University of South-Eastern Norway

Navigating Uncharted Waters

"How do officers in the Royal Norwegian Navy predict unforeseen events and employ innovation during problem-solving in operations?"

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This thesis is worth 30 study points.

Abstract

Military officers must handle unforeseen events and innovate under pressure in an ever-evolving operational waters. Recent educational reform at the Norwegian Defence University College aims to enhance these capabilities by revising training programs and methodologies. This thesis investigates the impact of the reform on officers' ability to predict and manage unforeseen events within the Royal Norwegian Navy. Employing a quantitative research design, the study surveyed officers who graduated before and after the educational reform was implemented. Theoretical frameworks regarding unforeseen events, decision-making, and innovation were utilized to analyze responses and interpret findings. Key theories included Torgersen's definitions of unforeseen events and Boyd's OODA-loop model for decision-making. The findings reveal a significant shift in officers' perceptions and capabilities following the educational reform. Younger officers, educated post-reform, reported enhanced innovation in problem-solving and greater adaptability to unforeseen situations. An increased perceived trust and cooperative innovation within their operational environments was also noted. These changes suggest a correlation between the updated programs and subjects at the Naval Academy. The results underscore the importance of adaptive training frameworks in military education. Enhanced decision-making skills and increased innovation align with the theoretical perspectives proposed by the study, indicating that the reform may offer benefits in preparing officers for complex and dynamic operational environments. However, the sample size is limited, and the effects of the reform are not entirely in effect, as the intermediate leaders that facilitate the heightened level of environmental trust most likely are part of the pre-reform selection of personnel. The findings are inconclusive due to the low number of respondents.

Keywords: military education, unforeseen events, decision-making, innovation, educational reform, Norwegian Naval Academy, operational readiness.

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Acknowledgments

This thesis concludes the end of my academic voyage at the University of South-East Norway. It has been challenging as I have had to maintain a part-time study while sailing full-time in the Royal Norwegian Navy in 1. Corvette Squadron. I am grateful to my commanding officers and current employer for their encouragement and support in my academic journey, allowing time to study inbetween all other activity. Their facilitation has enabled me to balance work, personal life, and studies, a prerequisite to completing this journey. Thank you.

I express my gratitude to my thesis supervisor, Leif Inge Magnussen, for his guidance, research, insights, and suggestions regarding literature and resources in the field have broadened my perspective and encouraged me to embark on this academic journey.I am also grateful to the team at NIFU, "Educating for the Unforeseen," for granting me access to their resources, which proved valuable in my research. Thank you, Torstein for answering my e-mails and guiding me when I embarked on the analysis part of the thesis.

I extend my heartfelt appreciation to my friends who have given me their valuable time to review my work, offering their support and keeping me motivated through long hours of work. I owe my gratitude to them for their generous efforts.

As I conclude, I realize there is still much to discover and explore. I am excited to explore the uncharted territories and solve the mysteries that lie ahead. I hope my contribution can impact those who choose to follow in my wake. I desire to continue the tradition of charting new territories in the domain of unforeseen events.

Sharks never rest.

Introduction

Due to ongoing wars, the world has been in a complex political situation for centuries. Crisis and war have proven chaotic, filled with violence and unforeseen events. A good leader in extreme situations will always be challenging, especially when consequences are significant for individuals, nations, or organizations. Leaders can show their true character during a crisis through compassion, integrity, and courage (Pietrzak, 2020). At the same time, the leader must be able to lead through the power of example, exercise discretion, and trust their intuition (Monsen, 2020). Extreme situations are unpredictable and dynamic events where individuals must make decisions that can endanger their physical and mental health to achieve their goals. In the armed forces, this decision can sometimes result in losing lives and equipment. The armed forces' primary objective is to handle these extreme situations. As there is no conclusion on what leadership theory is best for sound decision-making in war, principles around leadership, innovation, and decision-making inherently become the backbone of warfare and other complex situations. Evaluating how situations unfold and making decisions is necessary for any individual (Kahneman, 2011; Hoomans, 2015).

Recognizing and adapting to unforeseen events is essential, whether you are in the military or not. Unforeseen events happen unexpectedly, and decision-making involves figuring out how to handle them safely. To help with this process, I will discuss the importance of innovation, a crucial aspect of any organization that wants to keep evolving (Sjøvold, 2014; Kaufmann & Kaufmann, 2015).

Research question

How do officers in the Royal Norwegian Navy predict unforeseen events and employ innovation during problem-solving in operations?

Empirical context and limitations

Within the armed forces are two columns: Officers (OF) and Other Ranks (OR). OF are generalists with a vertical career path, while OR are specialists with a horizontal one. The title

“officer” is not limited to military branches, as civilian pilots and chief officers are job titles that do not mean they are military. Meanwhile, for this research, the term officer applies only to officers in the Navy who graduated from the Naval Academy. This study is limited to those who have attended the Naval Academy, OF. The thesis respondents are limited to the Royal Norwegian Navy (RNoN). The RNoN consists of 1. frigate squadron, 1. minehunter squadron, 1. submarine squadron, and 1. corvette squadron.

Understanding the organizational chart for the Norwegian Defence University College (NDUC) is a prerequisite. NDUC consists of three academies that educate OF: the Royal Norwegian Air Force Academy (RNAF), the Norwegian Military Academy (NMA), and the Royal Norwegian Naval Academy (RNNA). As this thesis focuses on OF graduates, the other academies are not part of the research. All courses at the Naval Academy include leadership, from operational studies to engineering within various fields and logistics.

As of November 1st, 2022, the Armed Forces HR and Conscription Centre (AFHRCC) does not supply register data for external research due to heightened preparedness. The number of officers and other demographic variables used in this thesis are based on the numbers and other statistics from the Norwegian Defence Research Establishment (NDFE).

Royal Norwegian Navy and Naval Academy

The following paragraphs will briefly explain how the Royal Norwegian Navy and the squadrons are organized. Afterwards, an outline of the Royal Norwegian Naval Academy, with its different educational branches. First, the Chief of Defense and his staff lead the Armed Forces at command level 1, while their respective commanders lead the four branches: Army, Navy, Air Force, and Cyber (*Organisation Chart, Armed Forces*, 2024). Meanwhile, the Navy is divided into the Coastguard and the “Navy” subsections. While the Coast Guard maintains the assertion of sovereignty, the Navy is the government's means of power in conflict or war. The Royal Norwegian Navy is subdivided into different squadrons. A simplified overview of the Navy will be presented to contextualize the different departments onboard and their responsibilities. While the navy is subdivided into different squadrons, the branches on board

perform the same duties, albeit with different propulsion and powerplant configurations, weapons load, and logistic capacity.

The squadrons have severely different operational patterns, meaning the branches experience different loads, stress, and time pressure.

- 1. Frigate squadron is mainly known for blue water and littoral operations, as the Norwegian coastline is long and treacherous. The Nansen class consists of four hulls: KNM (Kongelig Norske Marine, *His Norwegian Majesty´s Ship*) Fridtjof Nansen, KNM Roald Amundsen, KNM Otto Sverdrup, and KNM Thor Heyerdahl. At the same time, KNM Helge Ingstad was decommissioned in 2018 after the collision and subsequent sinking. The frigates specialize in Anti-Submarine Warfare (ASW) and are equipped with hull-mounted sonars and towed array sonar (TAS). Furthermore, they are equipped with anti-air missiles, advanced phased-array radars, and target illumination systems. The frigates also have helicopter-carrying capabilities, although they have never carried any helicopters as the NH-90 project was never delivered. With a large bunker capacity, the frigates have an extended operational endurance.
- 1. Corvette squadron consists of six vessels in the Skjold-class. The Norwegian-made surface effect ships (SES) utilize lifting fans to reduce draught and increase speed. These ships have the same armament as the Nansen-class, except for the anti-air missiles. In addition, the hull is constructed from glass fiber reinforced plastic (GRP) and is incredibly lightweight, considering its size of 47.5m LOA and 13.5m W, with only 275 tonnes displacement. Powered by four Pratt & Whitney marine gas turbines, they can move at over 60+ knots and cruise at 40+ knots, making them an asset for civilian and military applications in Search and Rescue, transportation, evacuation, and so on. The Skjold class was planned to be laid out by 2025, but due to the HNoMS Helge Ingstad shipwreck and scrapping, the class was extended beyond 2030.
- 1. Mine hunter squadron operates the Alta- and Oksøy-class minesweeper and minehunter vessels. These vessels utilize the Skjold-class technology in terms of construction and SES technology, with the main differences in propulsion as these vessels do not need speed capabilities. Instead, they are powered by MTU diesel engines powering waterjets, making for a top speed of around 20 knots. The Norwegian

minehunters are also outfitted with the portable Hugin ROV (a Kongsberg autonomous underwater sonar) that can be deployed to assess the bottom with much greater detail, in addition to sophisticated towed array and hull-mounted sonars. The main difference between the two classes is that Alta is mainly used for bottom-anchored mines, cutting their anchoring and allowing them to float to the surface for assessment. At the same time, the Oksøy-class deploys either explosive ordnance disposal (EOD)-personnel (Norwegian Naval EOD Command) or explosives underwater to dispose of mines. In 2009, Norwegian armed defenses assessed that there are still around 50.000 mines in the littoral waters along the coast, making the minehunter squadron highly relevant in 2024 (Lieungh, 2011).

- 1. The Submarine squadron operates the Ula-class submarine, which is vital in underwater surveillance and deterrence. This is because they can operate undetected and carry a strategic weapon, as their armament is torpedoes. The ongoing project with Thyssen Krupp Marine Systems to transition to the 212CD submarine is underway, and the first hulls are expected to be delivered in xx (Forsvaret, 2015). The submarines operate underwater for extended periods and have a crew of approximately 30 people, consisting of conscripts, NCOs, and officers. As the limited space on board only facilitates separate bunks for some crew members, hot bunking is used extensively, with only a few crew members having their own bunks (CO and chef).

Education reform

Before 2018, when the education reform within the Norwegian Defence University College was effectuated, completing NCO school was a prerequisite. All cadets would at least have 12 months of previous service before attending a war academy. This meant that the cadets at the academies had a larger group with knowledge of basic drill commands, infantry skills, and basic training. From 2018, however, cadets were mainly recruited directly from high school. Even though having previous military service would be disqualifying due to a low number of applicants, currently serving members were allowed to apply. Six years after the reform, the age has dropped, and FHS is currently mainly recruiting from high school.

Unlike many neighboring countries, Norway has focused on training and educating personnel for a vertical career. This has been done by allowing a single column of officers, also known as “enhetsbefalsordningen.” After the report “Competence for a New Age,” the Department of Defence concluded in 2014 that operative departments within the armed forces should be subject to modernization, effectivization, and supporting departments. As a result, McKinsey & Company Inc. (2015) reported on measures that could be taken to reduce spending within the Armed Forces. One of the measures was the education reform implemented in 2018 (Department of Defence, 2015, p. 35-39). The reform was presented in 2016, and the main objective was to increase education quality and save approximately 530 million NOK (Forsvarsdepartementet, 2018). On a political level, there has been a big focus on the positive benefits of the reform, while organizations supporting personnel groups and personnel voicing their skepticism towards the possible outcomes of the potential quality of the graduated cadets from the NDUC many departments.

With the education reform, the Air Force, Navy, and Army academies shared several subjects because part of the education was joint and taught at the NMA at Linderud, Oslo. In addition, the educational reform reduced the attending time for engineers and nautical studies from 3,5 years to 3 years. However, this has again been revised to 4 years as of 2023 (Armed Forces, 2024) because the time allotted was insufficient to prepare the cadets academically for service. The Educational reform is essential for this thesis, as it defines a crucial separation in subjects between those who attended RNNA before 2018 and vice versa, as leadership subjects are now taught at the War Academy at Linderud instead of at the Academy and Air Force Academy. Subsequently, the subjects have changed as they must accommodate all cadets.

The education at the Naval Academy is more orientated toward military application, navigation, and warfare. The different branches at the Naval Academy are subdivided into Operational and Nautical Studies, Electronic Engineering, Machine and Electro-Engineering, and Logistics. Cadets in Operational and Nautical Studies specialize in degraded navigation exercises, while Electronic Engineering Cadets focus on electronics, weapons, countermeasures, and telecommunications. Machine and Electro-Engineering Cadets specialize in propulsion, powerplant configurations, hydraulics, and stability, while Logistics Cadets learn supply management, logistics planning, and financial management. Common for all branches

is leadership subjects, which are taught at NMA. After graduation, these are again subdivided into even more specific departments. However, this research does not require this level of resolution as it breaches the Security Act without adding any significant value.

After graduating and starting their training onboard a navy ship, the workload during an operation varies considerably. Some squadrons and departments operate using 4-8 shift periods, meaning 4 hours of duty followed by 8 hours of administrative work or sleep, accounting for 24 hours during two cycles. Other squadrons operate with only wartime shifts, 6 hours of duty, and 6 hours of rest.

Theoretical background

This chapter contains relevant theory and literature for the thesis. Firstly, theory outlines unforeseen events and how different theories surround this topic. Furthermore, two different decision-making models explain how a strict framework can be advantageous and limit the individual. As the number of decisions being made increases, mental fatigue is essential in how the individual can think, how unforeseen events affect mental fatigue, and the ability to adapt. Organizational culture influences how individuals perceive their leaders and themselves in a system, enhancing or limiting their performance in the work environment. Lastly, innovation and processes leading to innovation are described in problem-solving scenarios to understand what this means. It is essential to remember that these scenarios are not meant to depict war or conflict but rather any unforeseen event as a reactive or passive unit in peacetime. War theory and war strategies will not be a part of this thesis as they are outside the scope and would likely include classified documents. This research is meant to reflect the everyday challenges officers face.

The literature examined in the research is based on my supervisor's and ChatGPT’s ScholarAI recommendations. The outline of what topics should be included in the theory chapter was decided by the input of the research question, considering recommendations from my supervisor. As ScholarAI was presented with

Unforeseen events

For this thesis, I will use the following definition of the unforeseen, adapted from Torgersen (2015):

An unforeseen event unfolds, with or without action from the observer, and is considered unforeseen until deliberate action is taken to adjust the trajectory of the events.

The model below shows the factors that influence preparedness for the unforeseen. As the theoretical background progresses, we will explore most of these topics.

