged constantly in processing internal regulation and external regulation. Evolution works, he states, by retaining processes or systems found satisfactory to provide acceptable solutions to problems of adaption[145]. Hogarth[146] refer to this as layers of systems found to work and that new systems or processes are added to existing layers systems, not necessarily replacing them. I find it important to be aware of this when training crew in handling everyday problem-solving and hence building the knowledge I believe to be a necessity to enhance their ability to improvise when dealing with critical situations or unfortunate incidents.

He claims that people learn from two sources, namely; What they are told by others and what they experience themselves. These two sources, however, interact with each other. What has been told may influence experience and experience may affect the interpretation of what one is being told. He continues by classifying two categories of learning; Content as knowledge of facts, how different variables are connected. This knowledge to be stored in the individual`s long-term memory. Rules, on the other hand, are knowledge on how to do things, both stored in the long-term and the short-term memory. Some rules, such as how to walk, will be stored

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[140] Reason 2016:70
[141] Reason 2016:70
[142] Hogarth 2001:12
[143] Hogarth 2001:12
[144] Hogarth 2001:12.13
[145] Hogarth 2001:15,16
[146] Hogarth 2001:15,16

for ever while performing the operation of various kinds of equipment may be stored on a short-time basis[147]. [As equipment frequently changes demanding new operation-procedures].

On the subject of learning, Hogarth[148] names two key principles to learn from experience. First, people learn by noticing associations or contingencies. The more of such being observed, the more likely they are to be remembered. Secondly, sanctions and rewards are helpful as to remember some associations better than others. He defines associations and contingencies as things occurring together, such as noticing the connections between actions and reactions. Rules and content are learned by what one experience, not from what you do not experience[149]. Seeing connections are critical to learning from experience[150]. Actions made based on beliefs, even though working, may not be optimal, thus such experience may be misleading. By this it is meant that learning from what is observed but not considered in the aftermath whether other options would have been more appropriate[151]. I believe this statement underlines the importance of debriefs following exercises, incidents, accidents or at the completion or during routine operations.

Still regarding intuition to be similar to expertise, I find, what Weick and Sutcliffe[152]. names as "deference to expertise", to be relevant to the topic of this thesis. Expertise may be ignored or dismissed, they explain, conditioned by rank, due to self-interest or rendered next to prevailing routine. Reliable systems organize in a way that individuals in their own hierarchies are attracted to propose unanticipated solutions Weick and Sutcliffe[153] makes it an important point not to regard deference as submission though. Deference, they explain, demands that both the person who do the deferring and he or she who being deferred to are to be regarded as experts containing wisdom. One person is not giving in to another, rather using the other person`s relative and domain-specific expertise sensitive to the context. Referring to Simon Dekker, they claim expertise to emerge "*from people querying each other, supplying data, opinions and other input to conversations in which it can be rejected, deferred to,*

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[147] Hogarth 2001:19,20
[148] Hogarth 2001:19,20
[149] Hogarth 2001:20
[150] Hogarth 2001:75
[151] Hogarth 2001:20
[152] Weick and Sutcliffe 2015:114
[153] Weick and Sutcliffe 2015:114

modified, delayed and more. Expertise, in other words, is a co-production"[154]. They express this as: "*Somebody provides an explanation to someone else who asked for it*"[155].

As improvising may be sensible to making mistakes and errors, I find it relevant to give a further, although brief description of some erroneous behaviors and violations in this section. Minor errors and mistakes also have an educational effect in the process leading to experience and intuition, Hogarth[156]. As to human errors, these have been described by several authors.

Reason[157] defines human error as:" *The failure of planned actions to achieve their desired ends-without the intervention of some unforeseen event*"[158]. Three elements to this definition are presented by Reason: 1. A plan or intention containing both goal and means to secure achievement. 2. The plan initiating a sequence of actions, and 3. To what extent actions succeed in achieving the goals.

He continues by presenting some reasons why actions may fail to fulfill the intentions:

<u>The plan is appropriate</u>, but actions fail to work as planned caused by:

> - Slips: observable actions associated with attentional or perceptual failures[159].
> - Lapses: Internal events or failure of memory[160].

<u>Inadequate plan</u>: Actions are performed according to plan, but no achievement of goal or intention. Failure lies at a higher level such as mental processes in:

> - Assessing available information, the planning itself, formulating intentions and misjudging the consequences of the actions planned[161].

Reason[162] labels these errors as mistakes and divides those into two: <u>Rule-based mistakes</u>: Misapplication of normally good rules, application of bad rules or failure to apply to good rules (Violation). <u>Knowledge-based mistakes</u>: Running out of prepacked solutions, problem-solving on-line in situ which is sensible and potent to making mistakes. He also states that

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154 Weick and Sutcliffe 2015:116
155 Weick and Sutcliffe 2015:116
156 Hogarth 2001:75
157 Reason 2016:71
158 Reason 2016:71
159 Reason 2016:71
160 Reason 2016:71
161 Reason 2016:71
162 Reason 2016 p. 78

errors involve some kind of deviation, either from current intention or from adequate path[163]. Such deviation, still pursuant to Reason[164]. may have different causes such as deliberate or erroneous violation. Examples of deliberate violations would be that possible bad consequences are intentionally gained by action or the risk of such consequences are taken This I find comparable to the statements of Grech et.al.[165]above.

The accuracy of risk-assessment may enhance correct or incorrect actions. Correct actions: based upon accurate risk-assessment as incorrect actions may be based upon in-accurate or inappropriate risk-assessment[166]. This I believe point out the importance of using time and effort in performing risk-assessments both as bases of safe-job procedures and contingency plans, as well as including all relevant personnel in this work. One may also refer to Weick and Sutcliffe on deference to expertise[167] to justify the use of a ship`s crew in planning. Performing this work will, in my opinion, represent a valuable arena of learning and building experience. Accepting the fact that SOPs and contingency plans cannot cover all possibilities of unsafe behavior. All hazards or combination of them cannot be anticipated. Bad-rule or no-rule situations will always occur[168].

Successful actions are not necessarily correct actions, according to Reason (2016). Compliance to rules or procedures is not automatically correct as non-compliance incorrect. It depends on the circumstances, local conditions and the adequacy of the procedures. What is correct is not always known in advance[169]. To exemplify this, Reason[170] refer in his book to the Piper Alpha – accident where emergency- procedures required personnel to muster in the galley-area of the accommodation. People in speech complied to the instructions and went to the pointed-out area. Most sadly this area was in the direct line of a fireball, causing the death of most of those who had acted in compliance with instructions.

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[163] Reason 2016:71
[164] Reason 2016 p. 72
[165] Grech et.al. 2008:53-55
[166] Reason 2016 p. 73
[167] Weick and Sutcliffe 2015 p. 112-128
[168] Reason 2016 p. 74
[169] Reason 2016 p. 75
[170] Reason 2016 p. 78

On the other hand, successful violations are not equal to correct violation. Such violations create conditions sensible to promote dangerous misventions such as over-confidence in personal skills, and underestimation of hazards[171].

Reasons term erroneous performance describes, among others mistakes or misjudgments made by professionals based on knowledge. The latter I believe may be caused by the misjudge of a situation, which I find highly understand-able considering the limited oversight and information, as described in the next section here, at the occurrence of an incident or accident. These three kinds of performance will, according to Reason[172], lead to an unsafe [or unsuccessful] outcome.

James Reason[173] presents, in his book, six kinds of rule-related behavior , including correct and erroneous performance. The way I interpret Reason here is as follows:

Correct compliance: correct and (safe) performance achieved by handling a situation in accordance with appropriate instructions and procedures. Correct violation: correct performance by taking actions deviating from instructions and procedures according to safe-operation-procedures (SOPs) or contingency-plans. Correct improvisation: actions performed where instructions and procedures covering the specific situation are absent although leading to a successful and safe outcome. Misvention: actions deviating from (established[174]) and appropriate safety-rules and performance errors leading to an unsafe (unfortunate) outcome. Mispliance: mistaken compliance with inappropriate or inaccurate procedures causing an unsafe (unfortunate) outcome. Mistake: knowledge-based action(s) or performance(s) following unsuitable plans due to lack of appropriate procedures.

In addition to Reason`s[175] erroneous performances, Weick and Sutcliffe[176] present the term *misjudgment*. The response to frequently occurring, nonobvious breakdowns is based on what might be named first explanation. Such an explanation gives the impression of being in control but may turn out to be a serious misjudgment.

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[171] Reason 2016 p. 75
[172] Reason 2016:75
[173] Reason 2016:75-79
[174] Referring to established SJAs
[175] Reason 2016:75-79
[176] Weick and Sutcliffe 2015:1,2

However: *"…, compliance is not automatically `correct`, nor a violation incorrect. It all depends on the local conditions and the adequacy of the procedures"*[177].

I recognize correct violation and correct improvisation, as described here, to be a version of the term improvisation. Pursuant to Webb and Chevreau on improvisation, individuals: *"…often short-curcuit or bypass established procedures, assume responsibility for things over which they have no authority, violate broader community norms, use makeshift tools or materials and perform their roles in new places"*[178].

Reason[179] gives an example of successful improvisation by referring to the accident at Sioux City, US, where an airplane crashed after a flight without controlling all means to steer the plane due to a disintegration of one part of an engine. The crew were able to control the plane to a certain degree by using remaining engines. The pilots had to improvise due to the fact that there were no procedures at hand. Such an incident where considered by designers to be too unlikely to occur ("Black Swan" or "Wild Card"[180]). Hence no procedures to cover this kind of event had not been worked out.

Concerning the maritime domain, I may refer to Colreg72, rule 2 – Responsibility[181], where legislation requires improvisation in certain situations:

«a) Nothing in these Rules shall exonerate any vessel, or the owner, master or crew thereof, from the consequences of ant neglect to comply with these Rules or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case

b) In construing and complying with these Rules due regard shall be had tp all dangers of navigation and collision and to any special circumstances, including the limitations of the vessels involved, which may make a departure from these Rules necessary to avoid immediate danger»

To be able to deviate from the rules (**improvise**), in order to avoid collision, I believe it demands both knowledge and experience. This belief I find supported by James Reason`s[182]

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[177] Reason 2016:73
[178] Webb and Chevreau 2006:68
[179] Reason 2016:79
[180] See definitions section in this thesis
[181] IMO: Colreg (International Regulations for Preventing Collisions at Sea) 1972, Rule 2
[182] Reason 2016:68-70

three levels of performance – knowledge-based performance in a sense that such ability is needed to handle unforeseen situations.

As an example on misvention one may refer to a conclusion by Giustiano et.al. on the case concerning the "Costa Concordia" `s unhappy voyage on January 13, 2012: "*The analysis of the collision of Costa Concordia displays how improvised actions can take place even in highly regulated environments and create organizational drift toward disastrous outcomes…*"[183]. Established facts in the aftermath of this accident showed that the master deliberately deviated from the initial voyage-plan, resulting in a, not only unfortunate or unhappy outcome, but a tragic one. Even though this deviant behavior does not concern contingency in the first place, I still find it descriptive to illuminate that improvisation in itself provides no guarantee to a safe or happy outcome.

Webb and Chevreau[184] describes in their paper some organizational impediments to improvisation and creativity. They specifically mention bureaucracy as an obstacle in the sense that such organizations demand conformity and predictability. This in opposite to improvisation which involves alteration of patterns and routines[185]. In order to encourage improvisation, Webb and Chevreau[186] investigates in what ways they discourage improvisation and find ways to enhance such behavior. They describe six characteristics of organizations that impedes creativity:

Webb and Chevreau[187] claims that organizations relay heavily on written rules and procedures describing in detail how different tasks should be performed, referring to Weber (1904 and 1946), Goffman (1961) and Veblen (1921). On the positive side, they emphasize the benefits of stability and continuity as people starts and quits the organization. On the negative hand, reliance on established rules and procedures chokes the ability to think creatively and thus handle new situations or ambiguous ones. This is named trained incapacity. Referring to Weber (1904/1946), they argue that bureaucracies destroy the autonomy, compassion and creativity of individuals. The demand for conformity among its members, the organization devaluate and under-utilizing the reservoir of creativity within their staff, referring to Goffman (1961).

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[183] Giustiano et.al. 2015:231
[184] Webb and Chevreau 2006:69,70
[185] Webb and Chevreau 2006:69,70
[186] Webb and Chevreau 2006:69
[187] Webb and Chevreau 2006:69

Another impediment is systematic divisioning and specialization of tasks. Positively these would contribute to increased efficiency, but also create some undesirable consequences. Most organizations are said to view upon safety, risk or crisis management as specialized functions. Except HROs, referring to Sagan (1993), Webb and Chevreau[188]. point at a tendency to diffusion of responsibility within organizations. Instead of engineering a safety-culture engaging all members, one assumes that experts will come to the rescue in a crisis. This will not encourage all to consider their role or contribution to crisis-response

The third characteristic is unrealistic crisis and disaster planning. Pursuant to Webb and Chevreau, referring to Tierney et.al. (2001), this phenomenon is based on the tendency or urge to emphasize contingency to the extent of mandatory requirements. These are unrealistic documents serving symbolic purposes, leaving the impression of control to the public and employees[189]. This will, pursuant to Webb and Chevreau[190], lead to incompetence within the staff rather than creativity.

Referring to Wybo (2004), the authors point out that learning in everyday work is an efficient way to prepare crisis management. Learning may also be carried out directly by training sessions and case-studies. Indirectly this can be achieved, referring to Chevreau and Denis-Remis (2003) or indirectly by implementing risk-analysis tools, with reference to Chevreau et.al. (2006). However this must be built on trust and commitment of managers and not lead to punishment of people responsible for errors. This is the fourth impediment.

Sanctions and the fear of such can prevent individuals from engaging in risk- and crisis-management[191]. Referring to Fischer (1998) and Dynes (1994), organizations commonly subscribe to a disaster mythology Webb and Chevreau says and adapt a command and control approach or ideology. This is the fifth impediment to improvisation. Based on the belief that disasters create chaos breakdown and anti-social behavior, the response to crises by organizations is to impose order, exert control and centralize command. Referring to Tierney et.al. (2001), this paper upholds that such approach might [possibly] serve the interests of certain organizations but will be inappropriate to manage most crises. Crises demands flexibility and improvisation, not central command nor rigidity[192].

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[188] Webb and Chevreau 2006:69
[189] Webb and Chevreau 2006:69
[190] Webb and Chevreau 2006:69
[191] Webb and Chevreau 2006:69
[192] Webb and Chevreau 2006:69,70

The sixth and final impediment presented by Webb and Chevreau[193] is the increasingly search for technological solutions as problem-solvers to problems of interley social nature. Western societies are said to be McDonaldized. Referring to Ritzer (2000), this paper explains this expression as the rewarding of predictability, efficiency and calculability. The replacement of humans by non-human technology is a part of this phenomenon, of which the crisis-arena is also affected by. Investments in computer-programs such as decision support systems are made to aid crisis response. Both public and private organizations are said to emphasize such investments[194]. Webb and Chevreau[195] consider these as useful tools but not able to provide all answers. Tasks during crises, such as coordination, allocating and distributing resources and communication requires humans not technology. Pursuant to Webb and Chevreau[196], technology may serve as supplement but not as substitute for human ingenuity, creativity and improvisation.

Planning for improvisation when a crisis occurs; a real-life example

In June 1989 the Russian cruise-ship, the "Maxim Gorkiy", carrying 575 passengers and a crew of 379, ran into an icefield outside Svalbard, Norway. The impact from the ice caused a severe leakage in the forward part of the ship`s hull, and she started to sink at the bow as tons of seawater flushed inside. The situation was, after a short while, stabilized so that she was kept afloat. As a precaution concerning the situation to take a negative direction, the crew started to evacuate passengers in lifeboats and life-rafts to the floating ice-pads[197]. The Norwegian coast-guard ship, the KV "Senja", was on patrol in the area some three to four hours away from the position of the "Maxim Gorkiy". The shipboard[198] gathered to a meeting to establish action-plans and to distribute tasks. On a ship like this the crew has strictly defined tasks, but the KV "Senja" were a bit undermanned so some tasks had been distributed to the remaining crewmembers.

There was no plan at hand for such a heavy situation, so further considerations had to be made. The single crewmember`s competence and experience from similar situations had to be

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[193] Webb and Chevreau 2006:70
[194] Webb and Chevreau 2006:70
[195] Webb and Chevreau 2006:70
[196] Webb and Chevreau 2006:70
[197] Hovden 2012:29-33
[198] Shipboard: commander, the second in command, chief engineer, chief radio-officer, intendant, ships-doctor and the operational officer.

brought forth [deference to expertise[199]] and action-plans had to be made for the management of this specific crisis. The aim was to find a way of organizing the crew in order to perform the rescue as efficient as possible given the available resources.[200]. This work was considered of the utmost importance to the successful solution to a situation with bad odds to succeed. Information were minimal at this point of the process. Hence plans were made considering a worst-case scenario with many injured, suffering from hypothermia and dead. Within a short period of time, a plan for the distribution of responsibilities and tasks was ready. This plan covered predicted situations. They also felt the pressure of restricted time available.

The excerpt of the real event above, serve to exemplify some of the theory on planning in general presented in this section. My aim by bringing this incident forth is to illuminate how even an organization as a coast-guard ship, who`s ordinary task among others is to manage crises at sea and develop contingencies for this, under certain circumstances need to improvise by making ad-hoc plans. It also, in my view, gives an insight in how creativity and flexibility can be implemented in the planning for crisis management.

I find this to be a good example to Webb and Chevrau`s[201] recommendation on *planning for improvisation and flexibility* as described belov in this thesis.

Pursuant to Boin and McConnell it is almost a contradiction to plan for an event that, by nature, violates the regular patterns of which planners rely for the purpose to prevent it. "*Developing plans that work for the endless array of complex, chaotic and destructive scenarios that arise from interlocking and often mutually dependent infrastructures may be all but possible*"[202].

Many officials have a believe that order and rigidity are to be imposed as a part of their task during crises, even if the opposite – improvisation – is most needed during such events. Webb and Chevreau[203] claims that there is a major gap between what researchers are upholding and what is being done during crises. They continue by presenting four recommendations for effective crisis planning: The most important is the first, namely *planning for improvisation*, by referring to Krebs (1991) and Weick (1998)[204]. Developing scripts covering all rapidly

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[199] Weick and Sutcliffe 2015:112-128
[200] Hovden 2012:44
[201] Webb and Chevreau 2006:67-71
[202] Boin and McConnel 2007:53
[203] Webb and Chevreau 2006:70
[204] Webb and Chevreau 2006:70

changing events are impossible[205]. This seems to be supported by Reason[206]; all hazards or combination of them cannot be anticipated. Bad-rule or no-rule situations will always occur[207].

The recommendation is to create visions for their organization rather than writing numerous [contingency] scripts. This way to approach contingency will, pursuant to Webb and Chevreau[208], lead to an acceptance of the complexities of crises and planning for flexibility. The second recommendation is to involve as many members of the organization in [contingency] planning. Due to the impact a crisis on an organization as a whole, planning should not entirely be performed by a few experts. Promoting a safety-culture throughout the organization should be considered an aim. Referring to Sagan (1993), Webb and Chevreau[209] claims that this have been achieved by HROs. Involving all members of an organization in planning will provide a wider range of individuals to perform a wider range of tasks as a crisis occur[210].

The third recommendation is that planners should enhance a generic approach when developing plans. Assuming that different incidents demands specific plans is only true to a certain degree. Research suggests that various incidents produce similar impacts. Generic plans should provide an organization the tools to manage or deal with a wider range of incidents[211]. Finally, computer technology should be used as supplement to, not the driving force behind planning. Various kinds of planning- or decision-support-systems may assist but can also contribute to a false sense of control. Technology may impede response by constraining the flexibility and creativity of crisis-responders. Hence such technology should not be over-stated but viewed upon in a realistic way[212].

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[205] Webb and Chevreau 2006:70
[206] See under sub-section human and organizational behavior above
[207] Reason 2016:74
[208] Webb and Chevreau 2006:70
[209] HRO – High reliability organizations
[210] Webb and Chevreau 2006 p. 71
[211] Webb and Chevreau 2006 p. 71
[212] Webb and Chevreau 2006 p. 71

Efficiency and financial requirements versus safety

"*Then there is the matter of costs. The conversion of `paper plans` into organizational readiness through staff training and crisis exercises can be expensive and time consuming*"[213].

