Power and Arms: The Diffusion of Military Innovations and Technology

A Comparative Historical Analysis of the Spread of Military Power After the Cold War and Consequences for the Norwegian Navy in the NATO Alliance

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Abstract

This thesis investigates the extensive puzzle of various influences on the diffusion of military power, meaning the spread of certain innovations, through the international system and the implications for international politics and the NATO alliance. Building on recent contributions to the studies of diffusion of military innovations, this thesis explores how and why certain innovations spread at a faster rate than others, through theoretical accounts of revolution in military affairs and adoption capacity theory, not only for discussing how military power diffuses through the international system as a whole, but also in relation to the case of sea power and modern warship innovations. According to previous literature, military technologies should spread fairly quickly because of structural pressures to emulate and the possibility to free-ride on research and development investments made by other states. Conversely, history offers numerous examples in which major military innovations spread neither quickly nor extensively. In order to explain this puzzle, the study intends to provide useful insights on states' financial and organizational capacity to adopt and implement new military innovations, and what this imply for the NATO alliance. Through a comparative historical analysis, the mechanisms at play will be mapped out by applying process tracing and historical accounts, and moreover, empirically tested against the theoretical and analytical framework.

Acknowledgements

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Acronyms and Abbreviations

ACT	Adoption Capacity Theory
ACO	Allied Command Operations
AGS	Allied Ground Surveillance
AMS	Alliance Maritime Strategy
ARRC	Allied Command Europe Rapid Reaction Corps
ASTOR	Airborne Standoff Radar
ASW	Anti-Surface Warfare
ASuW	Anti-Submarine Warfare
AWAC	Airborne Warning and Control System
C4I	Command, Control, Communications, Computing and Intelligence Processing
C4ISR	Command, Control, Communications, Computing, Intelligence Processing, Surveillance and Reconnaissance
CDS	Chief of Defense Staff
CFI	Connected Forces Initiative
CHA	Comparative Historical Analysis
CJCS	Chairman of the Joint Chiefs of Staff
CJTF	Combined Joint Task Force
COIN	Counterinsurgency
COW	Correlates of War
DCI	Defense Capabilities Initiative
DoD	Department of Defense
DWP	Defense White Paper
EBO	Effect-Based Operations
EBAO	Effects Based Approach to Operations
EHF	Extremely High Frequency
FCS	Future Combat System
FIST	Norwegian Army High Readiness Forces
GDP	Gross Domestic Product
GPS	Global Positioning System
HQ	Head Quarters
IFOR	Implementation Force
IRF	Immediate Response Force

ISR	Intelligence Gathering, Surveillance and Reconnaissance
JDAM	Joint Direct Attack Munitions
JSTARS	Joint Surveillance and Target Attack Radar System
JTIDS	Joint Tactical Information Distribution System
KDA	Kongsberg Defense & Aerospace
KFOR	Kosovo Force
LCS	Littoral Combat Ship
NAF	Norwegian Armed Forces
NATO	North Atlantic Treaty Organization
NMoD	Norwegian Ministry of Defense
NRF	NATO Response Force
NSM	Naval Strike Missile
NCW	Network-Centric Warfare
MARCOM	Allied Maritime Command
MID	Militarized Interstate Dispute
MIDS	Multifunctional Information Distribution System
MMI	Major Military Innovations
MSO	Maritime Security Operations
MTR	Military Technical Revolution
NEC	Network-Enabled Capability
NWC	Network-Centric Warfare
ONA	Office of Net Assessment
PCC	Prague Capabilities Commitment
PGM	Precision Guided Munitions
QDR	Quadrennial Defense Review
R&D	Research and Development
RAF	Royal Air Force
RBA	Revolution in Business Affairs
RMA	Revolution in Military Affairs
RNoN	Royal Norwegian Navy
SAC	Strategic Airlift Capability
SACEUR	Supreme Allied Commander Europe
SAM	Surface-to-Air Missiles
SDI	Smart Defense Initiative
SDR	Strategic Defense Review

SFOR	Stabilization Force
SHF	Super High Frequency
SLBM	Submarine-Launched Ballistic Missile
SLCM	Submarine-Launched Cruise Missile
SLOCs	North Atlantic Sea Lines of Communications
SOF	Special Operation Force
UAV	Unmanned Aerial Vehicle
UHF	Ultra High Frequency
UK	United Kingdom
UNPROFOR	United Nations Protection Force
US	United States
US DoD	United States' Department of Defense
USN	United States Navy
WMD	Weapons of Mass Destruction

Tables and Figures

1. Introduction

War is a harsh teacher

(Thucydides, 1972)

For the prevalent military power of certain states in the contemporary world, the historical development of their capacities for innovation, meaning patterns of how they have been able to transform their military organizations, is crucial for understanding the conduct of warfare through time and the security environment in which international politics has been wielded. Yet, there are certain parts of social life where some perspectives of international relations find it difficult to explain, such as internal dynamics within individual states. Since states function and act in different ways, it is important to explore how they work internally, not merely externally. Related to how military power spread through the international system, it is therefore unfeasible to understand structures of power without investigating and comparing states' internal dynamics as to how they manage to stay relevant on the international arena.

As such, the military as an organization is crucial to concepts of the state, as it in a historical sense has been considered as an upholding pillar in states' societies.[1] How the military is organized and equipped influences how this pillar could be utilized for political means. For example, universal conscription has been used as a mechanism for integration in heterogenous states, like France, and as part of the societal contract where conscription and other military arrangements provide political rights for individuals or certain groups, such as farmers in Norway, shipowners in Denmark-Norway and the aristocracy in the feudal Europe (Ralston 1996). This example is relevant, because if technology changes in such a way that the part of the population carrying arms also changes, it would have immense political effect. The introduction of artillery, for instance, made it easier to authorize and arm large masses, thereby leaving the aristocracy (which was built upon military specialization) declined. Accordingly, current patterns of the move-away from conscription could cause weakened state integration, which combined with states' loss of information control, could have repercussions for relations between the state and its citizens.[2] Additionally, weapon industries in several states have served as an economic and technological engine, pulling forward other fragments of the industry. Choices of weapon systems could hence be heavily influenced by industrial politics. Innovations in the production, deployment and application of military power are

[1] This relates to the Weberian definition of the states, where he views the state "as a human community that successfully claims the monopoly of the legitimate use of physical force within a given territory" (Lottholz and Lemay-Hébert (2016, 1467). This has gained footing across various disciplines such as sociology, political science, international law and international relations. decades later, his definition of the state still seems to be considered as common ground for most literature on contemporary state-building and transformations of state organizations.

[2] Stated by Ståle Ulriksen, teaching professor at the Royal Naval Academy, in a telephone conversation 10th of June 2018.

thus important to both comparative *and* international politics.

Regrettably however, most assessments of the international security environment rarely contain the relevance of military innovations or the importance of their spread. An illustrating example is the French Navy, which in a period of thirty years – from 1850 to 1880 – came to be the first in developing shell guns and to deploy a steam-powered warship, an ironclad warship, a mechanically powered submarine, and a steel-hulled warship (Horowitz 2010, 1). Such progresses should have facilitated the French in attaining domination over its British adversary, but they did not (Krepinevich 1994). Shortly after the introduction of the steel-hulled warship during the 1870s, French naval theorists claimed that future naval power followed emerging technologies such as torpedo boats and submarines rather than battleships, making the French seemingly ahead of the game once again. Despite these foreseeing considerations, most scholars do not think of France as an eminent naval innovator of this period. How could this be, and which advantages did it gain from pioneering several useful technologies into naval warfare?

As some argue, the French Navy did not achieve any real advantages.[3] In contrast to the US Navy, who mastered the technological and organizational practices accompanying carrier warfare (which brought it a viable upper hand in naval power during the second half of the twentieth century), the French proved unable to institutionalize their own advantage: while they surpassed rivals at inventing new technologies, organizational disagreements hindered the French in integrating them into naval strategy (Horowitz 2010). Put differently, even though France was the technological first mover in several occasions, it failed to channel its improvements into tangible war-fighting innovation that could amplify the country's relative naval power.

The introduction and spread of so-called major military innovations (MMIs), meaning new means of generating military power, have been crucial throughout history in shaping the global balance of power along with changes in the security environment and the character of warfare. During the Middle Ages, the notorious Mongol armies expanded their empire and defeated societies from China to those of the Eastern part of Europe by mastering the composite bow and new tactics of cavalry strikes, and in this way leaping in technology and strategy (Hildinger 2001). Centuries later, blitzkrieg warfare was introduced at the outbreak of the World War II by the Germans, which enabled them to overpower the French forces and thus establish control over Western Europe (Hobson 2010). Regardless of the magnitude of them inducing change in international politics, the processes and mechanisms steering the spread of innovations and their impacts are long from being fully comprehended by scholars of international relations.

Hence, there are numerous questions that still need to be answered. Is it more beneficial to

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[3] For further reading on influential assessments of the French Navy, see works of Herbert C. Fyfe (1902) and Theodore Ropp (1987).

be the first mover and being the first to discover how new forms of military power could be employed successfully, as Germany demonstrated with blitzkrieg?[4] Or is it more advantageous to follow the first mover and learning from it, attempting to expand and improve innovative ideas, like the Germans did with their all-big-gun battleships in responding to British innovations? How do this encompass with the spread of military power within the NATO alliance? And in what way do smaller states fit into this story – what influences their decisions on whether new innovations should be adopted in accordance to how they use force? This thesis addresses the extensive puzzle of different impacts on the spread of certain military innovations which shape international politics – through theoretical accounts of revolution in military affairs and adoption capacity theory – not only for discussing how military power diffuses through the international system as a whole, but also in relation to the case of sea power.[5]

1.1   Why Study the Spread of Military Power?

The failing French Navy during the nineteenth century regarding how to make use of its technological discoveries in sea power generates two essential lessons for a broader understanding of military power and international relations. Firstly, neither inventing technologies nor being the first to use them will certify advantages in the international security environment. Introducing technologies to the battlefield differs greatly from integrating them fully into national strategies.[6] It is really the difference between these two processes that usually governs success or failure of states in international politics. Therefore, military organizations employing the technologies, instead of the technologies themselves, often matter the most.

And secondly, deviating from the majority of previous literature on military innovation, which has tended to center on who innovates and why, it is the *diffusion* of military innovation that primarily rules its impact on international politics (Goldman and Eliason 2003a). Revising military power is inadequate without a coherent theoretical framework of how states are responding to MMIs, and in what way their responses contribute to thrust the rise and decline of states in addition to templates of warfare. By using a theoretical framework inspired by recent studies on diffusion of military power that could bring together empirical topics like contemporary warship innovations and sea power, could be valuable in the sense of outlining certain mechanisms of diffusion patterns

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[4] An important note on the case of the blitzkrieg, is that it really was the British who were the first movers in relation to the technology, while the Germans launched the *mature* innovation.

[5] Being a broad component of states' national power, sea power is often conceptually ambiguous. Although coining the term "sea power", the great admiral and historian Alfred Mahan failed to define it concisely in his principal works. For the purposes of this thesis, sea power will, in accordance with the definition of Kevin Falk (2000, 15) comprise a collection of military and other means that facilitate in defining political, military and economic relations among states at sea. This definition is necessarily broad because the modern components of sea power vary from naval military vessels to cargo ships, from actual firepower weapons to computing technology and communication systems, and further from aircraft production to deep-sea mining technology.

[6] This includes both warfare and coercive diplomacy (Horowitz 2010).

in not only the international system as a whole but also in selected states as well – and Norway in particular – which has not yet been under such scrutiny.

As military power as the measure of how states employ organized violence on the battlefield or otherwise coerce adversaries is decisive to international relations and the global balance of power, the diffusion of military power is imperative for the security of states and driven by their perceptions of threats (Posen 1984; Sloan 2002; 2008). For nation states, security is essential in protecting national and political-strategic interests. This is carefully connected to the need for a well-structured and innovative military organization, precisely for preserving such vital national interests. Though, what constitutes states' national interests differ significantly, and perceptions of threats will thus comprise great variations across the international system. Consequently, variations in states' military organizational practices, ranging from core policies relating to modernization patterns, training and educational regimes, command structures and information management, are key to how and why states adopt new military technologies (Talmadge 2016, 111).

Military strategies and responses to military inventions is thus meticulously related to the state through security aspects and threat perceptions in an ever-changing security environment. With heavy influence in the scholarly field of political science and international relations, Michael Howard has elegantly connected the relevance of military history and the state, moreover the ideas of state. By using criteria of width, depth and context, he infers that studying military history enables an understanding of the nature of war and its impact on society (Howard 1961). Furthermore, Howard argues that this directly improves soldiers' abilities to understand and fulfil their function. This is not to say, however, that the sole foundation of this thesis is military history, along with an emphasis security politics and international relations. Rather, military history is crucial for approaching a more comprehensive understanding of technological and military-strategic developments through time and is therefore not only important for future studies on the diffusion of military power, but it also demonstrates the linkages between security, defense and technology, *and* the state. As Howard validates with his perspectives on military history, analyses of the spread of military innovation improve our academic understanding of the function and role of military organizations within the broad field of political science and international relations.

1.2 Research Question and Research Design

The aim of this thesis is to explore patterns of diffusion of military innovations and consequences for NATO and accordingly international politics. It will focus on mechanisms influencing such patterns, and how these encompass with explanations in previous literature. Through a comparative historical analysis, the mechanisms at play will be mapped out by applying process tracing and historical accounts, and moreover, empirically tested against the adoption capacity theory of

Horowitz by using the concept of revolution of military affairs as context. Paralleled with previous research, this thesis provides an in-depth approach on the case of sea power and modern warship innovations after the Cold War. This will increase the explanatory value due to process tracing through history, and because of applying adoption capacity theory for explaining causal mechanisms affecting diffusion processes of military innovations in NATO. The discussions above generate the following research question:

In a military-strategic perspective, how are states' financial and organizational capacity for innovation influenced, and what are the implications of adopting new military innovations for the NATO alliance? What will the effect of adopting certain naval innovations of warships imply for the role of a small state navy, such as the Norwegian Navy, in the NATO alliance?

By assessing membership in and collaboration with the NATO alliance, as well as certain political, organizational and economic factors, the main task of this thesis is to provide useful insights in what way states' capacity for military innovation are affected, and to explain key implications of adopting new military innovations for the Alliance, thus the conduct of warfare and the distribution of power in the international system. These insights are acutely valuable at a time of rapid technological, strategic, and organizational change such as we are living through today and have abrupt implications for international politics (Goldman and Andres 1999; Goldman 2006).

Efforts are made for combining various important aspects of previous studies into an inclusive explanation for the diffusion of military power – not just in general but in relation to sea power as well. Accordingly, by answering alternative critiques, several elements of them will often overlap with adoption capacity theory, although some diverge as well. Sometimes, the analysis will look at alternatives from the literature, although it might not address the same questions. This is a crucial notice, yet, drawing from preexisting theories indicates an importance of deriving conventional and exclusive versions of alternative accounts than anything else.[7]

1.3 Importance for the Post-Cold War Security Environment

While previous studies of diffusion have tended to focus on military innovations from the past, meaning not necessarily from this century (or at least from the last decade), looking at innovations in the more contemporary period could be fruitful for demonstrating both the significance of this thesis' theoretical framework and the relevance of its analysis regarding ongoing debates within

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[7] These alternatives from the existing literature in international relations regarding the diffusion of military power derive especially from three schools of thought: The first is more or less neo-realist, claiming that strategic competition governs diffusion processes. The second is based on domestic and international norms, and argues that diffusion of innovations mainly happens when states try to gains status or legitimize their existence (not as a strategic measure to enhance relative power). And the third asserts the importance of cultural similarity when trying to understand diffusion.

policy and security circles. Moreover, this study could help explain how future warfare will incite various responses different actors, in addition to how it will benefit or weaken different states. Portraying how implications for the current security environment depend on certain assumptions based on patterns through history might be useful in providing a framework for discussions in future studies of the spread of military power.

Recent years have seen dynamic debates across the world regarding what type of wars we are most likely to experience in the future. In Western security communities, the utility of network-centric warfare (NCW) has been of great concern in which debates have included whether the US should concentrate its limited resources on institutionalizing counterinsurgency (COIN) lessons learned from the engagements in Afghanistan and Iraq or if it should reposition its military forces toward regular conventional warfare (Boot 2006a; McMaster 2008). For Biddle, it is apparent that existing empirical cases are not credible for capsizing the value of the "modern system" of warfare, meaning use of firepower, cover and concealment, to seize and hold territory in conventional land operations.[8] As modern systems center on dangers allowing technology to decide force structure, he claims that they are a "orthodox" approach to war wherein scholars and policymakers should be wary before including more "heterodox" approaches (Biddle 2007b, 463-64).[9]

A problem related to such interpretations of conventional war versus counterinsurgency is that it overlooks how the information age already has shaped and will continue to shape future warfare. To clarify, this must not be understood as a revival of techno-centric "Revolution in Military Affairs" thinking (Horowitz 2011, 5). Assuming that the information age, and the innovations brought by it, will influence future warfare does not imply that the human element or skills on the battlefield should be excluded (Gray 2006). Rather, it suggests that we need to study how the information age – like the age of industrialization before it – could impact the ways states organize and use their military forces more thoroughly. For example, Frank Hoffman (2007) offers a credible perspective on how the future of warfare could be "hybrid", by demonstrating aspects of both regular and irregular wars, yet in an operating environment embodied by the information age. As such, the strategic context in which the international security environment is shaped becomes increasingly indispensable for understanding this better.

Discussions about whether potential conflicts will be conventional land wars fought within Biddle's "modern system" or insurgencies could at times muddle how the information age is able to produce shifts in financial and organizational requirements for warfare no matter what the future world will look like. For instance, there is a possibility that the types of wars most liable to occur

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[8] This refers to information age innovations and network-centric warfare.
[9] Biddle also makes the remark that several occurrences which are being perceived as counterinsurgency campaigns, such as Lebanon, really have involved principles of conventional modern systems (Biddle and Friedman 2008).

are irregular campaigns including land forces. However, there are also important contingencies encompassing potential heavy use of naval and air forces (Horowitz 2010; 2011). Impacts of the information age could differ on each of these, just as it could differ for states and nonstate actors.