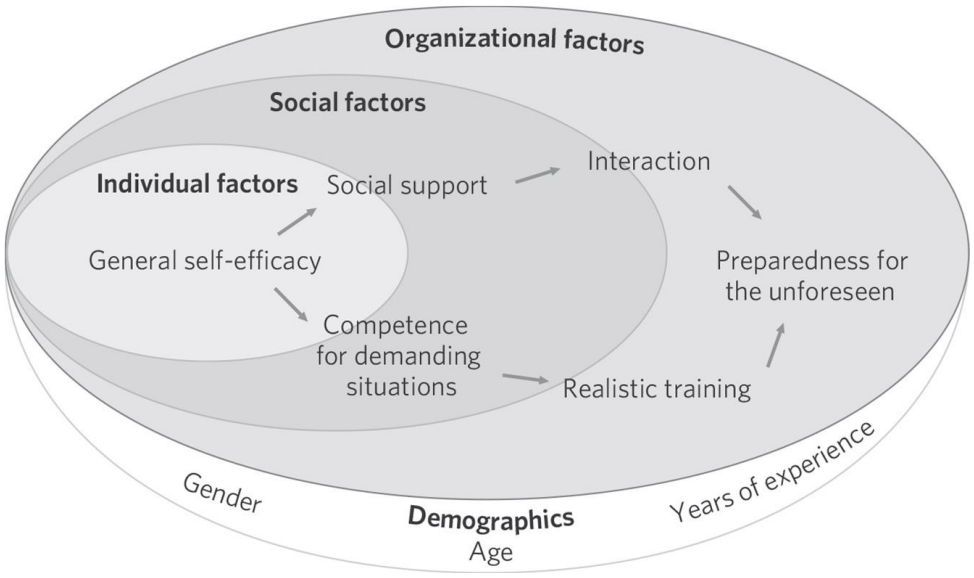

Figure 1- The predictive model of preparedness for the Unforeseen (Torgersen, 2018)

Although there are many definitions of an unforeseen event, the general idea is that the individual is surprised by what unfolds. While Sutcliffe and Weick (2015) mean that it occurs because the organization constructs and enacts certain events, Taleb (2004) argues that everything around us is an unforeseen event. If something is expected, one must know about it or that it is about to happen. If a financial strategist makes a one-in-a-hundred bet against the market and hits, or if a tanker collides with a navy frigate, how you prepared does not matter. It is all up to the universe, and they are unexpected for that exact reason – they happen out of

nowhere, seemingly. These theories do not fully support one another but do not contradict one another.

The unforeseen denotes something that occurs relatively unexpectedly and with relatively low probability or predictability for those who encounter to deal with it.

(Torgersen, p.30, translation from Norwegian).

Table P.1 Table of Confusion
Presenting the central distinctions used in the book

GENERAL	
Luck	Skills
Randomness	Determinism
Probability	Certainty
Belief, conjecture	Knowledge, certitude
Theory	Reality
Anecdote, coincidence	Causality, law
Forecast	Prophecy
MARKET PERFORMANCE	
Lucky idiot	Skilled investor
Survivorship bias	Market outperformance
FINANCE	
Volatility	Return (or drift)
Stochastic variable	Deterministic variable
PHYSICS AND ENGINEERING	
Noise	Signal
LITERARY CRITICISM	
None (literary critics do not seem to have a name for things they do not understand)	Symbol
PHILOSOPHY OF SCIENCE	
Epistemic probability	Physical probability
Induction	Deduction
Synthetic proposition	Analytic proposition

Table 1 - Talebs table of confusion (Torgersen, 2015, p.34)

The term "*unforeseen*" contains many relatives. The magnitude of this thesis does not allow for deep exploration of all of these, so the theory chapter does not contain extensive elaboration on all these terms. However, I will list the terms from Moe's (2014) fine-meshed table, allowing for some distinction between them. *Uncertain, unexpected, surprising, complex, unknown,*

unpredictable, unthinkable, uncertain/unknown, unlikely, and random are all terms covered by the "*unforeseen*"-umbrella. Even though several different terms describe unforeseen events, Taleb's table of confusion wishes to provide a different view of them. Luck is, in fact, "skills," while probability is "certainty." He argues that we believe we are on the right side of the table while operating on the left. Whether an accident results in millions of dollars in damage, loss of life, etc., the difference in magnitude does not alter the diagnostic in any of those scenarios. The reason behind failure is a lapse of detection (Sutcliffe, 2015, p.57).

Unforeseen events unfold in many ways. The accident involving Sola TS and HNoMS Helge Ingstad is an excellent example of how a seemingly known situation can change dramatically in seconds due to an incorrect understanding of the situation, leading to an unforeseen event. Due to multiple random events and poor communication, the two ships collided on November 4th, 2018.

"Predicting the unforeseen"

Our basic situation is that we cannot predict the future (Torgersen, 2015, p.37). However, unforeseen events (or even uncertain events) are linked to actions in different ways. Predicting the unforeseen is, in other words, predicting the future. By default, we can say that we have two categories of predictions: categorical and conditional. The first is whether X is going to happen—or not. Conditional means "if this, then that." Many factors determine the accuracy of the predictions. How many details, scope, and how it is worded influence how the results can be interpreted. Furthermore, trends are more accessible than entirely new situations.

Confirmation bias leads to individuals only seeking signs and observations confirming their views. Weick and Sutcliffe (8) describe the human mind's tendency to simplify when faced with a new, complex situation, enabling previously used processes to make the situation easier to comprehend. However, the weakness in simplifying a situation is confirmation bias, which involves looking for signs that support and anchor the current view (Kaufmann & Kaufmann, p. 239). While this can lead to more efficient decision-making, it may come at the cost of re-orienting and re-interpreting the situation. Reluctance to simplify allows for more detail, providing insight into what is causing the unforeseen or unexpected. For example, an investigation board might conclude that "the ship sank because it sprung a leak," but understanding why it sprung a leak is crucial.

Weick and Sutcliffe have researched organizations that function in complex environments with advanced technology and have found that they experience fewer "normal accidents" than Perrow's theories would predict. They have identified the critical practices of these organizations, which they have summarized as "FSORE" - preoccupation with Failure, reluctance to Simplify, sensitivity to Operations, commitment to Resilience, and deference to Expertise. These organizations are known as High-Reliability organizations (HROs) (Sutcliffe & Weick, 2015).

Decision making

During the day, an average person faces up to 35,000 decisions (Hoomans, 2015). Understanding and employing different strategies to enhance our decision-making process is crucial for good choices. These everyday decisions span from what to eat, what to wear, and what to do. However, decisions that are more crucial in an operating environment are made using other decision-making processes. Boyd's OODA-loop is a model used extensively in the leadership training at the Royal Norwegian Naval Academy, despite being developed by a US Fighter pilot. The OODA loop consists of four stages. Firstly, the outside world is observed. All external factors influencing the current situation are considered. Next, these impressions are deciphered into contextual meanings that can be used in the situation.

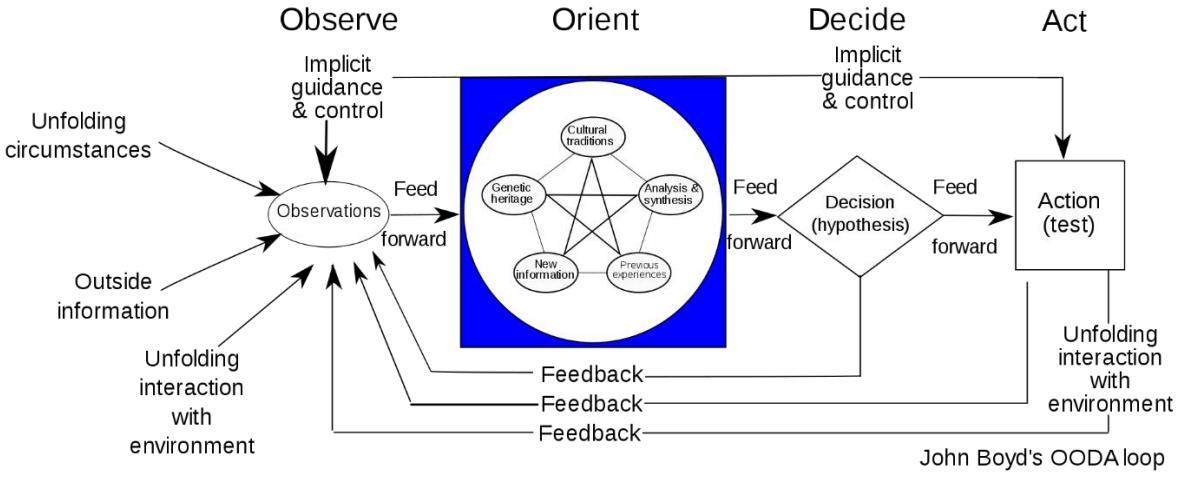

Figure 2 - John Boyds OODA-loop (Boyd, 1996)

The OODA-loop uses continual evaluation of reality to facilitate both action and reaction to the environment. Although described as a loop, many consider this decision-making model parallel in all its steps. The reason is that feedback is evaluated at each step, not only after the act. A benefit of using the OODA loop is the reduction in latency when evaluating situations. Furthermore, the OODA loop is highly reactive as the decision maker must observe any environmental changes. The reactive nature of the OODA loop means that the continuous cycle of re-interpretation of the world could lead to missing details. The dynamic, complex environment of rapidly evolving unforeseen events often, however, causes ambiguity, disorder, and interruptions and thus exceeds even the best emergency plans and preparations (Comfort, 2007; Lu & Xue, 2016; Van Wart & Kapucu, 2011 through Heiberg, 2023, p.23).

Training, practice, and exercises are essential in learning (Watkins & Marsick, 1993). Organizations like the Armed Forces systematically use training exercises to improve individual and department skills. This is usually done by using procedures and checklists, ensuring all personnel operate equipment similarly. Torgersen (2018) and Heiberg (2023) argue that organizations that practice decision-making during unforeseen events in stressful environments can develop and provide the competence required to handle new challenges.

Decision-making patterns

Rule-based decision-making (RBDM) is a set of rules that, when followed, should result in a known state (Flin et al., 2008, pp. 53-54). RBDM can be as simple as checklists and procedures. Checklists typically use imperative mood verbs, indicating the actions that must be taken. The purpose of a checklist is to ensure that all necessary actions are completed quickly (Degani et al., 1999). RBDM is often based on years of training and established procedures. RBDM increases decision-making precision but is inherently less time-efficient than relying on expert knowledge. This is where Rule-based violation (RBV) comes into play, as it allows for skipping steps but requires expert competence to understand shortcuts' potential outcomes and shortcomings. This is considered creative decision-making, as it deviates from standard procedures. While creative solutions may improve efficiency or solve problems, they demand a lot from the person implementing them (Flin et al., 2008, p. 26). RBV can lead to non-compliance with procedures, posing a risk in accident investigations and making retracing steps

more complex. When experts use RBV, they adapt existing standards and procedures to new situations, showing innovation based on experience and knowledge (Catino, 2008). Rule-based violation (RBV) allows one to skip specific steps to achieve the same end-state (Reason, 2008). Unforeseen events, however, do not fit within these parameters. Expertise is crucial in such situations, as autonomy and creativity are required for innovative problem-solving.

Innovation

Sjøvold (2022) discusses innovation in group processes, defining it as a state within a team that promotes the free flow of ideas and challenges to the status quo. He emphasizes that innovation involves the ability to think outside the box. This is crucial in complex and unpredictable operational environments where individual-level innovation is critical for effective problem-solving and operational success. Introducing and applying new and creative ideas, processes, or solutions to known or unforeseen challenges characterizes innovation. Cognitive abilities, personality traits, knowledge, skills, and motivational factors influence it. Traits like creativity, openness to experience, and a tolerance for ambiguity enhance an individual’s capacity for divergent thinking and the generation of novel solutions. Natural motivation and a predisposition for risk-taking are essential for implementing these ideas. Moreover, an individual's expertise and problem-solving skills are crucial in critically evaluating and selecting feasible solutions (West, 2002).

The innovation process is also shaped by social and contextual factors, including peer support and the prevailing organizational climate, which should encourage experimentation and tolerate failures (Edmondson, 1999; Zhou & George, 2001). Practical innovation leads to outcomes that address the initial problem and improve process efficiency, enhancing organizational and operational resilience and adaptability (Hülsheger et al., 2009). To foster a culture of innovation, there must be both knowledge and trust within the team. As a team member and an intermediate leader, establishing an innovative climate necessitates mutual trust among team members in their decisions. This trust should be grounded in critically assessing each other's opinions and viewpoints while acknowledging the importance of collective decision-making for the team's success.

Trust and status

Trust and status are essential building blocks within any organization, even more so for military branches, where hierarchy is essential. Though hierarchy is more important in the military than in other civilian organizations, the structure is somewhat flatter in the Norwegian armed forces. This is due to the recent transition from “enhetsbefalsordningen” to OMT. Regardless, the hierarchy does exist, and the respect one upholds for more senior officers does exist. A central predicament for someone to accept submission is trust (Sjøvold, 2014, p. 227; Hartog et al., 2002). This means that expected norms and values are upheld within the group. The use of executive power must be anchored within the norms and values. If not, conflict and resistance within the group emerge, resulting in lower cohesion and weakened trust in the hierarchy (Narayanan, 2012). Kaufmann and Kaufmann have defined trust as a positive expectation that another person, through words, actions, and decisions, will avoid acting purely opportunistically (2015, p. 482). This, in turn, means that there is an equal expectation within a group that everyone wants the best for one another. Trust within an organization can be defined in multiple ways due to its complex nature. The state of trust involves being willing to be vulnerable based on positive expectations of others' intentions and behaviors (Rousseau et al., 1998, p. 395). Reliability trust is based on the belief that colleagues and the organization will fulfill their obligations and responsibilities. Competence trust arises from the belief in the skills, knowledge, and ability of others within the organization. Emotional trust involves the confidence that one can express ideas, thoughts, and feelings without fear of negative repercussions. (Sjøvold, 2014, p.37) These are important for organizations such as the Navy and within branches and crews to facilitate a work environment that allows creativity and trust, especially as high-risk operations can have enormous consequences for the whole ship and the individual or team after a situation (Lee et al., 2023).

Just Culture

In aviation, “just culture” describes the phenomena in which the organization tries to identify what they could have done differently instead of investigating, pointing fingers, and blaming. It is known that subordinates greatly overreport good news and underreport bad news because of the potential punishments. There is a clear distinction between being reckless, taking

deliberate or unjustifiable risks, and unintentional errors or unsafe acts (Weick & Sutcliffe, 2015; Veland & Aven, 2015). Making a mistake is human; being reckless is subject to disciplinary action. Workspaces that facilitate a "just culture" enable and encourage sharing experiences, mishaps, and incidents. A recent near miss with a Norwegian Widerøe flight from Bodø to Svolvær, where the QNH was still reading the standard pressure, resulted in a reported altitude of 700 feet higher than the reality. This could have resulted in a terrible accident with mountainous terrain and 29 passengers on board. While being a pilot error with an enormous potential for disaster, the pilots reported the error, and the airline implemented the experience into their courses. Accident Investigation Board Norway (AIBN) was also immediately notified despite it only being a near miss. This is an excellent example of executing "just culture" (Karlsen, 2023; Parker, 2017).