Time to conduct risk-assessment and to perform exercises may be limited due to efficiency and financial requirements. This could lead to restrictions in the opportunities for the crew to build sufficient skills and experience and hence limit the abilities to improvise whenever needed.

In the case of the grounding and following shipwreck of the MV "Costa Concordia" off the Italian coast 13. January 2012, Hafting states that the cruise-line company had ordered their captains to set efficiency above safety[214]. This may be an element of importance when it comes to find time and space for emergency-training.

As to contingency the same was annotated by the committee that analyzed the fire on board the MV "Scandinavian Star" in April 1990[215]. The catering crew of such a ship has a vital role in evacuating passengers. The committee claims that this crew had limited time to get to know the ship were not allowed by the ships company given the workload to prepare the ship for operation and the period of time from the had embarked the ship until it sailed, "*They were the group with by far the heaviest workload and therefore had limited time to get to know the ship*"[216]. The same committee also criticized the abandoning ship and fire drills conducted prior to operation. "*However, no drills were held, and other forms of training were either not practiced or were in many ways deficient*"[217]. Furthermore the report states regarding the first officer, a key person in states of emergency: "*d) He had a short deadline and had other duties in connection with the preparation of the ship. e) His own knowledge of the ship and emergency-equipment was limited*"[218]. Based on the arguments above in this theory-section it is hard to see how the crew could have been able to improvise in an emergency given this background.

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[213] Boin and McConnell 2007 p. 53
[214] Hafting (red) 2017:39
[215] NOU: NOR 1991 1E
[216] NOU 1991:101
[217] NOU 1991:107
[218] NOU 1991:102

Grech et.al. name such behavior as Risk-taking behavior; Risk-based behavior: This behavior consists of taking calculated risks, where benefits are judged to outrank the risk. Hence errors or incidents may occur. Often this kind of behavior is a result of financial or operational pressure[219]

Some recent studies on the topic

Browsing the internet searching for literature or studies on the topic improvisation, have left me somewhat frustrated. I find that not much focus nor effort have been dedicated to this, in my opinion, obvious and important issue when it comes to emergency-management. To my relief I discovered that also far more sophisticated individuals have had the very same experience. I refer to Mendonca et.al.: "*This capability of improvisation, or – real-time planning, is, we believe, a useful but neglected topic in the organizational foresight literature*".

Pursuant to Frykmer et.al[220] an event that does not require improvisation is probably not a disaster. They continue by stating: "*One key reason why modern crises may be transboundary, for example, crossing both geographical and functional borders, is the increased interconnectedness of critical infrastructures (Cis)* [221]. *A disturbance in one infrastructure can easily spread to the next, giving rise to a cascade of failures.*" [222] This I find highly relevant to an organization as a ship, even if Frykmer et.al[223] most certain focus on society as a whole, and focus on definitions of the term improvisation and questioning existing research. On board a ship the interconnection is very visible. It has shown that a failure or break-down of one system (or department) put a strain on the others. I believe that what I have shown above un this thesis confirms this.

Trnka et.a[224]l have performed a study on the role of improvisation based on a simulated case founded on a real event. Although this case is not related to the maritime branch, I found it relevant to the scope of my thesis, as I have focused not only on real life response (on board), but also on simulation in this thesis by interviewing simulator instructors. Among other, they conclude: "*…The proposed simulation exercise design made it possible to utilize an advanced*

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[219] Grech et. al. 2008:54,55
[220] Frykmer et.al. 2017
[221] Cis – Critical infrastructures
[222] Frykmer et.al. 2017:101
[223] Mendonca et.al. 2001:25
[224] Trinka et.al. 2016

scenario and simulate dynamically developing situations which required improvisation during a response operation under progress…"[225]

Summary

In this section I would like to sum up some of the main arguments of the theory-section when it comes to contingency and crisis management.

The section starts by describing contingency in general; how operational plans and other barriers are developed based on risk-assessments. Then it continues to show how residual risk (risk not possible to avoid by barriers) is managed by contingency plans and exercises. Some legal requirements concerning the topic are also presented. On improvisation there are some views on decision-making when crises arise. Here the focus is on limitation of time and information which causes difficulties when it comes to making wise decisions. Contingency plans may ease the decision process in a stressed situation and benefit the ability to improvise.

As foundation of the ability to improvise, levels of human performance are described. Some theories on human behavior related to errors and mindfulness during operation are presented to give insight in how unfortunate events may be avoided. This item is described by various human errors. Mindfulness in everyday operation being partly depending on insight, knowledge and experience and hence contribute to the ability to improvise.

An attempt to define improvisation:

➢ Adjusting existing procedures in accordance with prevailing and/or alternating circumstances
➢ Deviation from existing procedures
➢ Creating new procedures – underway – considering prevailing and/or alternating circumstances

Followed by theory on learning to obtaining expertise and intuition. Regarding the scope of this thesis, the contingency planning process as well as everyday operation might benefit learning, insight in and understanding of systems and building knowledge. Some impediments to improvisation have also been described.

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[225] Trinka et.al. 2016:269

As an example of real-life planning for improvisation when an accident occurs, the K/V Senja rescue operation when the MV Maxim Gorkiy crashed into an icefield off Spitsbergen in 1989 is briefly described.

Efficiency and financial requirements versus safety are items briefly presented at the end of this section, as they may influence the topic of this thesis.

Some recent studies on the topic ends this chapter. Such studies were not easy to find though.

METHOD

Design

Pursuant to Norman Blaikie[226], the most important element of any research design are the research questions. Answering them directs research activities. *"...the formulation of research questions is the real starting-point in the preparation of a research design."*[227]. Questions should be stated clearly and concisely and reduced to "what", "why" and "how". Still referring to Blaikie, "what" - questions seek descriptions, "why" – questions are useful to explain and understand whilst "how" questions are suitable for developing recommendations for change. The strategy chosen is, according to Blaikie: *"…the second most important research design decision"*[228].

In order to fulfill the purposes of this study, I have considered a qualitative design. I find this view supported by Blakie: *"Social research is about asking questions"*[229]. Although questions also may be asked by surveys, but I do not believe such an approach would get me into the depth f my topic. I found, based on the above-mentioned, interviewing personnel (inductive) actively occupied on contingency and crisis management in the maritime domain to be a good way to achieve relevant and updated information on the topic[230]. Interviews may bring forth topics not considered by this author and not reviewed in a survey. Due to my former experience and knowledge on the topic, I found an abductive approach to be suitable for my purpose of this study. As said by Blaikie: *"The major characteristics of the research strategies are as follows… the Abductive strategy generates social scientific accounts from everyday accounts"*[231]. Interviewing participators and studying related literature I hold as good tools to answer my research question(s). An abductive strategy may answer all three kinds of questions according to Blaikie[232].

Studies of recent literature and research emphasizing improvisation in exercises and crisis-management will be a necessity, in addition to interviewing informants, to get a view on the current state of contingency-exercise performance[233]. Such studies may be helpful to develop precise, relevant and up to date questions. This is held forth by Blaikie: *"…a research design*

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[226] Blaikie 2015:18
[227] Blaikie 2015:17
[228] Blaikie 2015:18
[229] Blaikie 2015:10
[230] In combination with the abductive strategy.
[231] Blaikie 2015:10
[232] Blaikie 2015:89
[233] All interviews performed in Norwegian. Any quotes in this thesis will be authors translation into English

should include a brief literature review."[234] This includes the use of the internet to find relevant information regarding the topic. Browsing the internet to find information is mentioned as a tool by Annette M. Markham in Silverman[235]. Hence the internet was used to gather information in this study.

Sampling

Norman Blaikie[236] state that selecting the people, events or items from where data is collected, is a critical stage of a research. Keeping an eye on the possibility to generalize will be an important issue in his opinion. I agree to that, even though my research project is limited to the maritime domain, I hope some of the results may be transferred or used by other onshore based organizations. Based on Blaikie[237] and as I look upon myself given the purpose and design of this study, I find three methods useful:

- Quota sampling: A fixed number of respondents under certain criteria. This may or may not secure representativeness.
- Judgemental sampling: A significant number of respondents may give representative feed-back.
- Snowball sampling: Start with a few informants who may tip-off persons to speak with. This could secure representativeness.

Here I believed that using the two first methods to find the few respondents for the latter, would be a suitable approach to secure representativeness. It seemed to me to be the way to do it, given an abductive strategy where questions may pop up during the research. To up-date my insight on the topic, this strategy also seemed to turn out as an appropriate method.

Research-papers were found by searches on the following databases on the internet: Scopus, Web of Science and Google scholar by browsing the search words: *crisis AND handling* AND improvis* AND contingency* AND exer* AND improvis**. Some literature and similar sources however are books recommended by various lecturers and hand-outs from courses passed. Articles on the internet, as mentioned before, also turned out useful for this purpose.

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[234] Blaikie 2015:17
[235] Silverman 2011:111
[236] Blaikie 2015:23
[237] Blaikie 2015:176-179

Selection of significant informants

As stated above, my intention is to find a few respondents I hold to be significant. Then I seek to extend my informant-list during the interviews of these. Considering this, my initial list of respondents turns out to be as follows:

- Masters or safety–officers of ships in the merchant marine (Passenger ship/Polar Cruise)
- Instructors, and former naval officers, on HSC[238] and ferry courses.
- Instructor, and former naval-officer, on simulator-based contingency training.

During the conversation with one of the masters, I was tipped off to talk to a rating who had experienced a real crisis on board the MV "Nordlys", namely the fire described above in this thesis. To my fortune I succeeded in appointing an interview with the rating in speech as he was on shore-leave and had the opportunity and willingness to share his experience. I could not take this attitude for granted regarding the traumatic event a fire on board a ship represents. This interview lead to some very interesting statements.

- Rating on explorer passenger ship. He participated in the evacuation of passengers from a coastal steamer on fire.

In my opinion these persons should be considered able to bring me valuable information to renew my insight on the topic as well as lead me on to further questioning. The intention leading to my decision as to choosing personnel serving in the passenger and polar-cruise trades, were based on two main reasons. First, operating in polar waters demands special attention to safety and contingency due to the remoteness as to achieve shore-based assistance. The only immediate or close enough to provide helpful external assistance to unfortunate incidents or accidents would be other ships in the area. Restricted amount of such ships though being the reality. Secondly passenger ships in general represents a more complex organization due to a larger number of crewmembers and the variety of operations on board. My attempt to secure as vast a range of insight and experience as possible, as recommended by Howard Becker[239], is were fulfilled to the best of my knowledge by also interviewing personnel other than senior naval officers. This relates to one of the advices in Miles et.al: "*…But it is also important to work a bit on the peripheries…*"[240]. Talking to persons

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[238] HSC: High Speed Craft (In this context; passenger-ship in domestic trade)
[239] Becker 1998:93-95
[240] Miles et.al. 2014:36

currently not so central in decision-making on board like experienced simulator-instructors seems to meet this advice. The latter due to the tendency over the last years is that a great deal of contingency training is performed by using simulators. This is a trend that seem to expand to shore-based – such as company staff and public service organizations - contingency training. An example to this is the newly established "Nordlab" [241] situated at Nord university in Bodø.

A grand total of respondents I anticipated to six to eight persons, relying on the tip-off given and the information gathered during the research. This number I find sufficient and realistic to handle given the frames and scope of this thesis. Initially I aimed to also seek information from to officers serving on board Norwegian Coast Guard ships, other shore-based personnel as JRCC – operators and designated persons on company officers. Thinking a bit further on this issue. I found that exercises, including contingency training, represents most of their daily work in opposite to common merchant shipping. Due to this, I found information given by such informants not to be quite relevant to the scope of this thesis. Off course such personnel would be able to provide tips and advice, but the settings as to acquiring their experiences differs a good deal from the merchant trades settings. Bearing in mind the purpose of this thesis. The same may be argued when it comes to JRCC- personnel although some of them are former naval-officers and are in contact with ships as part of their normal work. Never-theless their on-board experience may be somewhat outdated and their contact with sailing personnel might not be sufficient to compensate this remoteness in time. When it comes to designated persons situated on company-offices, their regular cooperation with ship officers would, in my opinion, not provide relevant information differing from that I expect to gain from the informant I have chosen.

Analysis

In the aftermath of the sampling, it has been vital to organize the information given. Sorting out key-labels underway and the relation between them was an important issue in this work. It has been useful to review and refine labels as the work proceeded, to secure precision. This has also been stated by Miles et.al[242]. I have also considered to what extent the information

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[241] Nordlab: Simulator serving training to on-shore organizations in charge of contingency.
[242] Miles et.al. 2014:81

and labelling have given me sufficient answers to my research questions and served the purpose of my study. All this following Silverman`s[243] advice.

Quality

Have the research been performed in a careful, thoughtful way, and in accordance with established and accepted standards[244]. This I believe to have achieved by searching for relevant literature, papers and letting the informants read and comment transcripts of their statements in interviews. The only reservation has been made by one respondent, after having read the transcription of the actual interview, to read what I intend to use before I use it. I find this to be acceptable and understandable due to his statements regarding an actual accident with casualties of a fatal kind. Follow-up interviews were performed with three respondents.

Reliability

Data from literature-studies and interviews must be thrust-worthy. Pursuant to Becker[245] social scientists uses information of others, resulting that what theses providers have ruled out, will be hidden.. In this study this represents a potential limitation to the information I gather. Another pitfall in this study, is my former experience and knowledge on the topic, as well as my relation to some of the respondents. As the field from which I have selected informants is a relatively narrow one, Norwegian maritime domain consists of a relatively limited number of professionals, there is a certain risk that the researchers unfortunate influence may diminish the value of the information. Jacobsen[246] discuss this issue, holding forth that the ideal of eliminating or minimizing the researcher`s effect on what is studied. A positivistic ideal. An objective reality was to be studied, a reality not to be disturbed by the scientist. Au contraire, he claims that research never can eliminate what is called the research-effect, that is the researcher influencing the result. Totally removing the relationship between researcher and object is not possible, pursuant to Jacobsen[247]. On the other hand, he continues, it is claimed that the weight on distance between researcher and object [informants] has made research poorer. Such distance prevents the researcher from going deeper into the single individual`s understanding and interpretation. What is needed, he claims, is to be close – preferably equal to those he or she are doing research on and make efforts to understand them on their own premises I was extremely conscious on this bias during interviews or tried to use

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[243] Silverman 2011:277
[244] Miles et.al. 2014:65
[245] Becker 1998:101
[246] Jacobsen 2005:30,31
[247] Jacobsen 2005:30,31

my knowledge in a positive way. For instance to ask the right questions while speaking with the informants and to evaluate answers validity concerning this study as a mean to steer the interview in an appropriate direction for my purpose. My selection of informants may have both positive and negative effects. As described before in this thesis, the Norwegian maritime branch does not consist of numerous individuals. Hence it is quite inevitable not knowing available and relevant informants. In this case I knew all of them from near and not so near past. Some of them have been former students, colleagues or people I have known most of my lifetime. The positive effect due to me knowing the informants, is that I know their experience, their devotion to the maritime branch in general, ships in special and their dedication to maritime contingency. A negative aspect would probably be that, given my former experience and the above-mentioned knowledge of the informants, the information given may be too influenced by my own experiences and opinions. Total avoidance of such influence I do not find realistic, but I it was reduced by me as questioner being aware of this effect during the interviews. Miles et.al[248] presents some biases to be aware of. Two of these I found relevant here even though they are described as biases to presenting fieldwork. Personal bias: the researcher`s personal agenda, demons. Going native: Losing perspective and being co-opted into the perceptions and explanations of participants.

Restraint to information given and/or me seeking confirmation to my preoccupations may also be an issue arising from the relatively close relation between the interviewer and the informant as described above. The informants were off course well informed and updated on my experience and my degree of devotion to the branch. They were also aware of the limitations to my knowledge due to the time spent working away from active at sea service. This bias is described by Miles et.al. as: "*Do not casually show off how much you know; this is a covert plea for confirmation that deludes only the person making it*"[249]. In this case also how much the informants believed me to know may have influenced the interview as to the confirmation issue. The danger of mutual confirmation, I fear will be present, due to some common beliefs acquired by having been and still parts of the same maritime culture. Anyway, I rely on Silverman`s words: "*...good interview material should be viewed as `reliable enough` under the circumstances*"[250].

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[248] Miles et.al 2014:294
[249] Miles et.al 2014:298
[250] Silverman 2011:154

Validity

Findings must be relevant to the purpose of the study. One must ask oneself if the research questions relevant for measuring what we think we measures. Jacobsen[251] describes short internal validity as a question if our findings can be proven and continues defining external validity as a question whether the results from a limited context or research area may be valid for other areas or contexts. Anssi Peräkylä in Silverman defines validity: "*The validity of research concerns the interpretation of observations: whether or not `the researcher is calling what is measured by it`s right name*"[252]. When it comes to the validity of the research as basis for this thesis, I may refer to the discussion under *reliability* above, as I find this of importance also to the validity of this study. This I hold to be supported by Anssi Peräkylä in Silverman "*Reliability and validity are the technical terms that refer to the objectivity and credibility of research*"[253]. Due to my former and present insight in the topic of this thesis, I believe me to be able to consider whether the statements given by my informants are relevant or not. As to reliability and validity I find no reason to believe that the informants have been laying too much restraints on their statements. One might assume that their own eventual mistakes are likely to be hidden or mitigated. I do not find this to be a mentionable problem though. To my satisfaction openhearted statements have been given with no limitations as to serve my purpose.

Generability

An abductive strategy or approach normally tend to give understanding, rather than explanation. To generalize is not a goal in itself under this strategy. One seeks the participants understanding of reality and their organization – their tacit knowledge. The results of such a strategy will lead to so called thick descriptions and concepts[254]. Hence, as mentioned before in this thesis, it might be difficult to generalize given an abductive strategy. Nevertheless, it should be possible to give advice, suggestions and recommendations on how to implement improvisation, as the theory described in this thesis concerns HROs and social society in general and have shown similarities to the statements from my respondents serving in the maritime domain. I hold my findings and conclusions to have some value to other organizations.

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[251] Jacobsen 2005:19,20
[252] Silverman 2011:367
[253] Silverman 2011:366
[254] Blaikie 2015:105

FINDINGS AND ANALYSIS

In this section I present both findings from interviews and analysis. I have chosen to do so as I find it suitable to perform an analysis with direct reference to feed-back from respondents in comparison to theory on the topic. To make it easier to get an overview findings and analysis are presented in sub-sections covering various categories. Due to the very nature of operation on board ships – overlap between different sections and operations – there will be some overlap between sub-sections in this section.

Interviewing six respondents and having their statements transcribed, I feel confident to have obtained answers and achieved valuable insight concerning the topic of this thesis. The informants have willingly offered time and consideration to my project and sheared both their knowledge and experience. The information gathered I also believe to be up to date and relevant to how contingency planning, education and training are performed in the present as the persons who have shared their thoughts and experiences have been "in action" over the last years and still working in various maritime related positions on board and ashore. As all interviews have been performed in Norwegian, they are translated into English by the author of this thesis

Literature – books and papers – have given valuable information on the subject, both concerning the necessity of improvisation and how to achieve the required level of expertise and intuition to enable personnel serving on ships to improvise whenever needed.

On contingency

To manage unfortunate incidents or crises, considerations has to be made on how to manage possible critical situations. Such considerations are supposed to end up in plans to avoid unfortunate incidents – barriers - and plans for managing when a crisis occurs – *contingency*.

In this section I will present some of the information I gathered from my informants on contingency in general and some theory on the topic. Mostly it concerns contingency-planning and the use of debriefs as an aid to revise plans. Hence the section "*On debriefs*" below, must regarded as a part of this one. On the importance of contingency, one of my informants stated: "*Far away from help, yes. It is not for nothing we are not allowed to carry more than 200 passengers as we sail. But that is in the summertime.*" - Master of polar explorer cruise-ship.

This I find to very similar to one of Weick and Sutcliffe`s[255] definition of an HRO as referred to above in this thesis. None of the respondents characterized their ship or operation as HRO as such though.