Information age technologies, ranging from precision munitions to cyber-attack capabilities to unmanned vehicles and robotics, are likely to continue improving over the next years (Singer 2010). It is possible that the potential tipping points for such technologies and the integration of them into military organizations could be immensely disruptive for the US military and its allies (Horowitz 2011). If advances in technologies like munitions or unmanned vehicles start making the expensive platforms currently used to launch precision munitions (which rest at the core of US military) irrelevant, it could potentially cause large-scale changes in the military power balances. Moreover, if a cargo plane or ship turns into being just as good for launching missiles as a B-2 bomber or a littoral combat ship, it could be organizationally disruptive to the US but make those capabilities more financially conceivable to others. If unmanned vehicles become so sophisticated that they could replace manned fighters, militaries would also have to recruit differently and train people to manage different tasks since they would primarily be operating with joysticks from afar rather than engaging in actual battle spaces. For maintaining its technological lead, the US military have to be innovative in how to organize itself for best taking advantage of new developments.

Just as historical events have proved it foolish to think that the United States' conventional military edge would make it successful in countering insurgency warfare, it is unwise to suggest that the US military has already mastered the information age (Goldman and Eliason 2003a). Additionally, although the US has a technological lead in the application of information technology to its military operations, these developments are not just relevant for major powers. Other states continue to advance their military capabilities as well, making them prominent in other technological areas than those of the US. Besides, it is possible that the information age will also continue to empower nonstate actors.[10] However, these reflections are tentative. The information age might matter differently to various types of warfare. The point here is that discussions above should involve studying the variety of ways periods like the information age after the Cold War could shape different elements of warfare and the security environment related to it.

1.4 Structure of the Study

This thesis opens in chapter 2 with a conceptual section which introduces important descriptions and classifications of the content of military innovation diffusion. These are imperative for grasping

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[10] Cheaper and more available information age technologies could reduce impediments for groups attempting to challenge state authority. Meaning, it will be easier for such groups to rise in virtual environments and to exchange information across state borders that could potentially hurt state actors in a very efficient way (Hammes 2004).

the concepts and foci of the ways military power spread and how states might respond to new major military innovations. It further connects with and lays the foundation for the theoretical and analytical framework in chapter 3, in which the main focus is on adoption capacity theory in the context of the current revolution in military affairs (RMA). This combination contributes to an understanding of states behavior in situations where state security and strategic assessments prevail actions and interactions of states. It will also contribute to comprehend the complexities involved in aligning state behavior with international obligations.

The methodological framework in chapter 4 is outlined with emphasis on a comparative historical analysis approach, combined with case study and process tracing. In this sense, historical explanation is utterly important for tracing the mechanisms which could explain how military power diffuses. Strengths and potential weaknesses in the methodology will further be pointed out. Deriving from this, in addition to discussing relevant debates within the Alliance and outlining certain aspects regarding military transformation in NATO, the case study of sea power and warship innovation is portrayed in chapter 5. And finally, chapter 6 analyzes the spread of military innovation, and the sea power case in particular, in the post-Cold War era in light of theoretical accounts by which the adoption capacity theory is tested.

2. Concept and Context of the Diffusion of Military Innovations: A Literary Review

Just as Thucydides tells us, war is a harsh teacher. Either we learn from those better at fighting than we are, or we die. Still, there are puzzles to why some states suffer in warfare even though they are stronger than their opponents. After World War I, France was aware of Germany being demographically and economically stronger than themselves. Information on emergence of blitzkrieg warfare in Germany was available. Nonetheless, the French army prepared during the 1930s for the same kind of slow, methodical, defensive war it had learned from the World War I, although the logic of its alliance system called for it to go offensive against Germany when Poland was attacked by the German army (Owens 2000; Posen 1984). Why is this?

Further, in 1956, Egypt suffered a massive defeat against the Israelis, even though the Soviet Union provided it with an extensive amount of financial and technological support. It had every incentive to beat the Israelis at their own game, in addition to holding the material means to do so. For exactly the same reasons as for the French, it suffered another massive defeat in 1967. Again, why? Both France and Egypt should have learned from those who threatened them, but did not. This

study addresses the way states make strategic choices in response to major military innovations and how this affect the diffusion in military power in the international alliance system of NATO and international politics as a whole.

What follows outlines a new take on diffusion of military innovation, explaining adoption of capacities and strategies in comparison with certain existing theories, concepts and cases, to predict not only what determines states' interest in innovations and innovative skills, but also state capacity to adopt innovations, other strategic choices for states facing innovations, and the consequences for small states in the NATO alliance, warfare and the balance of power that stems from shifts in adoption capacity requirements.

2.1 The Spread of Military Power Matters

Scholars fascinated with military power have offered significant thought to the puzzles of how states try to gain advantages over other states through creating new ways of generating military power, meaning military innovations. Most notably, the works of Barry Posen and Stephen Rosen have theorized about the terms in which militaries are most likely to innovate, although diverging on whether innovations happen as a consequence of pressure from actors outside military organizations, military mavericks within the system, or as a consequence of changing promotion patterns that give those with innovative ideas organizational power (Posen 1984; Rosen 1991). Theorizing about such changes in international politics relies on clear implicit ideas about the way military power diffuses.[11] And by making those ideas *explicit* and testing them empirically to decide which more accurately portray international relations, this study will explain how certain changes in the international security environment occurs.

As Horowitz accentuates, the reason why innovations matter in the first place relates to their impact on world politics, that is what happens after the initial innovation occurs (2010, 18). The event of the blitzkrieg is exceedingly interesting in a historical sense, because Germany invaded France which proved unable to respond effectively (Hobson 2010, 626). The importance of, or absence thereof, the emergence of innovations for world politics lies in mechanisms governing the diffusion of military power, hence it rests on strategic choices states make in response to innovations. So, recent theorizing concerning features managing the diffusion of military power add up only in part because it explains why military power matters.

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[11] For further reading on strategic studies and military effectiveness, see Grissom (2006). Other key readings on military innovation studies, see Avant 1994; Evangelista 1988; Goldman and Eliason 2003a; 2003b; Kier 1997; Mahnken 2002; Pierce 2004; Posen 1984; Rosen 1991; Sapolsky 1972; Zarzecki 2002; Zisk 1993.

2.2 Explaining Diffusion

The spread of military power functions through processes of the marvel known in many scholarly disciplines as diffusion. Most prominently, the defining works on diffusion research in the social sciences are done by Everett Rogers (2003, 11), which describes diffusion as "the process by which (1) an innovation (2) is communicated through certain channels (3) over time (4) among the members of a social system". Moreover, crucial to diffusion research is the pattern by which successful innovations largely spread throughout a population. Notions of effective innovations construct the framework within which diffusion occur or does not occur, denoting the inevitable connection between innovation and diffusion.

The understanding in which normal innovations frequently diffuse in the shape of an S curve, is widely applicable across a range of disciplines and areas, such as consumer products, agriculture, public policy adoption and military technology (David 1986; Horowitz 2010).[12] Essentially, there are three main stages of diffusion for "normal" products after a triggering event or debut. Diffusion is slow whilst risk-acceptant actors – or early adopters – implement the innovation during the first stage. In the second stage, once diffusion has reached a critical mass (similar to a tipping point in game theory literature), the rate of diffusion increases in speed and the set of actors with capability to implement the innovation will generally do so. These are called main adopters. Through the third stage, the late adopters, also called laggards, will implement the innovation. The entire number of adopters, meaning the percentage of adopters out of the group of potential adopters, is known as a cumulative adopter distribution.

Moreover, innovations often transform as they spread, and adopters adjust them to the lines of their actual situation. In the pattern of responses to Napoleonic warfare and Prussian tactics of open orders in the nineteenth century, Geoffrey Herrera and Thomas Mahnken (2003, 242) demonstrate how states tended to adopt certain key elements of innovation over others, and also adjusted the innovation depending on their requirements.

Studies of when the diffusion of ideas are more or less likely to happen have also matured over the recent decades. However, the notion of interactions between domestic organizations and developments abroad is well-known in the social sciences. A wide variety of scholars demonstrate important linkages between new practices abroad and decision-making at home. Alexander Gerschenkron (1962) studied competition and industrial development, and the established works of Peter Gourevitch (1978) discussed how international politics stipulates domestic economic decisions. This research illustrates the significance of developing theories that consider the chance

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[12] Paul David's work (1986) on diffusion within the field of economics has been of particular interest. Another important reading is also done more recently by Goldman and Mahnken (2004).

of diffusion as not always efficient. Some individual actors may not benefit from adoption, and not all innovations are relative advances.[13]

2.3 Military Power and Major Military Innovations

Military power is how states generate organized violence either for use on the battlefield or as part of coercive strategies (Horowitz 2010; Smith 2006). It embodies a combination of different technologies, called hardware, used in combat – for instance rifles, artillery and bombers – and organizational processes, called software, used to prepare the use of and in fact employ the hardware.[14] It is too easy to assess the adoption and spread of military power as merely the spread of military technology, the tools and devices used to plan for or to fight armed conflicts.[15] Most of the existing literature on diffusion of military power underlines the spread of technology, or at best, the aspiration for obtaining innovations (Elman 1999; Goldman and Eliason 2003b; Resende-Santos 1997; Zarzecki 2002).[16] This is the point of departure for most studies of arms races along with studies of arms imports and exports.[17]

Nevertheless, certain events from the business world show that considering technology alone is not enough to comprehend the essence of how innovations matter and what makes effective change more likely. For example, looking at the computer industry, Dell forged during the 1990s a model of production that depended on made-to-order computers, based on customer specifications. This lead to lower inventories and overhead costs compared to its major competitors. As a result of the different organizational structure, their ability to integrate external, or exogenous, alterations in personal computer technology, improved. When a technological change happens, such as the release of Intel's new microprocessor, it was possible for Dell to integrate into its consumer production lines simply within a few days. For competitors to do the same, it could take weeks. This left Dell with a huge advantage in the ability to deliver first rate products to customers, which lead to increased sales (Brynjolfsson and Hitt 2000, 30). Even if the new technology mattered, Dell's ability to integrate it better and more efficient than its competitors was crucial in generating its market advantage.

Alternative explanations derive from survey data on business productivity, which emphasize the often synergistic nature of changes in technology and organizations. Results from a vast survey done by the McKinsey Corporation and the London School of Economics in 2001, revealed that

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[13] Many scholars have written about several topics ranging from the spread of decolonization movements, the spread of toxic pills in corporate businesses to student shantytown movements in divestment campaigns in South Africa. Further readings include Soule (1999), Strang (1991), Strang and Meyer (1993), and Strang and Soule (1998).

[14] With regard to military capabilities, this resembles to how Biddle define military effectiveness as ways of using forces that make winning a battle less difficult (Biddle 2004; 2007a). See also the work of Dupuy (190) for insight on capabilities based on lethality.

[15] This derives broadly from the definition of military technology by Zarzecki (2002, 74).

[16] The works by Farrell differ (Farrell 1998; 2002a; 2002b; 2005).

[17] Although there are several qualitative studies, the focus on quantitative measures regarding this research probably arises because arms such as tanks and rifles are easier to count than methods of recruiting and training. The literature on arms race may be based on even more questionable grounds because of the focus on military spending, instead of actual military equipment (Horowitz 2010).

businesses either implementing technological changes, changes in managerial practices or adjustments in both capacities, were undeniably influenced rarely by the combination of organizational and technological change. Businesses exclusively implementing technological changes faced a two percent increase in productivity, which faded compared to the nine percent increase spawned by exclusively managerial changes. Conversely, Dorgan and Dowdy (2004, 13-15) showed that businesses adopting both managerial *and* technological change underwent twenty percent of increase in productivity, denoting almost a double of the total when adding together technological and managerial change.

A key point is that military organizations share some basic features with firms, including the need to compete with other actors, survival threats from unsuccessful efforts to compete efficiently, the development of bureaucracies to regulate and manage their operations, and the need to make strategic choices in response to adjustments or changes in external surroundings (Cronin and Crawford 1999). Following Waltz (1979), regardless of numerous differences between the corporate world and the military domain, the importance of analogies based on business and micro-economic accounts for the underlying nature of the international system verifies it as useful, although inadequate, when thinking about military power.

2.3.1 Defining MMIs – Major Military Innovations

This study demonstrates the importance of investigating military power in a broader sense instead of just military technologies. Hence, the focus is on the adoption and thereby spread of major military innovations (MMIs), as well as the current use of particular military capacities and possible implications of this usage. When production of military power changes, meaning that the nature of conducting warfare change in some assessable way, it is a military innovation (Horowitz 2010). The greater the change, the greater is the innovation. More specifically, MMIs are changes in the conduct of warfare that is significant to military organizations designed to increase the efficiency of converting capabilities to power.[18]

MMIs are often closely linked to technological changes used by military organizations. This indicates that MMIs could just as well be key capacities such as aircraft carriers, battleships and warships, and advances of fighter jets, as innovations in computer and information technology.[19] A main purpose of this thesis is to explain new ways that military organizations, and the Norwegian Navy in particular, generate power and how it responds to innovations in the production of military

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[18] Scholars most often disagree on which shifts in military power that should be regarded as innovations. A crucial definitional distinction is made between the innovations designed to help states get advantages and the ones actually helping states get ahead (Gray 2002; Krepinevich 1994).

[19] Theo Farrell and Terry Terriff also distinguish MMIs, or "change in the [organizational] goals, actual strategies, and/or structure of a military organization", and minor military innovations, or "changes in operational means and methods (technologies and tactics) that have no implications for organizational strategy or structure" (2002, 5).

power – not just certain technological developments in itself.[20]

Given the possibility of misunderstandings concerning terminology that seem prevalent when discussing military power, the need for certain clarifications comes to mind. The "conduct of warfare that is significant to prominent military organizations" refers to the way major powers, meaning the dominant states in the world, organize their militaries and prepare to fight wars. The notion of transforming the nature of warfare speaks to the shift in core skills of military organizations or shifts in the duties that average soldiers perform.

Taking into account the efficiency with which military power is shaped in the definition, the idea that all innovations are neither the same nor successful is articulated. The objective of major military innovations is to produce massive increases in military capabilities, but whether that occurs is separate from the definition. This distinction is crucial, for avoiding a tautology in the definition and extent of the objective of interest, the military innovation and dependent variables like alliances, balance of power and war.[21]

2.3.2 The Rise of MMIs

In order to measure when diffusion can rationally begin, it is important to determine when major military innovations emerge. When looking at studies of the diffusion of consumer durables in the business world, we can find some similarities to the approach held in this section. They show that an incubation period often occurs between the entering of new products in the commercial market and when the product matures and sales launches. Meaning, in general there is a delay between when the technology enters the commercial market and when sales take off in the broader population. Information on the spread of color televisions and compact disc players stresses the disparity between development of a product and its launch in the population, also referred to as an incubation phase (Golder and Tellis 1993; 1997; Mahajan et al. 1990).

In a military context, the idea of an incubation period seems logic since specific technical capabilities that may represent the public "face" of a military innovation are frequently presented years – albeit decades – before the technologies develop to a point where they can be beneficial to militaries, and/or before militaries discover how to use them in producing differing military powers. Welch (1999, 122) shows the incubation period as the period between the first indications of a breakthrough in military power, such as the British use of the tank at the 1917 Battle of Cambrai,

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[20] This resembles to the work by Robert Gilpin (1981). From the perspective of the diffusion of innovations, the question of shifts in power also goes beyond the offense-defense paradigm. This seems logic since it is the relative balance of forces and beliefs about battles that have impact on behavior in militarized situations, and not something integral about certain technologies. Additionally, according to Lieber (2005), the role of politics in determining behavior is underplayed in the literature on offense-defense balance.

[21] It is debatable whether the definition actually is tautological, because all expansions of military effectiveness may represent innovations. Nevertheless, when documenting changes in doctrine, training, and education, in addition to resource allocations for measuring the way that organizational changes encompass generating new forms of military power, this understanding of MMIs escapes the issue of tautology.

and the introduction of a fully established innovation with new operational concepts like radios and air power, such as how the German military used the Blitzkrieg in World War II. During the intervening incubation period, Germans could decide how new technology would be best utilized and thus reform their operational concepts to employ combined arms warfare.[22]

When the incubation period is left from the takeoff period of an established innovation, the conceptual importance of determining the *demonstration point* for each major military innovation is brought to light. This critical stage called demonstration point for each MMI follows when the potential of its full capabilities is relatively recognized in the international system through a first mover action, rather than that the capability is solely the matter of internal maneuvers or debates. The demonstration point in itself is when the pressure on potential adoption by other states begins.[23] The existence of an MMI as a discontinuous change is partly based on the perspective of other states, and is not necessarily perceived as a discontinuous change for the first mover state.[24]

Different innovations have application for international politics in different time periods (Horowitz 2010). Consequently, each innovation has a unique cycle of life. Novelties in research could potentially trigger new MMIs in shorter time periods, which limits the time period of relevance for an innovation. At the onset of World War II, the mechanized battlefleet system that had superseded the sailing navy during the mid-19th and the early 20th century, was itself superseded by carrier warfare some decades later – even though the principles of warfare in the age of sail had changed fairly slowly over hundreds of years. Over a period of seventy-two years since 1945, nuclear weapons have continued to be an important part of global power, compared to blitzkrieg warfare which replaced modern trench warfare after just a few decades. Because innovation can serve a purpose in various capacities of warfare, like on land or at sea, in addition to the possibility for broad disparities in the time period of relevance for innovations, it adds up for studying innovations as units of analysis.

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[22] The well-known historian Ernest May is particularly fascinated by the German success compared to France's failure. Accordingly, the French military organization is described as "sclerotic" and unable to take advantage of the numbers of troops and tanks on the western front in 1940, due to the Allies' massive failures in intelligence (May 2000). His work also demonstrates that regular measurements of forces on the battlefield, such as troop counts or counts of specific technologies like tanks or planes, do not predict battlefield success at all times. The Germans had 76 division in first line and 26 second-line divisions in May 1940 at the outset of war, while the Allies had 96 first-line divisions and 30 ones in the second line. Furthermore, the Allies had deployed 3079 tanks, whereas the Germans had 2439 tanks deployed. However, it is important to understand how organizations employ force, in supplement to these measures. Although quantitative measures may be useful, the point here is to say that there is need for more sophisticated models and that how militaries use raw materials is necessary to incorporate.

[23] This separates the existence of diffusion processes from other simultaneous developments by numerous states. In theory, it is possible that more than one state could introduce the very same innovation at the same time. Thus, there could be more than one first mover. It is central to explain the existence of diffusion processes in the cases below in contrast to simultaneous developments.