Mental fatigue

Researchers have yet to agree on the exact definition of the term fatigue. The definition of fatigue is the same as (Caldwell & Caldwell, 2003; Flin et al., 2016); "the state of tiredness that is associated with long hours of work, prolonged periods without sleep, or requirements to work at a time that are "out of sync." However, (Cercarelli and Ryan (1996), through (Jason et al., 2010), propose that fatigue means a diminished capacity for work and possible decrements in attention, perception, decision-making, and skilled performance, which is more appropriate for this research. Even though the definitions differ, the main drivers between the two are sleep deprivation, long work hours, and extended hours of work without sleep.

The leading causes of accidents on road transportation show that mental fatigue is the most significant single identifiable cause of accidents (Flin et al., 2016, pp.192-169). Similarly, nurses, anesthetists, and anesthetic nurses report that in 61% of cases, fatigue has resulted in administering either the wrong drug or the incorrect dosage. These numbers indicate that even though these are skilled professionals at work, they are not immune to the effects of mental fatigue and sleep deprivation. (Caldwell, Mallis, Caldwell, Paul, Miller, Neri, 2009). Mental fatigue can also be induced much quicker, depending on the level of competence, task complexity, and various other factors. Mental exertion has played a significant role in multiple accidents, both the nuclear disaster on Three Mile Island and Chornobyl (Flin et al., 2016). The

Challenger space shuttle accident was also possibly caused by sleep loss, excessive duty shifts, and circadian rhythm[1].

Research has indicated that two hours of skilled work does not directly result in decreased performance; however, the level of goal-directedness of the action varies. Research points to a dip in performance already after two hours (Van Der Linden, Frese, and Meijman 2003, 305). This dip in performance leads to even trained professionals making bad decisions. Mental fatigue, both from sleep deprivation and prolonged exposure to demanding cognitive work, reduces decision-making capabilities. Sleep and rest are the only ways to combat fatigue (Flin et al., 2016, p.204). The literature suggests that awareness of human performance in these situations is necessary to implement a framework that enables policymakers to ensure safe and sustainable work environments.

Circadian rhythm is the biological response to the 24-hour cycle, in which the body produces different types of hormones throughout the cycle and regulatues both temperature and alertness.[1]

Method

The purpose of this chapter is to describe how the research has been conducted and what has been investigated. This chapter will give an overview of the selection of research design, sample, population, survey, data collection, processing, ethical considerations, and limitations. The background for choosing either the quantitative or qualitative method is that some things in the world are quantifiable, and others are not (Grimen, 2004, p.238). When researching a small group or selection, it is questionable how representative the selection is for the whole population. As research considers many variables, but the selection is narrow, Grimen argues that the research is intensive rather than extensive. What distinguishes the two is that quantitative research is extensive because of the number of variables available and the narrow selection in terms of being a small population in general (officers) and actual respondents. This thesis is immersed within one personal group, namely officers in the Royal Norwegian Navy, and can thus be a case study (Busch, 2021, p. 56). This thesis does not aim to generalize any other category of personnel, civilian or military, other than officers who have graduated from the Naval Academy.

Research design

This study aims to gain insight into whether navy officers understand what unforeseen events are, if they recognize them, and how problems are solved during these events. To answer the research question, an appropriate research method design was crucial. The survey supplies quantitative data within a questionnaire. Only at the end were the participants able to write text; therefore, the context to which the answers were given was limited. Thus, broad generalizations must be made to interpret the results. As mentioned, the survey allowed for an open-ended question to be answered. The last text input did not yield relevant information and is therefore not included in the research.

Data collection

Using a cross-sectional, time-limited data collection method and an open survey has some limitations. It only provides a snapshot of the respondents' and organizations' current state. However, using a cross-sectional method was deemed the most appropriate, as it gives a glimpse into the individuals and assessment of the organization at a certain point in time (Jakobsen, 2016, p. 109). I chose to conduct only quantitative research, as this thesis's time frame and scope would not allow in-depth data exploration if interviews were also performed. The research findings could have been verified had the methodology employed structured interviews with randomized respondents. Such an approach would have facilitated the collection of reliable and representative data that could have been analyzed to draw more accurate conclusions. This method would have also ensured that potential biases, intentional or unintentional, were minimized or eliminated.

Survey

The survey is part of the research project "*Educating for the Unforeseen (EFU): Using Educational Science and Innovation to Prepare Managers and Officers for Unforeseen events."* This project is done by "Nordisk institutt for studier innovasjon, forskning og utdanning" (NIFU) and the University of South-East Norway (USN), funded by "Norges Forskningsråd" (NFR). The opportunity to use their survey has significantly increased the precision of this research, as the formatting and number of data points are significantly beyond my competence. Analyzing the questionnaire supplied by NIFU/USN/NFR, I observed that all the questions were positively reinforced. In addition, the questions were shuffled so that the respondent did not fall into a rhythm while answering. On the other hand, my ownership of the survey is weakened, and some of the answers could have been improved with greater detail, for example, the metric of how many years of experience the officers have after graduation. The questions in the survey were in Norwegian. The wording in the questions is of a non-academic level of Norwegian, and the markers in annex 2 are based on the English survey. The survey had 67 questions, but I only used some for my research.

The survey link was distributed on February 4th and closed for entry on February 19th, allowing for 15 days. This is not optimal, as only 36 (N) respondents answered. Out of the total 36 respondents, only two were identified as female. This proportionately low representation of female officers in the sample may impact the accuracy and generalizability of the results. Notably, the percentage of female officers in the Navy is approximately 10%, which highlights the need for a more representative sample to ensure the validity of the findings (Weierud, 2020).

The splash page with the questions only provides a short guide and explanations for each statement. The survey had the demographic variables at the end. These included questions regarding their affiliation with the armed forces and an open text input field to clarify which specific situations were in mind when answering the questions. The survey uses a five-point Likert scale to avoid erroneous sources. All questions are equally positively reinforced to avoid errors using reversed scales (Pallant, 2020, p.97). The Likert scale provides a flexible yet standardized way of measuring ordinal values and facilitates quantitative research. On the other hand, it only offers five different answers, which inherently limits the resolution of the questions. Scales like Likert are standard when measuring a theoretical term (Brace, 2013 through Jacobsen, 2016, p.268). The battery of questions is subdivided into different subjects, listed in annex 2. These statements have been operationalized by using the methodology below.

Survey backdrop

Methodology for the unforeseen (UN-METH) is a questionnaire framework derived from UN-ORG and UN-CAF (UNforeseen Competence Assurance Frameworks). UN-METH designs a questionnaire following a twelve-phase process (Herberg, Torgersen, Rundmo, 2018, pp. 267-300; Torgersen & Kaarstad, 2017). This entails identifying the questionnaire's focus, compiling a list of potential items, organizing and categorizing the indicators, establishing the categories, determining their order, collaborating with professionals for an initial review, incorporating feedback into the questionnaire's revision, and refining and formatting it. Then, it is tested in the field, finalized, distributed, and regularly revisited and improved based on feedback. It was evaluated on a scale of 1 to 10 with a mean of 8.3 (SD=1.7), indicating high ease of use. This is considered a benefit, as surveys can be monotonous, in contrast to this survey.

Data testing and validation

Several statistical tests were conducted to ensure the validity and reliability of the data collected for this study. These tests included reliability testing using Cronbach's alpha, normality testing using the Shapiro-Wilk test, correlation analysis using Kendall's Tau and Spearman's Rho, and logistic regression analysis due to the data's non-normal distribution.

Table	Null Hypothesis (H0)
Table 3 - Normality Test for Variables	The data for each variable follows a normal distribution.
Table 4 - Independent Samples vs. School Reform	There is no difference in the variable distribution between pre-reform and post-reform groups.
Table 5 - Correlations Variables and School Reform	There is no correlation between school reform and each variable (e.g., median_unforeseen_individual, median_innovation_individual).
Table 7 - Correlation - School Reform and New Variables	There is no correlation between school reform and each new variable.
Table 8 - Correlation Table Age Kendall's Tau-b	There is no correlation between age and each variable (e.g., median_unforeseen_individual, median_innovation_individual).
Table 9 - Correlation Table Age Spearman's Rho	There is no correlation between age and each variable (e.g., median_unforeseen_individual, median_innovation_individual).

Table 2 - Null hypothesis for data tests

Reliability Testing

The first step in the validation process was to test the reliability of the survey instruments. Reliability refers to the consistency and stability of the measurement. For this purpose, Cronbach's alpha was calculated. Cronbach's alpha measures internal consistency, indicating how closely related a set of items are as a group and if they measure the same phenomenon.

In quantitative studies, Cronbach's alpha between 0.6 and 0.95 is acceptable. As some of the questions in the survey do investigate the same things, I had to conduct several rounds of analysis to avoid overlap and multicollinearity, as some of the analyses yielded values above .95. (Ringdal, 2018, p.104)

Testing for Normality

The Shapiro-Wilk test was employed to determine whether the data followed a normal distribution. This test is particularly suitable for small sample sizes ($n<50$), as in this study. The results indicated that the data were not normally distributed, with p-values less than 0.05 for several vital variables. Therefore, Mann-Whitney U tests were employed to compare differences between independent groups. This test is advantageous as it does not assume normal distribution and is suitable for ordinal or continuous data that do not meet the assumptions of parametric tests. The Mann-Whitney U test provided a robust method to assess differences between groups, ensuring the validity of the comparisons despite the non-normal data distribution (McKnight & Najab, 2010).

Kendall's Tau and Spearman's Rho are both measures of rank correlation that evaluate the strength and direction of the association between two variables. While Kendall's Tau is based on the data's concordance, Spearman's Rho relies on the data's rank order. Both measures assess the strength and direction of the relationship between two variables. However, despite implementing these robust methods, the correlation analyses did not produce the desired outcomes. The obtained correlation coefficients were low, indicating weak associations between the variables of interest.

Given the limitations encountered with the correlation analyses, logistic regression was selected as an alternative analytical approach. Logistic regression is a powerful statistical method that models the probability of a binary outcome based on one or more predictor variables. It is instrumental when the data are not normally distributed and when dealing with binary or categorical dependent variables. Dummy variables were created as binary expressions to investigate results further. These steps ensured that the data analysis was conducted using the most appropriate methods given the dataset's characteristics, thereby enhancing the validity and reliability of the study's findings.

Limitations and ethical considerations

Being open and honest about strengths and weaknesses is vital in all research. In the following sub-chapter, I will outline my considerations and what I would have done differently retrospectively. This is an essential prerequisite for discussing the paper’s reliability and validity (Jakobsen, 2016, p.238).

Gathering data from a government organization, especially the armed forces, can be more challenging than other organizations. Military branches and governmental organizations have access to critical and classified information. Many of the respondents within the scope of this thesis are deployed with limited internet access. Furthermore, in some instances, the respondent may have classified knowledge that cannot be part of such a survey. However, this is not the case, as the questions were broadly generalized and did not allow the respondents to reveal any classified information other than in the open-answer text fields, which would have violated the Security Act. The survey allowed the respondents to answer which squadron they were a part of, allowing insight into the different cultural factors influencing the participants, if any. The questionnaire was distributed within the Navy using the armed defenses classified email, using a bit.ly-link shortened for more accessible access points to the Qualtrics website. This is because taking pictures or using personal devices such as cell phones near classified computer systems is prohibited, making the distribution of a QR code ineligible. The bit.ly-link had some advantages, as I could monitor how many unique users had opened and re-opened the link and, therefore, gauge how many were reached. I did not send any reminders, as the collection time was limited. The Armed Forces have sent out many surveys to all military

personnel, with multiple reminders. This can, in turn, have influenced and resulted in the low response rate for my survey as the personnel possibly has reached a certain threshold or saturation of surveys. This is known as survey fatigue, where a group of participants is overwhelmed by the number of surveys received. The sample size of the available respondents is limited, and it is estimated that by the end of 2023, 823 officers would have been available for the survey (NDRE, 2023). It is worth noting that typically, a survey requires at least 1000 respondents to represent the population effectively. A questionnaire that includes sections not used in this research can also have influenced the results due to the previously mentioned saturation. Some research has found that, in some cases, a low response rate can give accurate data (Gigliotta & Foma, 2018, pp. 71-79). Considering the limited size of the population, this can be the case for this research.

The number of questions irrelevant to this research also may have influenced the number of respondents who finished the survey, further limiting the quality of the research. Conducting individual interviews to provide insights into further, specific questions could have provided more extensive knowledge.

At the end of 2023, there were 823 (n) officers in the Navy, yielding a response rate of 4.23%. This is lower than expected from surveys, as 10-11% is standard (Jacobsen). In hindsight, using the armed forces SMS service to distribute the survey would have been more effective as it would circumvent the security problems and could target the population even more precisely. Allowing a more extended data collection period could also have improved the response rate.

My personal experience with one of the squadrons may have influenced my analysis of the results. Nevertheless, I have presented all the results objectively, without any bias towards or against my squadron, known as publishing bias (Navarro & Foxcroft, p.2.7.12). However, since the results are primarily at an individual level, and grouping by squadron is not used as a variable, any publishing bias can be considered negligible.

Results

First analysis

Defining dependent variables

As the research question depends on two different indicators, “unforeseen” and “innovation,” I used the questions that investigate these phenomena. As the research is centered around individual performance, I used the survey questions to assess individual performance as a dependent variable. In addition, the variables centered around assessing the environment, in terms of capabilities of identifying the unforeseen, innovation, and trust were also established.

Cronbach's alpha (a) is presented by opposing the null hypothesis to the original statement. This coefficient is displayed as a numeric value ranging from 0 to 1. A higher number indicates a stronger correlation between the indicators, and a value between 0.6 and 0.95 is deemed a valid outcome. The variable “median_innovation_individual” falls below the threshold of 0.6 but is included in the research.

Survey question	Number of items	New variable name	Cronbachs α
Q31	1	median_unforeseen_indiv	
Q9,Q1,Q2,Q3,Q4	5	Median_unforeseen_enviro	0,692
Q29,Q30,Q32,Q33,Q34)	5	Median_innovation_indiv	0,584
Q6,Q10,Q12,Q17_3,	9	Median_innovation_enviro	0,836

Q19_3,Q19_4,Q21,Q23,Q57_3			
Q13,Q20,Q22,Q25,Q26,Q27,Q28	7	Median_trust_enviro	0,775

Table 3 - Dependant variables

As the sample size is limited, Shapiro-Wilks is the most appropriate normality test to use (n>50) (killed her). H_0: *The data is normally distributed." Both tests reject* H_0, indicating that the data is not normally distributed.