As described above in this thesis, there are rigid and quite specified international and national regulations concerning engineering of contingency-plans. These legislations stated in the SOLAS includes risk-assessments and including the ship`s crew in the developing of such plans. It is also important to be aware of the fact that some companies have their own regulations beyond mandatory requirements given by international and national regulations. As one of my respondents put it: "…*we are a bit beyond the SOLAS – requirements […]* [The Polar Code] *demands survival for five days without* [any assistance] …" - Master of polar explorer cruise-ship

My first impression after informant-interviews is that there are various ways of developing and organizing contingency-plans. Some seems to be following plans made by company personnel whilst others are more involved in the engineering of plans. To exemplify my initial impression on developing plans, I may refer to a rating: "*It is something that has come from the company.[…] I have never been involved in the developing, to put it like that […] I very much believe that it is cunning people […] Yes well I do not think that it is how it works […] there are people on the company assigned to that you might say. And off course I would have agreed on that, it would not have been no problem, I do have many opinions…*" - Bosun explorer cruise.

By this statement it may look as if the crew are not quite certain as to how and where the contingency-planning takes place but have a clear understanding that this is a company task. When been asked in another way, he stated: "…*I have been asked to join in the building of safety-manuals and to say a bit risk-assessments and such, I have done that yes. And especially…I am not sure in the domestic trade, but what I am speaking of as I have participated in and been asked of my opinions and such, it is the operation you…You are asked of your opinion and if you have something to add.*" - Bosun explorer cruise.

Webb and Chevreau[256] claims that involving all members of an organization should be involved planning to provide a wider range of individuals to perform a wider range of tasks when a crisis occurs. They also hold forth that planning should not entirely be performed by a

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[255] Weick and Sutcliffe 2015:96
[256] Webb and Chevreau 2006:69,70

few experts. It is likely to believe that similar thoughts are the basis of legal requirements stated in international (SOLAS) and national (Skipssikkerhetsloven) legislation on mandatory participation of crew as to risk-assessment and planning. They also claim, referring to Reflecting on this statement I get the impression that in the informant`s understanding of the term contingency also includes safe operations in general. He does not distinguish between safe operations, or barriers, and the actual plans to follow when an incident has occurred. The same impression I also got from a statement given by one of the masters: "*It is developed by the company [...] we do not have risk-assessments on that situation* [contingency]…"
- Master of polar explorer cruise-ship

Hogarth[257] describes ways to engineer intuition. Learning is obtained by being told by others in interaction with experience. One important issue he says is that they learn contents and rules by what they experience, not by what they do not experience[258]. As risk-assessment and contingency planning not only deals with former experiences but focus on what one may experience in the future ("Black Swans" for instance) it would be a good way to learn and to build intuition by participating in both assessment and planning. Weick and Sutcliffe[259] names deference to expertise as a main issue in contingency. Companies neglecting to follow regulations requiring the participation of ship crew in risk-assessment and planning are missing the benefits of both using the expertise on board and the benefits of assessment and contingency planning as tools for learning and building knowledge, skills and experience vital to improvisation in a crisis. Intuition, as described by Hogarth[260], demands domain-specific stock of knowledge which is likely to be held by a ship`s crew rather than the land-based staff even if such personnel have sea-experience. Luckily as shown by the following statements, not all companies neglect to involve their ships crew in this work.

In the other end a master gives another statement as to risk-assessment, developing and maintenance of plans: "*No, we do that on board [...] If something new has come up we discuss it on internal operations-meetings we have, the shipboard. And then the chief officer and the hotel-manager, the chief engineer and the first engineer, they take if there is something there then we make such together and then we get it approved at the end. Then we*

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[257] Hogarth 2001:19
[258] Hogarth 2001:20
[259] Weick and Sutcliffe 2015:112 - 128
[260] Hogarth 2001:9

send it to QA[261] *just letting them know that it has been made."* - Master of polar explorer cruise-ship

On involving the crew of his ship, as required by international legislation, he continues by stating: "*Yes. And I include them in the department-meetings. And they are to be revised annually, risk assessment [...] it is a job on the STAR*[262] *that pops up once a year. [...] So than all are included...and if new equipment arrives it is to be performed. And if procedures are changed to such a degree that it is necessary to alter risk assessment or see through it, then this is done too. And then there is risk assess following exercises..."* - Master of polar explorer cruise-ship

In this case it seems that mandatory legal requirements are met and that that what is performed on board supports the thoughts of both Webb and Chevreau[263] and Hogarth[264] when it comes to participation and learning as described above. Chevreau and Denis-Remis[265] states that learning may be carried out indirectly by implementing risk-analysis tools.

Another master has got another view on contingency plans: *"There lies the whole planning-tool and all in the software as we use for wages and all [...] If a man has lost an exercise then it will be revealed. It is under electronic surveillance as well, so it is not only the safety-officer surveilling [...] We have special people controlling."* - Master of polar explorer cruise-ship

Here it might be appropriate to repeat the words of Dreyfuss & Dreyfuss on computer-based systems: "*...In a crisis competence is not good enough.*[266]". Also Webb and Chevreau[267] have some thoughts on using computer technology in contingency. They recommend computers as supplement, but not the driving force behind planning. It may appear as that is what is done regarding the latter two statements above, it seems to be a mix of using computer technology and live personnel.

As stated by an informant: "*…When I speak of risk-assessment here, as I mentioned, then it is concerning the job that we do…*" - Master of polar explorer cruise-ship, former rating in the

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[261] QA – Quality assurance department on the company-office ashore
[262] STAR – Computer-based Management and Maintenance program
[263] Webb and Chevreau 2006
[264] Hogarth 2001
[265] Webb and Chevreau 2006:69
[266] Dreyfuss & Dreyfuss 1986:31
[267] Webb and Chevreau 2006:70

Norwegian Coast-Guard, gas-tanker and as deck officer on off-shore supply ships and passenger-liners.

The same informant continues by explaining his view on risk-assessment: "*You ask about risk-assessment, then I think risk-assessment concerning work, the operation of the boat [...] You talk of the total safety of the boat versus the personal safety, operational safety. They are very, very alert on this...on individual safety when they perform their daily tasks.[...] you get a good operation that way, then you have already built up barriers for much of what may happen in time to come [...] Yes, it is about doing it properly. That you shall reveal if something is wrong [...] If it has been some time since a task have been performed [...] They take a handful of risk-assessments and talk them through. It is...it works*" - Master of polar explorer cruise-ship

This statement points out quite clearly the opposite of what Webb and Chevreau[268] holds forth as an impediment to improvisation; organizations tendency to view upon safety, risk or crisis management as specialized functions.

It must be said that the term risk-assessment is also used for the developing of Safe-Job - Procedures (SOP`s). This is by some labelled as safe-job-analysis and is, off course, a vital part of safe operation. Such procedures are parts of what Reason[269] labels "Swiss Cheese"; barriers to prevent unfortunate incidents or accidents. This is not contingency as such but is very tightly connected to the issue and plays a vital part of the whole risk-assessment and planning process toward contingency.

Another vital part of an appropriate contingency is the knowledge of one`s ship. By this I mean knowing the surroundings on board, where to find safety-equipment and escape-routes, including alternatives. It also has to do with the understanding of technical and environmental systems. One informant had some views and an example: "*Yes. And we have given them a responsibility by giving them a thorough knowledge to the boat, what it looks like and where they may go and where they have a second option and where they have a third option [...] So every Saturday they look through all the equipment here, and they have to come up to sign that torches works. Head-torches are there...and keys and all that. And the notes we place on doors for evacuation and all this shall be in roper place according to the list, list of contents, and it shall be in good order [...] These are things you must never slip out of hand.*

[268] Webb and Chevreau:70
[269] Reason 2016:9,10

[…] We shall save our own and the passenger`s lives […] I say that when have let go from the quay; we are on our own…" - Master of polar explorer cruise-ship

On the same topic, another informant had some views when comparing the system in different trades. It seems to be a trade-specific issue: "*…inshore passenger I think has a better system than I am used to in the off-shore branch, it is that they have this checkout. There is checkout on the route a checkout on the vessel and that checkout is not limited in time. That checkout lasts as long as the simple individual needs to be cleared for service. That kind of checkout I never experienced in offshore. Not in such a formalized system […] as for me the first time I was captain I told the company that I would like a fortnight over-lap with the existing captain. I am entering a new role, I am serving a new company, I am serving a new customer, so I want at least a fortnight. But it is on the personal level […] Off course it is a bit challenging to perform route checkouts on a supply-vessel in the spot-market where you do not know what the next step is. It becomes impossible. But at least a vessel checkout so that you know the vessel and in a way a system-checkout so that you know the systems on board. Only there the main job has been done…"* – Simulator instructor

I find it appropriate to refer to Hogarth[270] on intuition here when he speaks of a "stack of knowledge". It is that persons may act intuitively or improvise by using specific knowledge of limited domains. The statements above supports what may be called domain-specific expertise. Knowing your environment, systems and the organization in which one operates is what I would call a domain-specific stack of knowledge. In this case on board ships. In the maritime domain one finds various complicated and complex systems and equipment that calls for special education and training to operate – this requires a very limited yet crucial stack of knowledge on top of common knowledge of the domain.

On improvisation

This section presents statements from informers in comparison to theory on improvisation. It describes why improvisation may be a necessity when an unfortunate incident or a crisis occurs and what it takes to be able to improvise.

Crises demands flexibility and improvisation, not central command and rigidity it is claimed by Webb and Chevreau[271]. The real-life example of the KV Senja – MV Maxim Gorkiy

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[270] Hogarth 2001 p. 8,9
[271] Webb and Chevreau 2006:70

rescue above[272] describes the importance and acknowledgment of improvisation when facing uncertain situations. Another example is the fatal accident of the MV Nordlys presented in section; "*On the MV Nordlys accident*" in this thesis.

The issue of improvisation where enlightened by some of the informants. The importance of improvisation where stated by one informant:"*…it is better that people do something and do it wrong instead of doing nothing, because they are afraid make a mistake[…]it is better that people do something, then you better occasionally make a mistake, within reason though.*"
- Simulator instructor

This I also find supported by referring to, among others mentioned in this thesis, Weisæth and Kjeserud[273] and Webb and Chevreau[274] given the restricted time to act and limited information as the nature of a crisis. In my view also Reason`s theory on correct – and erroneous performance support the thought of doing something as stated by my respondent[275]. Hafting has some thoughts on the same issue too; namely that even if decisions to act are not optimal, it is better to initiate actions to reduce damages caused by the crisis[276]. Also Reason has some thoughts that support the statement as he speaks of various kinds of correct and erroneous performance, describing how knowledge-based mistakes made by people running out of prepacked solutions and problem-solving in situ opens up for making mistakes as bad-rule or no-rule situations always might occur[277]. Leadership as the statement above shows, are a contradiction to Webb and Chevreau[278] descriptions of impediment by demanding conformity.

What comes clear by all who have contributed to my inquiry, is that to be able to improvise one need a foundation consisting of knowledge, skills and experience. As one respondent put it: "*I am a bit focused on that if you shall exercise improvisation you need a foundation. And that foundation is knowledge. You cannot improvise without knowledge […] And skills. And a bit of experience […]and what I see so incredibly clear it is that theory is so incredibly well connected to improvisation. It is a close connection between having a solid theoretical platform and the ability to improvise […] if you are to improvise you need to have built the*

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272 Hovden 2012
273 Wesæth and Kjeserud 2007:23,24
274 Webb and Chevreau 2006:68
275 Reason 2016:75
276 Hafting 2017:38,39
277 Reason 2016:75
278 Webb and Chevreau 2006:70

*theory[…] You need tools. You need something to hang on the racks to be able to improvise in a way that you do things right.[…] I am very concerned on improvisation, to keep it the in back of our heads how you…***intuition** *[…] The way we carry on with search – and rescue or exercising man over board , I see how important it is to think alternatively, how important it is to improvise actually, that we cannot follow the checklist then,…"* - Simulator instructor

There were also some views on how experience and skills for the use of improvisation can be achieved. The main view by my informants where that such skills were built by improvising in during daily operations: *"You get a bit experience on improvising during everyday operation. And then I think you can bring it on to exercises […] Yes I believe you really have to look at the operation of the boat in general. If you are used to improvise in the everyday operation then you will be able to improvise in an exercise and off course, in a crisis situation too."* - Simulator instructor

Daily operations often consist of minor repairs and adjustments, also known as "Firefighting". This was viewed upon as a way of increasing one`s repertoire and enhance the ability to improvise.: "*…yes, it* [`firefighting`] *may teach you that there are several ways of fixing a problem […] Yes, off course, then you build up, in a way, a repertoire of solutions. And that is what you need, it is a repertoire of solutions […] That is where you form the foundation…"*
- Simulator instructor

These statements I find comparable to the theories on building experience given by Reason`s[279] "Three levels of performance", Hogarth[280] on building intuition (expertise) and Dreyfuss & Dreyfuss[281] on various ways of performance from Novice to Expert presented in this thesis. Both theory and statements from informants shows the importance of knowledge, skills and experience to be able to improvise whenever needed. There is also a resemblance as to how experience and hence intuition is achieved. Namely through the daily operation by the solution of minor incidents and other challenges where improvisation might be a necessity for a safe and desirable outcome. Rankin et.al. [282] claims that improvisation can be seen as a range of different behaviors, small deviations at one end and spontaneous actions based on intuition at the other end. This I find as descriptive to the nature of building the knowledge, skills and experience necessary to enable improvisation.

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[279] Reason 2016:68,69
[280] Hogarth 2001
[281] Dreyfuss & Dreyfuss 1986:21- 36
[282] Rankin et.al. 2011:80

On exercises

In this section I aim to present some of the informant`s views, reflections and examples on exercises in comparison to theory on the subject. This also includes contingency exercises performed at land-based simulators. Various kinds of exercises, their purpose and benefits are described by Løvik[283]and referred to in the theory section of this thesis. Webb and Chevreau[284] points out that learning may be carried out directly by training sessions [drills], [exercises] and case-studies [table-top exercises].

I wish to start with a rating who gave an overview on how exercises are organized on his ship. He also addresses safety during exercises by rendering some interesting thoughts: "*It has been five weeks since I attended an exercise[285]. […] We do have exercises weekly. It has changed a bit […] this week it is about fire, that week it is lifeboat and […] it is a new routine in the company that we shall take…the chief engineer is concerned a bit on fire, the hotel manager is responsible for a bit hospital and evacuating cabins and stuff. And then there is the navigation officer taking care of…lifeboat and that part […] It has been distributed to avoid that all is laid on the safety officer. So we get more responsibility, that week you are in charge of the exercise and plan and […] they think of new elements and then we speak about what to do and what to train […] and then there is the physical part, to launch lifeboats, prepare lifeboats and such that is easily forgotten because every time we do that exercise we launch the lifeboat […]There are launching wires that may hang up, they might get locked…What do you do. This they have to watch, it is not something you learn by reading about it […]One thing is knowing how to do it and then it is another thing to watch for things that may go wrong […] If you do not know then you are just standing there. […] It is a good thing that you launch the MOB once or twice too much…that you get that training, that you know what you are doing., That it is not forgotten.*" – Bosun explorer cruise

This statement supports both Weick & Sutcliffe on preoccupation with failure[286] and Hogarth`s[287] theories on learning and building experience as described in the theory section of this thesis. Also Reason`s[288] theories on levels of competence seem to be relevant here.

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[283] Løvik 2017
[284] Webb and Chevreau 2006:69
[285] The informant had returned on board after a five-week vacation
[286] Weick and Sutcliffe 2015:45-62
[287] Hogarth 2001
[288] Reason 2016:68.71

Building experience and competence is an ongoing process of watching things being done, following rules and procedures and performing various tasks.

He also mentions that crewmembers may get tired of repeatedly exercising. Especially in the passenger trade where the frequency of exercises is high due to mandatory minimum standards regulated by strict international legislation: "*...exercises...quite certain I have experienced that exercise is a good thing. Many are annoyed about exercises […] those you sit with have 20 to 25 years of experience […] so you got sick and tired of these exercises; Like `But I do know this, this I do no need to`...afterwards I have realized that it helps you, that this here is […] one day it might...that you realize that this here is crucial. You need exercises...*" - Bosun explorer cruise.

Another informant stated that in the offshore support branch the chief officer usually created the exercises; different exercises on different ships. A system of rotation on board where different departments participated in creating exercises were launched. He explained why they did so and his view on the outcome of this system: "*...but it will be some differences from vessel to vessel, but the vessels I served on and got the systems under my skin, there we made a rotation arrangement where different departments participated in creating exercises […] So my role as chief officer, an incredibly important role on board, it was newer rehearsed […] But when throwing the ball around a bit...and involve the whole crew, then elements were trained on in a totally different way […] Yes, they saw things, challenges with their own eyes that me as chief officer was not aware of at all...and then they conducted the exercise […] the feed-back on the ships where this worked, was that these were the best exercises. We all had the impression I guess that the more connection to the exercises, the better the exercises and the more you gain from them. […] especially the departments who had participated in developing these exercises […] they felt that they had an extra and good outcome. But when you over the year rotated on all departments on board then...During a longer period of time they all got to exercise their things. […] I believe it is a model that might be...it is very important […]and we have all experienced that the eager of participating on exercises may vary. But when you involve the crew, they engage in the exercises too.*" – Simulator instructor

This was also mentioned by the bosun in explorer cruise: "*...You might make the exercises more attractive, that people see things more accurate...*" - Bosun explorer cruise

Tiredness of repeatedly exercising might be a consequence following the negligence of involving crew in the planning of contingency required by national and international

regulations[289]. As stated above, this can be mended to a certain degree by involving the crew in planning exercises. This is supported by Webb and Chevreau[290] as to involving all in planning. As to a rotating system, it seems to have a potential of increasing the crew`s ability to improvise as they get insight to a certain degree in other department`s issues. Also here I find support in Webb and Chevreau[291] claiming that to involve all members in planning gives a wider range of individuals a wider range of tasks in a crisis situation.

Three of the informants have their most recent experience from the passenger trade. They have slightly different views on contingency and exercises although not to the extreme. The other respondents show more variations in how exercises are performed. It seems to be trade-dependent and related to the experience of the personnel who attend the exercise. Simulator instructors had some ideas on this issue. It mainly concerned the use of manuscripts or just initiating an incident and let the rest of the exercise live its own life. To illuminate this, some statements are presented below. The first two respondents quoted, mainly serve as instructors on simulator based training and re-training of experienced personnel. It is important to be aware that these instructors have performed sea service themselves and have achieved solid practical sea service experience: "*I do not think we could have performed the kind of exercises that we do based on a manuscript. We would not have got anywhere really. We are depending on… […] Yes it* [exercises by manuscripts] *is very much repeating things. You might drill many such specific things during the exercise, getting good at that […] The point is that there is no absolute correct answer […]it is a bit like how we play too and what they consider […] The outcome of the exercise will turn out totally different as to where they start…Right, it is a consideration for the single individual to make […] and then you may discuss the choices afterwards, if it was wrong or right. And off course it is depending on the situation. The weather plays a part… […] it is clearly depending on each person […] depending on each person in the sense that…they are the decisions they mean is the best ones, what to take of care first and foremost*" - Simulator instructor

He explains this by saying that a sketch for the exercise has been developed prior to commencing but it is the considerations and actions of the participators that set the course to what the direction and incidents might be. The instructors just play along pursuant to the development of the exercise. The outcomes of equally initiated exercises, even with various incidents

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[289] Skipssikkerhetsloven [Law on Ship Safety] and SOLAS
[290] Webb and Chevreau 2006:68,69
[291] Webb and Chevreau 2006:68,69

and decisions, are not necessarily better or worse for any of them. It must be said that the participators on these exercises are skilled and experienced sailors: *"We performed that exercise four times before we started getting close to the outcome we had thought of prior to launching the exercise the first time. And then I am not saying that exercise 1, 2 and 3 were poorer or better exercises. They were all equally good exercises."* - Simulator instructor

These two statements I find to exemplify the challenges arising when an incident or accident occurs. Such challenges are described by, among others, by Weisæth and Kjeserud[292] and Hafting[293]. Experienced personnel are to demonstrate and train their ability to improvise to manage complex situations to achieve a safe and successful outcome. One may also refer to Hogarth[294] on intuition and Dreyfuss & Dreyfuss on expertise[295].