[24] Mahnken draws an example to Germany; to many German officers, Blitzkrieg was viewed as the culmination of German military improvements in the 1920s and 1930s. However, it seemed rather discontinuous to most of the French and British military officers upon its debut (Mahnken 2003).

2.4 Outlining Potential Responses to MMIs

Perspectives on the spread of military innovations or military technology has in a traditional sense perceived states' strategic choices as a yes or no question, meaning either innovations are adopted or they are not. Yet in reality, states are able to pursue a much more comprehensive array of options – sometimes simultaneously – once military innovations begin. In general, states could presumably respond to innovations in ways that they think will maximize their foreign policy interests. Their decisions are influenced by several incentives and constraints that will form their final response strategy. One of the most important factors defining the extent of states interested in an innovation, is the geostrategic environment. Additionally, there are other factors as well that might influence interest in responding to an innovation, ranging from international norms to cultural openness to the interoperability with allies.[25]

One set of such potential responses includes external actions, implying changes a state can make regarding its foreign policy to manage latent effects of another state adopting a military innovation. Moreover, a state could determine that the consequences of an innovation no longer make the success of foreign policy goals viable, calling for a shift towards neutrality or possibly only reducing the general foreign policy decisiveness of the state. This could potentially lead to what Schroeder expresses as "transcending" or "hiding" in international politics, meaning pushing for international institutions or other ways to manage when a state no longer has the relative power to protect itself (Schroeder 1994, 117).

Also, another potential external response is trying to lower the costs of non-adoption by affiliating with a likely adopter (Schweller 1994; Walt 1987). One alternative is balancing, creating or joining an alliance *against* the state that initiates a military innovation with another state – or group of states – which have capacity to positively adopt or answer the innovation. Contrary to balancing is allying with the inventive state that pioneered the new military innovation, also called bandwagoning. Additionally, alliances could help a state gain access to necessary knowledge more quickly for implementing the innovation – either through providing the state time to build capacity to adopt or through direct assistance from the first mover (Goldman and Ross 2003c, 375-79).

States may also follow internal military shifts in response to new military innovations. Trying to adopt parts of or the whole innovation is one option. This means that the innovation diffuses from country A to country B. For instance, Resende-Santos (1996) claims states such as Brazil and Argentina lack capacity to fully adopt in the short term yet will adopt certain technological elements in responding to naval innovations in the early and mid-twentieth century, since that is all they can afford. Partial adoption embroils in general adopting technological or operational aspects of an

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[25] See for example Elman, Posen and Resende-Santos, as cited above. Figure 2.1 in Appendix B can demonstrate the scope of possible responses states may have.

innovation, because it is usually a lot less disruptive to adopt technologies than to modify the way organizations consider employing military force. Another possible reaction is that even though some states have financial means to adopt – and value the strategic purpose of adoption – they may be unable to because of organizational reasons. States could potentially view adoption as initiating domestic concerns and/or disrupt key military social hierarchies, in which military benefits from adopting are offset and effective implementation is difficult to achieve.[26]

In addition, there are certain states that have crude financial and organizational capacity to adopt an innovation, but they do not as the financial and non-financial (mostly domestic political) costs of adoption are viewed as higher than the costs of non-adoption. This is especially so when an external alliance strategy is viable. For example, during the mass mobilization warfare in the post-Napoleonic period, the British Army had the capacity to adopt an innovation but chose not to. Army and political leaders believed the likelihood of massive British land engagements on the continent was adequately low that the domestic costs, such as public turmoil, from shifting to mass mobilization through recruitment overshadowed any benefits. Herrera and Mahnken (2003) accentuates that the presence of sustainable alliance strategy also made paying the costs of adoption less appealing to Great Britain.

Goldman and Eliason (2003a) depicts another internal response strategy, such as "countering" an innovation, referred to as "offsetting". Countering in this sense is defined as an internal military response that ignores adopting innovations although ranging from trying to neutralize or counteract its impact with low-cost tactics drawn from standing forces and operational plans in the pursuit for additional new military innovation in dealing with the first military innovation. Camouflage tactics used by the Serbian forces in response to the air campaign led by the American military over Kosovo in 1999, is an example of countering through prevailing military means. Moreover, the development of *trace italienne*, the stubby and broad-angled bastion fortress, is an example of a countering strategy that was an innovation in its own right, mainly as response to aggregate cannon quality, making offensive armies able to hammer through the thin walls of many early-modern Europe fortresses (Parker 1996, 9-11).

Exposure of the developed innovation can generally trigger two simultaneous processes in an "ideal" type of responding state.[27] Consequently, the military evaluates the requirements for adopting an innovation in relation to its current and latent capabilities (along with the likelihood of a countering strategy), while executives regulate the potential utility of the scope of external policy solutions such as alliances or shifts towards neutrality. In states where civilians rule the military, the

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[26] For a further account regarding this matter, see (Herrera and Mahnken 2003, 214-15).
[27] Ideal types are theoretical concepts of potential state behavior useful for identifying what many states might do however not meant to impersonate the exact state behavior (Weber 2002).

military must report back to executives, who evaluates relative costs and benefits on the advices from military leaders regarding different strategic possibilities. Thus, most likely choices of an average middle power holding an advanced industrial base and a medium-sized economy, are partial adoption of some technological components on the one hand, yet places a larger importance on alliance-based response on the other hand. The nature of alliance-based responses rests on the relationship between the responding state, the first mover and other potential adopters.[28] Figure 2.2 in Appendix B portrays an idealized model of this response process, given the international security environment we are currently facing. Because of these outlines, what are the factors that decide how military power spreads through the international system? This is some of what next chapters is about.

3. Theoretical and Analytical Framework

The ways in which national militaries have pursued adaption and adjustments, particularly with regards to the post-Cold War era, now nearly three decades old, could be seen as dramatic when facing the environment of an ever-changing security landscape. Security, meaning the absence of threats to values, is not a concept that is assured alone by the use of military force (Sloan 2002; 2008). For the most part, it only has a small role to play in this conception. But in many instances, this role is important, and precisely how militaries are sized, structured and equipped is thus crucial when dealing with potential threats. Combining primarily two interrelating theoretical assumptions, deriving from the preexisting literature on international relations and security policy, the revolution in military affairs (RMA) and adoption capacity theory (ACT) make the theoretical and analytical framework for examining and evaluating the diffusion of military power and security dilemmas of states, including small states – Norway in particular – in this thesis. While the former will function as a *contextual basis* in which states make strategic choices in response to contemporary major military innovations, the latter is meant to further address the diffusion in military power in international politics as a whole and the international alliance system of NATO – notably after the Cold War but also through history in general – by making predictions of how military power diffuses through different sets of variables.

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[28] For instance, bandwagoning is likely if the responding state is Canada and the first mover is the United States. However, if the first mover is China and the responding state is Japan, balancing is perhaps more likely (Horowitz 2010).

3.1 Understanding Current Military Innovation: The RMA

Already before the end of the Cold War, scholars were theorizing about the effect of new military technologies on the nature and conduct of war, and vice versa (Cohen 1996). During the late 1970s and 1980s, Soviet authors debated the presence of a military technical revolution (MTR), which US Pentagon analysts further assessed in their discussions of a revolution in military affairs (RMA) during the 1990s, adding both doctrinal and organizational dimensions to the idea. After the turn of the century, terminology moved toward *transformation*, with similar meaning as the RMA. But then it has slowly but surely come to include a wider range of concerns which eventually made the concept, according to some, "a generic buzzword for ill-focused change" (Sloan 2008, vii).

The RMA field is broad and extensive with its content and terminologies, yet the notion that we are engaged in a revolution in military affairs is common knowledge among analysts in the security environment. Behind this consensus, however, lies significant debates concerning the nature of the RMA, its expected development, and implications for different states, the future of warfare and defense policy. Nonetheless, there are much agreement on information technology innovations as the driving forces steering the RMA into a transformation of the nature of modern warfare. New technologies are being adopted and integrated in new military doctrines and organizational concepts in such a scale that it could render the doctrines and concepts guiding great powers throughout the Cold War, obsolete (Raska 2016). Additionally, it is widely supported that it was the Gulf War in 1991 that first presented a clear sign of the emerging revolution in military affairs.[29] This encounter could be seen as the forerunner of a broader RMA that, whilst combining technological advances with the limitations of defense budgets and bureaucratic inactivity, could be discussed as culminating this present-day and in the foreseeable future (Futter and Collins 2015).

Hence, the MTR, the RMA and military transformation are interconnected terminologies, emerging over the past decades to explain the continuing changes in Western militaries. It is impossible to fully understand this without placing it into some kind of historical perspective. There have been more than a few revolutions in military affairs over the course of history, and for grasping the substance of the current RMA, it is crucial to look at the terminologies shaping its origins and the current – as well as future – military transformations. Conceptual developments and arguments underlying the RMA debate have evolved into two parallel levels: *theoretical* and *policy-oriented* (Shimko 2010, 1-25). Following sections will portray the debate especially among defense and military analysts, on the perception that we are caught in a revolution in military affairs and whether the more rightful term should be *military transformation*, as proposed by Sloan. The relevance of

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[29] Yet, Soviet scholars had already observed this in the 1970s, which underscores a discrepancy; it might be more accurate to argue that the 1991 Gulf War confirmed what Soviet theoreticians had claimed was emerging. See discussion in section 3.1.1.

RMA is still important, also regarding military innovation in small states, and is meant to put further theorizing into the context of spreading power and new ways of conducting war.

3.1.1 Origins of the Current RMA and the Geopolitical Context

As noted above, technological elements of modern ideas on how militaries transform originate from improvements in military technologies through the late 1970s and 1980s in the United States. During most of the Cold War, dependency on an American strategic nuclear deterrent – in addition to the French and British nuclear weapons – was important for the US and its Western allies, in providing balance against the much greater conventional forces of the Soviet Union.[30] This made grounds for the refusal of the NATO and the US to discard a nuclear "first strike" alternative, and has been part of their perpetual policy, even through the remarkable changes in especially the US conventional force capabilities since the 1980s (Sloan 2008, 2).

The change started with the *offset strategy* of the former US Secretary of Defense Harold Brown (during the Jimmy Carter administration) for responding to the Soviet's quantitative advantage using Western qualitative, technological advances, because it was impossible for NATO to field as many soldiers as the Soviet military (Owens 2000; Sloan 2008). Capabilities in computers and microelectronics were being pursued through the idea that existing platforms and personnel could get a crucial competitive advantage if new technology were being applied, instead of buying new and supplementary ships, tanks and aircrafts, or increasing Western military forces. Throughout the 1980s, the US military did considerable research and development (R&D) of cutting-edge military technologies, as well as experimenting with them in war games and simulated scenarios, until they were actually tested in battle during the 1991 Gulf War. The coalition forces' success in the Gulf War happened because of essential innovative advancements in areas of command, control and communications, intelligence and surveillance sensors, precision-guided munitions, and the overpowering of the enemy's air defense systems (Perry 1991).[31]

The military technological improvements following the Gulf War staggered both the US military and their allies, as well as the general public. Conversely, the US Cold War adversary was conceivably not as surprised, being more familiar with the capabilities of the US military advances (Perry 1991). Soviet observers started discussing an MTR in the late 1970s, where usage of computers, space surveillance and long-range precision missiles would facilitate the West in competing as well as, or better, against the East regarding conventional military capabilities (Chapman 2003). Nikolaj Ogarkov, Chief of the Soviet General Staff, was confident that America experienced early stages of an MTR during the beginning of the 1980s (Cohen 1996). Accordingly,

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[30] The size of Soviet military forces was about the double or triple, compared to those of NATO (Sloan 2008).
[31] More detailed elaborations noted below.

he favored an increase of the Soviet defense budget and buying technologically sophisticated equipment for keeping pace. Yet, rising economic troubles and the final collapse of the Soviet Union hindered these plans, proving it incapable of developing such weaponry and keep up in the arms race driven by the information technologies.[32]

The MTR as a term gained foothold in the security environment, making its way into US defense policy circles. Andrew Marshall, a former Director of the Office of Net Assessment (ONA) in the United States' Department of Defense (US DoD), used the events of 1991 in his search for historical analogies regarding the potential impact of the MTR on the US military (Owens 2000). He traced it to the interwar period, when Germany combined new technologies that had surfaced during the end of World War I, with organizational and doctrinal modifications in order to produce its revolutionary Blitzkrieg warfare in World War II. Thus, Marshall argued that despite the military technological innovations emerging during the Gulf War turned out to be dramatic, it was necessary for the US military moving beyond the MTR and view supplementary organizational and doctrinal modifications in broader perspectives that could generate an RMA (Blaker 1997).

3.1.2 Defining the American RMA: Areas of Focus

Definitions of RMA are broad and numerous, varying from those capturing with easiness the basic nature of an RMA, such as Rogers (2000, 22) stating an RMA as "simply a revolutionary change in how wars are fought and won – a change that can often be recognized by the ease with which 'participating' armed forces can defeat 'non-participating' ones", to those highlighting defining attributes, e.g. Hundley (1999, 9) stressing "an RMA involves a paradigm shift in the nature and conduct of military operations which *renders obsolete* or *irrelevant* one or more *core competencies* of a dominant player" to those grasping specific bits and pieces by pointing to the perhaps most appraised one provided by former ONA Director Marshall (Lambeth 1997, 75) stressing RMA as "a major change in the nature of warfare brought about by the innovative application of technologies which, combined with dramatic changes in military doctrine and operational and organizational concepts, fundamentally alters the character and conduct of military operations".[33]

These definitions all share, either implicitly or explicitly, the point that an RMA covers more than just technological advances. In fact, the main tenet of an RMA, described by most military and defense analysts, is that improvements and innovations in technology should lead to significant changes in the ways in which military forces are organized, trained and equipped for war, thus alter

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[32] It should be specified that this incapability concerns some, but certainly not all technological areas.
[33] This appeared after the influential Washington think tank, RAND, argued in 1993 that "the Military Technical Revolution…refers to many aspects of military force besides technology; in fact, it is a timely combination of innovative technologies, doctrines, and military organizations, that is reshaping the way in which wars are fought" (Mazarr, Shaffer and Ederington 1993, 1). Underlining this, Marshall's office began to use RMA instead of the MTR terminology.

how wars are fought. The RMA terminology dominated the US military and defense policy circles throughout the mid and late 1990s, and to some extent in Europe. During this period, the ONA presented key documents reflecting the rational basis for Pentagon's quest of the RMA.[34] No real consensus was obtained, but as noted below, it is possible to identify some technological, doctrinal and organizational concepts that most often have been associated with the current RMA.

The military *technologies* comprising the RMA include the ones first advanced as part of the US Cold War offset strategy, thereby making their campaign debut in the Gulf War. According to Admiral William Owens of the US Navy – now retired and former Vice CJCS – these kinds of military capability, labeled as "revolutionary" in the early 1990s, derived from operational approaches and systems designed and developed in the late 1970s through the late 1980s that made victory in the 1991 Gulf War "inevitable and our historically small loss of life probable" (Owens 2000, 89).[35] The offset strategy led to major enhancements of military capability, as was evident during the 1999 military intervention in and around Kosovo, the 2001-2002 war in Afghanistan, and the 2003 war in Iraq, and included advances in precision-guided munitions (PGMs), intelligence gathering, surveillance and reconnaissance (ISR), and command, control, computing and intelligence processing (C4I).[36] These new advances intended to increase greater speed, range and accuracy (like PGMs), increase force-projection capabilities (like with low-observable or stealth technology), and increase battlespace awareness, meaning the ability to "see" over the next hill (Owens 2000; Smith 2006; Wong 2013). More than precision munitions, ISR technologies have potential to reduce "the fog of war" that have changed how wars are fought.[37]

Several military *doctrines* were released during the 1990s as part of the revolution in military affairs. Overarching in these doctrines remained the need for shifting the massive, heavy Cold War armies prepared for battle "in place", in which they were located in Europe and fighting in Europe (Sloan 2008, 5). Instead, changing them into lighter, more deployable armies being expeditionary, meaning located in Europe or North America yet deployable to operational theatres around the world, seemed sensible (Boot 2003; Singer 2010). Due to the changing nature of the international security environment, meaning Europe were no longer challenged by one large threat, allies faced many smaller risks and threats that stemmed from several regions across the world, mostly

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[34] The first, *The Military Technical Revolution: A Preliminary Assessment* was released in 1992, followed by *Joint Vision 2010*, outlining operational concepts the military services should attempt to achieve whilst integrating new technologies, and in 2000, *Joint Vision 2020* (JV2020 2000) was published bringing on the ideas from *Joint Vision 2010*, yet simultaneously suggesting a more cautionary view of the possibilities of technology.

[35] Perry (1991, 69), former Secretary of Defense, notes that the offset strategy "sought to use technology as an equalizer or 'force multiplier'" and were persistently pursued by five administrations prior to the Gulf War. Also, former Deputy Secretary of Defense Ashton Carter (2001), claimed that after the dramatic demonstration of the offset strategy during Operation Desert Storm, its percepts became crucial to Washington's way of waging war.

[36] The latter two are often combined as C4ISR (Singer 2010; Wong 2013).

[37] The term «fog of war» originally referred to as the vast clouds of smoke caused by musket fire that often masked what happened in battles. Today, it denotes all the confusion, mistakes, delays and misperceptions occurring in war due to difficulties in coordinating operations in an environment of fear and uncertainty, while adversaries are trying to dispatch you (Singer 2010, 185).

humanitarian crises. But the post-9/11 environment yielded greater concerns regarding the strategies that previously had been effective in responding to dangers, meaning deterrence and containment, which sustained inadequate in managing threats from nonstate actors.[38] Thus, a core requirement has been facing the threat as far from homeland as possible. For this reason, expeditionary – and rapidly deployable – forces are a crucial.

A second key doctrinal RMA tenet has been mobility on the battlefield, because of immensely dispersed forces, wherein no front enemy line would be defied, ought to characterize current military operations. Several scholars and military analysts also highlight the importance of increased jointness as one of the most decisive tenets of the RMA, meaning the ability of the navy, army and air force to operate together (Boot 2003; Boyer 2000; Owens 2000). The RMA expected, as Sloan describes it, a "seamless battlefield" (2008, 6) in which all military services, including the Marine Corps in the US case, were intended to interoperate in the attainment of military objectives.[39]

Even so, a challenge has been to subjugate technological snags hindering different systems from operating together. During the 1990s, Admiral William Owens observed that every military division sought to enhance their capacity for using military force with more precision, less risk and greater effectiveness. However, they were being obstructed by what has been referred to as the three "stovepipes" of military technology, more specifically sensors or ISR, C4I and PGMs, which were developed individually and were not interoperable on the battlefield. He argued the requirement should be a "system of systems" wherein those providing battlespace awareness, battlespace control and precision force should use more compatible hardware and software, thus increasing their ability to function together (Owens 1996, 2).