Variable	Statistic	df	Sig.
median_unforeseen_individual	0.804	36	<0.001
Median_innovation_individual	0.749	36	<0.001
Median_innovation_environment	0.839	36	<0.001
Median_trust_environment	0.745	36	<0.001
Median_unforeseen_environment	0.840	36	<0.001

Table 4- Normality test for variables

As the data is not normally distributed, I used the Mann-Whitney U test instead of t-tests. The Mann-Whitney U test is ideal for non-normal distribution data analysis. It uses a rank-based methodology, is robust against outliers and skewed data, and effectively compares

medians. It guarantees more reliable and valid inferences when normality cannot be ensured, making it a valuable tool in business or academic settings (McKnight & Najab, 2010). Data is compared between the two groups, pre and post-school reform, as these are the only variables that can make the research statistically significant.

Null Hypothesis	Test	Sig.	Decision
The distribution of median_unforeseen_individual is the same across categories of School reform.	Independent-Samples Mann-Whitney U Test	1.000c	Retain the null hypothesis.
The distribution of Median_unforeseen_environment is the same across categories of School reform.	Independent-Samples Mann-Whitney U Test	0.142c	Retain the null hypothesis.
The distribution of Median_innovation_individual is the same across categories of School reform.	Independent-Samples Mann-Whitney U Test	0.086c	Retain the null hypothesis.
The distribution of Median_innovation_environment is the same across categories of School reform.	Independent-Samples Mann-Whitney U Test	0.068c	Retain the null hypothesis.
The distribution of Median_trust_environment is the same across categories of School reform.	Independent-Samples Mann-Whitney U Test	0.032c	Reject the null hypothesis.

Table 5 - Independent Samples vs School Reform

The null hypothesis suggests no difference in the variable distribution between the two groups defined by the school reform categories before and after. If the null hypothesis is rejected, it indicates a significant statistical difference in the distributions between the groups. The results show that while most measured areas did not change significantly due to school reform, there was a significant change in trust in the environment.

Variable	Condition	Mean	Median	Skewness	Std. Deviation	Range
Median_Unforeseen_Individual	Pre	3,80010	4.0000	-1.861	0.7011	3.00
	Post	3,81820	4.0000	-0.628	0.6304	2.00
Median_Innovation_Individual	Pre	3,83060	4.0000	-1.184	0.4417	3.00
	Post	4,22790	4.0000	-1.109	0.4671	2.00
Median_Innovation_Environment	Pre	3,60400	4.0000	-0.393	0.8165	3.00
	Post	3,95410	4.0000	-0.563	0.6324	2.00
Median_Trust_Environment	Pre	3,41040	3,5000	1.151	0.8267	4.00
	Post	3,89990	4.0000	11.307	0.9011	4.00
Median_Unforeseen_Environment	Pre	3,19000	4.0000	-0.468	0.8040	4.00
	Post	3,43860	4.0000	-0.964	0.5054	1.00

Table 6 - Correlations variables and school reform

Conclusion

The present analysis aims to describe the observed changes in various variables post-reform, with specific attention to innovation and trust environments. The data reveals a slight increase in the mean. On the contrary, the Innovation Individual variable shows a notable increase in mean post-reform, indicating that responses are less extreme post-reform. Furthermore, the Innovation Environment variable shows an improvement in mean post-reform. The Trust Environment variable shows a substantial increase in mean, indicating higher outlier values, suggesting substantial changes in perceptions of trust. Finally, the Unforeseen Environment variable shows an increase in the mean and a shift from slight negative to more pronounced negative skewness post-reform, indicating a tighter, more peaked distribution around the median.

Second analysis

After finding low statistical significance using linear regression, I decided to try a different approach and used logistic regression instead. I included variable Q6 as a dummy variable to assess the statement, "Officers in my business have the ability to be spontaneous and inventive to cope with unforeseen events."

Independent variables: variables used in regression 1-3 separated by /	**Dependent variable: Q6 Officers in my business have the ability to be spontaneous and inventive to cope with unforeseen events**		
	Logistic Regression 1	**Logistic Regression 2**	**Logistic Regression 3**
Q3/Q3/Q13	2.130* (3.140)	1.447 (0.871)	3.353** (4.931)
Q12/Q12	3.276** (4.958)	3.160** (3.900)	0.367 (0.224)
Q26 (for all)	3.326** (4.958)	2.332** (4.252)	1.919** (4.005)
Q67 (for all)	2.202** (2.643)	-2.748*** 2.472	-0.503 (0.108)
//Q10			3.251** 4.828
Constant	-28.636	-33.544	-35.446
Measuring and testing the Goodness of fit			
Omnibus test: Chi^2	18.18	22.96	28.072
p-value of the Omnibus test: Chi^2	0.001	0.001	0.001
Cox & Snell R squared	0.478	0.549	0.541
Nagelkerke R Squared	0.647	0.744	0.734
Number of observation	28	28	36

Note: The significance of regression coefficients is indicated at 10%, 5%, and 1% levels using *, **, and * to represent significance. The Wald values are reported in parentheses next to the coefficients.**
Note 2: All answers are given on a Likert scale where 1 strongly disagrees.

Table 7- Logistic regression model

Some dummy variables were created using logistic regression to determine what correlation was present and identify relevant variables that influence these. The data was analyzed using logistic regression models to understand the impact of various independent variables on the dependent variable: the ability of officers to be spontaneous and inventive in coping with unforeseen events (Q6). The results of these analyses are summarized in Table 4.1, where three logistic regression models are compared. These variables were assessed across three logistic regression models to discern patterns and significance influencing officers' innovation and creativity.

Logistic regression models

In the initial model, the noteworthy predictors were Q3 and Q26, which demonstrated positive correlations with the dependent variable, as evidenced by their coefficients and significance levels (2.130*, 3.326**, respectively). This model yielded an Omnibus test statistic of 18.18 with a corresponding p-value of 0.001, suggesting a strong fit. The descriptive numbers determined by the Cox & Snell and Nagelkerke R Squared values were 0.478 and 0.647.

The second model included similar variables with the addition of Q67, school reform, which showed a significant negative relationship with the dependent variable (-2.748***). This model improved the goodness of fit from the first, with an Omnibus test statistic of 22.96 and a p-value of 0.001. The explanatory power also increased with Cox & Snell and Nagelkerke R Squared values at 0.549 and 0.744, respectively.3

The third model incorporated Q13 and Q10, along with the previous variables, with Q13 showing a notably strong positive impact on the dependent variable (3.353**). However, the Omnibus test statistic increased to 28.072 with a consistent p-value of 0.001, which points toward the model's increased complexity and fit. The model's descriptive power was slightly lower than the second model, with Cox & Snell and Nagelkerke values at 0.541 and 0.734, respectively.

Model comparison

The consistent significance of the p-values for the Omnibus tests across all models indicates the robustness of the models. The variation in Cox & Snell and Nagelkerke R-squared values across the models suggests that including different combinations of variables affects the amount of variance explained in the dependent variable. The negative number of Q67 shows that the school reform in the second and third models highlights a possible concern in intermediate management styles that could inhibit officers' creativity and innovation. In contrast, variables like Q3 and Q13 have a positive influence, suggesting that personal officers' attitudes and perceived organizational support play critical roles in enhancing officers' adaptability.

Conclusion

These findings underscore the importance of organizational context and individual officer attitudes in fostering an environment conducive to innovation and adaptability. The detailed analysis through logistic regression models provides valuable insights into the factors that significantly influence officer behavior in unpredictable situations. The findings in the logistic regression models show a better goodness of fit than the linear regression models. However, due to the limited sample size, the linear and logistic regression models should be evaluated carefully.

Findings

This chapter will examine the relevant portions of the survey to address the research question: "How do officers in the Royal Norwegian Navy predict the unforeseen and utilize innovation in problem solving?"

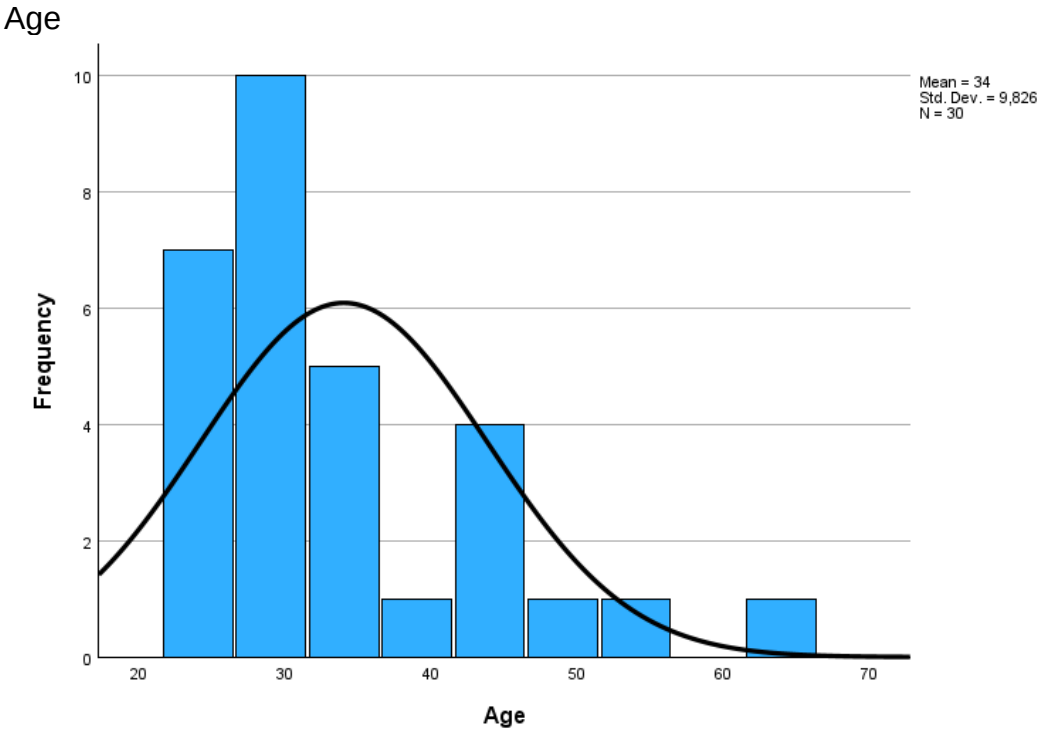

Figure 3- Age distribution

The most significant variable within the population is age, ranging from 24 to 62. Because the Naval Academy takes three years from start to finish, 24 is the lowest possible age for respondents. Sixty-two represents the other extrema, as this would indicate officers who have extended their contract beyond 60 years of age. The mean age is 34, while the distribution is positively skewed towards the younger officers. This means that the data, to a more significant degree, depicts the younger officers within the Navy.

Due to the limited sample size and age distribution, the distribution between pre- and post-reform respondents is expected. The first class of officers graduated post-reform in 2021. Of the 36 respondents, 69% attended the Naval Academy before educational reform. This is expected, as the median age is 30,5, and the cut-off for applying for the NDUC is 25, although older applicants are considered individually (Armed Forces, 2024).

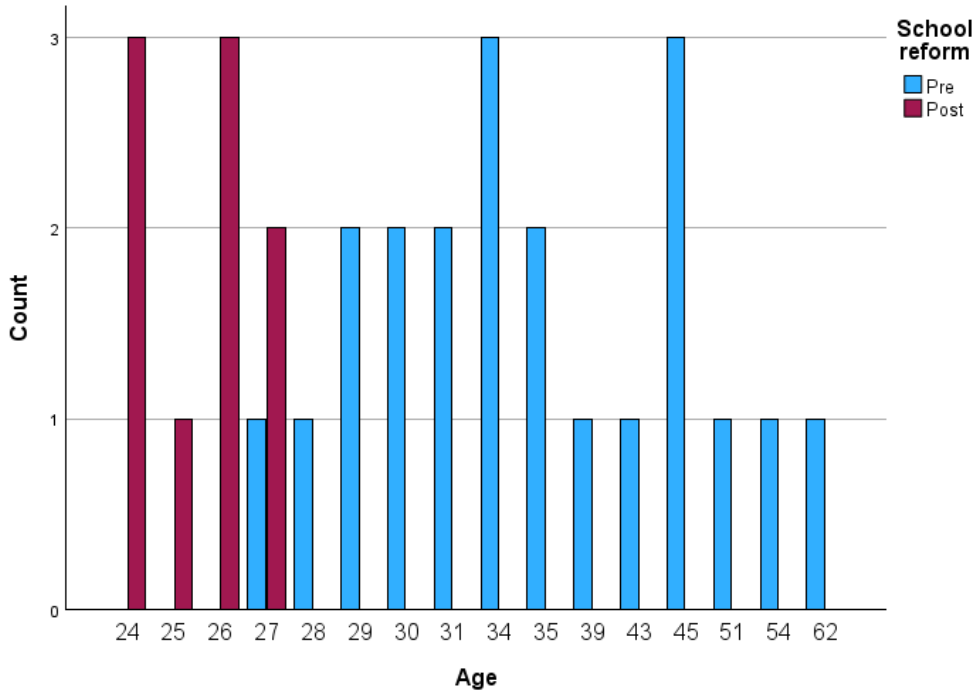

Figure 4- Respondents divided by reform

There were only two female respondents, resulting in a percentage of 5.56%. In 2020, there were 11.3% female officers. This number is likely to have increased somewhat since 2020, as the number of female applicants in 2024 was 33% (Armed Forces, 2024).

The survey did explore multiple factors to separate the respondents, but as (n) is limited, I have chosen to explore them by separating the groups before and after the school reform and age. Based on the data available, this was deemed the most appropriate, as the low number of respondents. This is likely due to the low number of respondents; however, the results are interpreted regardless.

School reform

The following results appear when performing a regression analysis using the new variables and grouping them by school reform. A methodology proposed by Jacobsen (2016) has been employed to evaluate the robustness of correlations. Jacobsen suggests a fundamental difference between social and natural sciences; hence, the strict requirements concerning the second cannot be applied to the first. Jacobsen suggests a more flexible approach that is better suited to social sciences. He recommends classifying correlations as weak, moderate, or strong based on their values. In this light, correlations below 0.30 are deemed weak, those between 0.30 and 0.50 fall under the moderate category, and correlations above 0.50 are considered

strong. This method offers a better understanding of the significance of correlations and the nature of the relationship between variables in social sciences.