The third one of the instructors mainly train student with no or some experience. He had a different approach to exercises. His focus was on theoretical knowledge and building skills, practical knowledge and experience bit by bit. This, he stated, would benefit their ability to improvise: *"…During the first year they [naval students] shall in many ways be done on this instrument-part. And during the second year it should only be focused on decision-making. It should only be focused on communication, situational awareness, improvisation […] Planning off course […] the more knowledge I have achieved myself, then I build the exercises in a totally different way […] you are not supposed to learn it all in one bit, you shall build it up slowly and carefully […] ending up doing all-included exercises […] And it gives them the possibility to actually improvise […]I also see that simulators are insanely good pedagogic tools"* - Simulator instructor

This statement should, in my opinion, serve to illuminate the theories of Hogarth[296] and Dreyfuss & Dreyfuss`s theories on how to build intuition and expertise provided to be able to improvise to manage incidents and accidents to obtain a fortunate outcome[297]. Both Hogarth[298] and Dreyfuss & Dreyfuss[299] describes the necessity of learning bit by bit.

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292 Wesæth and Kjeserud 2007:23,24
293 Hafting 2017:38,39
294 Hogarth 2001
295 Dreyfuss & Dreyfuss 1968:16-52
296 Hogarth 2001

297 Dreyfuss & Dreyfuss 1986:16-52
298 Hogarth 2001
299 Dreyfuss & Dreyfuss 1986:16-52

Especially Dreyfuss & Dreyfuss[300] describes how less- or no experienced personnel are depending on rules and procedures in the beginning of their way to expertise.

Speaking of complexity in exercises, there were some concern on performing too complex exercises or performing full-scale exercises too soon. The issue was that those participating in such exercises were to hold some degree of knowledge, skill and experience. One of the simulator instructors and one of the explorer masters had similar views on this. Words like crashing and killing came up: "*...the more complex you make the exercises the cleverer the crew gets after a while...you give them a task to solve.[…] And it can be as simple as putting a piece of paper on the table containing five difficult questions. They do not know what to face in an exercise. It might be a list of questions […] there shall be an element of surprise. But at the same time the level of difficulty must not be so high that you crash them on the first...that is not the intention of the exercise*" - Master of polar explorer cruise-ship

When asked if there were dangers by running full-scale exercises too soon, the simulator instructor responded: "*Yes, yes...and then we come back to not being able to improvise. […] You kill it all...only a few will have a good outcome after such an* [complex] *exercise.*"
- Simulator instructor

These statements I also find as fine descriptions of how to build experience and expertise pursuant to Hogarth[301] and Dreyfuss & Dreyfuss[302]. There is a danger of speeding up learning to fast to achieve the desired level of expertise and intuition to make people able to improvise. Making exercises to complex at any stage may cause an increased dependency of procedures rather than contribute to building intuition and expertise needed to improvise.

When it comes to trade-dependent exercises, the most significant differences seem to be between offshore support vessels and passenger ships. One of my informants, who have served on both categories, names this as *different regimes*. Ferries uses pre-defined exercises based on manuscripts written down in Excel-sheets. Further-more all ferries are training the same elements he stated: *"The same system and the same kind of exercises to be followed by all vessels in the company."* - Simulator instructor

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300 Dreyfuss & Dreyfuss 1986:16-23
301 Hogarth 2001
302 Dreyfuss & Dreyfuss 1986:16-52

Maintenance of skills rather than expanding repertoire were an issue held forth by one of the informants: "...*as I see it a bit in Norway and many other places it is that, especially on the contingency side, it is that one in many ways exercises known elements, that have been trained several times before. It becomes like routine exercises [...] And then I am afraid that if you do not expand then you are not able to become a good improviser. You have to emphasize unpredictability, you must keep on with elements of uncertainty etc."* - Simulator instructor

I both agree and disagree to this statement. Variation of challenges, as mentioned above in this thesis, are crucial to train improvisation. However, to learn you have to repeat. Hogarth states: "*The frequency with which a connection is observed affects what we learn*" [303]

The term improvisation was also discussed by another of my informants. He would like to call it testing people by making situations close to reality where people, all of a sudden get their hands full. This by giving them several tasks and reduce their resources: *"...I would rather call it diversity of the aspect of exercises....what you set them to train."* -Master of polar explorer cruise-ship

On debriefs

In the aftermath of an exercise it is commonly accepted to arrange debriefs to correct errors, organization and to evaluate whether existing procedures are appropriate to achieve their purposes and goals. What is spoken in such debriefs would be the basis for revising contingency plans. Hence I have asked my informants on this issue. It shows to be a bit less variation on this issue in views and systems.

Here it has been focused on table-top exercises, as described above in this thesis, as a fine way of improving contingency and learning due to participators have the option to ask questions underway in the exercise. Such learning may benefit the ability to improvise in a state of crisis. Dividing exercises into limited sectors followed by immediate discussion also seems to be looked upon as good settings to gain experience from exercises. This might be table-top exercises where questions and discussions are subjects underway. It may also be talking things through immediately after having performed sectorized exercises: *"...But in most cases when an exercise has been performed, either a practical or table-top, that people may ask and dig during the exercise, or we perform a pure smoke-diving exercise where they*

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[303] Hogarth 2001 p. 77

fill up a room with smoke [...] Then it is out again and talk things through, what have we done, what can be done better. It is that debrief that is the most important [...] I know when I served in the Coast guard then we had a debrief every time after a main exercise then it was small groups roaming around performing various tasks and had a debrief on that." - Master of polar explorer cruise-ship

This statement I find to fulfill the thoughts of Hogarth[304] on learning from experience. He emphasizes that learning from what you experience might not be optimal. One may also learn from what one not experience by considering in the aftermath whether other actions would have shown to be more appropriate[305].

Plans are presumably vital to a successful management of critical situations or unfortunate incidents. They must, however, be frequently practiced in order to provide any help. My informants had some views on this topic. One respondent gave an example of how contingency and competence can be maintained. In this case it concerns aid to passengers suffering from cardiac arrest and/or respiratory failure (passengers heart stops beating and/or passenger stops breathing): *"...and the same system we have on CPR[306]. There is the doctor and the nurse and there is the safety-officer arranging regular updates on CPR. And then it is doll and everybody through the same procedure, blow in the doll and all this, the whole ritual [...] It is very important because it is those downstairs and around the boat working that meets this first, not us on the bridge or those situated in the engine-control room."* - Master of polar explorer cruise-ship

As another respondent stated: "*...The thing about getting people to understand that our safety runs through the everyday from morning to evening, what you see and what you do [...] Yes, and it is fresh goods.[...] It has to be focused on all the time:"* – Master of polar explorer cruise-ship

On reduced resources

Another issue in this thesis, as described in the introduction, is the case of reduced resources when a crisis occurs; both human and equipment. In this section some thoughts from

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[304] Hogarth 2001
[305] Hogarth 2001:20
[306] CPR – Cardiopulmonary resuscitation

respondents are presented. The respondents were asked on their experiences on this matter as to exercises in particular. A simulator instructor had this view on the issue: "*Both on cruise, in the coast guard and in oil while I was there it was quite normal to remove vital persons so that…And it was really an element of surprise where you in many ways…he who was to be a leader all of a sudden, he was not aware of that…then the exercises were good. It was… some of the best exercises when you removed a vital…the captain or the chief engineer fell out and …the second in command or the first engineer had to enter and…Yes then this about improvisation appeared very clear […] But it is obvious that the problem of doing such things is that it require more, more effort to do things not by the book. That is the problem.*"
- Simulator instructor

The matter of effort, time and taking charge in situations where described by two masters in the passenger trade and a former master of an offshore vessel: "*…so I can say that we are more or less there…not on every exercise, but say every second or third exercise people are dismissed from participation […] Then we take out a leader somewhere so that the next person gets to step in, then we observe if that happens, if people take responsibility…So we are quite alert on this that if no one turns up something must happen anyway. Someone has to take responsibility before the whole organization freezes a couple of steps below.*" - Master of polar explorer cruise-ship

The same were held forth by another master: "*Yes. We do train with…not when we do the big contingency-exercises, then there is a full crew…For as a rule the most will…if not something giant has happened on board then the most will be available. […] Then you have to replace the first engineer for the chief and the chief-officer for the captain and vice versa […] it might be that we have to move both zone-leaders and those who perform evacuation too.*" - Master of polar explorer cruise-ship

In the offshore trade this is an issue in exercises as well: "*In the offshore trade we are pulling out, but they were perhaps afraid of pulling out people in important positions. Maybe we pulled out someone easy to replace […] we did not pull out those who had the important roles. In the aftermath I see that it was…we should have done that yes…but it is on the alarm-instructions, then you see who is dedicated stand-in to the various positions. If that one falls out then the other one stand-in and so on. So it was not totally randomized then. There is a connection and it would be rare if both the chief engineer and the first engineer for instance should be out of the game. Well yes, it has happened though.*" – Simulator instructor

Various roles are also an issue when training on simulators during exercises.: "*…You are fewer people. He is gone. He is in charge of communication. And he shall handle, he shall be briefed and […] you lose resources all along. At the end you are alone on the bridge […] They must really know how to improvise.*" - Simulator instructor

When it comes to limitations or loss of available equipment and technical resources, this was mentioned as an element in simulator exercises. This might be difficult to conduct when in service on board. "*We remove a bit such critical things. That we lecture on, and then we remove critical tings for them. For instance that they lose a rudder. They may lose the drift-line[307], they might lose the gyro[308]…*" – Simulator instructor

These statements seem to fulfill one of the recommendations made by the AIBN in their report 2013/02, after having investigated the fatal fire on board the MV Nordlys, on contingency and training with crewmembers out of action. Some informants also point out the matter of effort required to improvise as described by Reason`s[309] third level of performance – one informant hold this forth as a problem.

On time to perform exercises

As mentioned in the beginning of this thesis, time to conduct exercises in various trades was mentioned as a possible challenge. The informant`s response to this question was that they did not see this as an appreciable problem. Although depending on various trades. It seems as the offshore trade provides more space for exercise than the passenger trade. As stated by a former master of an offshore ship: "*Yes I will put it like on many of the boats you often had spare time between missions. Or you were stand-by as we call it. So I feel that when it comes to time to perform exercises it is more of a challenge to perform good exercises in this ferry trade concerning their busy days than in offshore. I felt that we had more…yes we could use the time we wished to perform good exercises […] I never felt a pressure of time in offshore.*" - Simulator instructor

A master in the passenger trade put it like this: "*Time to perform exercises, that is…But you take your time…*" - Master of polar explorer cruise-ship

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[307] Drift-line: Propulsion
[308] Gyro: Compass
[309] Reason 2016:70

Supported by another master of a similar ship: "*...it is on a boat like this that we have a certain number of hours...we use the hours we are allowed by law to work...*" - Master of polar explorer cruise-ship

When it comes to exercise various operational tasks, there might be restrictions of time: "*So they...I was to say that most, the very most of them are used to stand by the tender-pit looking down in the sea watching the ice drift past. They are known of our operation and have seen the lifeboats being launched. Everyone has seen this, but to go from there to actually doing it, there...then we return to the time-factor. It would not be a problem to let them do it, but we do not have the time nor the opportunity.*" - Master of polar explorer cruise-ship.

The last of the statements indicates that efficiency requirements as to operation limits the opportunities of performing practical exercises as one might have wanted. As said above, this seems to be trade dependent. Passenger-ships may have tighter schedules than others. As described in the theory chapter in this thesis, efficiency might be a priority above safety as hold forth by Hafting on the MV Costa Concordia accident[310]. A company`s or shipboard`s policy may be compared to what Grech et. al. [311] labels *risk-based behavior*. The statements of my informants above contradict to a certain degree that efficiency has the top priority. One must be aware however that resources spent on contingency are based on a cost versus benefit analysis – as low as reasonable possible - ALARP.[312]

On alternating jobs or roles

In this chapter the focus is on expanding one`s repertoire beyond the specific profession or role of each crewmember. This may increase the ability to step-in for others when needed, as described in the AIBN – report on the MV Nordlys fire[313]. Alternating jobs or rotating tasks have been mentioned as an important way to achieve the knowledge needed for relevant improvisation. As one respondent put it: "*And then I believe a bit on rotation...You rotate, you do not watch the mantle-wire[314] for 24 years. You are not to stand on one place for 25 years [...] you have to move a bit and then you must know what is going on elsewhere on the boat [...] But clearly, if you enter a ship and you are fixed at one place, you only get experience from that place [...] if you get new personnel on board it is a bit important to*

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[310] Hafting 2017:39
[311] Grech et.al.2008:54,55
[312] Lunde 2016:34,35
[313] AIBN report 2013/02
[314] Mantel-wire: Wire for lowering or hoisting lifeboats

rotate them so that they do not only know one thing [...] because it might be that those standing there performing that task they are not there., they might be gone. I have experienced that [...] no one were situated where they were supposed to." - Bosun explorer cruise

The masters of the passenger ships held forth that they used the crew to perform various tasks during normal operations: "*We are a crew under the operation down there. And they rig out and they rig in. They tidy it all [...] They are trained and [...] They know exactly what is going on down there* [on deck] *[...] Yes, it is people from the galley, people from the restaurant, and people from the bar. They are involved in all this. Putting on life-wests...helping the passengers"* - Master of polar explorer cruise-ship

A similar example given by another master: "*The waiter, he is not only a waiter, he might also have to stand by at the tender-pit[315], he will have to join other tasks around the boat. ...on our ship the crew is very much used around the boat to whatever needs to be done [...] bartender helping them in and out of the boat[316] [...] It is ordinary working-tasks for them...the most important tasks are about fire, average and operation. They* [the crew on explorer cruise-ships] *are doing many things much more sporty than ordinary ship-operations. Take people out on a tender-pit in on hell of a weather and perhaps wind blowing at 20 m/s. Throw them in an inflatable boat and ship them ashore. It is blowing so hard that penguins are coming rolling down the shore. They still operate, because we have...we are still within our safety-limits. It...I think people attending this operation becomes sharper when a crisis occurs"* - Master of polar explorer cruise-ship.

All the statements above seems to contradict one of Webb and Chevreau[317] impediments to improvisation, namely systematic divisioning and specialization of tasks.

The training on simulator is also concerned with the variation of tasks: "*...Then we exercise a bit on that we pick out maybe three of the crew or two of the crew gets occupied on taking care of a passenger problem then it is the matter of who is left on the bridge. And let us say that the chief engineer is left on the bridge then he might have to enter the chief officer`s role. And that may be for instance external communication ... That is communication against a coast-station or other ships [...] Yes, one of the navigators leaving the bridge. And then it is*

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[315] Tender-pit: platform on the ship where passengers are picked by tender-boats to be shipped ashore
[316] When tendering
[317] Webb and Chevreau 2006:69, 70

about who steps-in…And then you are vulnerable for a start related to that on handling a boat and handle communication [...] So we are more and more over to the bit of challenging all on different tasks…" - Simulator instructor and captain on HSC[318]

Regarding the same issue, the size of the ship and crew where experience is built was also regarded to be important, as to the possibilities to achieve such.: "*…you may consider a thing like…he is standing on a small freighter [...] the crew there they hang on the bridge. They have been in the engine-control room, they have been around to watch….hanging on the bridge and listen…they know the systems, they know the panels…all of them have some peripheral knowledge on what is going on…it was on the coast where we performed circular-training [...] divided the crew in three and then they had twenty minutes at the fire-station, and then twenty minutes at the evacuation…on the lifeboat-deck [...] and some of those who had been sailing on the Coastal steamer for years said that they had never been taken in at…and did not know what was going on there. It might be some of the philosophy that one knows the entire organization to the top, and the cook knows…or he who is in the middle of the organization knows the entire organization downwards and all…then you will have better odds if you lose personnel in drift or in crises."* - Master of polar explorer cruise-ship

On variation of tasks, an experienced bosun stated: "*…My opinion was that it was just the ABs who should deal with the boats, because then you were sure that they knew it. Do not put an AB on the fire-fighting team, rather put the cook at the fire-fighting team then we ABs care of the boats. But after the Nordlys-fire I changed my mind. It is bloody ok to know that the cook is able to do it. That it might well be that he is not there and he is not there, and then it is bleeding sad if the ABs all of a sudden are occupied doing others tasks, are gone, then there are no one who knows [...] Yes it is good to know that all knows what is going on..."* - Bosun explorer cruise

These statements indicate that the term domain-specific includes not only the single crew-members specific tasks but has a wider meaning as to the ship as a system. Although Hogarth`s[319] term talks of intuition similar to Dreyfuss & Dreyfuss[320]and Reason[321] on expertise, improvisation by a reduced crew also demands some knowledge and skills outside one`s primary profession. Such knowledge and skills can be achieved through the daily

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[318] HSC: High Speed Craft (Domestic passenger vessel)
[319] Hogarth 2001
[320] Dreyfuss & Dreyfuss 1986:30-36
[321] Reason 2016:70

operations on board. Referring to Wybo (2004), Webb and Chevreau[322] points out that learning in everyday work is an efficient way to prepare for crisis – management.

On competence and experience

In this section the matter of competence and experience as foundations of improvisation is discussed by comparing informant views and experiences to theory on the topic.

As one of the informants put it: "*Yes, I think that is important to hold forth, that the more experienced people the more hooks they have to hang it on, the more tools they have in their tool-box […] So experience…yes I think that is a key-word.*" - Simulator instructor

This I find supportive to Reason`s[323] three levels of performance and Hogarth[324] on engineering intuition. It is vital to be aware of the quality of experience though. This concerns in what trade the experience has been achieved: "*…it is off course about experience. But it has also a bit to do where their experiences come from. What trade they have served in before and where they are normally sailing and such things plays a role […] The ferries seem to have some more time. That is, they have more time to think things through, while HSC then it is…things are to happen very rapidly.[…] It has off course something to do with the speed...Because they work perhaps more against the clock then for instance a ferry […] So we see a clear difference on how fast they react to things and the decisions how rapidly they are made…*" - Simulator instructor

This statement supports Hogarth`s[325] thoughts on domain specific knowledge. It seems like intuition depends not only on where one`s expertise has been achieved, but on the specific operations it has been engineered as well.

As to exercises, the simulator instructors had the opinion that experienced personnel working tighter with less experienced ones, had a fortunate effect to learning: "*...then they have attended together with experienced people and got to act as crew, navigators, no captain`s role at all, and then they get to take over that role the last two weeks of the course. And the they get to train on […] It is a real situation […] we see that it has a very good learning-*

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[322] Webb and Chevreau 2006:69
[323] Reason 2016:70
[324] Hogarth 2001
[325] Hogarth 2001:8,9

effect that they exercise together with experienced people as chief officers." - Simulator instructor

This was supported by a former master: "… *We use to speak of the mix of crewmembers. And it is not optimal just to have experienced crew. It is not optimal to have only new. But having the mix of experienced and new, then you achieve that exchange of experience from the old ones to the new there. And then I truly believe that you will see more of improvisation when you have…the greater the amount of experienced people, the greater degree of improvisation."* - Simulator instructor

This I find supported by Hogarth: "*Humans learns about the world from two sources: what others tell them and their own experiences. Moreover, there is strong interaction between these two sources. What other people say can direct what people experience, and what people experience can affect how they interpret what they have been told*"[326]

The matter of knowledge and experience is also a question when it comes to the repertoire you may expect by stand-ins. Some technical equipment might be too complex to be handled by ratings or officers from all departments. The statement below narrows the term domain specific knowledge as described by Hogarth[327].

"*….It will be very difficult to fill in the missing competence of the ship-board"* - Master of polar explorer cruise-ship

The time required to build experience were pointed out by an experienced bosun: "*You cannot expect a one-year apprentice to know that. My experience as I have been building, I have built over many years. You cannot demand that […] that they can see what they are doing…it is only one thing; doing it, it is exercise and it is training. You need to have it in your fingers. And you cannot get experience just by reading […] It has to be done manually."* – Bosun explorer cruise

Hogarth[328] has some thoughts on learning. He mentions learning by noticing associations or contingencies. The more of such one observes the likelihood og remembering is increasing. Associations and contingencies defined as things occurring together, noticing actions and

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[326] Hogarth 2001 p. 19
[327] Hogarth 2001
[328] Hogarth 2001

reactions. Seeing connections are critical to learning from experience[329]. This will take some time as I find to be described in the statement above.