Furthermore, the US Navy also pursued a key doctrinal shift from platform-centric to network-centric warfare in this period (Adamsky 2008; Owens 2000). Originally, the idea behind network-centric warfare (NCW) was to give more importance to the ability of naval platforms in combining forces and communicating with each other, as opposed to pinpointing individual qualities of specific platforms (Cebrowski and Garstka 1998). Under this concept, the Navy pursued using compatible technology for networking numerous different and diffused sensors, shooters and deciders, previously incapable of interconnecting with one another. In the events of 9/11, and after,

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[38] Due to emerging powers advanced by new technologies and doctrines, and the rise of non-state actors, the classic works on deterrence, presented by amongst others Thomas Schelling (1960; 1966), could be questioned regarding new constellations in the post-Cold War international system. For example, in charging old notions of deterrence for being logically inconsistent and empirically inaccurate, Frank Zagare (2004) and other rational choice scholars argue in favor of perfect deterrence, stressing states' differing internal characteristics especially regarding the credibility of their threats of retaliation. Moreover, veteran cold-war policy makers as Henry Kissinger, Bill Perry, George Schultz and Sam Nunn have more recently reversed their previous positions, asserting that far from making the world safer, nuclear weapons in particular have become a source of great risk. Their rationale was not based on a world with only few nuclear players, but on the instability of many states possessing new improved technologies and the lack of means to properly maintain and upgrade existing weapons (2007).

[39] Joint and combined operations have been a main concern for ensuring interoperability, defined as "the ability of systems, units, and forces to provide services to and accept services from other systems, units, or forces and to use these services to enable them to operate effectively together" (Sloan 2002, 9).

network-centric warfare has been effected into land and air force doctrine.

The main *organizational* changes of the RMA involve formation of smaller units of more highly qualified, trained, and educated military personnel in all services. This is, however, not to say that the overall size of such forces is smaller. Instead, it means that forces would be divided into more mobile and agile units, tailored and assembled for special operations. They had to be as high-tech savvy as the equipment they were to use, and able to be deployed across the world. Since enlisted armies could not operate on such terms, a key organizational change linked to the RMA has been the shift from conscript to all-volunteer, or professional, armies.

3.1.3 Renewed Interest in the RMA: A Real Revolution?

Perspectives on what comprises military transformation and spread of military power are diverse and many within the defense community, and whether explicitly or implicitly, they are ranging from narrow understandings on how technology has affected and shaped warfare, to more extensive views reflecting the need for merging together technological, doctrinal and organizational change, to even more wide-ranging ideas on the ways in which military transformation could help militaries adapt to recent and future security challenges – how military transformation diffuses. Such perspectives – the latter two in particular – confine the true meaning of transformation, which Sloan (2008, 1) defines as "a marked change in character or form, usually for the better". In the security environment, military transformation is often discussed with regards to how modern and future wars diverge in terms of character and form from what the West had been preparing for – yet never fought – during the Cold War. Additionally, a transformed military is not surprisingly seen as a more advantageous tool for political performance by those supporting military transformation, than the means of the Cold War military machine (Boden 2006).

The existence of the current RMA is often presumed when discussing more feasible and important matters deriving from it. However, it is valuable to discuss the nature of the phenomenon for a broader conceptualization and for acknowledging how national perspectives might differ in the geopolitical context. Revisiting the definition made by Andrew Marshall, fairly applauded for accentuating that military-technological innovation is not sufficient for creating an RMA – it also requires doctrinal and organizational innovations as well – could also be criticized for being vague. What really constitutes "a major change in the nature of warfare"?

For example, neo-Clausewitzian scholars would possibly argue that a major change has never been listed through our history, because war has always implicated the quest for political ends through violent military means, and no level of technological advancement can ever change that (Howard 1994). In contrast, others claim we are currently observing a real RMA, not with reference to information technologies or sophisticated conventional weaponry, but rather to the end of the

Clausewitzian era, meaning the time when nation-states pursued war for political reasons and a new mode of war emerged where war detached from *raison d'État* and a way of existence, instead of a political instrument (Keegan 1993; van Creveld 1991).

Whether current changes, and/or the changes during the past two decades, qualify as an RMA is thus depending on criterias used in determining what signifies "major" or "revolutionary" change, which differ among military analysts. First, Rogers perceives from changes in the 1990s an RMA that potentially might cause a military revolution, while Marsh firmly believes that an RMA has not yet occurred. Even though their accounts may seem contradictory, they really have more in common than first noted. Rogers points to a discrepancy between an RMA and military revolution as described by historians.[40] Military revolutions involve transformations so intense that they go beyond the realm of warfare, influencing social, economic and political domestic structures, as well as international arrangements (Gongora and von Riekhoff 2000). RMAs that were not altering the balance between offense and defense failed in turning into military revolutions (Rogers 1995). Conversely, Marsh advocates that although information technologies are radically advancing military capabilities, these developments are essentially occurring within a traditional, doctrinal and intellectual framework, restraining further engagement.[41]

This leads to the notion that a "true" revolution in military affairs has not yet occurred, or is unlikely to, since some of these developments are not new. Analysts such as Michael O'Hanlon and Frederick Kagan stress the fact that much of the technology and weapons systems credited to the current RMA existed prior to both the 1991 Gulf War and internet and information technology boom (Kagan and Kagan 2000; O'Hanlon 2011). Forerunners of the modern RMA can be traced back to military operations during the 1982 War in Lebanon (the Israeli air operations across the Bekaa Valley), the Vietnam War (the use of guided bombs) or even World War II (e.g., aircraft carrier operations in the Pacific). Perhaps even more idiosyncratic to the period after the Gulf War is that the information revolution is no longer restrained to air warfare and naval operations, but is progressively affecting land warfare, the area proven most challenging when it comes to command and control of forces, execution of complex tactics, recognition of friendly and enemy units, and fire precision (Freedman 1998, 12).[42]

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[40] Williamson Murray also makes this distinction and accentuates that a military revolution is a phenomenon of such an extent that militaries could not do much but to "hold on and adapt to trying and difficult times" (Murray 1997, 72). Furthermore, Metz and Kievit have also stressed the disparity between minor and major RMAs (in which the latter refers to military revolutions), and how major RMAs cannot be controlled; alternatively, they require a capacity for adaptation (Metz and Kievit 1995).

[41] Hence, while Rogers believe that the RMA could allow for sociopolitical change to cause a military revolution, Marsh reverses this causality by arguing that a real revolution will possibly rise from loss of sociopolitical order linked to state sovereignty because of increasing virtual communities (Gongora and von Riekhoff 2000).

[42] Because of increased digitization of military organization, the efforts of the US and its Western allies on the battlefield have become extremely efficient at remarkably low costs in human life, in which such gains in military productivity is what Western armed forces will try to achieve in the future despite their shrinking size (Cohen 2004).

3.2 ACT – Adoption Capacity Theory

This section portrays "adoption capacity theory", as expressed by Horowitz (2010, 30-42), arguing that levels of resource mobilization and types of organizational changes required for implementing an innovation – further called financial intensity and organizational capital – decide how an innovation will be adopted and spread throughout the international system, and also determine the way individual states will make strategic choices in response, all other things being equal.[43] Thus, theoretical assumptions are made for both how military power should spread in the international system in general and the strategic choices particular states could make in the wake of the introduction of an MMI. In some way, it appears that the ACT could be considered as a subset of the RMA. Although the RMA theory and conceptualization will serve as a context for this study, it is important to underline ACT as the main theoretical account for further analysis. In this thesis, some of these theoretical expectations are associated with alternative theories, and how they might relate to diffusion of military power at both system- and state-level.

3.2.1 System-Level Assumptions

At the system level, the debut of a new military innovation in the international system will trigger other states' strategic responses. Whereas the given international context in which an innovation develops is very important for how it is translated into international politics, as discussed above, the factors that best explain the way it is likely to diffuse in the international system are the relative levels of financial intensity and organizational capital required for adopting the innovation.

A. Financial Intensity

There is nothing new about the perception that resources matter in shaping the global power. In several theories of international relation, including neo-realism, a core belief is the assumption that material power, or capabilities, lays the foundation of the general relative balance of power in the international system. This motivates NATO, but also other states' decision, through how it affects discussions between interest groups or within countries, or in other manners (Baldwin 1979; Waltz 1979). Financial intensity implies the specific requirements of resource mobilization linked with efforts in adopting MMI, and thereby defined as the relative amount of resources – whether as a share of the total military spending or as a share of the overall GDP – which is required to accomplish a specific task along with how fast such resources need to be mobilized. Put differently, financial

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[43] This includes an assumption of a fairly normal distribution of capabilities in the international system, at the time the innovation is demonstrated. As different innovations have different requirements for adoption, a general understanding of for instance first mover advantages or latecomer benefits is naturally limited (Horowitz 2010).

intensity means the relative resource allocation required to buy and implement the technological end of an MMI.[44] The higher the cost per unit of hardware connected with an innovation, and the more essential technologies are entirely military oriented, the higher the level of financial intensity is required to adopt the innovation.

It is important to stress the cost per unit of technologies. Lower costs per unit can permit a military organization to carry out more experimentation, and thus making it easier to run through new equipment and decide its feasibility for full deployment. For instance, the Industrial Revolution conveyed massive changes in production methods, and facilitated lowering of unit costs of weapons like the rifle, which had persisted through two hundred years before but never regularly appeared on the battlefield due to its earlier high costs per unit. Moreover, the production of one B-2 bomber, which on average costs between one and two billion dollars per plane, is so expensive that testing or experimentation is impossible at the same level (Pike 2005; U.S. Air Force 2006).[45]

The core technology fueling a military innovation can hold many forms. However, Horowitz (2010, 31) stresses that it for the most part is either an essential commercial technology or an essential military technology. This means that either private businesses have both economic and nondefense rationales for developing the technology or the technology was designed for military purposes and will provoke little interest from businesses outside of defense contractors. How these factors define the relative level of financial intensity required for adoption are demonstrated in table 3.1 (Appendix A). In short, it is difficult to adopt MMIs that require high levels of financial intensity for implementation, whereas the unit cost is high, and the core technological foundation is military rather than civilian, than those requiring low levels of financial intensity. As a result, the first assumption asserts that the higher the level of financial intensity required for implementing an innovation is, the harder will it be for a state attempting to adopt it, thereby making it likely for a slow spread of innovation through the international system.[46]

B. Organizational Capital

As financial requirements for adopting innovations can differ, the organizational requirements for adopting innovations can also be different (Gilli and Gilli 2014; 2016). During the late nineteenth and the early twentieth century, the British Navy faced two large innovations in naval warfare. The

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[44] It is debatable whether high levels of financial intensity could make innovation irrational. For instance, if nuclear weapons are so costly, why not build more tanks? In a reality where a nuclear weapon has the same price as one thousand tanks, but the latter do not assure states with coercive or actual military capabilities of a sole nuclear weapon, building nuclear weapons may in fact make more sense.

[45] This means that a type of experimentation that is more likely to happen when the unit cost is low, may also have noteworthy spillover effects on organizational capital. Meaning, experiments may facilitate adjusting military cultures to new technologies and organizational practices.

[46] See table 3.1 in Appendix A.

battlefleet warfare represented a peak of naval industrialization. Characterized by the *Dreadnought*, an all-big-gun battleship and first of its kind, battlefleet warfare altered transformations and required changes in the recruitment, education and training of naval personnel (Thomas and Patterson 2000).[47] Submarine warfare was the second innovation, epitomizing a more disruptive change. The looming shift in naval power away from gun and capital ships, and toward torpedoes and submarines, challenged centuries of assessing the production of naval power. Specifically, it confronted knowhow delineating the British naval dominance: gun battles between capital ships. Adding to changes in recruitment, education and training, the innovation required extensive shifts in the structure of force and plans for the use of force, making it a lot harder to implement, and is one of the reasons why Admiral John Fisher failed in trying to transition the British Navy away from the all-big-gun battleship and toward flotilla defense (Lambert 1995; 1999; Sumida 1995).

Accordingly, insofar as the type and degree of transformation required, different military innovations can put various demands on organizations. Several scholars suggest that a firm's organizational structure or capital can influence in substantial ways to a firm's productivity. Organizational capital is an intangible asset allowing organizations to make changes in response to perceived shifts in the environment. It is arguably the most important value-contributing asset they have.[48] But as with other intangible assets, there is no consensus definition of what organizational capital is, how to best measure it, or how to best quantify its contribution to output. For military organizations, Horowitz explains it as a "virtual stockpile of change assets" which is necessary for responding to changes in the nature of warfare (2010, 33).[49]

Accordingly, previous discussions induce a problem of measurement. In periods of uncertainty, the demands on military organizations for MMIs fluctuate in ways which could bear resemblance to inconsistency in the demands on firms through periods of rapid change. For measuring the level of organizational capital in a military organization and the reference level of organizational capital required to implement an MMI, useful alternate operationalizable indicators from this literature on business innovation can be helpful. The measures of levels of organizational capital in which military organizations have, as offered by Horowitz, are the critical task focus, experimentation resources and finally organizational age.

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[47] For example, because of improvements in the armament scheme, gunnery officers had to learn advanced math for plotting gun trajectories rather than training to climb the riggings. Also, they had to learn how to take apart and put together the engines instead of mastering sails. This made the innovation easier to implement organizationally.

[48] An asset that cannot easily be imitated by competitors, and consequently giving its owners sustained competitive advantage.

[49] New military technology does not produce value on its own. Technology has value for producing military force simply in combination with organizational processes. As follows, organizational capital is the nontechnological attribute of force development, confirmed through doctrine, education and training. Organizations with higher degrees of organizational capital are significantly more able to take advantage of new innovations and successfully transform for future occurrences, as opposed to organizations with lower degrees of organizational capital.

The critical task of an organization is usually measured by reports of intent and planning documents and is what an organization regards as its main "goal". Thus, it refers to what an organization pursues to achieve. In the literature on integration of innovations and organizational effectiveness, this is not always referred to as critical task but the concept of it apprehends the chief principle of organizations.[50] Comprising critical tasks make organizations able to frame and justify their actions and offering a pivotal premise for motivating personnel.[51] Second, excessive overall investments in experimentation should make militaries more receptive to innovations. Experiments display an institutional willingness to process new ideas and to think outside the box, denoting that the organization develops the capacity to incorporate innovations.[52]

Finally, independent of domestic politics and general political centralization, organizations obtain some level of inflexibility over periods of time which cause hindrance of transformation that undermine levels of organizational capital. Although research on business innovation shows identities of firms are not completely unchangeable, the conventional wisdom is that large organizations face difficulties with transformation when encountering new business challenges – especially when the challenge is disruptive to their underlying business model. In his research, Olson (1982) reveals that the age of an organization frequently predicts its productivity level. Older organizations often become more stagnant, thereby making them ill equipped to handle transformational changes. Also, Olson contends that incentives of collective action decrease as the group size increases, because benefits from collective actions are considerably more diffused, and makes it more difficult for larger groups to operate in the pursuit of common interests. Transferring this theoretically to the military realm makes it clearer. Often, well-define military service cultures militate against change, as service groups will uphold current distributional bargains related to the spending of defense capital against efforts to reallocate. Ultimately, the basic assumption is that with rising organizational age, the level of organizational capital will decline.

In combination with general assessments, a given innovation could be measured as requiring a certain amount of organizational capital to adopt.[53] In turn, the second assumption asserts that the

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[50] Clayton Christensen (1997, 168) notes that "Over time, however, the locus of the organization's capabilities shifts toward its processes and values". Critical task focus is the magnitude of which an organization achieves its goals through certain means, and how it blends with the goals themselves (Wilson 1989).

[51] Generally, organizations with relatively narrow critical tasks connect certain ways of doing business with the goal of the organization. However, organizations with broader critical tasks rather delink the organization's goal from means used to achieve that goal. The broader the critical task focus, the easier it is to integrate new ways of attaining goals, meaning adopting an innovation, without coming across too many bureaucratic hurdles in implementing the change. The more specific a military organization manages to outline its critical task, the harder it would be for militaries to adopt an innovation. For further examinations on this matter, see the works of (Clark 1985) and (Tushman and Anderson 1986).

[52] Experimentation might be a better alternative than research and development. Organizations may add a lot of resources into research and development, but if they fail to invest in the right fields, they can end up boosting incremental improvements to the last great thing, instead of the *next* best thing (Christensen 1997).

[53] It is important to emphasize that using first mover as a model for the required level of organizational capital is flawed. However, it does contextualize the adoption requirements. Over time, it is possible that the required level of organizational capital to adopt particular innovations will decline. This is a key limitation to the first mover test. Still it is numerous of other ways to measure organizational capital.

larger the levels of organizational capital required to implement the innovation is, the slower will the innovation spread at the system-level, and the lower the likelihood of a state attempting to adopt the innovation will be.[54]

3.2.2 State-Level Assumptions

It is fair to say that moving from system-level prediction to those of individual states, hence state-level predictions, requires conception of additional complexity. Important is whether knowledge about how to adopt has diffused to a certain state. Whereas the requirements of adoption capacity can predict how an innovation generally can be spread, forecasting individual states' decisions also requires acknowledging their specific motivations. It is arguable that system-level predictions, when applied to selected states, are tautological since they predict that states with capacity to adopt will do so. However, threats and domestic politics may lead them toward choices for maximizing their utility due to reasons of inclination other than enlarging short-term military power.

Strategic Choices

States responding to a major military innovation will usually choose a dominant response strategy that is by and large time-consuming and stipulates effort from the variety of potential choices outlined in the previous chapter, although they might engage in selected different paths simultaneously. As Horowitz writes, the dominant strategy is "an attempt by a state to maximize its utility in response to a given innovation, though states can and do make bad choices" (2010, 40). The reward of adopting certain strategies is states being confident about the essentials of the innovation, depending on how effectively information about the innovation has spread, states' interests in adopting based on their geopolitical position and arrangement of domestic politics, and its adaptation capacity, meaning the ability to adopt the innovation given their financial and organizational resources. There are other factors as well that could influence responses to innovations, though these factors are considered to be the most critical in general.