Variable Pair	Method	Correlation	p-value	Highlight
School Reform & Median_Innovation_Individual	Kendall's Tau-b	0.346	0.033	
School Reform & Median_Innovation_Environment	Kendall's Tau-b	0.321	0.044	
School Reform & Median_Trust_Environment	Kendall's Tau-b	0.406	0.012	Highly Significant
School Reform & Median_Innovation_Individual	Spearman's Rho	0.361	0.031	
School Reform & Median_Innovation_Environment	Spearman's Rho	0.341	0.042	
School Reform & Median_Trust_Environment	Spearman's Rho	0.423	0.010	Highly Significant
Median_Unforeseen_Environment & Median_Trust_Environment	Spearman's Rho	0.408	0.014	

Table 8 - Correlation - School reform and new variables

The data collected offers some insights into the impact of school reform on innovation. The analysis shows a moderate positive correlation (correlation coefficient: 0.346, significance: 0.033) between school reform and individual innovation. The results also found a positive association (correlation coefficient: 0.321, significance: 0.044) between school reform and innovative environmental factors. Lastly, the data suggests a strong positive correlation (correlation coefficient: 0.406, significance: 0.012) between school reform efforts and increased levels of trust within the environment. These results indicate the significant

impact school reform can have on innovation and trust. Following the methods outlined, Jacobsen's approach to correlation reveals a medium to strong correlation for all values, notwithstanding the lack of significant statistical correlation in some instances.

Age

There are some differences in the results when age is used as the dependent variable. As there is a negative correlation between the variables, this suggests that as age increases, the capability within the other fields are lowered.

Kendall's Tau-b

Variable Pair	Correlation Coefficient	Significance Level	Highlighted
Age & Median_Unforeseen_Individual	-0.152	0.313	
Age & Median_Innovation_Individual	-0.013	0.929	
Age & Median_Innovation_Environment	-0.169	0.258	
Age & Median_Trust_Environment	-0.330	0.028	Highlighted
Age & Median_Unforeseen_Environment	-0.173	0.234	

Table 9 - Correlation table Age Kendall´s Tau-b

Spearman's Rho

Variable Pair	Correlation Coefficient	Significance Level	Highlighted
Age & Median_Unforeseen_Individual	-0.176	0.353	
Age & Median_Innovation_Individual	-0.028	0.882	
Age & Median_Innovation_Environment	-0.186	0.285	

Age & Median_Trust_Environment	-0.427	0.019	Highlighted
Age & Median_Unforeseen_Environment	-0.240	0.201	

Table 10 - Correlation table Age Spearman´s Rho

The analysis revealed a weak negative correlation between age and the ability to predict unforeseen events, with a correlation coefficient of -0.176 and a significance level of 0.353. This indicates that their perceived ability to foresee such events may decrease slightly as officers age. However, the lack of statistical significance suggests that age may not strongly determine this capability among the officers surveyed.

Similarly, the relationship between age and individual innovation showed a weak negative correlation, with a correlation coefficient of -0.028 and a significance level of 0.882. This finding implies that age has a negligible impact on the officers' innovation. When exploring the environmental aspect of innovation, age, and innovation within the environmental setting also displayed a weak negative correlation, with a coefficient of -0.186 and a significance level of 0.285. Like the previous findings, this correlation is not statistically significant, indicating that older officers' contribution to or perception of an innovative environment is not substantially different from their younger counterparts.

A notably stronger correlation was observed between age and the level of trust within the environment, where the correlation coefficient was -0.427 with a significance level of 0.019. This result is statistically significant and highlights a moderate negative correlation, suggesting that older officers perceive or contribute to trust within their operational environment differently than younger officers. This finding is critical as it implies that age could influence perceptions of trust, a fundamental component of teamwork and operational efficiency.

As the number of respondents is low and the linear test shows a noticeably lower statistical significance, these models must be evaluated carefully.

Discussion

This subchapter will discuss the logistic and linear regression results to assess how various factors influence officers' ability to predict the unforeseen and use innovation in problem-solving within the Royal Norwegian Navy. To address the research question, "How do officers in the Royal Norwegian Navy predict unforeseen events and employ innovation during problem-solving in operations?" the discussion is structured around two subsidiary research questions: "What influences the ability to predict the unforeseen?" and "What facilitates innovation?" The discussion is based on the study results. However, the limited number of respondents and low statistical significance of some results must be considered.

What Influences the Ability to Predict the Unforeseen?

School Reform: The results indicate that younger officers who graduated after the reform demonstrate a higher perceived ability to predict unforeseen events than their older colleagues. Although not critical, this ability is advantageous and is enhanced by decision-making processes like the OODA loop. The OODA loop relies heavily on interpreting surroundings, which is influenced by the ability to predict the unforeseen. The RBDM training enables officers to automate operations, allowing cognitive resources to interpret the surroundings (Boyd, 1996; Heiberg, 2023). The younger officers, who have younger intermediate leaders, appear to find themselves in an environment encouraging them to develop these skills more effectively. This could be due to updated training curricula emphasizing adaptability and responsiveness to unforeseen events. The reform's focus on developing cognitive skills and practical knowledge seems to have equipped younger officers with better tools to predict and manage unforeseen circumstances.

Age and Experience: Younger officers show greater creativity but lack the experience for effective RBV. Conversely, older officers possess more experience but less trust in their environment, which could decrease their inclination to explore new creative solutions. This reduced trust, linked to fear of accountability for deviating from procedures, may hinder their ability to innovate, as they fear reprisals (Rousseau et al., 1998). Trust is crucial in high-stress environments, and its decline with age negatively impacts the ability to innovate and utilize RBV effectively (Sjøvold, 2014; Kaufmann & Kaufmann, 2015). On the other, they are likely

to be more proficient in using OODA-loop and other observation techniques to evaluate and predict the unforeseen.

Results indicate that experience can sometimes lead to an overreliance on established methods and a reluctance to adapt to new situations. Older officers may rely on their tried-and-tested approaches, potentially overlooking novel solutions that younger, less experienced officers might consider. This dynamic suggests that while experience provides a solid foundation for decision-making, it must be balanced with openness to new ideas and methods.

Additionally, the results suggest that older officers might experience a decrease in environmental trust, which can further impede their ability to predict the unforeseen. This lack of trust could stem from a career's worth of navigating bureaucratic and procedural constraints, leading to a more rigid approach to problem-solving. Other factors that may influence this are expert knowledge and the fact that some things are best solved in a certain way. On the contrary, younger officers trained in a more flexible and innovative environment may find it easier to trust their surroundings and colleagues, enhancing their predictive abilities.

Generational Influence: Younger, post-reform officers report higher trust and innovation levels, suggesting that generational shifts positively influence the environment. The generational shift may contribute to a more supportive environment, increasing younger officers' perceived ability to predict unforeseen events (Herberg et al., 2018).

The generational shift within the Royal Norwegian Navy encourages an environment where trust and innovation can increase. Having been trained in a reformed educational system, younger officers bring fresh perspectives and a willingness to embrace change. However, this positive shift does not entirely negate the valuable experience older officers bring. A balanced approach that leverages the innovative potential of younger officers while integrating the wisdom and expertise of their older counterparts can create a robust and adaptive force. Encouraging mentorship and collaboration across generations can help bridge the gap between experience and innovation, enhancing the overall capability of the Navy to predict and manage unforeseen events.

What Facilitates Innovation?

Trust and Social Support

Trust within a team is paramount for fostering innovation. The study indicates a negative correlation between age and trust, with older officers potentially hindering innovation by adhering strictly to procedures and dismissing subordinates' ideas. High-functioning teams require an environment where ideas can be tested and implemented. Trust facilitates this by reducing fear of accountability and encouraging creative solutions (Sjøvold, 2014; Kaufmann & Kaufmann, 2015).

Creating a culture of trust within the Royal Norwegian Navy is essential for fostering innovation. Trust allows team members to feel secure in sharing their ideas and taking risks without fear of retribution. This psychological safety is crucial for innovation, as it encourages officers to think creatively and propose novel solutions. The study's findings suggest that younger officers benefit from a more trusting environment, likely contributing to their higher levels of reported innovation.

Moreover, trust is about interpersonal relationships, organizational culture, and leadership. Leaders who trust their subordinates and encourage open communication create an environment where innovation can flourish. This involves acknowledging and rewarding creative efforts, even if they occasionally lead to failure. By doing so, leaders can reinforce the value of innovation and create a positive feedback loop that further enhances trust and creativity.

Mental Fatigue and Performance

Long work hours and lack of sleep contribute to mental fatigue, impairing decision-making and reducing innovation. Stress, compounded by an environment lacking trust, further diminishes performance. A supportive environment that mitigates fatigue and stress can enhance officers' innovative capabilities (Caldwell et al., 2009; Flin et al., 2016).

Mental fatigue significantly impacts the ability to innovate and make sound decisions. Prolonged work periods without adequate rest can lead to decreased attention, impaired

cognitive function, and reduced creativity. Managing mental fatigue is crucial for maintaining performance and fostering innovation in the high-stress environment of military operations.

Implementing policies that promote work-life balance and ensure adequate rest periods can help mitigate the effects of mental fatigue. Additionally, providing resources for stress management and mental health support can enhance officers' ability to perform optimally. Creating a culture that values well-being and recognizes the impact of fatigue on performance can lead to a more resilient and innovative force.

Creativity and Risk-Taking

Creativity, openness to experience, and tolerance for uncertainty enhance divergent thinking and the generation of novel solutions. The capacity to take calculated risks is crucial for implementing these solutions. Younger officers, benefiting from higher trust and a supportive environment, exhibit increased creativity and innovation (Amabile, 1996; Anderson & West, 1998).

Encouraging creativity and risk-taking is essential for innovation. Officers open to new experiences and willing to take calculated risks are more likely to develop innovative solutions to complex problems. The study's findings suggest that younger officers operating in a more supportive and trusting environment are likelier to exhibit these traits.

Fostering an environment that encourages experimentation and tolerates failure is vital in enhancing creativity and innovation. This involves creating a culture where officers feel empowered to explore new ideas and challenge the status quo without fear of negative consequences. Providing opportunities for professional development and continuous learning can also enhance creativity and innovation by exposing officers to new concepts and approaches.

School Reform and Generational Shifts

The reform appears to correlate with increased trust and a supportive environment among younger officers. This positive generational influence is reflected in their greater innovation and trust levels. However, older officers' expertise and established ways of operating

may reduce the perceived need for innovation, potentially hindering creative problem-solving (West, 2002; Hülsheger et al., 2009).

The educational reform implemented at the Royal Norwegian Naval Academy has likely played a significant role in fostering a culture of innovation and trust among younger officers. The reform has emphasized the importance of adaptability, critical thinking, and collaborative problem-solving, creating an environment where innovation can thrive.

The reform's generational shift highlights the importance of continuous improvement in training and education. As the nature of military operations evolves, so must the training and development of officers. The Navy can ensure its officers are well-equipped to innovate and adapt to unforeseen events by continually updating training programs to reflect current best practices and emerging challenges.

Group Dynamics and Team Processes

Innovation is not limited to individual creativity; it also involves group dynamics and team processes. Teams with high levels of trust and open communication are more likely to generate and implement innovative ideas (Sjøvold, 2014). The study suggests that younger officers benefit from a more supportive team environment, likely contributing to their higher levels of reported innovation.

Creating high-functioning teams involves fostering a culture of collaboration and mutual respect. Encouraging diverse perspectives and leveraging each team member's unique strengths can lead to more comprehensive and innovative solutions. Team-building activities and leadership training emphasizing trust and collaboration can enhance group dynamics and facilitate innovation.

Leadership and Organizational Culture

Leadership plays a crucial role in shaping organizational culture and fostering innovation. Leaders who promote a culture of trust, openness, and continuous improvement create an environment where innovation can flourish (Kaufmann & Kaufmann, 2015). The study indicates that younger officers trained in this more supportive environment are likelier to exhibit innovative behaviors.

Effective leadership involves setting the vision and direction, empowering subordinates, and encouraging them to take initiative. Leaders who provide clear guidance while allowing for autonomy and creativity can enhance their teams' innovative capacity. Additionally, recognizing and rewarding innovative efforts reinforces the value of creativity and encourages a culture of continuous improvement.

Conclusion

The ability to predict unforeseen events and foster innovation in problem-solving within the Royal Norwegian Navy is influenced by several critical factors, including educational reform, age, trust, mental fatigue, creativity, and leadership. Younger officers benefiting from recent educational reform report higher levels of trust and innovation, suggesting that the reform has successfully created a more supportive and adaptive environment. In opposition, with their extensive experience, older officers may exhibit reduced trust and openness to new ideas, potentially hindering their innovative capacities. Creating a culture of trust and support is paramount for fostering innovation. Trust allows officers to feel secure in taking risks and sharing ideas, while a supportive environment mitigates the impacts of mental fatigue and stress. Encouraging creativity, risk-taking, and continuous learning further enhances officers' innovative capabilities. Leadership is crucial in shaping this environment, promoting a culture of openness, collaboration, and continuous improvement.

Adapting and innovating is essential in the high-stress and unpredictable environment of military operations. As Franklin D. Roosevelt appropriately said, "A smooth sea never made a skilled sailor." This proverb highlights the importance of challenging environments in developing the skills and resilience necessary for effective problem-solving and innovation. The Royal Norwegian Navy can enhance its operational effectiveness and preparedness for unforeseen challenges by fostering a culture that values trust, creativity, and continuous improvement.

Conclusion

This study explored how officers in the Royal Norwegian Navy predict unforeseen events and use innovation during problem-solving, especially after educational reform. The results suggest that the reform has positively impacted younger officers, enhancing their ability to innovate and manage unexpected situations.

"How do officers in the Royal Norwegian Navy predict unforeseen events and employ innovation during problem-solving in operations?"
The educational reform at the Royal Norwegian Naval Academy appears to have improved younger officers' ability to handle unforeseen events and innovate. The reform emphasizes skills like critical thinking, adaptability, and collaboration, which are essential for dealing with unexpected challenges. The study found that younger officers who have been through these new training programs report higher levels of trust and innovation. This suggests that the updated training is helping officers develop better problem-solving skills.

Creating an environment of trust is crucial for fostering innovation. Trust allows officers to take risks and share ideas without fear, while a supportive environment helps mitigate the impacts of mental fatigue and stress. The study indicates that younger officers feel more trust and cooperation in their working environments, essential for fostering innovation.

However, the study also found a difference between younger and older officers. Younger officers seem more innovative and adaptable than their older colleagues. While older officers have valuable experience, they may be less open to new ideas, which can hinder innovation. This points to the need for a balance between using the experience of older officers and encouraging them to be open to new approaches to maintain a dynamic and adaptable force.