On experience versus procedures

Over the last three or four decades, the use of procedures for operation has been more and more common in shipping. This might lead to dependency of procedures impeding improvisation.

The informants were asked of their view on using procedures versus experience. The answers have shown similar opinions on this specific topic. As one stated: "…*No, obviously, if you shall be shaped in a way that whatever occurs you must in and read what the solution shall be…If you are not able to think by yourself, you are very much ruled by a frame-work like that*.[procedures]*"* – Simulator instructor

They reveal a tendency that the dependency of procedures and checklists are decreasing with a growing experience. As one informant put it: "*Well these days…let`s take offshore, and maybe passenger trade too, then you have procedures from arrival to departure. And the less experience you have the more I think you relay on that procedure to in a way give a confirmation to yourself that I am doing the right thing, because it is written. In a way you quit using your head and the other things you have learned through education [...] the procedures they are off course a tool to make us perform a work operation in a safe way. I was about to say that the dependence of having a procedure I have felt and seen a bit that it is greater the more unexperienced you are. You are always supposed to use a procedure, no matter how experienced you are, but if you are experienced then you use, in a way, procedures as support. If you are new and unexperienced it is the procedure that leads you through…*" - Simulator instructor

I find the statement above illustrative to Dreyfuss & Dreyfuss[330] description of human behavior as they develop from novice to expert. Reason`s[331] three levels of performancemay also be supportive to the content of the statement as it describes human approach to various tasks; namely routine (skill-based), adjusting or modifying (rule-based) and thinking things

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[329] Hogarth 2001 p. 20 and 75
[330] Dreyfuss & Dreyfuss 1986:16-52
[331] Reason 2016:70

through on the spot (knowledge-based) appearing simultaneously. Also Grech et.al.[332] on *rule-based behavior* may be said to be exemplified by this statement.

He continues by questioning the relevance of procedures developed by companies for the use on board ships. There is also a tendency to skip procedures not quite suitable for a ship`s operations instead of getting them corrected by a dialogue with the personnel on-shore who have made them. This he claims is a matter of willingness to use effort. "*…it is up to the users of the procedures to have a dialogue with those who create the procedures, that you get a procedure that fits to what you are doing. And it is perhaps a bit there the maritime directorate and…are a bit lazy, the issue that this is what we have got from the company, and that point does not fit, that does not fit, that does not fit…so they skip them. Instead of having a dialogue with the company, that we need to have a procedure fitted for our system […] but I think it is like baked in or ingrown in the systems that what we get from the company is what we shall do, instead of having it and play the ball back and forth. […] Right. Instead of playing the ball back and forth to get it fitted to the system […] in a way one skip reporting due to it demanding too much effort."* - Simulator instructor

The demand to use procedures, as the informant above suggests, were supported by another informant: "*And that is a typical sign for this age, especially this in the procedure-age, the demand that all things shall be described. You may not have trust upon that people are doing their job. It has to be specified […] Because you are taught to read a procedure"* - Simulator instructor

These statements support one of Webb and Chevreau`s[333] impediments to improvisation – the tendency of organizations relaying on written rules and procedures describing in detail how different tasks should be performed. They claim that reliance on established rules and procedures chokes the ability of creative thinking. Organizations demand for conformity devaluates the reservoir of creativity within their crew. Mendonca et.al. also have a view on this item as they claim that in certain situations no planned-for activities may turn out feasible to manage such events[334].

Another of the informants labelled the dependency to procedures to be a problem although he emphasized the importance of such: "*… They get scared, they are very focused on the*

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[332] Grech et.al. 2008:53
[333] Webb and Chevreau 2006:69,70
[334] Mendonca et.al. 2001

checklist and procedures then they lock themselves to…yes they become very static […] I am eagerly supporting these checklists, having them as a background…that they lay there, that you have them" - Simulator instructor

The same respondent had made some observations when performing exercises using a navigational simulator. Diverting from procedures he found to have a positive effect on the outcome of an exercise. "*…what we have seen when performing these man over board exercises that those who have shown to be most effective and have performed the best man over board exercise, are those who actually have put the check-lists away not using it point by point…"* - Simulator instructor

On this issue I find it appropriate to mention Hogarth`s[335] theory on intuition as a quick way of solving or managing events demanding ad-hoc actions due to limited time available. One may also here look upon Reason`s three levels of performance[336] as checklists and procedures (rule-based behavior) are used as support to decisions and actions and put away if the situation requires so (knowledge-based behavior). Even though Reason[337] holds forth the knowledge-based performance as a conscious, slow one depending on time I believe that improvisation within a limited time-frame in a crisis, as described by Weisæth and Kjeserud[338], some deliberate considerations will have to be done in combination with intuition and automatic mode.

On safety attitude

A good and healthy safety attitude seems crucial both to avoid and to manage crises. Hence I like to present some of my informant`s views on this issue: "*…I am old school when it comes to HMS[339] and…I am very like that…over the last five years I have had to change my attitude concerning a lot when it comes to HMS and safety and such…"* - Bosun and AB coastal freighter, coastal steamer and for the present explorer cruise

A master on a passenger ship put it like this: "*First we got a bunch on board in Bergen, drove them through the safety-bit and then on the operation-bit, you sharpen the gang. […] After a while we checked out the status […] this was forgotten. And not caused by people never mind,*

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[335] Hogarth 2001:8
[336] Reason 2016:70
[337] Reason 2016:70
[338] Weisæth and Kjeserud 2008:23,24
[339] HMS: Helse, miljø og sikkerhet [Health, Environment and Safety]

but the focus was not there [...] new gang on board in Bergen, so you have to go straight on to build attitude on safety [...] `And you shall not only stand here chopping sausages and make salad, you are a fire-fighter on board as well`. The thing about getting people to understand that our safety runs through the everyday from morning to evening, what you see and what you do [...] Yes, and it is fresh goods. [...] It has to be focused on all the time."
- Master of polar explorer cruise-ship.

These statements I find to be highly supportive to Weick and Sutcliffe`s[340] theories on mind-fulness. Especially on the items Preoccupation with failure[341] and Sensitivity to operations[342] the informants exemplifies the theory in a practical way, both from a personal and a management or leadership point of view.

On the MV Nordlys accident

In the beginning of this thesis I referred to the AIBN-report 2013/02, after the fire on board the coastal steamer the MV "Nordlys". The official report focused on dedicated stand-ins for performing various tasks, such as closing valves in this case. Evacuating passengers were not covered in this report. One of my informants attended this very unfortunate incident and shared some of his experiences.

I find it exemplifying to the scope of this thesis to present some of his experiences: "*Yes, it was bad...when it happens so rapidly. You have got fifteen minutes from everything fine to all is black. [...] Virtually all were dining at the time. It was breakfast [...] no one were where they were supposed to be. No one [...] The starboard side was out, it was filled with smoke, it was impossible to evacuate from there. Hence it all happened on the port side. It is my site on the port side operating the MOB. But we had sent off the MOBs carrying the casualties. It was what we...and we had contact with people up on the deck. They were so burned and...It was just a matter of getting them ashore, it was our first thought. But as a rule the MOB shall work as a backup when the lifeboats are launched and if you are to assist [...] But a decision was made there and then that we start with the wounded [...]* [procedures] *were deviated, because our routine is that the MOB is to be like...let us say that something happens to the lifeboats or something else, push them away or etc. so it shall be launched as the first and assist lifeboats if needed. Help them away if the engine does not start. It is to be launched*

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[340] Weick and Sutcliffe 2015
[341] Weick and Sutcliffe 2015:45-62
[342] Weick and Sutcliffe 2015:77-94

anyway if something happens. It could be the case of people falling over board or…It is a backup to pick them up or […] It was the first engineer and the repair-man who was burned as much that they had to be sent ashore…" - Bosun explorer cruise.

He continues relating the incident to what he had experienced during years of exercising and using procedures: *"Yes it was nothing like an exercise. No one were where they were supposed to be …this happens in ten – fifteen minutes from it starts until it is an inferno…that things happens… there is no time to think […] what was good was that it was experienced sailors knowing what to do, how to do it, and […] It was the guys who were free to use […] It was just using your head, but when you have experienced it you see that it is ok, you exercise things, but you see how it works, you see how it works, and off course, if you change roles and see you will get some insight on what to do and such. One tries to make the best out of it. There is nothing in my instructions for me to enter the dining salon to fetch people in wheelchairs and to get them up on the boat-deck. […] I did that…it is written that you are to count the passengers on board* [into the lifeboats] *and all, but if there is a fire under your … I believe you throw those people on board quickly as h…That counting and that organization and all it might…But you shall try it off course. But what happens if it is… Let us say if it is burning under your […] My task is to operate that MOB, the one I shall out in […] No one can anticipate what happens […] I took a lifeboat…It was because he who were in charge of that lifeboat …well he was not present. He did not show up. And…I took the one lifeboat. Me and a chef, two lifeboats carrying passengers. And we were inside the port, so it was just around the quay and so…I left the boat there due to people were standing by to take care of, rescue-team. And I got a message from the chief officer on the radio to show up `asap`. So I just ran down to the quay, because then the Redningsskøyta[343] came to push her in and…then I started to speak with the fire-fighters[344], to explain how, what I had seen and…So those fire-fighters were standing on the quay…Then it was to embark to show the fire-fighters the way to the engine. They went in by the poop-deck[345] and then down and into the control room[346]. But say it like this that when […] all were in the dining-room."* - Bosun explorer cruise

This should very clearly confirm the necessity of improvisation in crisis management.

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[343] Redningsskøyta: Rescue vessel
[344] Fire-fighters: Shore – based official fire-fighting brigade (RITS)
[345] Poop-deck: The deck aft of a ship
[346] Control-room: Engine control-room

CONCLUSION

General

This study has revealed that most crises demands rapid actions to manage and to achieve a safe and desirable outcome. Such actions are often based on decisions and improvisation in a state of chaos due to limited time and information. Critical situations tend to escalate or change requiring reconsiderations. There may probably not be time to find optimal solutions. Hence so called "good enough" actions may be appropriate to manage a critical situation. To make sound and relevant decisions and to improvise it takes knowledge, skills, expertise and intuition. Enhancing improvisation should be consider an important barrier concerning safety and contingency. The notion that the more experienced the crew are the better the change for improvisation are shining through both in statements by informants and theory.

It has come forth that knowledge, skills, expertise and intuition may be engineered in several ways. This inquiry has shown some of these ways.

In this section I aim to answer the research question:

How may improvisation be enhanced in contingency and crisis-management on board ships?

My study of literature and the information that has been given by my informants, have been enlightening and have given me expanded insight in the topic of this thesis; Enhancing improvisation in crisis management. The most outstanding and important, in my view, insight it has brought forth, is that contingency is not only engineered by contingency plans and exercises alone. These observations or experiences though does **not**, to my conviction, diminish the value of such exercises. Being able to improvise prior to and during crises management depends on expertise and intuition to make relevant and rapid decisions and executing actions in chaotic situations where time and information are limited. Contingency and the ability to improvise also seems to be a part of everyday work, by building knowledge, skills and experience and through everyday work and the fixing of minor problems or incidents. It is also important to notice that technology as for instance computer programs designed for crisis management are useful supplements not the solution as a whole.

Contingency planning including risk-assessment, the brainstorming, the actual work on plans and revisions will benefit the crew`s understanding of how things work and by that increase their ability to improvise. Such plans should be as generic as possible to ease adjustment to

specific situations and benefit the ability to improvise. When acknowledging improvisation as crucial to crisis management on must also accept the possibilities of misvention, mispliance and mistakes.

The dedication to the topic shown by my informants have convinced me that safety and contingency are highly acknowledged by both active sailors and instructors, improvisation being a vital part of it. At least in the part of the Norwegian maritime domain this study includes it seem to be so.

Enhancing improvisation through everyday operations

An important element is to alter tasks for the crew to perform or watch being performed in daily operation. In other words, the building of a contingency is a continuous process. This I find highly supported by the statements of the one respondent who has a real-life experience from a fatal accident – the MV Nordlys fire. Alteration of roles or tasks in daily work seem to enhance improvisation needed when crewmembers are absent during crises.

Those of my informants who have been and still are serving on board ships, as officers and ratings, have brought to my notion that the engineering of contingency and improvisation is very much based on managing different events in the daily operations. Both routine and minor incidents are regarded as basis or a necessity for developing ability of improvisation in crises. Some of the literature has left me with a similar understanding, concerning the different stages of building of experience, expertise and intuition. Experience is said to be key word although it may be trade dependent and domain specific. The necessity of time to build experience has also been emphazised.

A crew of experienced and less experienced members are said to be an advantage that benefits the exchange of experience. This will be a vital part of the way from novice to expert and building intuition.

Enhancing and maintaining safety attitude are mentioned as vital to managing crises. It is said that maintaining the focus on safety is crucial. Otherwise it is easy forgotten. Safety has been described as fresh goods.

Mindfulness or awareness to early signs of possible dangerous failures are mentioned as a way of gaining knowledge and experience. Daily work is considered a part of contingency and contingency considered a part of a ship`s total safety.

Enhancing improvisation by contingency-exercises on board

It is likely to believe that engaging the whole crew when planning exercises, giving them an ownership to them, would benefit the eager for exercising and eliminate the feeling of exercises as boring and disturbing tasks. Reduced personnel during exercises by discharging persons are said to be a good way to train and enhance improvisation. It is also recommended by maritime experts in accident reports. One must be aware though, that some tasks demands special knowledge not easy to replace. Hence there may be few alternatives as to stand-ins. Debriefs after exercises are regarded important to the development of understanding and experience.

Table-top exercises are said to be suitable for enhancing improvisation as they open for discussions around the table on solving imaginary situations. They are also a forum for evaluating and improving contingency plans.

Time given to perform contingency exercises, as suggested in this thesis, are not considered to be an appreciable problem pursuant to my informants. There seems to be given sufficient space for exercises pursuant to mandatory national and international regulations. Some companies have set their own standards beyond mandatory regulations.

Use of shore-based simulators in exercises

Simulators are said to be excellent tools for training contingency and improvisation. Statements by those of my informants who serve as instructors on contingency education and training using shore-based simulators, have brought me to a closer understanding of the different levels of such training based on the level of knowledge, skills and experience of the participants attending courses. They also prefer to perform exercises with a mix of experienced and less experienced participators to achieve exchange of experience. Some simulator exercises also include discharging participators to train improvisation as they have to alter roles and tasks. It is important also not to make exercises too complex as it is believed to diminish the outcome. This, off course, also goes for exercises on board ships.

Ordinary training of maritime students is building knowledge, skills, experience and intuition bit by bit to enable them to improvise and consider abandoning check lists if necessary. Such training includes both relevant theory and practice on simulators.

Impediments to improvisation

My inquiry shows that involving the crew in contingency planning, as required by international rules, varies among different ships. Negligence of involving ship`s crew in contingency planning do not seem to enhance the building knowledge, skills, experience, expertise and intuition needed to be able to improvise to manage unfortunate incidents, emergencies or crisis situations.

Conformity and specialization are also said to limit the ability to improvise. The demand of documentation and to follow procedures may lead to a dependency of such and diminish the eager and ability to improvise. Procedure dependency is said to be decreasing with growing experience. As to specialization it is a necessity onboard most ships of today due to highly specialized operations and complicated or complex technology and may be difficult to avoid.

Dependency of procedures have been mentioned. The request to follow procedures and the demand of things to be described have been said to be a possible problem to ship`s crew. Focus on following checklists may make people static and reduce situational awareness in the surroundings and hence impede improvisation. Deviating from procedures have shown to have a positive effect in simulator exercises. Dependency of procedures are however said to be decreasing with growing experience.

FURTHER RESEARCH

Automation in ships operation:

Over the years more and more operations are automized, leaving the crew to be surveyors watching instruments. Examples on automation are Dynamic Positioning and ships sailing themselves pursuant to pre-defined routing. Fewer operations are depending on manual conduction. This may cause less possibilities for ship`s crew to practice manual handling and building experience. This issue is, in my view, a highly relevant and important topic to take a closer look upon. Some of my respondents made statements on this issue that should be taken seriously regarding the present expanding focus on digitalization and automation of operations. How will this influence the possibility for humans to achieve knowledge, skills and experience? I base this question on statements given through the work on this thesis.

One statement: "*Yes quite clear. Just that is a bit of a scary picture because when you have…if we speak of external factors like weather, wind and sea and when you are handling a ship you get this in many ways in your fingers. If you are to dock and undock ships. Semi-autonomic ships, then it is clear that these naval officers never get this in their fingers. So if automation should fail you would in many ways react more slow and your ability to improvise will become poorer due to not getting the opportunity to [...]* **Some bells should ring […] it scares me a bit.**" - Simulator instructor

Asked whether automation has an influence on the ability to improvise, another respondent stated: "**Yes I believe so**. *Because maybe you trust upon instruments too much, right. And then I believe that people may not know the system well enough either [...] You may look upon sailing on track[347], right. How many are reluctant to leave the track? [...] they do not know how to get back on track again…people are afraid to [...] If you automize for instance a boat to dock and undock people will struggle to override it. That is; you will get less practice on what is your original task [...] you are to monitor something and then you shall…you basically get less practice [...] Yes and especially on DP-boats[348], right…they are not able to handle a boat because it is a system doing it. And it has been criticized that they do not understand…they are in a way not able to maneuver a boat from one rig manually anymore because they are used to the DP doing it for them…*" - Simulator instructor

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[347] Sailing on track: The ship automatically follows a predefined route by instruments actually perform the operation under way

[348] DP: Dynamic Positioning systems – ships maneuvered entirely by computers

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INFORMANTS

Active bosun and masters, Explorer Cruise, North-Norway 2019

Former naval officers; at present simulator-instructors, Bodin Maritime School, Norway 2019

ENCLOSURES

I Definitions

- Able bodied seaman (AB): Fully experienced deckhand
- Accidents[349]: Severe or fatal injuries to personnel, shipwreck, fires, collisions, environmental damage due to spill etc. leading to the involvement of on-shore-based organizations, such as authorities, rescue-centers, police, public healthcare and media.
- ALARP: As low as reasonable possible; the range of crisis-countermeasures (barriers) considered within the limits of what is physically, organizationally and financially possible or beneficial taking into account the levels of consequences and probabilities.
- Barriers: Organization, equipment, procedures, job-instructions and training to avoid unfortunate incidents and/or accidents.
- "Black Swans": Incidents and/or accidents most unlikely or occur and therefore not considered nor included in contingency-plans. Hence there are no procedures available to handle such incidents or accidents. Also named "Wild Cards"
- Cis: Critical infrastructures.
- Contingency: Procedures, plans and training to handle various unfortunate incidents and accidents.
- Contingency-plan: See section "Developing contingency-plans" below.
- CPR: Cardiopulmonary resuscitation
- Crisis-management: The operative in-situ handling of an incident or accident including organization on management-level such as; providing external resources, handling communications towards media, next of kin, authorities, business associates and other similar organizational tasks performed by the on-shore organization.
- Designated person: Safety officer on a shipping company. Dedicated to serve as liaison between ship and company and in charge of the company safety management.
- DPA: Designated Person Ashore – the company`s safety officer.
- Equipment: Tools to aid the protection of ship and crew/passengers from dangers caused by unfortunate incidents or accidents, like fire-extinguishers, life-rafts etc.
- Exercises: See section; Developing contingency-plans" below.

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[349] Sea-accident defined by FOR-2008-06-27-744 – «Forskrift om melde- og rapporteringsplikt ved sjøulykker og andre hendelser til sjøs» [Prescription on the duty of reporting accidents and other incidents at sea]

- Experience: Learning by fixing minor problems underway during the years, leading to understanding of how things works – developing an; "Understanding of the systems".

- Improvisation: See section "A preliminary view on the topic – improvisation" below in this thesis.

- "Firefighting": Mending of equipment failures and minor unwanted incidents.

- Learning by doing: Drills on procedures and handling of various equipment. In this context the term differs from experience – see above

- Maritime domain: Off-shore and onshore organizations according to the context of this thesis – see below.