In his research of the European interwar period, Posen (1984) upholds that large-scale geopolitical threats could enhance the swiftness of states in responding to new military innovations. It is not necessarily a rule that threats will lead to adoption, however, it will lead to the optimization of response strategies. Contingent on its preinnovation formation of alliances and adoption capacity, the optimal response strategy of a state could be a dominant alliance strategy, an adoption strategy, or a shift toward neutrality (Elman 1999; Goldman and Eliason 2003a; Parker 1996).

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[54] See table 3.2 in Appendix A.

Other factors may influence state decisions, like domestic political costs and benefits. As Herrera and Mahnken (2003) demonstrates, the failure of Archduke Charles to fully implement Napoleonic reforms in the Austro-Hungarian Army originated from domestic political havoc that blocked effective mobilization, inferring that regime stability would be threatened if mobilization actually did occur. Regardless of a strategic need and financial capacity to adopt, the absence of necessary organizational capital and domestic political constraints hindered an effective adoption.

When geopolitics and domestic politics can influence response strategies away from adoption, pursuing countering strategies as one alternative becomes more likely. Countering efforts attempt to offset the value of an innovation through low-cost alternatives or replacements of lacking capabilities and are overall easier to adopt (Goldman and Eliason 2003a). The perhaps inexpensive character of countering may serve as a particularly attractive solution for states that think they can compete and adopt the innovation over time but have to postpone in the short-term, or states lacking the capabilities to adopt in every reasonable time frame but are not willing to leave their current foreign policy through entering new alliances or a shift toward neutrality (Parker 1996).

Success and Failure

When determining the diffusion of military innovations, it is necessary to not just uncovering what a country will try to do but whether it in fact will work as well. In relation to possible external strategies in response to an innovation, predicting success and failure is not the most difficult thing to do – success or failure depends on states' willingness to abandon foreign policy goals and who their friends or opponents are in the international system. Though, building on Goldman's notion of capacity, the failure of states' countering or adoption efforts are more fascinating. Requirements for implementing each innovation determine which states that are least likely to adopt and/or most likely to fail, and these differ greatly across innovations (Goldman 2007).[55]

The key determining factor of success for states attempting to adopt an innovation, is whether financial and organizational requirements for implementing it fits with the states' capabilities when pursuing an adoption strategy.[56] Allegations about success and failure could purpose in two different accounts: one is focusing on selection and the other is focusing on organizational shortsightedness. A selection argument may assume that a state attempts to adopt only if it is the best option, which implies that the state has the capacity to implement the innovation successfully.[57] Conversely, as stated by Robert Jervis (1976, 189-91), slowly changing perceptions might trigger what he calls

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[55] This further distinguishes adoption capacity theory from realist perspectives, assumed that Resende-Santos (1997, 9-11) clearly remarks that neorealist theories, such as his own, cannot justify the strategies' success or failure – only whether states will compete.
[56] In many cases, ACT is obviously endogenous to strategic choices. States with financial and organizational capabilities are in most cases more likely to attempt adoption – yet the British response to Napoleonic warfare demonstrates that this is not necessarily true.
[57] Also, it is also a rational possibility that efforts to adopt an innovation might be the strategy leaders prefer, even if they may think the attempts will fail. Efforts can signal a commitment internationally that affects allies and possible opponents.

"organizational myopia", meaning when actors fail to accurately evaluate their own capabilities and situations they come across.

There is a specific type of state more prone to errors – such as states attempting to adopt when it is a mistake and states choosing not to when they should – when encountering a strategic choice in response to an innovation: major powers lacking the capacity to adopt the new major military innovation. When new military innovations necessitate high levels of organizational capital to implement, holding the ability to invest heavily and successfully in military capacities that increase combat effectiveness during a period may worsen a military organization's capability to transform in dealing with the next period of military power.[58]

Certain major powers might consider the relative costs of an innovation, both material and political, and decide that it is necessary with an alternative strategy even though it undermines their relative status in the international system. On the other side, others may try to defend the status quo at all costs, which means that they are more likely to engage in a risky strategy and attempt to adopt the innovation. Avoiding becoming a "regular" state or a desire to bring back the former days of glory could lead to a form of recognition bias, where leaders of major powers that by logic seem incapable to effectively adopt an innovation try to do it anyway. Major powers with preinnovation structures will those with utmost capacity to attempt and fail in adopting new military innovations.

3.3 Alternate Assumptions of Diffusion

Despite discussions above, adoption capacity theory is not without limitations, and it is important to elaborate on some conceivable criticisms raised by it. A clear one is that the model only treats the supply-side of the relationship, by ignoring *why* states might be interested in adopting innovations. Yet, it is important to note that this thesis is based on the richness of existing works and simultaneously deals with a definite question. ACT begins when diffusion launches, after the point when the international system, in which norms and other factors, influence whether or not a state sees itself compelled responding to an innovation. It is the alteration in adoption requirements related to states' capacity to adopt that decides the *substance* of state responses.[59]

Critics of the significance of organizational capital could question that rational national leaders should be recognizing their military organizations are inflexible and consequently attune national policy to improve the organizational capital of their military, providing them the capability to adopt essential innovations. Yet, domestic political constraints frequently avert leaders from

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[58] Despite the fact that this tradeoff may not be zero-sum, it is surely possible for states to have both great wealth and high levels of organizational capital – and it appears to happen more often than not. See Christensen's (1997) research on firm failures, a parallel in which firms having greatest success in existing markets often fail when they face disruptive innovations.

[59] Notably, the geostrategic surroundings can make a country feel needed to respond to an innovation, but it is the states' capacity to adopt that is critical for the nature of the response. This assessment can benefit states' decisions whether adoption, using external alliances or shifting to neutrality, could be the best response.

imposing major changes on the military in the short-term. Rosen (1991) also stress that external pressure from politicians is often not enough to make militaries change their organizational system, particularly when it comes to war fighting-related pressure.[60]

A different critique relates to perceptions of innovation effectiveness. This, rather than capacity to adopt, is better at predicting the distribution of responses to innovations, as perceptions of effectiveness of innovations construct the framework in which diffusion happen or not (Garstka 2009; Gilli and Gilli 2016; Grissom 2006). Strategic bombing for instance, is an innovation that did not diffuse partly because of perceptions of ineffectiveness. No theory could possibly explain everything. The point is that within the variety of innovations states could be interested in adopting, it is not enough to simply wanting to adopt when predicting distribution of responses or influence on international politics.

3.3.1 Strategic Competition

The model of diffusion related to strategic competition is basically a translation of the neorealist paradigm of international relations into the field of diffusion. States are primarily acting for maximizing their security for external threats and the most important determinant of this behavior is not domestic politics, but the international environment (Waltz 1979).[61] In accordance to Waltz, states meet on similar behaviors that are appreciated by the international system. The ones failing at this are ultimately eliminated. When translating this general understanding to concerns of military technology, he views competition as creating similar processes for the competitors, "And so the weapons of major contenders, and even their strategies, begin to look the same all over the world" (Waltz 1979, 127). Whereas he does not offer much time reflecting on issues of emulation, the theory Waltz presents rests on an implicit idea of strategic competition as driven by structural motivations, which makes diffusion an expected and relatively straightforward process.[62]

Accordingly, the broadest narrative of this realist line of reasoning is that states take part in security maximization in response to military innovations, in which geopolitical pressure established under certain circumstances determines a states' national response to an innovation. Therefore, *systemic pressure* is what determines the behavior of a country's military in response to innovations

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[60] Some scholars associate the operational struggles of e.g. the US Army in the Vietnam War partially to its failure in reforming regardless of pressure from civilian leaders (Bacevich 1986). In the beginning of 1960s, the US Army received direct orders from President J. F. Kennedy to focus on and prepare for counterinsurgency warfare. In spite of high-level pressure, the army failed to make significant changes. Rather, the army decided to esthetically adjust the training programs and define counterinsurgency as less important hence easier form of conventional warfare. That is why the US Army entered the Vietnam War a lot less able to fight an insurgency than if external civilian pressure had been sufficient to cause change (Nagl 2005).

[61] Waltz claimed his theory as being systemic and unable to predict the actions of individual states. Since Waltz, most scholars have used neo-realism in making explicit predictions about decisions of nation-states (Buzan et al. 1993; Elman 1996; Waltz 1999).

[62] Elman (1999), disagreeing with Waltz, presents an alternative realist theory of emulation, and emphasizes that while strategic competition and geopolitical limitations trigger security maximization for nation-states, optimal responses to the introduction of innovations might involve offsetting or doing nothing besides adopting the innovation. This resembles the ACT in moving beyond a simple choice-set of adoption vs. non-adoption. Thus, ACT continues where Elman ends.

(Goldman and Eliason 2003b). While states might choose to adopt an innovation or choose to hold an alternate strategy such as offsetting an innovation, the choice would maximize national security because of structural constraints. In his research on South American militaries during the late nineteenth century, Resende-Santos (2007) highlights that the seriousness of external threats illustrates the magnitude of emulation and states attempting to imitate successful innovations in important areas of warfare. Hence, a state would attempt to adopt an innovation if the perceived risk from non-adoption is large enough.

The assumption of strategic competition is credible since events of military diffusion most likely have at least some strategic attributes at their core, either because of threat perceptions motivating interest groups to encourage certain types of modifications or international norms making interpretation of situations happen in certain manner in which particular innovations are more likely to diffuse than others. When applied to decisions of individual states, this theoretical framework similarly argues that a state's geopolitical position is contributing in predicting its behavior, but still in a less mechanistic way. Even so, one must assume the perspective of strategic competition could be flawed when explaining diffusion of military power.[63]

3.3.2 Domestic and International "Norms"

A further perspective on diffusion of military power stresses that shared norms of appropriate behavior influence how countries respond in the international environment, and military affairs are no exception (DiMaggio and Powell 1983). When studying this in relation to military organizations, it is often referred to as "sociological institutionalism" (Hall and Taylor 1996). Applying sociological institutionalism to procurements of military technology in the developing world, Dana Eyre and Mark Suchman (1996) maintain that spread of military technology relies on minor powers' perceptions of appropriateness in a greater sense than concerns of genuine security (Suchman and Eyre 1992; Wendt and Barnett 1993). Research by Theo Farrell (2005), who examines convergence because of norms, could also be added into this classification. His case studies of the Irish military during the inter-war period and NATO air operations in Kosovo in 1999, called Operation Allied Force, reveal that perceptions about "appropriate" types of military operations and organizations have a tendency to drive doctrine and the use of force.[64] States impersonate leading actors not

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[63] First, the idea of financial and organizational capacity as highly influential in responses to innovations is left out of certain strict strategic competition approaches, especially in more recent works of Resende-Santos (2007). As explained above, and as the following empirical chapters will demonstrate, internal military organizational factors play critical roles in how militaries deal with war and organize themselves to fight. Many case studies, ranging from British strategy in the Boer War to U.S. naval progresses during the 1920s and throughout 1930s to Soviet military innovation after the World War II, illustrate the importance of internal factors in military organizations in processes of adopting innovations (Avant 1994; Farrell 1998; Rosen 1991; Zisk 1993). Secondly, strategic competition can predict which states might potentially consider adopting an innovation, but it struggles in predicting the ones who actually will succeed in adopting. Because it is unable to explain capacity, it can only predict interests and not outcomes.

[64] There are more alternatives in addition to the arguments described above, such as competitive isomorphism or mimicry because of competitive pressure, which further leads to predictions similar to realist assertions. Such approaches could be applied when

because of efficiency reasons, but for seeking status and legitimacy in the international system or internally in an alliance. The assumption in this case is therefore, despite lack of strategic motivations, states seeking status in the international system will make attempts to adopt new major military innovations.

In some respects, the norms alternative is not necessarily sustainable with the theoretical structure in this thesis, mostly because adoption capacity theory is not deterministic regarding reasons why states could attempt purchasing particular technologies. Because systems of fighting, or the organization of military forces for warfare, is the heart of this thesis, it is highly possible that weapons transfer or occur at least somewhat in parallel with predictions of this norms analysis. Although norms could have important influence in determining the extent and rate of diffusion, the norms perspective is also, not surprisingly, inadequate in explaining the adoption and spread of military innovations (Farrell 2001; 2005). Even if actors adopt organizational approaches because of the impact of international norms, these norms might exist as experiential, or heuristic, for maximizing efficiency for states in the international system. Nation-states might converge due to similar ways of producing military power, simply because they are the best practices and not because they want to imitate other countries for legitimizing their existence.[65]

3.3.3 Military Culture

In developing research from both inner and outer scholarly circles of international relations, Goldman (2006) argues that levels of cultural tolerance are important in explaining when states will make real attempts to adopt innovations from abroad. It is more likely for political systems which are more tolerant of external ideas to adopt innovations built abroad. This is because the public and the top leaders will not perceive an innovation as an actual threat. These assumptions could be drawn from the work of Michael Fischerkeller (1998), who gives similar explanation on the cultural foundations of military approaches.[66] A state will attempt to adopt an innovation if it contains higher levels of cultural "openness" in the international system, especially in periods where there are perceptions of high external threats.

The cultural approach alone cannot give a sufficient explanation of the diffusion of major military innovations. First, the significance of survival motivations for defining military

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predicting mimicry in regard to status seeking rather than competition. Farrell defines norms as "beliefs shared by a community about what action is appropriate in given situations" (Farrell 2005).

[65] It is crucial to note that even though a norms perspective can describe why actors are interested in choosing specific strategies, it fails to explain implementation success or failure. It could be important to include a more sophisticated and precise approach or an assessment where norms motivating states' interests in adoption and the innovation implementation are fairly identical.

[66] Fischerkeller (1998) argues that the net assessments of militaries, like the British, Japanese, and the Italians before the World War II, had significant cultural prejudices that affected their decision-making in negative ways. Decisions of adoption, he highlights, might be influenced by cultural perceptions of possible opponents in addition to cultural perceptions of the first mover for a certain military innovation or even how potential military innovations could interact with a country's prevailing culture.

organizational approaches should not be overlooked. Elites could potentially block organizational changes that challenge or undermine their power and influence, but the motivations for adopting efficient methods in producing military force will continue to be influential and will also often cause counteracting interest groups. Using a civil-military competition framework, Posen (1984) views military organizations resisting change by design. As rational, functional and specialized bureaucracies, militaries have institutionalized vested interests in preserving their autonomy, size and wealth while reducing operational insecurities. Therefore, military innovation might progress through direct combat experiences with new technologies, major failure on the battlefield and external civilian intervention forcing change in military decision-making processes, demonstrating how civilian intervention is conditioned by perpetual uncertainty and threat perceptions shaped by the international system.[67] Threat levels that states or the essential relative power of interest groups encounter might be trickled out by cultural views, however, they may have autonomous power as well that affect how domestic actors see the need for change (Goldman 2006).

In addition, some scholars acknowledge the dynamicity of culture, meaning that culture is not static (Goldman 2007; Kier 1997), advocating that discussions over the implementation of specific military organizational assessments could result in minds being changed and the establishment of cultural norms. This is especially so if the approach is adopted in response to disruptions, or shocks, such as unexpected defeat in a war. Related to a school of thought in explaining sources of military innovation through differences in strategic and organizational cultures, Adamsky accentuates that "different cultures think differently about military innovation and produce various types of doctrinal outcomes from the same technological discontinuity" (2010, 1). Accordingly, military innovation is conditioned by different national "cognitive" styles; meaning strategic preferences, perceptions, ideas and knowledge, techniques and personal attributes and habitual behavior developed through time within national strategic communities.[68]

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[67] Deriving from Posen's framework, civilian leaders translate continuity and change in the security environment, and respond by modifying internal organizational, bureaucratic and military liabilities. Low threat perceptions imply that civilian intervention and military innovation are incremental. Conversely, high threat perceptions imply that civilian leaders have greater incentive to mediate and impose major changes on the military. Either direct or indirect, pathways for such intervention are guided through a connection between civilian leaders and elite maverick officers, providing the civilian leadership with their military expertise and thus stimulate innovation. In contrast, Rosen (1991) advocates an intra-service competition model, arguing that military innovation could be facilitated internally, meaning between branches of the same service, with no civilian interference. Innovation diffuses through internal structural changes, gradually or evolutionary, transforming the distribution of organizational power midst competing organizational factions or subgroups.

[68] Secondly, so-called cultural arguments could also be added into domestic political or organizational approaches, which indicates that determining causal precedence is a difficult thing to do. Goldman (2006) writes, for example, whereas elites intend to survive in their positions of authority and could potentially regard adoption of some specific military organizational approaches as threatening, the line between identifying that type of rigidity and power seeking a "cultural argument" as opposed to a "domestic politics argument", is difficult to draw.

3.4 Implications for International Politics and the NATO Alliance

Studying specific innovations and their contents, as well as how they affect international interactions, is important for revealing implications for international politics and the NATO alliance. For instance, the "modern system" taking advantage of transformations in firepower, transportations and communications resulted in considerable changes in force structure and combat planning that accelerated wars' destructiveness (Biddle 2004; Smith 2005). However, this alone yields a narrow type of analysis, because it does not consider the relative implications of innovations for the international security environment. The content of some innovations obviously matters for altering the ways specific wars are fought, but it is the spread – or the lack of it – of such innovations that defines "winners and losers in international politics" (Horowitz 2010, 42).

While military power is built on the ability to adopt important military methods of a specific period, the making of military innovations and their different impact on various states in the system is just one of the ways in which extensive changes in the relative military balance of power happen. Power transitions – when some states arise while others decay – are key moments in time in international politics, since they might fuel major fires, meaning large-scale wars.[69] Understanding how diffusion patterns of some dominant innovations in specific periods of time fits with adoption requirements to states' capabilities is helpful in explaining power transitions. In his influential work, Robert Gilpin (1981, 161-62) argues, in contrast to his general argument about the inevitable decline of existing powers, that existing powers can rediscover themselves and thereby stay on top, by pointing to for example British and Chinese developments over time. However, he fails to explain why they can do this when facing certain challenges, and face what he calls "institutional rigidities" at other times that speed their decline.[70]

The theoretical basis as outlined above, could explain the mechanisms, in a narrow sense, by which these transitions occasionally happen. Diffusion of military innovation is part of the causal process determining power transitions.[71] Assumptions about the way requirements for adoption and state responses will influence the spread of military innovations further ensue predictions about the importance of innovation diffusion for the international security environment. By differentiating between financial and organizational requirements for adopting innovations and implications for international politics, it can also clarify processes where new states get ahead in Gilpin's account or how Powell views shifting costs of war.