Leadership plays a crucial role in creating an organizational culture that supports innovation. Leaders who foster a culture of trust, openness, and continuous improvement can create an environment where innovation thrives. Effective leadership involves empowering subordinates, encouraging them to take initiative, and recognizing their innovative efforts. The study suggests that younger officers trained in this supportive environment are more likely to be innovative, highlighting the importance of leadership in promoting a culture of innovation.

Limitations

While the study provides valuable insights, several limitations must be acknowledged. The sample size of 36 respondents is relatively small, which may affect the generalizability of the findings. The low response rate and the limited demographic representation, particularly the small number of female respondents, means that the study may not fully capture the diversity within the Royal Norwegian Navy. Furthermore, relying on self-reported data could introduce bias, as officers might overestimate their capabilities or align their responses with perceived expectations, potentially skewing the results.

The study's cross-sectional design offers a snapshot of the current state but does not allow for analysis of changes over time. This limitation means we cannot definitively say how the observed trends will evolve. A longitudinal approach could provide more robust insights into how educational reform and other interventions impact officers' abilities to predict and manage unforeseen events throughout their careers.

Another limitation is the study's primary focus on individual perceptions, which does not delve deeply into the organizational processes and structural factors that could influence innovation and decision-making. Understanding these organizational aspects could offer a more comprehensive picture of how to foster innovation and practical problem-solving within the Navy.

Conclusion

In conclusion, the educational reform at the NDUC seems to have positively impacted younger officers, enhancing their innovation and adaptability. The reform, focusing on critical thinking, adaptability, and teamwork, has created an environment that supports innovation and effective management of unforeseen events. Younger officers report higher levels of trust and innovation, suggesting that the updated training programs are helping them develop better problem-solving skills.

However, several limitations must be considered, such as the small sample size, low response rate, and limited demographic representation. Future research should address these limitations by conducting longitudinal studies, aiming for a broader demographic by allowing a more extended data collection period.

By addressing these findings and limitations, the Navy can continue to develop a capable and resilient force ready to handle future challenges. Encouraging mentorship and collaboration across generations, fostering a culture of trust and support, and continuously refining training programs will prepare officers to manage unforeseen events and drive innovation in problem-solving effectively.

Suggestions for Future Research:

1. **How do the capabilities of officers to predict unforeseen events and innovate evolve over their careers in the Royal Norwegian Navy?**
2. **What role does intermediate leadership play in facilitating or hindering the development of trust and innovation among junior officers in the Royal Norwegian Navy?**

Future research should address several areas to understand further and enhance officers' capabilities in handling unforeseen events and fostering innovation. Longitudinal studies could track cohorts of officers over time to assess the long-term impact of educational reform and other interventions. By observing how officers' abilities to predict unforeseen events and innovate evolve over their careers, researchers can gain more comprehensive insights into the effectiveness of the reform.

Additionally, future studies should aim for broader demographic representation to explore how factors such as gender, rank, and years of service influence the ability to predict and manage unforeseen events. This approach would help ensure that the findings are more representative of the diverse population, including both OF and OR, within the Royal Norwegian Navy.

Another area for future research is the impact of organizational culture on fostering innovation and adaptability among officers. Investigating the cultural elements that support or hinder these capabilities could provide actionable insights for organizational development.

Another important area for future research is the role of intermediate leadership in facilitating or hindering the development of trust and innovation among junior officers. Understanding

the dynamics at different leadership levels could help design targeted interventions to enhance organizational performance.

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Figures and tables

Annex 1

Declaration of use of AI (artificial intelligence)

I acknowledge the use of Grammarly in helping me review my writing at the final stage of preparing my thesis. I used the following features and prompts: Clarity, correctness, formality, “Suggest ways to make my writing more academic.” I critically reviewed Grammarly's feedback and, based on this, revised the writing using my own words and expressions, as well as Grammarly´s rewritten phrases, after careful consideration.

I have used ChatGPT to help gather research papers, using the ScholarAI plugin.

I have used ChatGPT to interpret some of the results and checked these results before using any interpretation. I critically reviewed ChatGPT’s feedback and, based on this, revised the writing using my own words and expressions, as well as Grammarly´s rewritten phrases, after careful consideration.

Annex 2

Indicators, questions

Emne	Spørsmål	Nøkkel fra Excel til Qaltrics	Spørreskjema
Background variables	What is your gender	Q37	Pål
Background variables	How old are you?	Q38	Pål
Background variables	What position or role do you have in your business?	Q39	Pål
Background variables	How many years have you worked in your current business?	Q40	Pål
Background variables	What education do you have? (max two intersections)	Q41	Pål
Background variables	What role do you have in your business? Multiple crosses possible	Q50	Pål (modifisert)
Background variables	What subject area/profession do you work within Several intersections possible	Q60	
Competence development	In my business, we have scenarios where we practice improvising	(Tidligere Q10)	UNMETH (modifisert)
Competence development	My business trains to observe relevant details during events	(Tidligere Q11)	UNMETH (modifisert)
Competence development	In my business, we learn to handle unforeseen events	(Tidligere Q8)	UNMETH (modifisert)
Competence development	In my work, we learn to identify trends that may affect the future	(Tidligere Q9)	UNMETH (modifisert)
Competence development	Ta stilling til følgende påstander:	Q8, Matrise	UNMETH (modifisert)
Competence for management of entr	My immediate managers have the ability to describe visions of the future	Q24 (tidligere Q62)	Konstepanalyse, entrepreneural leadership
Competence for management of entr	My immediate managers inspire and stimulate employees to see opportunities and solutions	Q25 (tidligere Q63)	Konstepanalyse, entrepreneural leadership
Competence for management of entr	My immediate managers are willing to take risks and stimulate employees to take risks (with respect for life and health)	Q26 (tidligere Q64)	Konstepanalyse, entrepreneural leadership
Culture of innovation	In my business, there is a culture of trial and error	Q20	Innovasjonsbarometeret (modifisert)
Culture of innovation	In my business, we work systematically to learn from our mistakes	Q21	Innovasjonsbarometeret
Culture of innovation	In my business, we have developed routines and structures that support the development of new ideas and forms of cooperation	Q22	Innovasjonsbarometeret
Culture of innovation	In my business, innovation and initiative are encouraged	Q23	Innovasjonsbarometeret (modifisert)
Innovation	The main task of employees in my business is to work with innovation	Q18	Innovasjonsbarometeret (modifisert)
Innovative environment	Take a position on the following statements: My business...	Q17	UNMETH (modifisert)
Innovative environment	... can react spontaneously to stop a threatening situation	Q17_1 (Tidligere Q24)	UNMETH (modifisert)
Innovative environment	... are willing to risk criticism from others for introducing new ways of doing things in the face of unforeseen challenges	Q17_2 (Tidligere Q25)	UNMETH (modifisert)
Innovative environment	... has the ability to break pattern	Q17_3 (Tidligere Q26)	UNMETH (modifisert)
Innovative environment	... can easily rearrange as needed	Q17_4 (Tidligere Q27, modifisert)	UNMETH (modifisert)
Innovative environment	... take all observed signs of the need for change seriously and investigate these further	Q17_5 (Tidligere Q29)	UNMETH (modifisert)
Interaction	My business has the ability to exchange and exploit the employees' unique expertise	Q12	UNMETH (modifisert)
Interaction	In my business, most people trust each other	Q13	UNMETH (modifisert)
Interaction	In my business, we have developed an open flow of information	Q14	UNMETH (modifisert)
Interaction	My business cooperates with external actors (eg. Clients, customers, competitors, consultants)	Q15	UNMETH (modifisert)
Interaction	My business is trying to achieve a shared situational awareness during an unseen incident	Q16	UNMETH (modifisert)
Learning along the way	Employees in my business have the ability to exploit spontaneous situations for learning	Q10	UNMETH (modifisert)
Learning along the way	In my business, we set aside enough time and resources to learn along the way from situations that arise	Q11	UNMETH (modifisert)
Learning along the way	My business has thorough reviews (debrief) of the sequence of events to learn from an unforeseen event	Q9	UNMETH (modifisert)
Relationship with the unforeseen	In my business, we have a clear perception of what is meant by unforeseen events	Q1	UNMETH (modifisert)
Relationship with the unforeseen	In my business, we have contingency plans for unforeseen events	Q2	UNMETH (modifisert)
Relationship with the unforeseen	Employees in my business are familiar with the contingency plans for unforeseen events	Q3	UNMETH (modifisert)
Self-efficacy	I feel confident that I can handle unforeseen events effectively	Q33	UNMETH
Self-efficacy	I have good abilities to make decisions in difficult situations	Q34	UNMETH
Self-efficacy	I am good at giving others support in challenging situations	Q35	UNMETH (modifisert)
Social support	My immediate manager gives me the support I feel I need in my daily work	Q27	UNMETH
Social support	My immediate manager likes to hear what I think in a work context	Q28	UNMETH
Social support	I rely on my colleagues to support me in my daily work when I need it	Q36	UNMETH
Types of competence	Consider the following statements:	Q19 (tidligere Q51-61)	
Types of competence	My business values bodily skills	Q19_1	Konsetpanalyse, knowledge articulation
Types of competence	My business manages to articulate bodily experiences into shared learning	Q19_2	Konsetpanalyse, knowledge articulation
Types of competence	My business values critical and provocative thinking and solutions	Q19_3	Konseptanalyse, creativity (modifisert)
Types of competence	My business appreciates non-traditional thinking and mannerisms	Q19_4	Konseptanalyse, creativity (modifisert)
Types of competence	I manage to simplify complex challenges to get an overview	Q29	Konseptanalyse, divergent thinking (modifisert)
Types of competence	I am able to explore new ideas by "thinking outside the box"	Q30	Konseptanalyse, divergent thinking (modifisert)
Types of competence	I am good at imagining a situation in the future, and seeing the development steps from the current situation to the situation in the fu	Q31	Konseptanalyse, divergent thinking (modifisert)
Types of competence	I am good at transferring previous knowledge and experiences (team skills, subject knowledge, emotions, social skills, digital compet	Q32	Konseptanalyse, divergent thinking (modifisert)
Types of competence	Consider the following statements:	Q57	Konseptanalyse
Types of competence	My business encourages employees to take advantage of opportunities that arise randomly, while we work on something else	Q57_1	Konseptanalyse, serendipity (modifisert)
Types of competence	My business encourages sharing experience and knowledge in different ways (drawings, music, dance and more)	Q57_2	Konsetpanalyse, knowledge articulation
Types of competence	My business encourages creative thinking	Q57_3	Konseptanalyse, creativity (modifisert)
Types of competence	Consider the following statements:	Q58	Konseptanalyse
Types of competence	My business facilitates and gives time and space to fantasize/play with thoughts and ideas	Q58_1	Konseptanalyse, imagination
Types of competence	... stimulates to use many different scenarios (without ties to what we usually do) in learning processes	Q58_2	Konseptanalyse, imagination (modifisert)
Types of competence	My business accepts the use of humor, irony, and indirect expressions (metaphors) as tools	Q58_3	Konseptanalyse, imagination
Types of competence and learning	In my business, we have plans for training and training in emergency preparedness for unforeseen events	Q4	UNMETH (modifisert)
Types of competence and learning	Employees in my business have expertise that is relevant for handling unforeseen events	Q5	UNMETH (modifisert)
Types of competence and learning	Employees in my business have the ability to be spontaneous and inventive to cope with unforeseen events	Q6	UNMETH (modifisert)
Types of competence and learning	mployees in my business have the competence to find new and unfamiliar solutions to challenges that are relevant to the business	Q7	UNMETH (modifisert)

Annex 3
E-mail request

E-mail header removed due to Security Act

Hei! Beklager bredt nedslagsfelt og lang innskyting – denne mailen gjelder kun de som har gått på Sjøkrigsskolen!

I forbindelse med min masteroppgave ved USN, ønsker jeg veldig gjerne at de med utdanning fra Sjøkrigsskolen svarer på spørreundersøkelsen under!

Jeg forsker på offiserer evne til å forutse det uforutse og bruke innovasjon i problemløsning.

Bruk bit.ly/4axt22 lenken for å komme til spørreundersøkelsen

På forhånd, takk!

Med vennlig hilsen

Jens Christian Hossmann

Kjære kolleger ved USN/Dear colleagues at USN!

Anmodning om å svare på spørreskjema: *Kompetanse for det uforutsette og innovasjon*
Ved å svare bidrar du til viktig grunnforskning på et nyere forskningsfelt.

Leif Inge Magnussen (TNM/MO), Ole Boe (HH) og jeg, Glenn-Egil Torgersen (HIU/IPED) er med i en gruppe forskere fra USN og NIFU (Nordisk institutt for studier av innovasjon, forskning og utdanning)
som jobber med et NFR-finansiert grunnforskningsprosjekt om det uforutsette og innovasjon. NFR (Norsk Forskningsråd) honorerte søknaden med toppkarakter (7) på alle vurderingsfaktorer.

I dette prosjektet har vi utviklet et validert spørreskjema, som vi sender ut til ulike organisasjoner innen utdanning, forskning, næringsliv og skoler, inkludert utvalgte departementer. Tema bør engasjere alle
som jobber med nytenkning, utdanning og forskning. Svarene er anonyme, både mht. organisasjon og person, også ved analyse og rapportering. Vi er ute etter generelle sammenhenger i kompetansestrukturer,
som vi måler via spørsmålene i skjemaet.

Prosjektet er innmeldt til SIKT (Kunnskapssektorens tjenesteleverandør). Vi har fått aksess av USN til å sende ut denne anmodningen til alle ansatte på universitetet. For å komme til spørreskjema,
klikk på lenken under – hvor du kan velge språk (NO/ENG):
~~Til spørreskjemaet~~

All informasjon blir gitt på selve spørreskjemaet. Du kan gå ut og inn av skjemaet, og fortsette senere der du slapp ved å trykke på samme lenke. Svarene sendes ikke inn før du klikker på «send inn» til slutt i skjemaet.
Fint om du kan fullføre spørreskjemaet innen 2 uker.

Resultatene vil bli publisert i vitenskapelige artikler. Ikke nøl med å ta kontakt med oss for spørsmål eller dialog om status i forskningen og foreløpige funn. *På forhånd takk!*

Med vennlig hilsen,
Prof. Glenn-Egil Torgersen (92017363)**,** prof. Leif Inge Magnussen (95751814)**,** prof. Ole Boe (47023634)

Annex 4

AVTALE OM BRUK AV SPØRREUNDERSØKELSE OG DATA

1. Avtalen er inngått mellom Jens Christian Hossman (student ved Master in Maritime management ved USN) og prosjektet Education for the Unforeseen (ED-Unf) ved Prof. Glenn-Egil Torgersen (USN). Veileder er Prof. Leif Inge Magnussen (USN).