- MOB: Man Overboard Boat – small rescue craft situated on board ships

- Naked analysis: Considering limited risk- or vulnerable-areas without taking into account existing barriers.

- Off-shore: At sea. In this context, on-board ships.

- Offshore: Vessels serving the petroleum branch at sea

- On-shore: In this thesis; shipping-companies, authorities, rescue-centers, fire-brigades, medical-care and similar organizations.

- Organization: Plans containing specific tasks for individual positions and rank of crewmembers and onshore staff. These plans include responsibility, authority, authorization and proxies.

- Procedures: Step by step instructions on how to deal with certain incidents or accidents as well of the use of various equipment.

- RITS – Rescue Efforts at Sea [Rednings Innsats Til Sjøs]. On-shore based Fire-brigades specially trained to fight fire or assist firefighting on board ships.

- ROS: Risk assessment (Risk = Consequence x Probability)

- SMS: Safety Management System

- Unfortunate incidents (adverse events): Minor injuries to personnel, environmental hazards (spills), and other incidents leading to time spill causing financial loss.

- Wild Card: Incident not likely to happen although possible (comparable to Black Swans)

II Interview – Guide

1. How do you perform risk-assessments?

   - Are all crewmembers engaged in the risk-assessments?

2. How do you organize and plan contingency exercises?

3. What is/are your experience(s) on the outcome of such exercises?

4. Do/does your exercises require participants to improvise?

5. Do you plan for improvisation?

6. To what extent do you experience schedules and efficiency as restraints?

7. If so, to what extent?

8. What do you expect to gain by enhancing improvisation when training contingency?

9. If not, why is that so?

III List of figures

Original text in Norwegian	Page	Translation into English by author
"Langt ifra hjelp, ja. Det er jo ikke for ingen ting at ikke vi har lov å ha mer enn 200 passasjerer når vi går rundt. Men det er på sommeren."	51	*"Far away from help, yes. It is not for nothing we are not allowed to carry more than 200 passengers as we sail. But that is in the summertime."*
…vi i overkant av det som SOLAS-kravene er [...] Kravet er at du skal overleve 5 dager uten [noen assistanse] …	52	*"…we are a bit beyond the SOLAS – requirements [...] [The Polar Code] demands survival for five days without any assistance…"*
"Det er noe som er kommet fra rederiet. […] jeg har i hvert fall ikke vært med å utarbeide de, for å si det sånn […] jeg går jo sterkt ut fra at det er folk som har peiling på det. […] Ja altså jeg tror jo ikke det er sånn det fungerer […] det er jo folk i rederiet som er ansatt til det kan du si. Og jeg må si at klart jeg skal ha gått med på det, det hadde ikke vært noe problem, jeg har jo masse meninger …»	52	*"It is something that has come from the company.[...]I have never been involved in the developing, to put it like that [...] I very much believe that it is cunning people [...] Yes well I do not think that it is how it works [...] there are people on the company assigned to that you might say. And off course I would have agreed on that, it would not have been no problem, I do have many opinions…"*
«… jeg har … blitt forespurt i oppbygging av sikkerhetsmanualer og litt å si at jeg har hatt risikovurderinger og litt sånne greier, det har jeg vært med på ja. Og særlig … jeg vet ikke sånn på kysten, men altså det jeg snakker om som jeg har vært med på og blitt spurt om hva jeg mente og sånn, det er den operasjonen som man … Altså du har blitt spurt hva du mener og om du har noe å komme med.»	52	*"…I have been asked to join in the building of safety-manuals and to say a bit risk-assessments and such, I have done that yes. And especially…I am not sure in the domestic trade, but what I am speaking of as I have participated in and been asked of my opinions and such, it is the operation you…You are asked of your opinion and if you have something to add."*
«Den er jo satt opp av rederiet […] vi har jo ikke noen risikovurderinger på akkurat den situasjonen [beredskap] …»	53	*"It is developed by the company [...] we do not have risk-assessments on that situation [contingency]…"*
«Nei det gjør vi om bord. […] Er det noe nytt som er kommet fram så tar vi det gjerne opp på de interne operasjonsmøtene som vi har, skipsledelsen. Og så tar da over-styrmann og hotellsjefen, maskinsjefen, førstemaskinisten, de tar da hvis at det er noe der så lager vi en sånn i lag og så blir den da godkjent til slutt. Så sender vi den inn til QA bare så de vet at det er laget.»	53 54	*"No, we do that on board…If something new has come up we discuss it on internal operations-meetings we have, the shipboard. And then the chief officer and the hotel-manager, the chief engineer and the first engineer, they take if there is something there then we make such together and then we get it approved at the end. Then we send it to QA just letting them know that it has been made."*
Ja. Og de har jeg jo også oppe i departementsmøtet. Og de skal jo revideres årlig, risk assessment […] der ligger det en jobb på Star som kommer opp en gang i året. […] Så da er alle mann med på… Og kommer det nytt utstyr om bord så skal det også lages. Og hvis	54	*"Yes. And I include them in the department-meetings. And they are to be revised annually, risk assessment [...] it is a job on the STAR that pops up once a year. [...] So than all are included…and if new equipment arrives it is to be performed. And if procedures are changed*

prosedyrer blir forandret i en sånn grad at det blir nødvendig å forandre risk assessment eller gå igjennom den, så blir det også gjort. Og der er jo også risikorert øvelser ..."		*to such a degree that it is necessary to alter risk assessment or see through it, then this is done too. And then there is risk assess following exercises..."*
«Der ligger hele planleggingsverktøyet og alt sammen i samme programvaren som vi kjører hyrer og hele hurrameien. [...] Hvis et er en mann som har mistet en øvelse så vil det komme fram. Det er overvåket elektronisk også, det er ikke bare en sikkerhetsoffiser som sitter og følger med. [...] Og vi har egne folk som sitter og følger med det»	54	*"There lies the whole planning-tool and all in the software as we use for wages and all [...] If a man has lost an exercise then it will be revealed. It is under electronic surveillance as well, so it is not only the safety-officer surveilling [...] We have special people controlling."*
"... Når jeg snakker om risikovurdering, det som jeg nevnte i sted, så er det i forhold til den jobben vi gjør ...»	54	*"...When I speak of risk-assessment here, as I mentioned, then it is concerning the job that we do..."*
Du spør videre risk assessment, da tenker jeg jo risikovurdering [...] i forhold til arbeid, driften av båten. [...] Da snakker du om den totale sikkerheten i båten kontra den personlige sikkerheten, operasjonelle sikkerheten. De er jo veldig, veldig frempå med denne ... til den individuelle sikkerheten når de jobber i hverdagen. [...] får en god drift på den måten, så har du allerede demmet opp for veldig mye av det som kanskje videre. [...] Ja det er jo at du gjør det ordentlig. Og det er da du skal avdekke om det er noe som er feil. [...] hvis det er lenge siden de har gjort det [...] Da tar de en liten neve med risikovurderinger og så prater de igjennom. Det er ... det virker.»	55	*"You ask about risk-assessment, then I think risk-assessment concerning work, the operation of the boat [...] You talk of the total safety of the boat versus the personal safety, operational safety. They are very, very alert on this...on individual safety when they perform their daily tasks. [...] you get a good operation that way, then you have already built up barriers for much of what may happen in time to come [...] Yes, it is about doing it properly. That you shall reveal if something is wrong [...] If it has been some time since a task have been performed [...] They take a handful of risk-assessments and talk them through. It is...it works"*
«Ja. Og dermed så har vi lagt et ansvar på dem med det at de får en grundig innføring i båten, hvordan den ser ut og hvor de kan gå og hvor de har second option og hvor de har third option. [...] Så hver lørdag så går de gjennom alt utstyret her, og det må de opp og signere på at lyktene virker. Hodelykter er der jo og der er ... ja nøkler og alt dette her. Og disse lappene som vi henger på dørene for evakuering og alt dette her det skal være på plass alt, det skal stemme etter lista, innholdsfortegnelsen, og det skal være i orden. [...] Det er en ting du aldri må slippe. Nei. [...] Vi skal berge livet på oss selv og passasjerene. [...] For jeg sier når vi har sluppet tampene og gått ifra kai så er vi vår egen hjelp nærmest ...»	56 57	*"Yes. And we have given them a responsibility by giving them a thorough knowledge to the boat, what it looks like and where they may go and where they have a second option and where they have a third option [...] So every Saturday they look through all the equipment here, and they have to come up to sign that torches works. Head-torches are there...and keys and all that. And the notes we place on doors for evacuation and all this shall be in roper place according to the list, list of contents, and it shall be in good order [...] These are things you must never slip out of hand. We shall save our own and the passenger`s lives [...] I say that when have let go from the quay; we are on our own..."*
"innenriks passasjer synes jeg et bedre system enn det som jeg er vant til i offshore, det er at de har denne utsjekken.	57	*"...inshore passenger I think has a better system than I am used to in the off-shore branch, it is that they have this checkout.*

Du har utsjekk i ruta og du har utsjekk på fartøyet, og den utsjekken er ikke tidsbegrenset. Den utsjekken er så lenge som den enkelte trenger for å bli utsjekket. Den type utsjekk var jeg aldri borti i offshore. Ikke i sånn formalisert system […] sånn som for min del, første gangen jeg var kaptein så sa jeg til rederiet at jeg vil gjerne ha 14 dager overlapp med han som er kaptein. Jeg skal inn i en ny rolle, jeg skal inn i et nytt rederi, jeg skal inn for en ny kunde, så jeg vil jo ha i hvert fall 14 dager da. Men det er liksom på det personlige plan da, hva den enkelte ønsker. […] Det er klart det kan jo være litt utfordrende å kjøre ruteutsjekk på en supply-båt som er i spotmarkedet der du ikke vet hva neste steg er for noe. Det blir jo umulig. Men i hvert fall en fartøysutsjekk og på en måte en systemutsjekk sånn at du kan fartøyet og du kan systemene om bord. Bare der så har du gjort grovjobben."		*There is checkout on the route a checkout on the vessel and that checkout is not limited in time. That checkout lasts as long as the simple individual needs to be cleared for service. That kind of checkout I never experienced in offshore. Not in such a formalized system […] as for me the first time I was captain I told the company that I would like a fortnight over-lap with the existing captain. I am entering a new role, I am serving a new company, I am serving a new customer, so I want at least a fortnight. But it is on the personal level […] Off course it is a bit challenging to perform route checkouts on a supply-vessel in the spot-market where you do not know what the next step is. It becomes impossible. But at least a vessel checkout so that you know the vessel and in a way a system-checkout so that you know the systems on board. Only there the main job has been done…"*
«… det er bedre at folk gjør noe og gjør feil istedenfor at de ikke gjør noen ting, fordi at de er redde for å gjøre feil […]det er at det er bedre at folk gjør noe, så får en heller bare gjøre en feil en og andre gangen innenfor rimelighetens grenser ja.»	58	*"…it is better that people do something and do it wrong instead of doing nothing, because they are afraid make a mistake[…]it is better that people do something, then you better occasionally make a mistake, within reason though."*
"Men jeg er jo litt sånn opptatt av at skal du kunne holde på å øve improvisasjon så er du nødt til å ha et grunnlag. Og grunnlaget er kunnskap. Du kan ikke improvisere uten å ha kunnskap […] Og ferdighet. Og også faktisk litt erfaring. […] og det jeg ser så utrolig tydelig det er det at teori henger så utrolig godt i forhold til dette med improvisasjon. Det er en nær sammenheng mellom det å ha en god teoretisk plattform og det med å kunne improvisere […] Altså, skal du kunne improvisere så er du nødt til å ha bygget opp teorien. […] Du må ha verktøy. Du må ha noe å henge knaggene på for å kunne improvisere sånn at du faktisk klarer å gjøre ting riktig. […] Jeg er veldig opptatt av improvisering, at vi skal ha det i bakhodet hvordan du … **magefølelse**. […] Sånn som vi driver på med en søk- og redningsaksjon eller vi driver på med en mann over bord, så ser jeg hvor viktig det er å tenke alternativt, hvor viktig det er å improvisere faktisk, at vi kan ikke følge sjekklista da, …»	58 59	*"I am a bit focused on that if you shall exercise improvisation you need a foundation. And that foundation is knowledge. You cannot improvise without knowledge […] And skills. And a bit of experience […]and what I see so incredibly clear it is that theory is so incredibly well connected to improvisation. It is a close connection between having a solid theoretical platform and the ability to improvise […] if you are to improvise you need to have built the theory […] You need tools. You need something to hang on the racks to be able to improvise in a way that you do things right.[…] I am very concerned on improvisation, to keep it the in back of our heads how you…**intuition** […] The way we carry on with search – and rescue or exercising man over board , I see how important it is to think alternatively, how important it is to improvise actually, that we cannot follow the checklist then,…"*

«Du får litt sånn erfaring med å improvisere i den daglige drifta. Og da tror jeg egentlig at du kan ta det med deg også i øvelsessammenheng. […] Ja jeg tror egentlig at du må se på drifta av båten generelt. Er du vant med å improvisere i hverdagen så vil du kunne improvisere i øvelse og selvfølgelig i en krisesituasjon også.»	59	*"You get a bit experience on improvising during everyday operation. And then I think you can bring it on to exercises […] Yes I believe you really have to look at the operation of the boat in general. If you are used to improvise in the everyday operation then you will be able to improvise in an exercise and off course, in a crisis situation too."*
«…jo da, det [`brannslokking`] kan nok lære deg til at det er flere måter å ordne opp et problem på. […] Ja, Joda, det er klart, da bygger du jo opp på en måte et repertoar av løsninger. Og det er jo nettopp det du må ha, det er jo et repertoar av løsninger. […] Det er der du legger grunnlaget …"	59	*"…yes, it [`firefighting`] may teach you that there are several ways of fixing a problem […] Yes, off course, then you build up, in a way, a repertoire of solutions. And that is what you need, it is a repertoire of solutions […] That is where you form the foundation…"*
«Sist det er en 5 ukers tid siden jeg var på den siste øvelsen […] Vi har jo ukentlige øvelser. Det har jo forandret seg lite grann […] den uka tar vi brann, den uka tar vi livbåt og […] det er jo nytt i rederiet da at vi skal ta … chiefen har en del med brann, hotellsjefen får ansvar for litt hospital og evakuering av lugarer og litt sånne greier. Og så er det jo da navigasjons-offiserer som tar det som er … livbåt og den delen. […] Det er fordelt så ikke alt skal ligge på en sikkerhetsoffiser, så at vi får mer sånn ansvar, den uka så er det du som tar den øvelsen og legger opp og […] de finner på nye ting og så prater om hva vi skal gjøre og hva vi skal trene på. […] og det er jo den fysiske delen, å sette ut livbåter, klargjøre livbåter og sånt som går litt i glemmeboka fordi bestandig når vi har den øvelsen så setter vi ut livbåten. […] Det er jo låringswirer som kan henge seg opp, det kan kile seg … Hva gjør du. Dette her må de se, det er ikke noe du kan lese deg til. […] Det er en ting å vite hvordan du gjør det, og så er det en ting å følge med det som kan gå galt, og så er det en ting; hvordan skal en gjøre det når det går galt. […] Hvis du ikke vet det så blir du bare stående og se. […] det er bra at du setter ut båten to ganger for mye eller en gang … altså får noe treningen der, at du vet hva det er du holder på med. At det ikke blir sånn at du glemmer det av.»	60	*"It has been five weeks since I attended an exercise. […] We do have exercises weekly. It has changed a bit […] this week it is about fire, that week it is lifeboat and […] it is a new routine in the company that we shall take…the chief engineer is concerned a bit on fire, the hotel manager is responsible for a bit hospital and evacuating cabins and stuff. And then there is the navigation officer taking care of…lifeboat and that part […] It has been distributed to avoid that all is laid on the safety officer. So we get more responsibility, that week you are in charge of the exercise and plan and […] they think of new elements and then we speak about what to do and what to train […] and then there is the physical part, to launch lifeboats, prepare lifeboats and such that is easily forgotten because every time we do that exercise we launch the lifeboat[…] There are launching wires that may hang up, they might get locked…What do you do. This they have to watch, it is not something you learn by reading about it […] One thing is knowing how to do it and then it is another thing to watch for things that may go wrong […] If you do not know then you are just standing there. […] It is a good thing that you launch the MOB once or twice too much…that you get that training, that you know what you are doing., That it is not forgotten."*
«Men øvelse er altså helt sikkert at det har jeg erfart, at øvelse det er bra. Det er mange som er irritert på øvelser […] og	61	*"…exercises…quite certain I have experienced that exercise is a good thing. Many are annoyed about exercises […]*

de som man sitter i lag med har 20-25 års fartstid [...] så ble man lei av de øvelsene. Si sånn «dette her kan jeg jo», dette her trenger ikke jeg å … Jeg har jo skjønt det i ettertid at det hjelper deg jo […] en dag kan det komme til … at du ser at dette her det er nøye. Øvelse må man ha."		*those you sit with have 20 to 25 years of experience [...] so you got sick and tired of these exercises; Like `But I do know this, this I do not need to`…afterwards I have realized that it helps you, that this here is [...] one day it might…that you realize that this here is crucial. You need exercises…"*
"… men nå blir det litt sånn forskjell ifra fartøy til fartøy da, men de fartøyene som jeg var på over lengre tid og ble litt innarbeidet i systemene, der laget vi til en liten sånn rotasjonsordning der de forskjellige departementene var med på å planlegge øvelsene […] Så min rolle som overstyrmann, som er jo en utrolig viktig rolle om bord, han ble aldri øvet, aldri prøvet […] Men ved å kaste denne her ballen litt sånn rundt til dekk, litt til maskin, litt til bysse og involvere hele mannskapet så ble det øvd på momenter på en helt annen måte […] Yes, de så ting, utfordringer, med sine øyne som ikke jeg som overstyrmann i det hele tatt var klar over [...] ja de båtene de fikk det der til, det var egentlig ens enighet om at dette her var av de beste øvelsene. Vi har vel alle et inntrykk av at jo mer tilhørighet de fikk til øvelsene, jo bedre ble øvelsene mere utbytte har vi av øvelsene også [...] spesielt de departementene som hadde vært med på å utforme de enkelte øvelsene. […] følte at de hadde ekstra og godt utbytte. Men når du over året roterte på alle departementene om bord så … Under en lengre periode så fikk alle på en måte øvd på sitt. [...] Ja, det tror jeg kan være en modell som kan være ja det er veldig viktig. […] ja vi har vel alle erfart at den iveren etter å være med på øvelser den har vel kanskje gått veldig i sånn berg og dalbaner. Men når du involverer mannskapet mer i øvelsene så er de mer involvert i øvelsene også.»	61	*"…but it will be some differences from vessel to vessel, but the vessels I served on and got the systems under my skin, there we made a rotation arrangement where different departments participated in creating exercises [...] So my role as chief officer, an incredibly important role on board, it was newer rehearsed [...] But when throwing the ball around a bit…and involve the whole crew, then elements were trained on in a totally different way [...] Yes, they saw things, challenges with their own eyes that me as chief officer was not aware of at all…and then they conducted the exercise [...] the feed-back on the ships where this worked, was that these were the best exercises. We all had the impression I guess that the more connection to the exercises, the better the exercises and the more you gain from them [...] especially the departments who had participated in developing these exercises [...] they felt that they had an extra and good outcome. But when you over the year rotated on all departments on board then…During a longer period of time they all got to exercise their things.[...] I believe it is a model that might be…it is very important [...]and we have all experienced that the eager of participating on exercises may vary. But when you involve the crew, they engage in the exercises too."*
"… Man kan gjøre øvelsene mer attraktive, at folk ser mer nøye i de greiene der.»	61	*"…You might make the exercises more attractive, that people see things more accurate…"*
«Jeg tror ikke vi kunne ha drevet den typeøvelser som vi gjør med noe dreiebok. Vi hadde ikke kommet noen vei med det egentlig. Vi er avhengige av … […] Ja det er veldig repetering av ting. Du kan jo øve sikkert på mange sånne spesifikke ting under øvingen, altså bli god på det da. […] Nei det er jo akkurat	62	*"I do not think we could have performed the kind of exercises that we do based on a manuscript. We would not have got anywhere really. We are depending on… [...] Yes it [exercises by manuscripts] is very much repeating things. You might drill many such specific things during the exercise, getting good at that [...] The*