Moreover, the theoretical basis makes it possible, in a broader sense, to explain why particular shifts in relative power arise and how. Certain new major military innovations represent

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[69] Power transition is a concept which could be used in describing increases and decreases in relative power, rather than the power transition "school" (Organski and Kugler 1980).

[70] This relates to the works of Olson (1982) and Gilpin (1981) concerning the rise and decline of existing powers.

[71] See the work of Goldman and Andres (1999) for a further discussion of the influence of innovation diffusion on power.

disruptions in international politics that could yield large power differences. First movers could gain significant advantages by innovating and creating new ways of producing military power. And by exploiting these advantages, they might be steered through power transitions that present status quo powers as "overmatched paper tigers" (Horowitz 2010, 43). Rising powers becoming first movers are most likely to experience large gains in relative power. Existing powers that are first movers or those rapidly emulating or generally adopting an MMI, can also make relative gains in power or hold back damaging power shifts. More generally, innovations trigger strategic responses with regard to the rest of the international system and within the Alliance, where success and failure of new innovations are defined by the combination of financial and organizational requirements for adoption and capabilities of states, adjusted by their alliance bearings and other options.

Being a first mover has certain advantages in terms of long-term returns and organizational sustainability.[72] For example, patent law has been used to compare the military and business world, and is important in demonstrating how firms keep control and monopoly over the production knowledge and expand their first-mover advantage (Mykytyn et al. 2002). Patents are critical to the first-movers' ability to maintain their advantages in the long run, especially when industries are depending on secrecy about production processes. As with businesses, first movers of MMIs have obvious reasons for holding secrecy about their new technological capabilities and organizational processes, because it involves the competence first movers wants to avoid from leaking. However, it is demanding to uphold secrecy when a demonstration first occurs, or enough information have spread, except for perhaps the most intricate innovations.[73]

There are several ways of how innovations matter for the security environment, and one approach in which these ways could be changed is when an innovation's adoption requirements affect the length of asymmetrical advantages that adopters, especially first movers, receive. For instance, it is difficult for an actor to keep the first-mover advantage for the time needed to establish a significant monopoly if an innovation is fairly easy to adopt, making it uncomplicated for both early adopters and following actors to adopt as well. Hence, the duration of the first-mover advantage will decline and "the *relative* impact on the international balance of power will also be smaller" (Horowitz 2010, 49-50).[74] Other states will imitate the first mover so quickly that many

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[72] Through decades, most notions of ostensible first movers have usually described their ability to launch new products into markets that will get sizeable market shares (Schumpeter 1942; Bain 1956). However, it is important to stress two focal parts of the first-mover advantages. First, the technological advantage implies hardware, in which firms are ground-breaking in certain products, such as semiconductor improvements, or they introduce completely new products, like the personal computer. Second, the organizational advantage refers to firms having specific technologies that they figure out how to produce and market in such a way that it benefits the firms with advantages (for example the production line, which Henry Ford developed for the Model T).

[73] Regarding choices of research and development strategies, military organizations need to decide whether limited resources should be allocated toward competence reinforcement in current military areas, or toward new military technology or innovative organizational processes, making them a potential first mover (Lieberman and Montgomery 1988).

[74] This relates to his explanations for why the *duration* of first-mover advantages for some innovations has impact on its consequences. A first-mover state should increase its relative power in relation to equal states quicker in its first-mover period, and the primary effect of a given innovation is also assumed to be particularly prominent for the first movers.

advantages of being first will be counteracted. Innovations that are harder to adopt, however, will, given the organizational requirements, give early adopters greater first-mover advantages, which in turn make it easier for them to attain increased international political dominance.

The diffusion pattern for MMIs could also affect many other related factors regarding how states choose to enter wars and engage in combat. Swift changes in military effectiveness can influence how military power is being utilized in general, as a means for achieving higher political goals. First, there is nothing new about the effect of geography on international interactions, and military interactions in particular (Vasquez 1991; 1995). Although most conflicts are between neighboring states in fighting over territorial control, it is crucial not to overlook technological aspects and assessments on how to use military force that supports military operations.[75] Furthermore, while specific innovations may not be directly linked with the technology that is spreading, MMIs could allow a state to steer its bearings into deadlier military interactions in a more extensive geographic scope. Because of MMIs' ability to shift the geographic scope of the militarily possible, they will supposedly lead to increased systemic instability.

In order to explain diffusion of military innovations beyond the international system, more specifically in this case, investigating the adoption and spread of specific military innovations to a small state such as Norway, drawing from preexisting literature is necessary for conceptualizing the differing notions of "small states" and their geopolitical position in the international system. The magnitude of contending debates in the field of small states and international relations is wide and varied, because of fundamental conceptual tensions and difficulties in linking and defining the "shades of grey" of small states and their relative capabilities, relevance, policy preferences and behavioral patterns in the international system.

Thus, in a broad perspective, the conception of small states will henceforth follow three core baseline indicators, notably their geostrategic constraints, relative capabilities and patterns of behavior. Small states in this thesis are conceived along the relational approach of Handel, portrayed in the dominant geostrategic dilemmas in their particular regional or geographic situation and alignments.[76] Sharing a rudimentary sense of insecurity, in which drive their need for ensuring existence and survival, common characteristics determining their "smallness" such as relative asymmetries in territorial geography, size and location, societal and environmental constraints, dependence on external political and material assistance and protection, security uncertainties, and

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[75] Supposing the MMIs are successful, which is not always a given, diffusion of MMIs should change the geography of military events considerably, by opening the door for states undergoing MMIs to interrelate militarily with a wider geographic variety of states. According to Horowitz (2010, 51), the effect should be clearer after dyad states have faced an MMI, however it could be present in asymmetrical relationships as well.
[76] Underpinning this lies the neo-realist belief that states' behavior in a geopolitical scheme is primarily determined by power relations and disparities among them (Handel 1990).

relations and positions between and to major powers, shape national security and military strategies of small states.[77]

When pooled through the international system, how will different adoption requirements for innovations actually translate into changes in how an important innovation will affect the international security environment? There are primarily two key types of predictions relevant to the way diffusion of military power influences international security politics. First, through the consequences of system-level distribution of responses, which relates to the relative balance of power between states. And second, from first-mover advantages and power asymmetries for individual states, which relates to the implications for the relative timing, intensity and the geographic extent of warfare. Table 3.3 and table 3.4 (Appendix A), portrays the assumed distribution of strategic choices in response to MMIs and the assumed relationship between the spread of military power and the balance of power, which will be important for assessing the theoretical assumptions in the next chapters. Regardless of which theory one uses when studying changes in the balance of power, the discussion above illustrates that shifts in the capacity of producing power matter. Diffusion of military innovation signifies a causal process which controls the timing and nature of power shifts that previously have been explained by other factors. How leading countries take advantage of new practices of military power contributes to predict long-term trends related to the international balance of power.

3.5 Chapter Conclusion

This chapter sets the theoretical and analytical framework for the next chapters in this thesis. By combining theoretical accounts on the revolution in military affairs and the adoption capacity theory – the former as a contextual basis and the latter being the main theory for the analysis – it represents a new approach of studying the spread of military innovations. It utilizes existing literature on military innovations and emulation for producing a structure to explain how certain military innovations, primarily modern warships related to network-centric warfare during the information age, spread throughout the international system as well as selected states after the Cold War. It also makes it possible to conceptually comprehend how the uneven speed of military innovation diffusion

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[77] Bearing this in mind, it is the international system that influences the behaviors of states, and vice versa. As Keohane notes, however, traditionally small states have not been able to radically change or affect system-level forces influencing them (1969, 291-310). Still, not all states might have interest in pursuing military innovation by this perception. In addition to their motives or intentions, small states could instigate military advancement because of essential means and sophistication (Raska 2016). However, small states will not necessarily be synonymous with weak states. However, criticisms of this categorization have often included perceptions of its rigidity, and contestations as result of its arbitrary nature. In contrast, relational definitions describe smallness as lack of influence in the international system, high sensitivity to it, or lack of insusceptibility against influences from the environment, implying an idea of small states as weak states. According to David Vital (1967), considered as one of the scholars making up the foundation of small power research tradition in the heyday of non-alignment, claims that the size of human and material resources of a state determine its political options and viability in the international system. However, examining the internal as well as the external sources of states' weaknesses or strengths embedded in the power constellations of the international system, is imperative.

works as one of the major driving mechanisms causing shifts in relative power (balance of power) and warfare. The next chapter forms the methodological framework for how this theory could be empirically tested on the case of modern warships in relation to sea power, and how a small navy as Norway fits into this account.

4. Methodological Framework

Historical examples clarify everything and also provide the best kind of proof in the empirical sciences. This is particularly true of the art of war.

(Karl von Clausewitz, in McNeil 2001, 7)

This thesis uses one main method of research, namely qualitative comparative historical analysis (CHA), accompanied by qualitative case studies using historical explanations for revealing continuity and breaches in political-military mechanisms in the ways states are responding to new major military innovations. Consequently, assessing the diversity of strategic choices available to states is in theory comparable to studies of strategic choices under periods of uncertainty in the international security environment (Lake and Powell 1999; Schelling 1966). Yet, this could be a decision-theoretic way of thinking about the spread of military power. Theoretical assumptions derive from requirements for adopting the innovation and postulations around capability diffusion in the international system.[78] Based on several possible options, the theory is further meant to assess strategic choices for individual states given the state capabilities, requirements for adopting an innovation and the structure of the international system.[79] As such, the case study of sea power and warship innovations is essential as variations in how long innovations stay relevant, in addition to the chance of some innovations overlapping (for example land and sea, and air and sea), could make an all-embracing quantitative data approach flawed. Hence, other methods could provide alternative insights on processes of innovation diffusion yet they may have weaknesses in providing a complete delineation of the dynamics influencing the processes of innovation diffusion. On that note, this study is not without limitations, which will be presented further below. Still, the methodological framework discussed in this chapter his is imperative for answering the research question, and for demonstrating the temporality of diffusion of military innovations.

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[78] Even though these factors vary over time, being state capabilities or distribution of capabilities, they are adequately invariant for stable predictions in the short run.

[79] When thinking about the spread of military power, this seems significant because military organizations are not interminably flexible (especially over shorter periods of time). Although ACT deals with strategic choices, it does not cope with them in a game theoretic sense that tolerates mixed equilibriums. If the ACT of Horowitz is incorrect, military organizations would turn out to be much more elastic than predicted. In addition, it would suggest that future research will be more fruitful by focusing on this issue from a game theoretic point of view.

4.1 Choice of Method: Assessing with the Proper Tools

The study of peace and war cuts across several disciplines and beyond theoretically and methodologically specified research communities within the scholarly field of political science. While academics from various research communities have tended to work separated from each other, scholars have gradually advocated knowledge cumulation by pursuing collaboration and inspiration from work conducted in other research communities. This is true for method as well as for theory, and for studies of international conflict and international relations in general there are increasingly more research built on multi-method research designs (Levy 2008, 1).[80] However, research designs incorporating both qualitative and quantitative methods have commonly harvested much criticism over the years, primarily because of its alleged disability in conducting research thoroughly enough in either techniques, denoting the pitfalls of combining qualitative and quantitative approaches (Keman and Pennings 2014, 53-54).[81] This is not to say that research built on merging statistical and qualitative data are unreliable or invalid. On the contrary, several studies with multi-method designs could indeed increase causal inference, which are essential to both scholars and policymakers.[82]

As the purpose of this thesis is twofold, the main intention is to investigate the influences on states' capacity for innovation and the implications of adopting new military innovations for the NATO alliance. The second seeks to give some insights into the effect of adopting certain naval innovations of warships on the role of a small state navy, such as the Norwegian Navy, in the NATO alliance. The thesis attempts to contribute to the literature on diffusion of military power by examining this phenomenon in a particular setting, notably the post-Cold War era. In order to explain the dynamics as empirically correct as possible, the method used in this study is able to provide students of political science with the proper tools to guide their research. Hence, given the expansive literature on diffusion studies and limited space, it is profitable to center on qualitative comparative methods in this thesis, in conjunction with case study and historical explanation.

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[80] This is marked by the growing integration of formal and statistical approaches, and by a growing attraction of including case study analyses into such multi-method research models. For more detailed overviews of the differing types and combinations of such research designs, see the works of Goertz (2016), Goertz and Mahoney (2006), Collier and Elman (2008) and Berg-Schlosser (2012).

[81] Potential weaknesses related to the use of multi-method approaches could involve puzzling results due to different types of data and designs which might create unequal evidence. As Braun and Maggetti (2015) observe, there is no yardstick available to evaluate the range of how the different methods strengthen the analysis' results with certainty. Therefore, for adopting such methods it is crucial to consider the risks involved with great caution (Creswell 2015).

[82] As Jason Seawright (2016, 42) asserts, if multi-method research should be "worth the effort", the design must be made in such a way that supplementary methods test assumptions which are not usually tested in single-method research. If this is done well, multi-method approaches could convert important issues of descriptive and causal inference from speculative claims into point of empirical debate – just like Horowitz has done with his studies of diffusion of military innovations. This point is relevant for the method used in this thesis. Although this study is not relying explicitly on the use of multi-method designs, but rather on a qualitative model of comparative analysis using historical explanation, case study and process tracing (as described in section 4.1.2), it has still been crucial in that parts of this thesis' theoretical and analytical frameworks relies on the works of Michael Horowitz with his adoption-capacity theory. If his methodological and theoretical work had been executed unsuccessfully, this would have major implications for the credibility of this thesis.

4.1.1 Comparative Historical Analysis (CHA)

In the field of security studies and political science, as well as perspectives on military strategy, there is solid evidence that existing quantitative measures and models of military innovation have, empirically, little or no explanatory or predicative value when actual wars, battles or conflicts are examined. In Biddle's own words, it is "a literature built on weak foundations" (Biddle 2004, 14). Transformations in the conduct of warfare is difficult to explain without seeking to historic accounts and tracing the mechanisms in which the conduct of warfare has changed.

This motivates the use of comparative historical analyses (CHA) in this thesis, which traditionally involves a deep commitment in providing historically rooted explanations with a robust apprehension for causal analysis while acknowledging the significance of temporal processes and utilizing systematic and contextual comparison (Mahoney 2003). This points towards the importance of causal arguments in CHA, as scholars treating this method in their works are primarily interested in explaining and identifying causal structures producing key outcomes. Moreover, equally important is the emphasis on historical aspects and sequences in elucidating processes over time (Mahoney and Rueschemeyer 2009). In this thesis, adding context has been key in for increasing the understanding of the spread of military innovations, for demonstrating how certain events and processes are related to each other through special dynamics revealed over periods of time. In the words of Paul Pierson, "history matters" (Pierson 2004, 15).

The contexts surrounding the emergence of naval innovations during the period around the Cold War's end and the aftermath makes quantitative statistical tests difficult. First, although the innovations have been relevant for quite some time – from its initial debut during the World War II which has been viewed as the beginning phase of the information age innovations – it is far more parameters determining its diffusion patterns than quantitative measures could include. Furthermore, there are ongoing debates whether its diffusion has been completed and fully embraced in the international system, making it difficult to draw a specific period of time from which to draw observations for statistical analyses. Second, traditional datasets such as Militarized Interstate Disputes (MIDs) dataset and the Correlates of War (COW) dataset do not adequately illustrate the complex interactions endemic to conflicts and occurrences after the Cold War. This implies that testing hypotheses of military innovations requires more of an emphasis on process tracing. Fortunately, it is possible to examine an entire universe of cases, making it easier to select the particular case of modern warships related to the information age for a more in-depth study.

4.1.2 CHA, Single Case Study and Process Tracing

When embarking on the literature on diffusion of military innovations, it has become clear that tracing the mechanisms in a military-strategic and historical perspective has been inherently crucial for the thesis' research question. Because of its process-tracing approach, the concept of diffusion is able to explain how and why states choose to adopt or abstain from implementing an innovation. Much literature in the field of diffusion advocates the spread of innovations will not happen at a constant rate. As Santoro (2006, 18) points out, an innovation could generally be perceived as being costly, risky or inapt with the existing social practices, during the initial phases of diffusion. As innovations diffuse further, it could become easier – even safer – for potential adopters to overcome critical thresholds, even if some constraints seem to remain. That is part of the reason why the spread of certain innovations and technologies has been neither irreversible nor inevitable. Looking at various mechanisms at play for demonstrating influential relationships and impacts through process-tracing will therefore be highly valuable.

As this thesis attempts to combine several variables with a single case could induce a "small-*N* problem" – a common criticism of this method (Gerring 2007, 43). Investigating a small number of cases or merely a single case could potentially yield only one logical outcome, meaning generating assumptions that could be tested in other numerous cases. It could arguably imply the problem of lacking external validity, meaning the difficulty of using explanatory aspects based on the study of one or few cases in attempting to explain a wide-ranging phenomenon (Rueschemeyer 2009; Collier, Brady and Seawright 2010). Moreover, Pierson (2004, 173) stresses the difficulties of "many variables, few cases", in that they could escalate and be worsened by CHA's temporal context. A reason for this is the combination of studying correlations among variables simultaneously with the series of change in variables over time. Accordingly, small-*N* analyses generally seek to generate theory, which requires testing in an increased number of cases.

Conversely, both Rueschemeyer (2009) and Ljiphart (1971) have argued that single case studies might be capable of offering more than just theory generating, as they also could facilitate theory testing and bring credible causal explanations. In this thesis, the case study has been imperative because it provide in-depth historical descriptions and discussions of sea power and innovation of warships, crucial in understanding what influences the spread of naval power and military transformation within states. It should be noted, however, that although the case of warship innovations indicates a sense of plurality, as it contains the vessels of both frigates, corvettes and submarines, they are comprised as a singular case of modern warships. This is for demonstrating the

interoperability of technologies applied to ships – or platforms – that several states within the NATO Alliance possess in their navies, making it easier to compare patterns of diffusion.[83]

4.2 Validity and Reliability

A great advantage with CHA and single case study, is the interchanging process between data collection, theory generation and theory testing at play throughout the research process (King, Keohane and Verba 1994, 46). A descriptive in-depth approach should contribute to providing the analysis accurate empirical material when investigating the post-Cold War transformation and spread of military innovations in NATO. Accordingly, it could enrich both the testing of existing theories as well as theory building, facilitating a more robust theoretical and analytical framework in dealing with the phenomenon in a broader sense. Therefore, permitting the material to reform assumptions and guiding the procedure of this study throughout the data collection process is greatly beneficial when doing a case study like this.