2. Avtalen regulerer eierskap og bruk av data. Studenten (JCH) gis tillatelse til å benytte DU/INN-spørreskjema (nettskjema, 2024) i forbindelse med sitt masterarbeid for innsamling av data i Sjøforsvaret.

3. Innkomne data fra Sjøforsvaret kan brukes av JCH i arbeidet med avhandlingen. All annen bruk av JCH eller Forsvaret, må avtales med Ed-Unf/Torgersen og Magnussen.

4. Dataene som studenten (JCH) samler inn ved bruk av DU/INN-skjemaet kan også brukes i forskningsprosjektet (ED-Unf), hvor dataene analyseres og publiseres anonymt mht spesifikk organisasjon (eks. Sjøforsvaret) og person.

5. Dataene vil under pkt 4, sorteres under overordnede funksjoner/organisasjoner (eks. beredskap/Forsvar, hvor data fra Sjøforsvaret kombineres (summeres) anonymt med andre tilsvarende generelle organisasjoner, slik at data fra Sjøforsvaret *ikke* vil fremgå spesifikt.

6. Hvis en komparativ analyse ønskes (mellom eks. data fra Sjøforsvaret og samlet datagrunnlag/andre grupper), må dette avtales spesielt.

7. Ved en eventuell publisering av artikler/bøker basert på det spesifikke arbeidet/data til JCH, vil JCH krediteres med navn hvis han er medforfatter.

8. Ved publisering av generiske data, slik som gitt under pkt 4/5 , og JCH ikke er medforfatter, oppgis (hvis samtykke/ønskelig) at deler av datagrunnlaget er innsamlet med støtte fra JCH, under artikkelens Ethics Statement/Contributions.

9. Forskningen gjennomføres «til samfunnets beste», og ved behov for endringer i avtalen, justeres denne etter samtykke fra denne avtalens navngitte aktører.

Vi ser frem til vider samarbeid og grunnforsking til samfunnets beste.

Halden/Oslo
Sign

Annex 5

The unforeseen innovation competence 10.10.2023

Start of Block: Introduksjon

Q66 Norsk:
Før du begynner kan du kan velge språk i nedtrekkslista til høyre

English:
Before you start you can choose the language in the dropdown menu to the right

Page Break

Q_intro_Text EVNEN TIL Å HÅNDTERE UFORUTSETTE HENDELSER OG INNOVASJON

Her er viktig informasjonen til deg som skal svare på spørreskjemaet:

Introduksjon til spørreskjemaet

Hensikten med spørreskjemaet er å undersøke hvilken kompetanse som brukes ved å tenke nytt i situasjoner der personer og virksomheter møter uforutsette hendelser og igangsetter innovative prosesser. Vi undersøker også om det er noen sammenhenger mellom kompetanse for håndtering av uforutsette hendelser og innovasjon.

Spørreundersøkelsen er en del av et flerårig forskningsprosjekt «Educating for the unforeseen» finansiert av Norges forskningsråd.

Det tar ca. 30 minutter å svare på spørreskjemaet. Du kan gå ut og inn av spørreskjemaet, og fortsette senere der du slapp ved å trykke på samme lenke.

Viktige ord og uttrykk

En **uforutsett hendelse** er en hendelse som opptrer sjeldent og plutselig og som ikke er planlagt eller forventet. Det kan være store hendelser som pandemier eller krig, eller mindre hendelser som en langtidssykemelding hos en ansatt eller en omdømmesak i media. Det kan også være overraskende hendelser i en undervisningssituasjon eller i en produktutviklingsfase, hvor hendelsen kan utnyttes til læring.

Innovasjon skjer når nye kombinasjoner av ny eller eksisterende kunnskap, ressurser, utstyr og andre faktorer får virke sammen og bidrar til en positiv og nyttig endring for en eller flere målgrupper. Det kan skje med store steg av gangen, eller gradvis.

Med **virksomheten din** menes organisasjonsenheten (f.eks. bedrift, divisjon, offentlig enhet, avdeling, skole, institutt osv.) som du føler størst tilhørighet til.

Kompetanse er et samlebegrep for kunnskap, forståelse, ferdigheter, egenskaper, holdninger og verdier.

Hvem er ansvarlig for spørreundersøkelsen?

Spørreundersøkelsen gjennomføres av Nordisk Institutt for studier av innovasjon, forskning og utdanning (NIFU) og Universitetet i Sørøst-Norge (USN). Prosjektet inkluderer innovasjonsforskere fra NIFU og forskere spesialisert innenfor pedagogikk og arbeids- og organisasjonspsykologi.

Hva innebærer det for deg å delta?

Ved å delta i spørreundersøkelsen bidrar du til å utvikle ny kunnskap om håndtering av uforutsette utfordringer. Det å delta innebærer at du besvarer og sender inn dette spørreskjemaet. Spørreskjemaet inneholder spørsmål og påstander knyttet til hvor godt forberedt din virksomhet er til å håndtere uforutsette hendelser, samt sosiale og individuelle faktorer relatert til dette.

Konfidensialitet og frivillighet

All informasjon behandles konfidensielt, og det er frivillig å delta i spørreundersøkelsen. Du kan når som helst trekke deg fra undersøkelsen uten å oppgi noen grunn. Dersom du velger å trekke deg, vil alle opplysninger om deg bli slettet. Innsamlede opplysninger fra spørreundersøkelsen skal kun brukes til forskning og vitenskapelig publisering.

Det vil ikke bli spurt om person- eller organisasjonsnavn. Spørreundersøkelsen er således anonym. Hvis du ønsker å bli kontaktet for oppfølging/intervju senere kan du oppgi navn og epost til slutt i spørreskjemaet.

Samtykke og informasjon om spørreskjemaet

Du samtykker til å delta i spørreundersøkelsen ved å besvare spørreskjemaet. Hvis du har spørsmål til spørreundersøkelsen eller andre deler av forskningsprosjektet, ta kontakt med:

Torstein de Besche (e-post: torstein.de.besche@nifu.no, mobil: 936 60 734), eller
Dorothy Sutherland Olsen (e-post: dorothy.olsen@nifu.no, mobil: 906 49 500), eller
Glenn-Egil Torgersen (e-post: Glenn-Egil.Torgersen@usn.no, mobil: 920 17 363), eller
Ole Boe (e-post: Ole.Boe@usn.no, Ole.Boe@phs.no, mobil: 47023634), eller
Leif Inge Magnussen (e-post: Leif.Magnussen@usn.no, mobil: 95751814), eller
Herner Sæverot (e-post: Herner.Severot@hvl.no, mobil: 41616182)

Spørreskjemaet kan ikke kopieres helt eller delvis uten samtykke fra prosjektet (USN og NIFU).

Takk for at du deltar og bidrar til viktig grunnforskning til samfunnets beste

Q_intro_Text THE ABILITY TO HANDLE UNFORESEEN EVENTS AND INNOVATION

Here is some important information for you to answer the questionnaire:

Introduction to the questionnaire

The purpose of the questionnaire is to investigate which competencies are used to innovate in situations where individuals and companies encounter unforeseen events and initiate innovative processes. We also investigate whether there are any correlations between competence for handling unforeseen events and innovation.

The survey is part of a multi-year research project «Educating for the unforeseen» funded by the Research Council of Norway.

Important words and expressions

An **unforeseen** event is an event that occurs rarely and suddenly and is not planned or expected. They can be major events such as pandemics or war, or minor events such as an officer going on long-term sick leave or a reputational issue in the media. It can also be surprising events in a teaching situation or in a product development phase, where the event can be used for learning.

Innovation happens when new combinations of new or existing knowledge, resources, equipment and other factors come together and contribute to a positive and useful change for one or more target groups. Innovation can occur gradually or suddenly.

Your **organisation refers to your workplace** (e.g. company, division, public entity, department, school, institute, etc.) to which you feel the greatest affinity.

Competence is a collective term for knowledge, understanding, skills, characteristics, attitudes, and values.

Who is responsible for the survey?

The survey is being conducted by the Nordic Institute for Studies in Innovation, Research and Education (NIFU) and the University of South-Eastern Norway (USN). The project includes innovation researchers from NIFU and researchers specializing in pedagogy and work and organizational psychology.

What does it mean for you to participate?

By participating in the survey, you are contributing to the development of new knowledge about handling unforeseen challenges. Participating means that you answer and submit this questionnaire. The questionnaire contains questions and statements related to how well prepared your company is to handle unforeseen events, as well as social and individual factors related to this.

Confidentiality and voluntariness

All information is treated confidentially and participation in the survey is voluntary. You can withdraw from the survey at any time without giving any reason. If you choose to withdraw, all information about you will be deleted. Information collected from the survey will only be used for research and scientific publication. Responses from individuals, and possibly organizational names, will be anonymized in all forms of publication.

Consent and information about the questionnaire

You agree to participate in the survey by completing the questionnaire. If you have any questions about the questionnaire or other parts of the research project, please contact:

Torstein de Besche (e-post: torstein.de.besche@nifu.no, mobil: + 47 936 60 734), or
Dorothy Sutherland Olsen (e-post: dorothy.olsen@nifu.no, mobil: + 47 906 49 500), or
Glenn-Egil Torgersen (e-post: Glenn-Egil.Torgersen@usn.no, mobil: + 47 920 17 363), or
Ole Boe (e-post: Ole.Boe@usn.no, Ole.Boe@phs.no, mobil: + 47 47023634), or
Leif Inge Magnussen (e-post: Leif.Magnussen@usn.no, mobil: + 47 95751814), or
Herner Saeverot (e-post: Herner.Severot@hvl.no, mobil: + 47 41616182)

The questionnaire may not be copied in whole or in part without the consent of the project (USN and NIFU).

Thank you for participating and contributing to crucial fundamental research for the benefit of society!

End of Block: Introduksjon

Start of Block: Block 15

Q55 Vi er opptatt av dine personlige vurderinger og at du svarer ut fra egne erfaringer.

Q55 We are interested in your personal assessments and that you answer based on your own experiences.

End of Block: Block 15

Start of Block: FORHOLD TIL DET UFORUTSETTE

Q1 I min virksomhet har vi en klar oppfatning av hva som menes med uforutsette hendelser

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q1 In my organisation, we have a clear understanding of what is meant by unforeseen events

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

Q2 I min virksomhet har vi beredskapsplaner for uforutsette hendelser

- Svært enig (5)
- Enig (4)
- Verken enig eller uenig (3)
- Uenig (2)
- Svært uenig (1)

Q2 In my organisation, we have contingency plans for unforeseen events

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

End of Block: FORHOLD TIL DET UFORUTSETTE

Start of Block: GRUNNKAPASITET FOR DET UFORUTSETTE

Display This Question:

If Q2 = Svært enig

Or Q2 = Enig

Q3 Ansatte i min virksomhet kjenner til beredskapsplanene for uforutsette hendelser

- ○ Svært enig (1)
- ○ Enig (2)
- ○ Verken enig eller uenig (3)
- ○ Uenig (4)
- ○ Svært uenig (5)

Q3 Officers in my organisation are aware of the contingency plans for unforeseen events

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Neither agree nor disagree (3)
- ○ Disagree (4)
- ○ Strongly disagree (5)

End of Block: GRUNNKAPASITET FOR DET UFORUTSETTE

Start of Block: Kompetansetyper og læring

Q4 I min virksomhet har vi planer for opplæring og trening innen beredskap for uforutsette hendelser

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q4 In my organisation, we have plans for training and practice emergency preparedness for unforeseen incidents

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

Q5 Ansatte i min virksomhet har kompetanse som er relevant for å håndtere uforutsette hendelser

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q5 Officers in my organisation have the relevant competence to deal with unforeseen incidents

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

Page Break

Q6 Ansatte i min virksomhet har evne til å være spontane og oppfinnsomme for å håndtere uforutsette hendelser

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q6 Officers in my organisation have the ability to be spontaneous and resourceful to deal with unforeseen incidents

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

Page Break

Q92_TEXT Kompetanse og kommunikasjon i din virksomhet

Q92_TEXT Competence and communication in your organisation

Q7 Ansatte i min virksomhet har kompetanse til å finne nye og uvante løsninger på utfordringer som er relevante for virksomheten

- Svært enig (5)
- Enig (4)
- Verken enig eller uenig (3)
- Uenig (2)
- Svært uenig (1)

Q7 Officers in my organisation have the competence to find new and unfamiliar solutions to challenges which are relevant to the organisation

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

End of Block: Kompetansetyper og læring

Start of Block: Kompetanseutvikling

Q8 Ta stilling til følgende påstander:

	Ja (1)	Nei (2)	Vet ikke (3)
I min virksomhet lærer vi å håndtere uforutsette hendelser (1)	○	○	○
I min virksomhet lærer vi å identifisere utviklingstrekk som kan påvirke framtiden (2)	○	○	○
I min virksomhet har vi scenarier der vi trener på å improvisere (3)	○	○	○
Min virksomhet trener på å observere relevante detaljer under hendelser (4)	○	○	○

Q8 Consider the following statements:

	Yes (1)	No (2)	Don't know (3)
In my organisation, we learn to deal with unforeseen incidents (1)	○	○	○
In my organisation, we learn to identify trends that can affect the future (2)	○	○	○
In my organisation, we have scenarios where we practice improvisation (3)	○	○	○
My organisation practices observing relevant details during incidents (4)	○	○	○

End of Block: Kompetanseutvikling

Start of Block: Underveislæring

Q9 Min virksomhet har grundige gjennomganger (debrief) av hendelsesforløpet for å lære av en uforutsett hendelse

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q9 My organisation has thorough debriefs to learn from an unforeseen incident

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

Q10 Ansatte i min virksomhet har evne til å utnytte spontane situasjoner til læring

- Svært enig (5)
- Enig (4)
- Verken enig eller uenig (3)
- Uenig (2)
- Svært uenig (1)

Q10 Officers in my organisation have the ability to use spontaneous situations to learn

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

Page Break

Q11 I min virksomhet setter vi av nok tid og ressurser til å lære underveis av situasjoner som oppstår

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q11 In my organisation, we make room for time and resources to learn during situations that arise

- Strongly agree (5)
- Agree (4)
- Neither agree nor disagree (3)
- Disagree (2)
- Strongly disagree (1)

End of Block: Underveislæring

Start of Block: Samhandling

Q12 Min virksomhet har evne til å utnytte og utveksle ansattes unike kompetanse

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q12 My organisation utilizes the unique competencies of their officers

- Strongly agree (5)
- Agree (4)
- Neither agree nor disagree (3)
- Disagree (2)
- Strongly disagree (1)