det som er. Det er ikke et fasitsvar. […] … det er jo litt sånn hvordan vi spiller også og hva de vurderer […] Utfallet i øvelsen vil jo bli helt forskjellig ut ifra hvor de begynner hen […] … det er jo en vurdering som hver enkelt må gjøre. […] Så kan man jo heller si at man kan diskutere valgene etterpå, om det var rett eller galt. Og det er jo selv-følgelig situasjonsavhengig. Været spiller jo inn. […] Ja det er klart det er personavhengig. […] Ja altså personavhengig det er jo egentlig fordi at det er ikke noe… altså det er jo de vurderingene som de mener er den beste, hva er det de skal ivareta først og fremst.»		*point is that there is no absolute correct answer […] ...it is a bit like how we play too and what they consider [...] The outcome of the exercise will turn out totally different as to where they start…Right, it is a consideration for the single individual to make […] and then you may discuss the choices afterwards, if it was wrong or right. And off course it is depending on the situation. The weather plays a part […] ...it is clearly depending on each person […] depending on each person in the sense that…they are the decisions they mean is the best ones, what to take of care first and foremost"*
«Kjørte vel den øvelsen 4 ganger før at vi begynte å nærme oss det utfallet som vi hadde tenkt oss før vi startet øvelsen første gangen. Og da sier jo ikke jeg at øvelse 1,2 og 3 var dårligere eller bedre øvelser. Men de var med et helt annet utfall. Alle var like gode øvelser.»	63	*"We performed that exercise four times before we started getting close to the outcome we had thought of prior to launching the exercise the first time. And then I am not saying that exercise 1, 2 and 3 were poorer or better exercises. They were all equally good exercises."*
«For på første året så skal de på mange måter være ferdig med denne instrumenteringsbiten. Og på andre året så bør det egentlig kun være fokus på beslutningstaking. Det skal kun være fokus på kommunikasjon og det skal være fokus på situasjonsforståelse, improvisasjon […] Planlegging skal selvfølgelig gjøres […] jo mer kunnskap jeg selv har fått så bygger jo jeg opp øvelsene på en helt annen måte […] du skal ikke lære alt på en gang, du skal bygge det sakte men sikkert […] der du på mange måter kulminerer når vi kommer til april nå med mer helhetlig øvelser […] Og det gir dem jo også muligheten til faktisk å kunne improvisere […] Ja men så ser jeg også det at simulator er jo et sinnsykt bra pedagogisk verktøy.»	63	*"…During the first year they [naval students] shall in many ways be done on this instrument-part. And during the second year it should only be focused on decision-making. It should only be focused on communication, situational awareness, improvisation […] Planning off course […] the more knowledge I have achieved myself, then I build the exercises in a totally different way [...] you are not supposed to learn it all in one bit, you shall build it up slowly and carefully [...] ending up doing all-included exercises[...]And it gives them the possibility to actually improvise […] I also see that simulators are insanely good pedagogic tools"*
«…jo mer kompleks du gjør øvelsene, jo flinkere vil jo folket bli etter hvert […] altså du gir dem en oppgave å løse. […] Og det kan være så enkelt som at du legger et ark på bordet med 5 vanskelige spørsmål. Vet ikke hva de får i øynene når de har øvelse. Det kan være spørreliste […] altså det skal være et overraskelsesmoment. Men samtidig så må ikke vanskelighets-graden være så høy at du kjører dem i grøfta på første… det er jo ikke hensikten med øvelsen.»	64	*"...the more complex you make the exercises the cleverer the crew gets after a while…you give them a task to solve. [...] And it can be as simple as putting a piece of paper on the table containing five difficult questions. They do not know what to face in an exercise. It might be a list of questions [...] there shall be an element of surprise. But at the same time the level of difficulty must not be so high that you crash them on the first…that is not the intention of the exercise"*

«Og da er vi tilbake til det at da er du ikke i stand til å kunne improvisere. […] Du dreper alt. Og det er på mange måter … det er bare noen få som får noe utbytte av den øvelsen.»	64	*"Yes, yes…and then we come back to not being able to improvise. […] You kill it all…only a few will have a good outcome after such an* [complex] *exercise."*
«De bruker et sånn ferdig oppsett i et Excel-skjema der du får ut hva slags øvelse du skal ha. […] Det er vel ikke laget på hvert enkelt fartøy, det er det vel ikke. Det er vel i rederi-ånden at det er laget. Så jeg mener at hvert enkelt fartøy har samme systemet …»	64	*"The same system and the same kind of exercises to be followed by all vessels in the company."*
" …sånn som jeg ser det litt i Norge og mange andre plasser det er jo det at spesielt i beredskap- siden det er jo at det øves på mange måter på ting som de kan, som har vært øvd på mange ganger før. Det blir sånn rutinepreget øvelser. […] Og da er jeg så redd for det at når du ikke drar det hakket videre så klarer du heller ikke å få dette å bli flink å improvisere. Du må holde på og ha uforutsigbarhet, du må holde på og ha usikkerhets-momenter osv …		*"…as I see it a bit in Norway and many other places it is that, especially on the contingency side, it is that one in many ways exercises known elements, that have been trained several times before. It becomes like routine exercises.[…] And then I am afraid that if you do not expand then you are not able to become a good improviser. You have to emphasize impredictability, you must keep on with elements of uncertainty etc."*
«… men der vil jeg heller bruke mangfoldet i øvelsesaspektet, hva du setter dem til å øve på.»	65	*"…I would rather call it diversity of the aspect of exercises.…what you set them to train."*
«Men i de aller fleste tilfeller når de kjører en øvelse så er den enten som sånn praktisk/table top, at folk kan spørre og grave underveis, eller så kjører vi en ren røykdykkerøvelse der de fyller et rom med røyk […] Så er det ut igjen og så er det å samsnakkes, hva er det vi har gjort, hva kan vi bli bedre på. Det er jo den debriefen som er det viktigste […] Jeg vet når jeg var i kystvakten så hadde vi jo hver gang vi kjørte storøvelse så var vi jo små grupper som for rundt og gjorde ulike oppgaver og hadde debrief på det.»	65 66	*"…But in most cases when an exercise has been performed, either a practical or table-top, that people may ask and dig during the exercise, or we perform a pure smoke-diving exercise where they fill up a room with smoke […] Then it is out again and talk things through, what have we done, what can be done better. It is that debrief that is the most important […] I know when I served in the Coast guard then we had a debrief every time after a main exercise then it was small groups roaming around performing various tasks and had a debrief on that."*
«Og samme gjennomgangene har de på hjerte/lungeredning. Der er doktor og nurse og der arrangerer sikkerhetsoffiseren og doktoren og nursa de arrangerer faste oppkjøringer for hjerte- og lungeredning. Og da er det dukke og da er det alle sammen igjennom samme prosedyren, blåse dukka og alt dette her, hele ritualet. […] Det er veldig viktig for det er jo de som er nede og rundt om i båten og arbeider som kommer borti dette her først, det er jo ikke vi som sitter på brua og det er ikke de som sitter i kontrollrommet.»	66	*"…and the same system we have on CPR. There is the doctor and the nurse and there is the safety-officer arranging regular updates on CPR. And then it is doll and everybody through the same procedure, blow in the doll and all this, the whole ritual. […] It is very important because it is those downstairs and around the boat working that meets this first, not us on the bridge or those situated in the engine-control room."*

"Det å få folk til å forstå at sikkerheten vår går igjennom hverdagen fra morgen til kveld, hva du ser og hva du gjør. […] Og det er ferskvare. […] Det må purres på hele tiden.»	66	"…*The thing about getting people to understand that our safety runs through the everyday from morning to evening, what you see and what you do […] Yes, and it is fresh goods.[…] It has to be focused on all the time:*"
"Både på cruise og i kystvakta og i olja mens jeg var der så var det helt vanlig å ta bort vitale personer sånn at … Og det var egentlig et sånn overraskelsesmoment der du på mange måter … han som da skulle plutselig bli leder han var egentlig ikke klar over det. […] da ble det faktisk gode øvelser. Det var faktisk noen av de bedre øvelsene det var når du tok bort en vital … kapteinen eller chiefen gikk bort, der på mange måter NKen eller førstemaskinisten måtte inn og… Ja da kom plutselig dette her med improvisasjon veldig tydelig. Da ble dette her med å trene på improvisasjon det kom veldig tydelig fram. […] Men det er klart at problemet med å gjøre sånne ting det er at ofte det krever mer, det er mer energikrevende å gjøre ting som ikke er etter boka. Det er det som er problemet.»	67	"*Both on cruise, in the coast guard and in oil while I was there it was quite normal to remove vital persons so that…And it was really an element of surprise where you in many ways…he who was to be a leader all of a sudden, he was not aware of that…then the exercises were good. It was… some of the best exercises when you removed a vital…the captain or the chief engineer fell out and …the second in command or the first engineer had to enter and…Yes then this about improvisation appeared very clear […] But it is obvious that the problem of doing such things is that it require more, more effort to do things not by the book. That is the problem.*"
«… så kan jeg jo si det at vi er jo der mer eller mindre … ikke på hver øvelse, men si nå at vi er på hver annen eller hver tredje der det blir tatt ut folk. […] Da tar vi ut gjerne en leder en eller annen plassen sånn at nestemann får hoppe inn, så ser vi om det skjer, om folk tar ansvaret. Så vi er ganske frampå om dette med at hvis det ikke kommer noen så må det skje noe likevel. Noen må ta ansvar, før hele organisasjonen fryser et par hakk lenger ned.»	67	"*…so I can say that we are more or less there…not on every exercise, but say every second or third exercise people are dismissed from participation […] Then we take out a leader somewhere so that the next person gets to step in, then we observe if that happens, if people take responsibility…So we are quite alert on this that if no one turns up something must happen anyway. Someone has to take responsibility before the whole organization freezes a couple of steps below.*"
"Ja. Vi øver jo med … ikke når vi har de store beredskapsøvelsene, da har vi fullt mannskap. […] For som regel så skal det jo … hvis det ikke har skjedd noe kjempestort om bord så er jo de fleste tilgjengelige. […] Da må du bytte inn førstemaskinisten for chiefen og overstyrmann for skipperen og så omvendt. […] det kan jo være at vi må flytte på både soneledere og de som foretar evakuering og.»	67	"*Yes. We do train with…not when we do the big contingency-exercises, then there is a full crew…For as a rule the most will…if not something giant has happened on board then the most will be available.[…] Then you have to replace the first engineer for the chief and the chief-officer for the captain and vice versa […] it might be that we have to move both zone-leaders and those who perform evacuation too.*"
"Du er færre folk. Han er borte. Han skal ha kommunikasjonen. Og han skal kjøre, han skal orienteres og […] du mister ressurser hele veien. Til slutt så sitter du	68	"*…You are fewer people. He is gone. He is in charge of communication. And he shall handle, he shall be briefed and […] you lose resources all along. At the end*

alene på brua. […] Da må de virkelig kunne improvisere.»		*you are alone on the bridge [...] They must really know how to improvise."*
"Vi plukker ut litt sånn ting som er kritiske. Altså vi har en forelesning om det, og så tar vi bort kritiske ting for dem. For eksempel at de mister et ror. De kan miste fremdriftslinje, de kan miste gyro.»	68	*"We remove a bit such critical things. That we lecture on, and then we remove critical tings for them. For instance that they lose a rudder. They may lose the drift-line, they might loose the gyro…"*
«Ja jeg vil jo si det sånn at mange av de båtene så hadde du ofte ledige tider imellom oppdragene. Eller at du lå på en måte i stand by som vi kaller det for. Så jeg føler vel når det gjelder tid til å ha øvelser så er det mer utfordrende å få til en god øvelse innenfor denne passasjerfarten og den travle dagen de har eller i offshore. Jeg følte at vi hadde mer … ja vi kunne egentlig bruke den tiden som vi ville bruke til for å få til gode øvelser. […] Jeg følte aldri at det var et tidspress i offshore	68	*"Yes I will put it like on many of the boats you often had spare time between missions. Or you were stand-by as we call it. So I feel that when it comes to time to perform exercises it is more of a challenge to perform good exercises in this ferry trade concerning their busy days than in offshore. I felt that we had more…yes we could use the time we wished to perform good exercises [...] I never felt a pressure of time in offshore."*
«Tid til øvelse det er jo en … Men du tar deg tiden.»	68	*"Time to perform exercises, that is…But you take your time…"*
« … det er en gang sånn på en sånn båt at vi har et visst antall arbeidstimer …det bruker vi maksimal det vi får lov til å jobbe»	69	*"…it is on a boat like this that we have a certain number of hours…we use the hours we are allowed by law to work…"*
«Så de.. jeg skulle til å si at de aller, aller fleste av dem er vant til å stå på tender-piten og se rett ned i havet, se isen dra forbi. De er jo kjent med operasjonen vår og har jo sett livbåtene bli satt ut. Alle har jo sett det, men å gå derfra til at de har faktisk fysisk gjort det, der … da kommer vi inn på den der tidsfaktoren. ikke noe problem å gjøre det, men har ikke tiden og anledningen.»	69	*"So they…I was to say that most, the very most of them are used to stand by the tender-pit looking down in the sea watching the ice drift past. They are known of our operation and have seen the lifeboats being launched. Everyone has seen this, but to go from there to actually doing it, there…then we return to the time-factor. It would not be a problem to let them do it, but we do not have the time nor the opportunity."*
«Og så har jeg også litt tro på at rullerer lite grann på dette her. Det ville jeg ha gjort altså. Du rullerer på at … Altså du skal ikke stå ved mantelen i 25 år. Du skal ikke stå på en plass i 25 år […] du må flytte litt på deg og så må du vite hva som foregår andre plasser på båten. […] Men så klart, hvis du kommer om bord i en båt og du blir satt på en plass, så får du jo bare erfaring fra den plassen der. […] men får du nye folk om bord så er det litt viktig å flytte på dem rundt omkring, at de ikke bare vet én ting. […] for at det kan hende at de som står der og gjør den jobben de er ikke der, de kan være borte. Og det har jeg opplevd […] Det var ingen som var der de skulle være.	69 70	*"And then I believe a bit on rotation…You rotate, you do not watch the mantle-wire for 24 years. You are not to stand on one place for 25 years [...] you have to move a bit and then you must know what is going on elsewhere on the boat [...] But clearly, if you enter a ship and you are fixed at one place, you only get experience from that place [...] if you get new personnel on board it is a bit important to rotate them so that they do not only know one thing [...] because it might be that those standing there performing that task they are not there., they might be gone. I have experienced that [...]no one were situated where they were supposed to."*

«Vi er mannskap der nede. Vi er mannskap under operasjonen av båten der nede. Og de rigger ut og de rigger inn. De tar i sammen alt og rigger inn og kjører inn og skalker og […] De er opplært og […] De vet akkurat hva som foregår der nede. […] Ja, det er folk ifra byssa, det er folk ifra restauranten og det er folk ifra baren som han sier. De er involvert i dette her, alt. Påkledning av redningsvester og alt dette her det har de, å hjelpe passasjerene»	70	*"We are a crew under the operation down there. And they rig out and they rig in. They tidy it all […] They are trained and […] They know exactly what is going on down there* [on deck] *[…] Yes, it is people from the galley, people from the restaurant, and people from the bar. They are involved in all this. Putting on life-wests…helping the passengers"*
«Kelneren han er ikke bare kelner, han må kanskje stå på tender-piten, han må være med og gjøre andre arbeidsoppgaver rund omkring i båten. De er mye mer rundt om i båten enn for eksempel det jeg innbiller meg de er på en cruisebåt. veldig mye der du bruker hele besetningen rundt i hele båten til hva det skal være […] bartender der som hjelper dem inn og ut av båten. […] at jeg mener er den viktigste oppgaven går på brann og havari og det går på drift. De gjør jo en masse ting som er kanskje mye mer sporty enn vanlig skipsdrift. Tar folk ut på en tender-pit i et helvetes vær og kanskje blåser 20 sekundmeter. Fyr de i en gummibåt og kjør de på land. Det blåser så pingvinene kommer rullende nedigjennom fjæra. De operer likevel, fordi at vi har … vi er innenfor sikkerhetsmarginene våre. Det … jeg tror at folk som holder på med dette her blir kvassere når det smeller.»	70	*"The waiter, he is not only a waiter, he might also have to stand by at the tender-pit, he will have to join other tasks around the boat. …on our ship the crew is very much used around the boat to whatever needs to be done […] bartender helping them in and out of the boat […] It is ordinary working-tasks for them…the most important tasks are about fire, average and operation. They* [the crew on explorer cruise-ships] *are doing many things much more sporty than ordinary ship-operations. Take people out on a tender-pit in on hell of a weather and perhaps wind blowing at 20 m/s. Throw them in an inflatable boat and ship them ashore. It is blowing so hard that penguins are coming rolling down the shore. They still operate, because we have…we are still within our safety-limits. It…I think people attending this operation becomes sharper when a crisis occurs"*
"… du kan ta en sånn ting som … han står på en frakteskute. […] besetningen der de er om bord på brua. De har vært i maskinkontrollen, de har vært rundt og sett. […] henge på brua og høre på … de kjenner systemene, de vet panelene […] alle sammen har en eller annen perifer kjennskap til hva som foregår. […] det var på kysten der vi hadde sirkeltrening, […] delte mannskapet i tre, og så hadde de 20 minutt på brannstasjon og så hadde de 20 minutt på utsettings altså på … livbåtdekket […] og det var av de som hadde reist i mange år på hurtigruta og sa de hadde aldri vært tatt inn på … hva egentlig som foregikk der. Det kanskje er noe som er av den filosofien at en kjenner hele organisasjonen til topps, og kokken kjenner… eller han som er midt i organisasjonen kjenner hele	70	*"…you may consider a thing like…he is standing on a small freighter […] the crew there they hang on the bridge. They have been in the engine-control room, they have been around to watch.…hanging on the bridge and listen…they know the systems, they know the panels…all of them have some peripheral knowledge on what is going on…it was on the coast where we performed circular-training […] divided the crew in three and then they had twenty minutes at the fire-station, and then twenty minutes at the evacuation…on the lifeboat-deck […] and some of those who had been sailing on the Coastal steamer for years said that they had never been taken in at…and did not know what was going on there. It might be some of the philosophy that one knows the entire*