As mentioned above, however, conducting this method often imply the priority of internal validity over external validity, meaning the problem of representativeness and external validity rise as detailed explanatory depth is given precedence to over explanatory power across cases (Ragin 1987; 2004; George and Bennett 2005). Nonetheless, the findings and outcomes of the analysis are indeed relevant and replicable in other cases with similar diffusion patterns, as the technologies applicable to modern warships are also applicable to branches other than the sea domain. This is also why examples from other domains – land and air – are relevant. As military innovations consist of numerous components regarding transformations of technology and doctrine, for instance, there are microprocesses affecting all three services which makes it unwise to separate the case of sea power and modern warship innovations completely from transformation and innovations patterns in other domains. Hence, there is an unavoiding interplay between the land, air and sea domain, thereby evading the problem of cherry-picking, which could disturb the generalizability and make an incorrect picture of the empirical evidence (Roberts, Priest and Traynor 2013, 44).

Using multiple sources of evidence is also a great advantage when using this method. This improves the validity and reliability of the findings, as using several sources of empirical evidence fosters what Yin (2009, 114-115) identifies as "converging lines of inquiry", denoting that several sources point the evidence in the same direction. Because the data collection of scientific research should be explicitly accounted for, in terms of replication of others, triangulation of both data

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[83] As such, it is crucial to identify platforms as any existing structure or system on which a weapon or technology could be mounted. For example, a fighter jet is a platform for amongst other missiles, bombs or autocannons. The term could also describe a naval vessel, which new communication or weapon technologies could be applied to, or other technologies related to the information age and RMA (Walls et al. 1999). Historically, attempts to mount weapons on platforms at sea have included catapults and later cannons on navies' final form as ships of the line before the introduction of ironclad warships mounted turrets. This rationalizes the interchangeable use of platforms and vessels in the following chapters.

collection and methods strengthens the reliability of the study (Creswell and Miller 2010; Creswell 2015; Bergman 2008). Relevant for this thesis is so-called within-method triangulation, frequently used data when the phenomenon under scrutiny is multidimensional (Duffy 1987, 131). By choosing one main method, several other strategies as outlined above are applied to examine the data, which as for this thesis derives from archive documents, peer-reviewed academic publications, citations from state officials, military leaders and scholars and reproduced quantitative data, in order to control the reliability of the data by contrasting and comparing the empirical material from the different sources.

Using case study in this thesis, high levels of conceptual validity are possible to achieve, as it could identify and measure the indicators that best characterize the selected theoretical concept. As several variables pose challenges to measurement, it is important to do contextualized comparison seeking to cope with issues of equivalence by searching for logically equivalent phenomena amongst different contexts. In contrast to quantitative analyses that risks conceptual stretching, case studies including few cases can accept conceptual improvements with higher levels of validity (George and Bennett 2005, 19).

4.3 Scope of the Study

The central analytical concern of this study is not how military innovations begin, but *how they spread*, in which who has the capacity to adopt and how quickly they are able to do it, and with what consequences for certain states in the NATO alliance – correspondingly, implications for international politics and the global balance of power. Thus, at the heart of the comparisons of historical and contemporary cases is a concern with understanding the dynamics of the diffusion process in the information age, meaning in the post-Cold War security environment.

Innovations partially happen by the means of an action-reaction process, as Horowitz so appropriately denotes in his research. New innovations can relocate, or even occur side by side with, the prevailing weaponry and strategies of earlier eras, meaning efforts to measure innovation diffusion are often viewed as "right censored" (Horowitz 2010, 60). It is difficult to screen the full reach of responses to an innovation over time, because new innovations develop as to supersede old ones, while states could attempt to build the capacity to adopt or advance a longstanding response strategy. In other instances, however, it is possible to consider the full reach, but the possibility for right censoring is making the assessment of the diffusion process complicated.   In this study, the unit of analysis is the innovation itself. By using process tracing (explained further below), it is possible to establish the existence of the innovation and assess the scope to which diffusion processes have governed certain strategic choices of key states through time. This combined with

case study and triangulation would increase the certainty in the correctness of the results by ensuring that both the system- and state-level are consistent with the theory.

4.3.1 Case Selection

In presenting the case of modern warship innovation and sea power, there are some specifications that must be addressed for the further analysis. First, as noted above, modern warships in this sense comprise primarily naval ships such as frigates, corvettes and submarines. This is crucial when explaining how states enhance their maritime power and naval power projection capabilities. Yet, it is meaningful turning to other aspects and domains of military power as well in demonstrating mechanisms at play and their effect on international politics. This will in turn construct a broader understanding on diffusion patterns of military innovation. Second, although sea power and modern warships are at the center of the case study, they are explored in the context of the American pursuit of the current revolution in military affairs, meaning in the age of information and network-centric warfare (NCW). However, these innovations were introduced in the event of the World War II. Therefore, it has been vital to explain their debut during this period as the modern warships after the Cold War have matured and developed from the ones during the World War II.

Hence, it is the modern warships after the Cold War that primarily are examined, and not those prior to the information age. Meaning, the post-Cold War warship innovations are essentially old platforms, but with application of new technologies of advanced weapon and communication systems, radars, sonars and low-observable technology. Still, some of them have faced radical and disruptive transformations, not only in relation to RMA-technologies, but also with regards to how they are built. This reflects the tenets of NCW and the current RMA – as outlined in table 4.1. In short, even if NCW is highlighted in the table below, it is the modern warships during this period where NCW has become a principal concept that is in focus.

4.3.2 Limitations of the Study

The scholarly field on diffusion studies and literature on military innovation is broad and extensive, and there are certainly several relevant aspects as to why and how to investigate transformation processes in NATO after the Cold War beyond those chosen in this study. As transformation processes reflects and influences strategy and strategic choices, it is certainly a process that both spring from and form strategic conditions. That is, those facts and ideas framing states' strategic options. Strategic conditions are thus nothing but the sum of strategic dimensions such as national policies, foreign politics, command and control, geography, financing, logistics, preparations (administrative, recruiting, training and structure), operations, technology, information and intelligence, the enemy, friction, uncertainty and time (Gray, 1999; Howard, 1979).

The thesis does not go into depth on each and every one of these factors, far from it. Keeping that in mind, the explanations those not allow for all possible, or even likely, explanations to what explains states' capacity to adopt new military innovations are, nor should it. The aim has throughout to provide a comprehensive approach, not an all-encompassing approach. Therefore, the thesis could be expanded on. Further studies of its topic in width, breath and context could provide further details and a broader understanding but would also lead to an incompatible task where the main features drowse in detail and individual deviations.

Subsequently, the thesis should be seen and read as a comprehensive framework for clarification of its research question, and not as a theory that explains an individual state's innovation approach and choices. Moreover, the research question points in a direction where a selection of factors are investigated for providing useful insights on the diffusion patterns of military innovations after the Cold War. However, in terms of testing the adoption capacity theory, parts of it seems to be applicable in explaining certain trends of diffusion – such as the relevance of international norms and culture, strategic choices and domestic politics, and strategic competition. Thus, states will have dissimilar reasons for why and how they choose to invest in and implement adoption of new military innovations. Hence, it might be difficult to encompass the ACT with all the diverging national outcomes in each of the twenty-nine-member states.

Lastly, there could be some risks of tautology, meaning using several literary terms for explaining the same things. For instance, in the cultural perspective, there is in some cases a risk of tautology since it is complicated to assess or measure variables like openness to cultural diversity without considering if particular states have actually adopted the innovations in question. Yet, the thesis' theoretical foundation could potentially explain the situations in which cultural openness is likely to occur with regard to military organizations.

5. Military Innovations and Capabilities in NATO: The Case of Modern Warships and Sea power

Sea power affects international relations. Historically, it made the establishment and sustainment of overseas colonies possible for major powers and smaller European powers, leaving a clear mark in battles during the first half of the twentieth century, such as Jutland, Atlantic, Midway, Pearl Harbor and Leyte Gulf (Fuller 1997). More recently, naval power enabled Britain to regain the Falkland Islands in 1982. It also enabled the US to send and support large offensive forces to Iraq in 1990

and 2003 (Chrisher and Souva 2014). For projecting influence and protecting their interests across the oceans, states need a powerful and innovative navy whenever being challenged.

During the last few centuries, most of the world's great naval powers have originated from the West, except for Japan in the first half of the twentieth century (Horowitz 2010). However, other nations from other parts of the world are increasingly allocating considerable resources in developing their navies, such as India, China and Brazil (Chrisher and Souva 2014). Also, Japan has again advanced one of the strongest navies in the world. Yet, while new naval powers are developing, traditional ones are still striving to improve their fighting forces. The focus in this chapter lies on the post-Cold War transformation of NATO, reflecting a shifting geostrategic environment through past decades, and longstanding innovation processes of both overall military as well as naval capabilities explicitly. By stressing essential changes of strategic concepts, doctrines and technology, it is possible to get a more comprehensive understanding of the nature of naval military transformation and states' pursuit of maritime power in the international system. This understanding could further contribute in explaining the diffusion of modern warship innovations in not only great powers but also in small navies such as the Norwegian Navy, and especially related to the RMA and network-centric warfare by demonstrating linkages between innovation processes and alliance politics – crucial in debates concerning the political will, hegemonic power and threat perceptions of states.

5.1 Sharing the Burden, Capabilities and Purpose of the Alliance

Since its inception, many within the security environment have debated the burden-sharing and purpose of the Alliance, thus contributing to internal reform. These discussions have reflected emerging gaps ascended over time, affecting the ability to implement capability initiatives in NATO. When explaining transformation processes in NATO, it is vital to address existing gaps within the Alliance. First, since the beginning, the US have carried most of the burden, in which both the US and its allies have grown used to. Associated with this, European allied states have thereby been adapted to distinct roles and having disproportional weight with the continuing hegemonic power of the US. And third, NATO have faced discords concerning interoperability between the US and European allies, as the US have maintained its technological lead in certain areas since the 1990s. Accordingly, these gaps could explain states' differing abilities to innovate, why the US stress the need for transformation in NATO, and the lack of unity about political and military willingness to meet the commitments outlined in capability initiatives.

The "transatlantic bargain", or burden-sharing, balances US commitments against European contributions, and have endured since the beginning of NATO (Sloan 2002). In articulating disbelief in the reliability of US commitments, Europeans have been met with discontent regarding their

contributions by the Americans, reflecting the vagueness of the entire arrangement while indicating that failure to address this might undermine the very solidarity underpinning the Alliance. However, rising events would make this division between the US and the European allies, even clearer (Cooper and Zycher 1989, 2).

This debate, as well as other issues causing previous change, is still relevant for the current transformation processes in NATO, which escalated after the end of the Cold War. As NATO members awaited a "peace dividend", most allies experienced severe cuts in armed forces and defense budgets during the 1990s (Rimanelli 2009, 476). From 1986 to 2016, US defense spending was reduced by half, denoting a decrease from 6.1 to 3.3 percent of GDP. The five main European allies – UK, France, Germany, Italy and Spain – also suffered cuts in their defenses, ranging from 4.5 percent to 1.2 percent of GDP during the same period (World Bank 2017). Correspondingly, the gap in defense spending within the Alliance declined.

Driven by the markedly new post-Cold War geostrategic environment, meaning Europe were no longer defied by one large threat, NATO began envisioning situations where it had to carry out military activities, inferring power projection as well as rapid reaction and mobile forces able to operate, outside NATO territory. Allies reducing their defense budget and forces is highly pertinent if NATO should uphold innovative skills and prepare for interventions abroad. Hence, the burden-sharing debate will likely continue to reemerge, as with the 1990 US-led intervention in Iraq, which revealed a widened gap in military capabilities within the Alliance. Similarly, it became even more evident in the Balkan engagements, exposing shortcomings in European states as they were reliant on the diplomatic and military power (air and naval assets) of the US for resolving the crisis (Hallams and Schreer 2012; Kay 2013).

Discussions of how to share the burden within the Alliance also interact with debates on its political and military purpose, which could be traced to the 1967 Harmel Report on the Future Tasks of the Alliance, expressing the balance between the military and the political function of NATO (Locher and Nuenlist 2004). Often referred to as the *magna carta* of NATO, it represented first efforts of ripening a common political strategy and defining the political purpose of the Alliance, notably pursuing a policy of détente with seeking explicitly to deescalate the East-West rivalry (Østerud and Toje 2013, 76).[84]

By adopting the Harmel Report in 1967, the allies faced an imminent transformation of both the objective, appearance and future task of NATO. Combining defense and détente facilitated an

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[84] Furthering the vision of détente, it is important to note the §5, stating that balancing force would contribute to create a stable, secure and confident environment. The dual approach of credible collective defense, combined with coexistence, continued in the post-Cold War era. This is crucial. As NATO accepted a balance of military defense and deterrence by committing to political détente, the security of its member states was reassured. However, security guarantees in itself were not sufficient, directing the making of a collective foreign policy (Hill and Smith 2002).

intellectual and political framework for the Alliance, thereby accelerating the increasing divide between left and right. By uniting different perspectives on political-military issues, the report broadened, as Sloan argues, the potential auxiliary base for NATO. Furthermore, NATO could function as pivoting a balance of differing point of views regarding the requirements of Western security policy in Europe, rather than enabling further polarization among the Western politicians (Sloan 1985). Nevertheless, the above discussions demonstrate that the purpose of the Alliance has been contested over several decades, and still is. The overall rationale for NATO regarding transformation, though, is an entirely different debate, and is portrayed below.

5.2 NATO's Military Development

5.2.1 Military Transformation Initiatives

How NATO has altered its purpose and issues of burden-sharing, is important in discussing in what way transformation of its arrangement and the capabilities of allies, occurs. With the collapse of the Soviet Union, the Alliance was met by challenges in transforming its *raison d'être*, brought by the new security environment. Decisions on how to relate to former Soviet states posed one challenge, while another major challenge was redefining its Strategic Concept and altering its modus operandi. The reorientation of the NATO rationale from defense in place to managing threats outside Alliance borders, is deeply connected to – and influences – the content of NATO's diverse military development initiatives. Developing rapidly deployable, combat capable expeditionary forces, which is an RMA constituent of military transformation, is echoed in the 1999 Defense Capabilities Initiative (DCI), the 2002 Prague Capabilities Commitment (PCC), and more recently the 2011 Smart Defense Initiative (SDI).

At the Washington Summit in 1999, the DCI was approved as a way of addressing the cumulative gap in military capabilities and technologies between the US and its allies. The summit occurred shortly after the NATO operation in and surrounding areas of Kosovo, thus unintentionally providing greater incentive for the need of increased allied interoperability and demonstrating deficiencies in military capabilities of allied states. Central areas of capabilities in the DCI comprised deployability and mobility, sustainability and logistics, survivability, effective engagement, and command and control and information systems, with intrinsic goals intended to be overseen, but NATO allies made no definite commitments (Sloan 2008, 78).

After three years with minor accomplishment, NATO heads and governments met at Prague in 2002, adopting a dissimilar approach from that of the DCI in efforts of improving its broadness and softness. Instead of completing all of the capability goals, the allies agreed under the PCC to upsurge their military capability in one of the following eight areas: Defense against weapons of

mass destruction (WMD); intelligence; air-to-ground surveillance; command, control and communications; combat effectiveness (with precision-guided munitions); strategic airlift and sealift; aerial refuelling; and deployable combat support units (NATO 2002).

In many of these areas, specific nations accepted to forge ahead in pushing capability forward. Spain agreed to lead a group of countries to lease air-to-air refuelling tankers. The Netherlands did the same for securing smarter weapons, Norway to develop sealift, and Germany to lease airlift (Sloan 2008). These groups were created in which states sought to increase their capabilities in specific areas. Accordingly, the overall line of the PCC was an attention to multinational teaming or pooling, crisis management, and to role sharing or specialization (Shimkus 2005). Although allies made advancements in certain PCC capability areas, the capability gaps remained mostly the same four years after the plan's adoption. This reflected the lacking political will to commit, and that actual implementation would continue to be a slow process, putting great emphasis on the funding by national governments (Ek 2007).

While the PCC seemed more adjustable than the DCI, the Smart Defense Initiative (SDI) is regarded as a way of getting "more bang for the buck". The former Secretary General Anders Fogh Rasmussen unveiled the initiative at the 2011 Wehrkunde Security conference in Munich, presenting it as a new means of "ensuring greater security, for less money, by working together with more flexibility" (NATO 2011). NATO leaders agreed to incorporate Smart Defense at the Chicago Summit in 2012, for making sure that the Alliance could develop, acquire and maintain the capabilities required to achieve goals for NATO Forces 2020, due to the continuing lack of interoperability and persistent capability shortfalls (Fiott 2017). Central for this is the Connected Forces Initiative (CFI), adding emphasis on supporting measures in the areas of education and training, exercises and technology (Desit and Perks 2012; Viereck 2013).

Because of pressing requirements for results, the SDI is different from the DCI and PCC. NATO have faced increasingly more complex and diverse challenges such as threats from nonstate actors, conflicts out of NATO territory and cyber-attacks (NATO 2010; NATO 2016). The revise of the Strategic Concept in 2010 not only strengthened the credible deterrence and Article V mission, but simultaneously included more tasks and challenges, such as ballistic missile defense, intelligence, surveillance and reconnaissance, maintenance of readiness, training and force preparation, effective engagement and force protection (NATO 2012). Adding to this complexity, these challenges needed to be met in a time of decreasing military expenditures and military structures of allied states.[85] In dealing with this problem, SDI requires change in national along with the alliance's culture of cooperation (NMoD 2012a).

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[85] See Figure 5.1, 5.2, 5.3 and 5.4 for trends in NATO military expenditures in Appendix B. Figure 5.1 shows that the peace dividend, in terms of falling defense spending, following the end of the Cold War was short-lived for the world as a whole. The 2008 recession

5.2.2 Organizational Transformations

Soon after the collapse of the Soviet Union, NATO began to adapt its multinational, joint military command structure to the new security environment, hence the release of the New Strategic Concept in 1991.[86] What was referred to as the RMA during the 1990s, thus shaping the essence of military change, includes several concepts along technological, doctrinal and organizational lines, distinct but yet closely interrelated in that each facilitates the others. The most noteworthy advancements in NATO are related to organizational transformation, and explicitly the design of command and control structures concerning rapidly deployable force projection as the guiding doctrine for transforming their armed forces.