Q13 I min virksomhet har de fleste tillit til hverandre

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q13 In my organisation, most people trust one another

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

Page Break

Q14 I min virksomhet har vi utviklet åpen informasjonsflyt

- Svært enig (5)
- Enig (4)
- Verken enig eller uenig (3)
- Uenig (2)
- Svært uenig (1)

Q14 Information flows freely in my organisation

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

Q15 Min virksomhet samarbeider med eksterne aktører (f.eks. klienter, kunder, konkurrenter, konsulenter)

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q15 My organisation collaborates with external stakeholders (e.g. clients, customers, competitors, consultants, educators, researchers)

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

Page Break

Q16 Min virksomhet prøver å få til en felles situasjonsforståelse under en uforutsett hendelse

- Svært enig (5)
- Enig (4)
- Verken enig eller uenig (3)
- Uenig (2)
- Svært uenig (1)

Q16 My organisation tries to achieve a common situational understanding during an unforeseen incident

- Strongly agree (5)
- Agree (4)
- Neither agree nor disagree (3)
- Disagree (2)
- Strongly disagree (1)

End of Block: Samhandling

Start of Block: Innovativt miljø, improvisasjon

Q17 Ta stilling til følgende påstander:

	Svært uenig (1)	Uenig (2)	Verken enig eller uenig (3)	Enig (4)	Svært enig (5)
Min virksomhet kan reagere spontant for å stoppe en truende situasjon (2)	○	○	○	○	○
Min virksomhet er villig til å risikere kritikk fra andre for å introdusere nye måter å gjøre ting på (3)	○	○	○	○	○
Min virksomhet har mulighet til å bryte mønster (1)	○	○	○	○	○

Min virksomhet kan lett omorganisere seg etter behov (4)	○	○	○	○	○
Min virksomhet tar alle tegn på endringsbehov på alvor og undersøker disse nærmere (5)	○	○	○	○	○

Q17 Consider the following statements

	Strongly agree (1)	Agree (2)	Neither agree nor disagree (3)	Disagree (4)	Strongly disagree (5)
My organisation can react spontaneously to stop a threatening situation (2)	○	○	○	○	○
My organisation is willing to risk criticism from others to introdue new ways of doing things (3)	○	○	○	○	○
My organisation has the opportunity to break patterns (1)	○	○	○	○	○

My organisation can easily reorganize itself when needed (4)	○	○	○	○	○
My organisation takes all signs of the need for change seriously and investigates them closer (5)	○	○	○	○	○

End of Block: Innovativt miljø, improvisasjon

Start of Block: Innovasjon

Q18 Ansatte i min virksomhet har som hovedoppgave å jobbe med innovasjon

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q18 Officers in my organisation have innovation as their primary task

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

End of Block: Innovasjon

Start of Block: Andre karakteristikker ved din virksomhet (kompetansetyper)

Q101 **Kjennetegn ved din virksomhet**

Q101 **Characteristics of your organisation**

Q19 Ta stilling til følgende påstander:

	Svært uenig (1)	Uenig (2)	Verken enig eller uenig (3)	Enig (4)	Svært enig (5)
Min virksomhet verdsetter kroppslige ferdigheter (1)	○	○	○	○	○
Min virksomhet klarer å sette ord på kroppslige erfaringer til felles læring (2)	○	○	○	○	○
Min virksomhet verdsetter kritisk og provoserende tenkning og løsningsmåter (3)	○	○	○	○	○

Min virksomhet setter pris på utradisjonell tenkning og væremåter (4)	○	○	○	○	○

Q19 Consider the following statements

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
My organisation values physical skills (1)	○	○	○	○	○
My organisation is able to articulate physical experiences for shared learning (2)	○	○	○	○	○
My organisation values critical and provocative thinking and solutions (3)	○	○	○	○	○

My organisation values non-traditional thinking and ways of being (4)	○	○	○	○	○

Q57 Ta stilling til følgende påstander:

	Svært uenig (1)	Uenig (2)	Verken enig eller uenig (3)	Enig (4)	Svært enig (5)
Min virksomhet oppfordrer ansatte til å utnytte muligheter som oppstår tilfeldig, mens vi jobber med noe annet (1)	○	○	○	○	○
Min virksomhet oppfordrer til å dele erfaring og kunnskap på ulike måter (tegninger, musikk, dans og annet) (2)	○	○	○	○	○

Min virksomhet oppfordrer til kreativ tenking (3)	○	○	○	○	○

Q57 Consider the following statements:

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
My organisation encourages officers to take advantage of coincidental opportunities while working on something else (1)	○	○	○	○	○
My organisation encourages sharing experiences and knowledge in different ways (drawings, music, dance and others) (2)	○	○	○	○	○

My organisation encourages creative thinking (3)	○	○	○	○	○

Q58 Ta stilling til følgende påstander:

	Svært uenig (1)	Uenig (2)	Verken enig eller uenig (3)	Enig (4)	Svært enig (5)
Min virksomhet tilrettelegger for og gir tid og rom til å fantasere/leke med tanker og ideer (1)	○	○	○	○	○
Min virksomhet stimulerer til å bruke mange ulike scenarier (uten bindinger til det vi pleier å gjøre) i læringsprosesser (2)	○	○	○	○	○
Min virksomhet aksepterer bruk av humor, ironi, og indirekte uttrykk (metaforer) som virkemidler (3)	○	○	○	○	○

Q58 Consider the following statements:

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
My organisation facilitates and provides time and space to fantasise/play with thoughts and ideas (1)	○	○	○	○	○
My organisation encourages the use of many different scenarios in learning processes (2)	○	○	○	○	○

My organisation accepts the use of humor, irony, and indirect expressions (metaphors) as tools (3)	○	○	○	○	○

End of Block: Andre karakteristikker ved din virksomhet (kompetansetyper)

Start of Block: Kultur for innovasjon

Q20 I min virksomhet er det kultur for å prøve og feile

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q20 In my organisation, there is a culture for trial and error

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

Q21 I min virksomhet arbeider vi systematisk med å lære av våre feil

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q21 In my organisation, we work systematically to learn from our errors

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

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Q22 I min virksomhet har vi utarbeidet rutiner og strukturer som støtter utvikling av nye ideer og samarbeidsformer

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q22 In my organisation, we have developed routines and structures supporting the development of new ideas and forms of collaboration

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

Q23 I min virksomhet oppfordres det til nytenking og initiativ

- Svært enig (5)
- Enig (4)
- Verken enig eller uenig (3)
- Uenig (2)
- Svært uenig (1)

Q23 In my organisation, novel thinking and initiative are encouraged

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

End of Block: Kultur for innovasjon

Start of Block: Ledere

Q96 Hvor enig eller uenig er du i hvert av disse utsagnene om hjelp og støtte du får fra din nærmeste leder?

Q96 How much do you agree or disagree with each of these statements about the help and support you receive from your closest leader?

Q24 Min nærmeste leder har evne til å beskrive visjoner om fremtiden

- Svært enig (1)
- Enig (2)
- Verken enig eller uenig (3)
- Uenig (4)
- Svært uenig (5)

Q24 My closest leader has the ability to describe visions of the future

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Neither agree nor disagree (3)
- ○ Disagree (4)
- ○ Strongly disagree (5)

Q25 Min nærmeste leder inspirerer og stimulerer ansatte til å se muligheter og løsninger

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q25 My closest leader inspires and encourages officers to see opportunities and solutions

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

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Q26 Min nærmeste leder er risikovillig og stimulerer medarbeidere til å ta risiko (med respekt for liv og helse)

- Svært enig (5)
- Enig (4)
- Verken enig eller uenig (3)
- Uenig (2)
- Svært uenig (1)

Q26 My closest leader is willing to take risks and encourages officers to take risks (respecting life and health)

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

Q27 Min nærmeste leder gir meg den støtten jeg føler at jeg trenger i mitt daglige arbeid

- Svært enig (5)
- Enig (4)
- Verken enig eller uenig (3)
- Uenig (2)
- Svært uenig (1)

Q27 My closest leader gives me the support I feel I need in my daily work

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

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Q28 Min nærmeste leder liker å høre hva jeg mener i jobbsammenheng

- Svært enig (5)
- Enig (4)
- Verken enig eller uenig (3)
- Uenig (2)
- Svært uenig (1)

Q28 My closest leader likes to hear my opinions at work

- Strongly agree (5)
- Agree (4)
- Neither agree nor disagree (3)
- Disagree (2)
- Strongly disagree (1)

End of Block: Ledere

Start of Block: Kompetansetyper (individ)

Q102 Hvor enig eller uenig er du i hvert av disse utsagnene om dine personlige egenskaper?

Q102 How much do you agree or disagree with each of these statements about your personal characteristics?

Q29 Jeg klarer å forenkle komplekse utfordringer for å få oversikt

- Svært enig (5)
- Enig (4)
- Verken enig eller uenig (3)
- Uenig (2)
- Svært uenig (1)

Q29 I am able to simplify complex challenges to gain an overview

- Strongly agree (5)
- Agree (4)
- Neither agree nor disagree (3)
- Disagree (2)
- Strongly disagree (1)

Q30 Jeg klarer å utforske nye ideer ved å «tenke utenfor boksen»

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q30 I am able to explore new ideas by "thinking outside the box"

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

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Q31 Jeg er god til å forestille meg en situasjon i fremtiden, og se utviklingstrinnene fra dagens situasjon til situasjoner i fremtiden

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q31 I am good at imagining situations in the future, and seeing the developments from the current situation to possible situations in the future

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

Q32 Jeg er god til å overføre tidligere kunnskaper og erfaringer (teamferdigheter, fagkunnskaper, følelser, sosiale ferdigheter, digital kompetanse osv.), og bruke disse i nye situasjoner og utfordringer

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q32 I am good at transferring previous knowledge and experiences (team skills, professional knowledge, emotions, social skills, digital competence, etc.), and making use of these in new situations and challenges

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

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Q33 Jeg føler meg trygg på at jeg kan håndtere uforutsette hendelser effektivt

- Svært enig (5)
- Enig (4)
- Verken enig eller uenig (3)
- Uenig (2)
- Svært uenig (1)

Q33 I feel confident that I can handle unforeseen incidents effectively

- Strongly agree (5)
- Agree (4)
- Neither agree nor disagree (3)
- Disagree (2)
- Strongly disagree (1)

Q34 Jeg er god til å ta beslutninger i vanskelige situasjoner

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q34 I am good at making decisions in difficult situations

- Strongly agree (5)
- Agree (4)
- Neither agree nor disagree (3)
- Disagree (2)
- Strongly disagree (1)

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Q35 Jeg er god til å gi andre støtte i krevende situasjoner

- Svært enig (5)
- Enig (4)
- Verken enig eller uenig (3)
- Uenig (2)
- Svært uenig (1)

Q35 I am good at supporting others in demanding situations

- Strongly agree (5)
- Agree (4)
- Neither agree nor disagree (3)
- Disagree (2)
- Strongly disagree (1)

Q36 Jeg stoler på at kollegene mine gir meg støtte i mitt daglige arbeid når jeg trenger det

- ○ Svært enig (5)
- ○ Enig (4)
- ○ Verken enig eller uenig (3)
- ○ Uenig (2)
- ○ Svært uenig (1)

Q36 I trust my colleagues to support me in my daily work when I need it

- ○ Strongly agree (5)
- ○ Agree (4)
- ○ Neither agree nor disagree (3)
- ○ Disagree (2)
- ○ Strongly disagree (1)

Page Break

Q52 Hvilke(n) uforutsette hendelse(r) har du tenkt på når du har svart på spørreundersøkelsen?

Q52 Which unforeseen incident(s) have you thought of when answering the survey?

Q53 Har du noen eksempler på nye løsninger/prosesser/produkter som ble tatt i bruk som følge av en uforutsett hendelse?

Q53 Do you have any examples of new solutions/processes/products which were implemented as a result of an unforeseen incident?

_____

_____

_____

_____

_____

End of Block: Kompetansetyper (individ)

Start of Block: Bakgrunnsvariabler

Q49 Informasjon om deg

Q49 Information about you

Q37 Kjønn?

- Mann (2)
- Kvinne (1)
- Annet (spesifiser om du vil) (3) _____

Q37 Gender?

- Male (2)
- Female (1)
- Other (specify if you wish) (3) _____

Q38 Alder?

- ○ Under 30 år (4)
- ○ 30-49 år (5)
- ○ 50 år eller eldre (6)

Q38 Age?

- ○ Under 30 years (4)
- ○ 30-49 years (5)
- ○ 50 years or older (6)

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Q40 Hvor mange år har du jobbet i din nåværende virksomhet?

- ○ 1-4 år (4)
- ○ 5-9 år (5)
- ○ 10-19 år (6)
- ○ 20 år eller mer (7)

Q40 How many years how you worked in your current organisation?

- ○ 1-4 years (4)
- ○ 5-9 years (5)
- ○ 10-19 years (6)
- ○ 20 years or more (7)

*

Q41 Hvilken utdanning har du? (maks to kryss)

- [ ] Grunnskole (1)
- [ ] Videregående skole (2)
- [ ] Fagskole (3)
- [ ] Universitets og høgskole (4)
- [ ] Bedriftsintern opplæring (5)
- [ ] Uoppgitt (7)

Q41 What is your education? (max two choices)

- [ ] Elementary school (1)
- [ ] Upper secondary school (2)
- [ ] Vocational school (3)
- [ ] University or college (4)
- [ ] In-house training (5)
- [ ] Rather not say (7)

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Q64 Hvilken sektor jobber du innenfor?

- ○ Offentlig (1)
- ○ Privat (2)
- ○ Frivillig, ideell (3)

Q64 What sector do you work in?

- ○ Public (1)
- ○ Private (2)
- ○ Non-governmental organization (3)

Q63 Hvilken rolle har du i din virksomhet? For eksempel ledelse med eller uten personalansvar, administrasjon, operatør osv.

_____

Q63 What role do you have in your organisation? For example, management with or without personnel responsibility, administration, operator etc.

Q62 Hvilket fagområde/profesjon jobber du innenfor?

Q62 What subject area/profession do you work in?

Q61 Hvis du har noen kommentarer eller synspunkter til spørsmålene, ord som brukes, eller annet, kan du skrive det her:

Q61 If you have any comments or views on the questions, words used, or otherwise, please write here:

Q65 Om du vil være med videre i prosjektet eller delta på intervju om det uforutsette og innovasjon, kan du skrive epostadressen din her:

_____

_____

_____

_____

_____

Q65 If you want to contribute more to the project, by for example participating in interviews about the unforeseen and innovation, you can write your e-mail address here:

_____

_____

_____

_____

_____

End of Block: Bakgrunnsvariabler