organisasjonen ned og hele vil du stille mye sterkere hvis du får et frafall drift eller i kriser»		*organization to the top, and the cook knows…or he who is in the middle of the organization knows the entire organization downwards and all…then you will have better odds if you lose personnel in drift or in crises"*
"… Jeg hadde den formening at det var bare matrosene som skulle ha med båtene å gjøre, for da var man sikker på at de kunne det. Ikke ta en matros og sette han på brannlaget, sett heller kokken på brannlaget så tar vi matroser båter. Men etter Nordlys-brannen så forandret jeg mening. For at det er jo jævlig greit å vite at kokken kan også det. At det kan jo godt hende at han er ikke der og han er ikke der, og da er det jævlig synd hvis matrosene plutselig er opptatt med et eller annet, er borte, så er det faen ikke andre som kan. […] Ja altså det er bra å vite at alle vet hva som foregår …»	70	*"…My opinion was that it was just the ABs who should deal with the boats, because then you were sure that they knew it. Do not put an AB on the fire-fighting team, rather put the cook at the fire-fighting team then we ABs care of the boats. But after the Nordlys-fire I changed my mind. It is bloody ok to know that the cook is able to do it. That it might well be that he is not there and he is not there, and then it is bleeding sad if the ABs all of a sudden are occupied doing others tasks, are gone, then there are no one who knows[…] Yes it is good to know that all knows what is going on…"*
" … Så vi øver jo litt på at vi plukker ut kanskje 3 av besetningen eller 2 av besetningen blir opptatt med å ta seg av noe med passasjerer så er det jo hvem som er igjen på brua. Og la oss nå si at maskinsjefen er igjen på brua så kan det jo hende at han må ta en styrmann sin rolle. Og det kan jo for eksempel gå på det som går på ekstern kommunikasjon. Ikke sant. Altså, for eksempel dette med kommunikasjon oppimot en kystradio eller andre båter. […] Ja det er jo en av navigatørene som går ned. Og da er man jo i utgangspunktet sårbar i forhold til det som går på du skal både håndtere en båt og du skal håndtere kommunikasjon. […] Så vi er mer og mer over på den biten at vi utfordrer alle på forskjellige oppgaver.»	70 71	*"…Then we exercise a bit on that we pick out maybe three of the crew or two of the crew gets occupied on taking care of a passenger problem then it is the matter of who is left on the bridge. And let us say that the chief engineer is left on the bridge then he might have to enter the chief officer`s role. And that may be for instance external communication…That is communication against a coast-station or other ships [...] Yes, one of the navigators leaving the bridge. And then it is about who steps-in…And then you are vulnerable for a start related to that on handling a boat and handle communication [...] So we are more and more over to the bit of challenging all on different tasks…"*
"Ja jeg tror det er litt viktig å få fram, at jo mer erfarne folk, jo mer knagger de har å henge dette på, jo mer verktøy har de i verktøykassa si. […] Så erfaring … ja det tror jeg er et nøkkelord."	72	*"Yes, I think that is important to hold forth, that the more experienced people the more hooks they have to hang it on, the more tools they have in their tool-box [...] So experience…yes I think that is a key-word."*
"… det har selvfølgelig masse med erfaring å gjøre. Men det har også litt med hvor erfaringene deres kommer ifra. Hva slags type fart har de vært i før og hvor trafikkerer de hen vanligvis og sånne ting som spiller inn. […] Fergene der har jeg inntrykk av at de har litt mer tid. Altså de har litt mer tid å tenke igjennom ting før … altså de tar seg mer tid til å tenke igjennom, mens hurtigbåt så er det… ting	72 73	*"…it is off course about experience. But it has also a bit to do where their experiences come from. What trade they have served in before and where they are normally sailing and such things plays a role [...] The ferries seem to have some more time. That is, they have more time to think things through, while HSC then it is…things are to happen very rapidly. [...] It has off course something to do with*

skal skje veldig fort. […] Det har selvfølgelig noe med farta å gjøre. Ja det har det. Fordi at de jobber kanskje mer imot klokka enn for eksempel ei ferge. […] Så vi ser helt klart en stor forskjell på hvor fort de reagerer på ting og de avgjørelsene hvor fort de blir tatt.»		the speed...Because they work perhaps more against the clock then for instance a ferry [...] So we see a clear difference on how fast they react to things and the decisions how rapidly they are made..."
"… da har de egentlig gått i lag med erfarne folk og fått være mannskap, styrmenn, ikke skipperrolle i det hele tatt, og så får de ta over da den rollen der de to siste dagene. Og da får de øvd på […] Det er en reell situasjon […] vi ser også at det er veldig lærerikt at de går i lag med erfarne folk som styrmenn gjør da.»	73	"...then they have attended together with experienced people and got to act as crew, navigators, no captain`s role at all, and then they get to take over that role the last two weeks of the course. And the they get to train on [...] It is a real situation [...] we see that it has a very good learning-effect that they exercise together with experienced people as chief officers."
«Vi bruker jo å prate om miksen av mannskap. Og det er ikke bra å ha bare erfarne folk. Det er ikke bra å ha bare nye. Men å ha den miksen av erfarne og nye, da får du på en måte den erfaringsoverføringen fra de gamle til de nye der. Og da tror jeg nok at du ser en større grad av improvisasjon når du har … jo større innslag du har av erfarne folk, jo større grad av improvisasjon.»	73	"… We use to speak of the mix of crewmembers. And it is not optimal just to have experienced crew. It is not optimal to have only new. But having the mix of experienced and new, then you achieve that exchange of experience from the old ones to the new there. And then I truly believe that you will see more of improvisation when you have...the greater the amount of experienced people, the greater degree of improvisation."
«… Du vil jo ikke grei å oppfylle den kompetansen som du mister når de skipsledelsen begynner å fall. Det vil være veldig vanskelig.»	73	"...It will be very difficult to fill in the missing competence of the ship-board"
"Du kan jo ikke forlange at en lærling på ett år skal vite det. Den erfaringen som jeg har opparbeidet den har jeg opparbeidet i løpet av mange år altså. Du kan ikke forlange at […] at de ser hva de holder på med. […] det er bare en ting; å gjøre det, det er øvelse, og det er trening. Du må ha det i fingrene. Og erfaring går det ikke an å lese seg til. […] Det må gjøres for hand.	73	"You cannot expect a one-year apprentice to know that. My experience as I have been building, I have built over many years. You cannot demand that [...] that they can see what they are doing [...] it is only one thing; doing it, it is exercise and it is training. You need to have it in your fingers. And you cannot get experience just by reading [...] It has to be done manually."
"… Nei da, det er klart, hvis du skal være sånn anlagt at uansett hva som oppstår så må du inn og lese hva som skal være løsningen … Hvis du ikke skal være i stand til å tenke selv, så blir du veldig styrt av et sånn rammeverk som det der.»	74	"…No, obviously, if you shall be shaped in a way that whatever occurs you must in and read what the solution shall be…If you are not able to think by yourself, you are very much ruled by a frame-work like that.[procedures]"
"Altså i dag på … la oss nå ta offshore, og kanskje passasjerfart også, så har du jo prosedyrer ifra ankomst til avgang. Og jo mindre erfaring du har, jo mer tenker jeg at du støtter deg til den prosedyren for å på en måte gi en bekreftelse til deg selv at jeg gjør det rette, for det står der. Du på en	74	"Well these days…let`s take offshore, and maybe passenger trade too, then you have procedures from arrival to departure. And the less experience you have the more I think you relay on that procedure to in a way give a confirmation to yourself that I am doing the right thing, because it is

måte slutter å bruke hodet og det øvrige du har lært under utdanning. […] Ja det er jo … prosedyrene de er jo selvfølgelig et verktøy for å skal få oss til å kunne gå igjennom en arbeidsoperasjon på en trygg måte. Jeg skulle til å si den avhengigheten av å ha en prosedyre har jeg vel følt og sett litt at den er større jo mer uerfaren du er. Du skal jo alltid bruke en prosedyre, uansett hvor erfaren du er, men hvis du er erfaren så bruker på en måte prosedyre bare til lite grann sånn støtte. Er du ny og uerfaren så er det prosedyren som leder deg igjennom …»		*written. In a way you quit using your head and the other things you have learned through education […] the procedures they are off course a tool to make us perform a work operation in a safe way. I was about to say that the dependence of having a procedure I have felt and seen a bit that it is greater the more unexperienced you are. You are always supposed to use a procedure, no matter how experienced you are, but if you are experienced then you use, in a way, procedures as support. If you are new and unexperienced it is the procedure that leads you through…"*
"…da er det jo opp til de som bruker prosedyrene å ha en dialog med de som lager prosedyrene, at man får en prosedyre som passer til det man holder på med. Og det er vel kanskje litt der sjøfart og … er lite grann slapp, det at dette her har vi fått ifra rederiet, og det punktet passer ikke, det punktet passer ikke, det punktet passer ikke … så de hopper vi over. Istedenfor å ha en dialog med rederiet, at vi må ha en prosedyre som er tilpasset vårt system. […] men det tror jeg er litt sånn innarbeidet eller inngrodd i systemene at det vi får ifra rederiet det er på en måte det vi skal forholde oss til, istedenfor å ha det og spille ballen frem og tilbake. […] Ikke sant. Istedenfor å spille ballen frem og tilbake og så få et som er systemtilpasset. […] Ja det kan nok være noe der, at en lar være å melde det inn på en måte eller at det er for arbeidskrevende.»	75	*"…it is up to the users of the procedures to have a dialogue with those who create the procedures, that you get a procedure that fits to what you are doing. And it is perhaps a bit there the maritime directorate and…are a bit lazy, the issue that this is what we have got from the company, and that point does not fit, that does not fit, that does not fit…so they skip them. Instead of having a dialogue with the company, that we need to have a procedure fitted for our system […] but I think it is like baked in or ingrown in the systems that what we get from the company is what we shall do, instead of having it and play the ball back and forth. […] Right. Instead of playing the ball back and forth to get it fitted to the system […] in a way one skip reporting due to it demanding too much effort."*
"Og det der er jo egentlig et typisk i tiden, spesielt dette her i prosedyretiden, det at alt skal være beskrevet. Du kan liksom ikke stole på at folk gjør jobben sin. Det skal være spesifisert. […] For at du er innlært til å lese en prosedyre.»	75	*"And that is a typical sign for this age, especially this in the procedure-age, the demand that all things shall be described. You may not have trust upon that people are doing their job. It has to be specified […] Because you are taught to read a procedure"*
«… De blir redde, de er veldig opptatt av sjekklista og prosedyrer da. De låser seg veldig fast i … ja, de blir veldig statiske. […] … jeg er veldig tilhenger av disse sjekklistene, å ha det som en sånn bakgrunns … at de ligger der, at du har dem.»	75 76	*"… They get scared, they are very focused on the checklist and procedures then they lock themselves to…yes they become very static […] I am eagerly supporting these checklists, having them as a background…that they lay there, that you have them"*
"… det vi har sett når vi har kjørt disse mann over bord-øvelsene at de som har vært mest effektiv og gjort den beste	76	*"…what we have seen when performing these man over board exercises that those who have shown to be most effective and*

mann over bord-øvelsen det er jo de faktisk som har på mange måter har lagt sjekklisten til side og ikke brukt den slavisk …»		*have performed the best man over board exercise, are those who actually have put the check-lists away not using it point by point…"*
"… jeg er jo av den gamle skole også når det kommer til HMS og … Jeg er veldig sånn … i de siste kan du si 5 årene så måtte jo jeg ha forandret innstilling på ganske masse år det kommer til HMS og sikkerhet og alt slags …»	76	*"…I am old school when it comes to HMS and…I am very like that…over the last five years I have had to change my attitude concerning a lot when it comes to HMS and safety and such…"*
"Først fikk vi en gjeng om bord i Bergen, kjører de opp på sikkerhetsbiten og på driftsbiten, så kvesser du gjengen. […] Men vi gjorde jo den sjekken på bakgrunn av at … for å se hvordan rikets tilstand var. […] det der det ble avglemt. Og det var ikke gjort fordi at folk ga seg faen, men det var fordi at fokuset var ikke der. nytt gjeng om bord i Bergen, så … du er nødt å gå rett på det med en gang det med holdningsskapning overfor sikkerheten […] `Og du skal ikke bare stå og hakke pølser og lage salat, du er faktisk brannmann om bord også`. Det å få folk til å forstå at sikkerheten vår går igjennom hverdagen fra morgen til kveld, hva du ser og hva du gjør. […] Og det er ferskvare. […] Det må purres på hele tiden.	76 77	*"First we got a bunch on board in Bergen, drove them through the safety-bit and then on the operation-bit, you sharpen the gang. […] After a while we checked out the status […] this was forgotten. And not caused by people never mind, but the focus was not there […]…new gang on board in Bergen, so … you have to go straight on to build attitude on safety […] `And you shall not only stand here chopping sausages and make salad, you are a fire-fighter on board as well`. The thing about getting people to understand that our safety runs through the everyday from morning to evening, what you see and what you do […] Yes, and it is fresh goods.[…] It has to be focused on all the time."*
"Ja det var ille. Altså når det skjer så fort. Du har et kvarter ifra alt er sånn som det skal være til alt er svart. [...] Så å si alle satt og spiste da. Det var frokost … […] For det var ingen som var der de skulle være. Ingen. […] Styrbord-siden var jo ute, det var jo røyklagt, der var det umulig å evakuere ifra. Så alt skjedde jo via babord-siden. Så det er jo min plass var jo på babord side med mob-båt. Men vi sendte jo først mob-båtene av gårde de som var skadet. Det var det vi … og vi hadde kontakt folk oppe på dekket. De var så forbrent og … Det var bare å få de på land, det var det vi tenkte på først. Men som regel så skal jo mob-båten fungere som en backup når livbåtene gikk ut og hvis du skal hjelpes til. […] Men det ble jo tatt en avgjørelse der og da at vi begynner med de skadde. […] Ja de ble fraveket, fordi vi har det jo sånn at mob-båten skal jo være sånn … la oss nå si hvis det skjer noe på livbåtene eller et eller annet, skyve dem ifra eller etc. så skal jo han ut først og bistå livbåter hvis det er noe som skjer. Hjelpe de ifra hvis	77 78	*"Yes, it was bad…when it happens so rapidly. You have got fifteen minutes from everything fine to all is black. […] Virtually all were dining at the time. It was breakfast […] no one were where they were supposed to be. No one […] The starboard side was out, it was filled with smoke, it was impossible to evacuate from there. Hence it all happened on the port side. It is my site on the port side operating the MOB. But we had sent off the MOBs carrying the casualties. It was what we…and we had contact with people up on the deck. They were so burned and…It was just a matter of getting them ashore, it was our first thought. But as a rule the MOB shall work as a backup when the lifeboats are launched and if you are to assist […] But a decision was made there and then that we start with the wounded […] [procedures] were deviated, because our routine is that the MOB is to be like…let us say that something happens to the lifeboats or something else, push them away or etc. so it shall be launched as the first and assist lifeboats if needed.*

ikke motoren starter. Han skal i hvert fall ut hvis det skjer noe. Det kan jo hende at folk detter i havet eller … Det er et backup der for å ta de opp eller […] Det var førstemaskinisten og reparatøren som var så forbrent at de ble sendt i land.»		*Help them away if the engine does not start. It is to be launched anyway if something happens. It could be the case of people falling overboard or…It is a backup to pick them up or […] It was the first engineer and the repair-man who was burned as much that they had to be sent ashore…"*
"Ja altså det var ikke noe som lignet en øvelse. Det var ingen som var der de skulle være. […] dette her det skjer på ti minutter/et kvarter ifra det starter til at det er et inferno … at ting skjer. Så du har ikke tid å tenke deg om. […] det som var bra det var at det var jo erfarne sjøfolk som visste hva de skulle gjøre, hvordan de skulle gjøre det, og […] Det var de karene som var ledig til rådighet. […] Det er jo bare å bruke hodet altså, men altså når man har opplevd det så ser man jo det at det er jo greit, man øver jo på en ting, men man ser jo hvordan det fungerer, man ser hvordan det fungerer, og så klart, bytter man på rollene og ser så får man jo innsikt i hva man kan gjøre og sånn. Man prøver å gjøre det beste av det. Det står ikke ting i min instruks at jeg skal dra i spisesalen og hente folk i rullestol og få dem opp på båtdekket. […] Ja jeg gjør jo det … det heter seg jo det at du skal telle passasjerene om bord og alt, men hvis det brenner under ræva på deg så tror jeg du hiver de folkene inn i fort som faen altså. Den tellingen og den organiseringen og alt den kommer kanskje til … Men du skal jo prøve å gjøre det så klart. Men hva som skjer hvis det er … La oss nå si hvis det brenner under … […] Jeg har den mob-båten, den er min, den skal jeg ut i. […] Altså det er ingen som kan forutse hva som skjer. […] jeg tok en livbåt … Det var fordi at han som hadde den livbåten han … ja han var ikke til stede for å si det sånn. Han dukket ikke opp. Og … så jeg tok den ene livbåten. Jeg og en kjøkkensjef, to livbåter med passasjerer. Og vi var jo inne i havna, så det var jo bare rundt kaia og så … Jeg levnet jo båten der for det var jo folk som stod og tok imot, hjelpekorps. Og jeg fikk jo beskjed hos overstyrmann på radio om å innfinne meg så fort som mulig. Så jeg sprang jo bare ned på kaia, for da lå jo redningsskøyta og trykket henne inntil og … Så jeg begynte å snakke med	78	*"Yes it was nothing like an exercise. No one were where they were supposed to be …this happens in ten – fifteen minutes from it starts until it is an inferno…that things happens… there is no time to think […] what was good was that it was experienced sailors knowing what to do, how to do it, and […] It was the guys who were free to use […] It was just using your head, but when you have experienced it you see that it is ok, you exercise things, but you see how it works, you see how it works, and off course, if you change roles and see you will get some insight on what to do and such. One tries to make the best out of it. There is nothing in my instructions for me to enter the dining salon to fetch people in wheelchairs and to get them up on the boat-deck. […] I did that…it is written that you are to count the passengers on board* [into the lifeboats] *and all, but if there is a fire under your … I believe you throw those people on board quickly as h…That counting and that organization and all it might…But you shall try it off course. But what happens if it is… Let us say if it is burning under your […] My task is to operate that MOB, the one I shall out in […] No one can anticipate what happens […] I took a lifeboat…It was because he who were in charge of that lifeboat …well he was not present. He did not show up. And…I took the one lifeboat. Me and a chef, two lifeboats carrying passengers. And we were inside the port, so it was just around the quay and so…I left the boat there due to people were standing by to take care of, rescue-team. And I got a message from the chief officer on the radio to show up `asap`. So I just ran down to the quay, because then the Redningsskøyta came to push her in and…then I started to speak with the fire-fighters to explain how, what I had seen and…So those fire-fighters were standing on the quay…Then it was to embark to*

brannfolkene, å forklare hvordan, hva som jeg hadde sett og … Så de brannfolkene stod jo på kaia da, å gjorde dem … Så var det jo om bord og vise brannfolk veien til maskin. De gikk inn via poppen og så ned og så inn i kontroll-rommet. […] var alle i spisesalen.»		*show the fire-fighters the way to the engine. They went in by the poop-deck and then down and into the control room But say it like this that when […] all were in the dining-room."*
"Ja det er helt klart. Akkurat det der er faktisk litt sånn skremselsbilde fordi at når du har … hvis vi snakker om ytre faktorer som vær, vind og sjø, og når du står og holder på med skipshåndtering så får du jo på mange måter dette litt inn i fingrene. Hvis du da begynner å skal la båter gå til og fra kai, halvveis autonome skip, så er det klart at da får jo aldri disse skipsoffiserene dette her i fingrene. Så skulle det plutselig være sånn at automatikken svikter så vil du på mange måter kunne reagere senere og din evne til å improvisere vil jo på mange måter bli dårligere på grunn av at du da ikke får […] Det bør jo ringe noen bjeller […] det skremmer meg litt.»	83	*"Yes quite clear. Just that is a bit of a scary picture because when you have…if we speak of external factors like weather, wind and sea and when you are handling a ship you get this in many ways in your fingers If you are to dock and undock ships. Semi-autonomic ships, then it is clear that these naval officers never get this in their fingers. So if automation should fail you would in many ways react more slow and your ability to improvise will become poorer due to not getting the opportunity to […]* **Some bells should ring […] it scares me a bit."**
"Ja det tror jeg. Fordi at du stoler kanskje for mye på systemene, ikke sant. Og så tror jeg nok at folk kanskje ikke kjenner systemene godt nok heller. […] Der kan du for eksempel ta det der med track-seiling, ikke sant. Hvor mange kvier seg jo for å gå ut av tracket. […] de vet ikke hvordan de kommer seg inn. […] det med at folk er redde for å … […]. Du går i et spor. […] Hvis man automatiserer for eksempel en båt til å gå til og fra kai, det gjør jo at folk vil slite med å overkjøre det. Altså du vil jo få mindre trening i det du egentlig skal gjøre. […] Så du skal liksom sitte og se og overvåke noe og så skal du … du får jo mindre trening rett og slett. […] Ja, og spesielt på DP-båter, ikke sant. De klarer … de kan ikke handtere en båt fordi at det er et system som gjør det. Og det har jo vært kritikk imot at de forstår … de kan liksom ikke ta en båt manuelt til en rigg lenger fordi at de er så vant med DP-systemet gjør det.»	83	***"Yes I believe so.*** *Because maybe you trust upon instruments too much, right. And then I believe that people may not know the system well enough either […] You may look upon sailing on track, right. How many are reluctant to leave the track? [...] they do not know how to get back on track again…people are afraid to […] If you automize for instance a boat to dock and undock people will struggle to override it. That is; you will get less practice on what is your original task […] you are to monitor something and then you shall…you basically get less practice [...]Yes and especially on DP-boats, right…they are not able to handle a boat because it is a system doing it. And it has been criticized that they do not understand…they are in a way not able to maneuver a boat from one rig manually anymore because they are used to the DP doing it for them…"*