Early in the 1990s, NATO formed the Allied Command Europe Rapid Reaction Corps (ARRC), a mobile army headquarters of around a thousand multinational military personnel, meant for conducting humanitarian and peacekeeping missions (Sloan 2002; 2008). Following this idea, the Alliance launched the Combined Joint Task Force (CJTF) shortly after, a concept for assisting allied forces in shifting from collective defense capabilities to those necessary in operating "out of area".[87] The concept would also reflect the readiness to make the alliance's assets available for the members. Approved at the 1994 NATO Summit, the CJTF concept sought to create headquarter structures, enabling different allied forces and services to converge as a task force and carry out several types of operations outside NATO borders (Rynning 2005).

Over the following years, the Alliance went through vast conceptual work in instituting command and control arrangements for many different operations, in addition to conducting exercises for assessing planned structures (NATO 1999a; 1999b; 2001). It was not until the Prague Summit in 2002 that ideas of the CJTF concept truly progressed. Whereas the PCC was one outcome of the summit, there were especially two decisions being more vital for organizational transformation, notably to radically reduce and streamline the entire NATO command structure – by forming a command purposely devoted to center on military change – and to establish a NATO Response Force (NRF), intended to serve as a catalyst for thrusting transformation in practice.

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braked the increase rate in global military expenditure. After 2009, downturn in military expenditure was mostly because of the decline in US defense spending, as US budget deficit concerns resulted in large-scale cuts in government spending. In 2012, the US share of global military expenditure fell to less than 40 per cent for the first time since 1960. Figure 5.1 highlights the overall upward spending on global defense since 1960, while Figure 5.2 indicates that states are generally allocating less of their GDP to defense since the end of the Cold War. The latter tendency is true except for three major powers (i.e. the US, China and Russia) and countries where tensions are high (e.g., Greece and Turkey). Figure 5.3 displays distribution of military expenditures as NATO allies are grouped into four categories; the US, medium powers (France, Germany and the Britain), other allies (12 pre-1999 expansion allies) and the 12 expansion allies. Finally, Figure 5.4 demonstrates the military expenditure distributed among the major powers (Sandler and George 2016).

[86] The Strategic Concept fell short in providing detailed guidance for how to improve the NATO command and control structures. Rather, it called for creating flexible command and control arrangements that could enable crisis management and conflict prevention. This Strategic Concept and the following initiatives have led to substantial reorganization of alliance command and control arrangements (NATO 1991; Young 1997; Johnsen 1997).

[87] "Combined" in this concept refers to multinational forces, while "joint" comprises more than one military service, such as the navy, army, air force and marine corps (which is the case for the US and for Britain).

The Alliance's new command structure now entailed one operational command, Allied Command Operations (ACO), which merged the former two operational commands – Allied Command Europe and Allied Command Atlantic – enduring since the 1950s. Simultaneously, NATO created a nonoperational command, Allied Command Transformation, tasked with being "NATO's forcing agent for change", for evaluating strategic surroundings the Alliance encounters, identifying the need for new capabilities in adapting to these surroundings, and facilitating innovations of capability solutions (Velde 2006, 3).[88] Essentially, it remains the long-term strategic branch of NATO, with joint force headquarters around the world. As Boland asserts, its creation "represents a transformation in NATO from being an entity that reacts to imminent threats to an organization that plans for future troop capabilities" (Boland 2006, 56).

This organizational reform of the allied command structure also imposed great impacts on the maritime domain as well. Based on the decisions in Prague, the 2010 NATO Summit in Lisbon determined to create an even leaner and more effective command structure, by reducing the number of major headquarters from eleven to six which led directly to the deactivation of the Allied Maritime Command Naples in 2013 – leaving the newly named MARCOM as the sole maritime component of NATO (NATO 2014). For ensuring the interoperability and readiness of allied forces, MARCOM has been responsible for planning and conducting all maritime operations, in leading four standing maritime groups – two frigate groups and two countermeasures groups. Being multinational, the groups integrate maritime force composing vessels from allied countries, thereby providing NATO with continuous maritime capability.

Finally, the creation of a NATO Response Force (NRF) was another crucial organizational undertaking at the Prague Summit, comprising about 25 000 personnel and combining land, sea, air and special operation forces (SOFs), capable of being deployed within a five-day notice and to sustain itself for thirty days or more if resupplied. Its tasks are to contain Article V collective defense, non-Article V crisis response (e.g. evacuations and disaster management), responding to humanitarian crises, counter-terrorism, and acting as an "initial entry force" for larger, subsequent forces (NATO 2006). Even if the NRF was declared fully operational in 2006, it has faced challenges in upholding necessary force strength. For example, allied states have ought to avert forces initially promised to the NRF, to operations in Iraq, Afghanistan, Lebanon and Kosovo, which urged NATO heads to question the NRF concept.

The NRF is ideally a key operational instrument for addressing crises in the current security environment. When Secretary Rumsfeld presented the NRF in 2002, it was also with the intent of it being a practical force promoting transformation. As various allied forces rotated through the NRF,

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[88] Moreover, Allied Command Transformations arranges conferences, joint training and exercises to foster these processes

they would be trained to high standards and learn about new concepts and technologies, thus favoring military innovation. Also, the practice would be continuous. The NRF could be viewed as a perpetually ongoing allied military training exercise, applied for assessing new concepts and capability advancements. A past NATO Supreme Allied Commander Europa (SACEUR) argued that "for NATO, the operational path for transformation lies in the emergence of the NRF" (Jones 2005, 16). Yet, struggles in realizing the NRF prophecy could question its ability to appear as a channel of promoting NATO transformation. In some way the missions themselves – to the extent NRF forces has been averted – have still adopted this role (Kington 2007).

5.2.3 NATO Military Technology and Capabilities

Despite half a century debating the problem of burden-sharing, NATO has proven incapable of generating equal sharing of the defense burden.[89] As the discussion above comments, a growing gap in technology and military capabilities has limited the interoperability. However, despite this gap and moving beyond the organizational changes, the Alliance is still making advances in other areas associated with the RMA core of military innovation.

Early in the 2000s, NATO members agreed on a plan to pool military sealift capabilities, with the aim of amplifying the deployability of its military forces. Under the agreement's conditions, which was the outcome of the strategic sealift group led by Norway after the Prague Summit, the Alliance has secured entry of numerous sealift vessels owned by allied states. For increasing rapid deployability, the Alliance agreed on an interim airlift solution, in which Germany was charged with the pilot role. Included in the contract, a Russian joint venture was expected to provide NATO with two AN-124 Antonov air transporters on full-time charter, along with two more on six days' notice and two others on nine days' notice – far less than the "up to 20 C-17 or An-124 airlifters" initially anticipated as part of the interim solution (Fiorenza 2002, 7). This deal was intended to supply NATO with airlift until European member states instigated receiving delivery of A400M airlifters.[90]

Yet, this raised two central concerns. Russian officials from the joint venture stated the aircrafts would only transport humanitarian cargo, and "If an airlift does not correspond with Russia's interests, it will not take place" (Abdullaev 2006, 44), potentially impeding NATO forces in certain types of operations. Furthermore, it is arguable whether this type of A400 aircraft even fit within the category of "strategic airlift", which represent a shortcoming for the Alliance. Since the aircraft is much smaller than the C-17 Globemaster air transporter, it is being considered by among

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[89] It should be noted, however, that the lowered defense budgets of most European states are primarily because of national interests, in addition to some NATO-led operations such as the "Resolute Support" in Afghanistan. The scope of the US contribution involves military power in parts of the world where Europe will not or do not have the interest of contributing. Therefore, it is arguable to what degree the burden-sharing of NATO really is uneven.
[90] In August 2013, however, the first A400M aircrafts were delivered to the French Air Force (Flight Global 2013).

others Australia as a replacement for their C-130 Hercules tactical airlifter. This might have laid the grounds for decisions at the Riga Summit, to promote a Strategic Airlift Capability (SAC) initiative, in which ten members have joined the airlift fleet.

There has been less progress in other areas. At the Prague Summit, NATO members reached agreement in increasing their capabilities regarding air-to-ground surveillance, notably the Allied Ground Surveillance (AGS) program – emerging since the 1990s. The intent was to highlight the shortcoming of NATO's capability to monitor large tracks of land for movement, regardless of weather, over longer periods of time (Sloan 2008). For a long time, NATO had to rely on the US JSTARS aircraft for assuring this capability during operations, and also the British Airborne Standoff Radar (ASTOR) aircraft, reflecting the technological gap within the Alliance. Settlement among the prime allied – France, Germany, Italy, the Netherlands, Spain and the US – on the program involved concerns over funding, what should comprise the AGS capability and who should build the aircraft's Synthetic Aperture Radar. The US first proposed that NATO should buy JSTARS, but Germany in particular, foresaw an unmanned future. Accordingly, the program launched in 2004 called for a mixed platform approach, comprising modified Airbus 321s, with multinational crews, and Global Hawk UAVs. Additionally, France have preferred a radar built in Europe, rather than an American type due to potential US controls or limitations. In 2006, NATO decided to discontinue the mixed-fleet solution, and instead moving forward with the AGS' design and development phase. Although concerns were raised over achieving this capability goal, NATO signed a procurement contract for the AGS system in 2012, paving the way for delivering a vital capability to all member states (NATO 2017).

In other areas of C4ISR, NATO has had – since the 1980s – a fleet of committed AWACS aircraft for air-to-air surveillance. The AWACS, one of the few commonly funded military systems in NATO, have recently endured upgrades through modernization programs, and according to Boeing, the first modified E-3A aircrafts are expected to be completed by 2018 (Stevenson 2016). The Alliance also has common satellite communications capabilities for its forces. In 2005, NATO agreed under the Satcom Post-2000 program, with the British, French and Italian governments, to purchase UHF and SHF capacity – two each from British Skynet, French Syracuse and Italian SICRAL satellites.[91] The program is also anticipating acquiring the Extremely High Frequency (EHF) band in the future, which have caused much controversy related to its scope of transmission (Wong 2013). For network-centric capability and interoperability among allied forces, key systems are Joint Tactical Information Systems (JTIDS) and Multifunctional Information Distribution System (MIDS) which has long been integrated in NATO forces. Based on tactical link-16

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[91] UHF indicates ultra high frequency, and SHF implies super high frequency.

technology, JTIDS/MIDS are integrated into their fighter jets, bombers, and sea, land and air command and control centers (Adams et al. 2004).

For the maritime domain specifically, allied states have sought to improve their navies by retaining a broad array of naval capabilities despite declining defense budgets yet resulting in smaller fleets. This is especially related to some states' move away from deep-ocean operations and toward littoral warfare, meaning operations along coastal areas, due to changes in the post-Cold War security environment (Sloan 2008). But it also corresponds with increasing costs of new technology. Advanced computer systems, for example, modified for interoperability between various military platforms, is enormously expensive, causing major changes not only in the defense industry (more costly modes of production), but also costlier R&D programs. Important for NATO over the years has been a push for improving anti-surface, anti-submarine and anti-aircraft defense systems, thereby enhancing overall maritime capability of allied forces. The AEGIS combat system has long been vital for command and control structures, and is incorporated into several allied navies, such as Norway and Spain, as part of NATO's European missile defense system (NATO 2012). While the global trend is smaller and more technologically advanced navies, the allied forces differ in their capability improvements, with somewhat diverse approaches for balancing national and allied defense planning.

5.3 Norwegian Military Development

5.3.1 Military Transformation Initiatives

The political backdrop and transformation of NATO is imperative in assessing the strategic and military change of selected allies, and in particular a small allied state such as Norway. Despite some national differences, major changes have occurred in the Scandinavian militaries. More specifically, the challenges NATO faced in the aftermath of the Cold War, were also inflicted on the way Norway's military force transformed. Furthermore, the rethinking of NATO and the new geostrategic environment after the Cold War, causing a "nation-in-arms" to move away from territorial defense emphasizing the High North (which was unique for Norway), and towards operations "out of area", are inextricably linked to several Norwegian development initiatives. The modifications of the Norwegian Armed Forces (NAF) into smaller, highly modernized, flexible forces capable of joining expeditionary operations abroad, as displayed in the Long-Term Plans for the NAF since the Cold War, demonstrates the importance of the alliance with the US and NATO as a tenacious cornerstone of Norwegian security policy.

In 1990, a Defense Commission was appointed, which submitted its findings from their transformation assessments later in 1992, articulating a wary conservatism. Despite the remarkable

changes after the collapse of the Soviet Union, the commission chose to center on defense of northern Norway, due to improvements in southern Norway caused by alterations in Eastern Europe (Børresen 2012; Petersson and Saxi 2013). Instability in and conflict with Russia were perceived as the main security challenges. More importantly, the gap between NAF's size and resources available to maintain and renew it, saw an increase.[92] Therefore, the commission advocated a significant cut in the brigades of the planned wartime army, navy and coastal artillery fortresses, moving into the future with great caution.

When NATO's Strategic Concept was launched in 1991, the reorientation towards new tasks received positive response from the Norwegian government, but the shift towards international operations seemed to be a slow transformational process. While the new long-term plan commented regional and global political changes, the objectives and tasks of the Norwegian security policy stayed the same. Adjacent to one of the largest military concentrations in the world, guarding the northern Norway remained the primary task of the NAF (NMoD 1993, 8-14). Transformations in size and organization of the NAF were almost exclusively in response to absence of resources for sustaining the Cold War structure, rather than any desire to provide new tasks for the military (Ulriksen 2002a).

Transformations of the Armed Forces, in terms of policies and conceptual tasks after the Cold War, must be understood in the correspondence with developments in international politics and specific events. The broad changes accompanying the collapse of the Soviet Union allowed for a wave of UN operations across the world, which differed from the original Chapter VI UN peacekeeping missions (Mayall 2007). The 1991 Gulf War and 1991 Yugoslavian breakdown provided Norway an opportunity to adapt the NAF to the "novelty" of using armed forces as a tool for foreign policy. But the Norwegian contribution was not particularly groundbreaking, since Norwegian authorities deliberately decided not to send combat units, only support units along with humanitarian and economic aid (Børresen et al. 2004).

During the mid-1990s, this changed, when the NATO-led Implementation Force (IFOR) replaced the United Nation Protection Force (UNPROFOR) in Bosnia (Cox 2008). When IFOR became Stabilization Force (SFOR) in 1996, Norway's role changed too as combat units were deployed in a peace enforcement operation for the first time. A mechanized infantry battalion was sent to Bosnia, anticipating it would be more visible, thereby facilitating increased political influence (Gjeseth 2008). Less visibly, however, were the Norwegian SOFs when deployed in the Balkans

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[92] This is rooted in the economic difficulties of NAF after the Cold War ended. The force structure established with allied assistance during the 1950s and 1960s was greater than Norway could fund for maintaining and renewing on its own. Key equipment groups were about to reach their end of life cycles, while the price of new military technology raised abruptly. For example, in 1985 the gap between procurement plans and actual investments reached the counterpart of the entire Navy's worth of equipment (Johansen 2000, 15).

from 1996. This reflected a new, robust capability, in addition to being one of the first deployments of standing, combat ready forces in international operations, hence making real contributions in improving NATO's collective forces (Robertsen 2007). However, the contribution in the NATO-led Kosovo Force (KFOR) demonstrated difficulties with the IRF reaction-time requirement, thus strengthening NATO's argument for more regular, standing units with contracted personnel for enabling the European militaries to respond rapidly.

When NATO again revised its Strategic Concept in 1999, moving towards further enlargement and out of area operations, Norwegian authorities leveled their skepticism in regard to new tasks, partly for tactical reasons – including the fear of being perceived as the last "Cold Warrior" within the Alliance (Saxi 2010; Tamnes 1997). The NAF should still be designed to meet invasion on Norwegian territory, however, they did not receive the resources needed to sustain the structure presented in the 1999-2002 Long Term Plan. A White Paper demonstrated the need for NAF to be designed for more relevant scenarios requiring better and more responsive units, meaning rapid deployment capabilities for operations at home *and* abroad (NMoD 1998). It proposed the concept of Norwegian Army High Readiness Forces (FIST), available for international operations, washing out the divide between NATO IRF and UN standby forces. For the first time, the NAF planned to deploy tanks and artillery in missions outside Norway (Petersson and Saxi 2013).

The 2002-2005 Long Term Plan for the NAF was introduced in 2001, as the Government expressed concerns of the NAF's critical state, which were "not up to the solving tasks of the future" (NMoD 2000, 6). Despite considerable resources and increasingly more highly qualified personnel, the NAF lacked the capabilities required by the government. The Armed Forces needed to proliferate their mobility and flexibility, shorten reaction time, and improve the readiness for domestic use as well as international operations. Even so, a form of brigade proved itself available for rapid deployments abroad, with robust forces expected to credibly participate in high-intensity warfare, representing a milestone in Norwegian willingness to conduct actual warfare (Saxi 2010).

Specifically, Norway's strategic environment changed because of the deterioration of the Russian military and because of advances in military technology. When the 2005-2008 Long Term Plan was presented in 2004, it demonstrated the scope of changes in defense planning since the Kosovo War. The shift away from conscripted reserve units and towards more regular contracted units, mirrors the awareness of Russia's continuance as a potential threat. Under these circumstances, Norway adopted a policy allowing a brigade-sized expeditionary force, in developing better and more mobile units with briefer reaction time (NMoD 2005). Crisis management replaced invasion-defense tasks for the Norwegian units, especially in the northern Norway (Saxi 2010). For the Navy, the primary tasks would center on national defense, though it

had improved sufficient capacity to contribute in international operations by taking part in and possibly leading NATO's Standing Naval Force Atlantic.

Based on the recommendations of the Defense Policy Committee, the 2009-2012 Long Term Plan introduced in 2008 basically preserved the overall structure of the NAF, although lowering the number of bases and units in facilitating organizational reform (NOU 2007). With a further increased attention regarding responsiveness, Norwegian authorities moved towards a new total-defense concept, aiming at – amongst other things – combating terrorism. Renewed cost-cutting and effectivization measures were forcefully implemented, and the defense budgets increased slightly, giving the impression of successful efforts (Åmot 2014, 3).

After the shift in Government following the 2013 elections, these efforts were critized for being "rose-tinted" (Eriksen Søreide 2012). The following two long-term plans, respectively for the periods of 2013 to 2016 and of 2017 to 2020, encountered the problem concerning sustaining a balanced force, including heavily increased spending and renewed cuts (NCoD 2015). While this could "finally lie to rest of the main bones of contention" in Norwegian civil-military relations, the consequences remain to be seen (Bogen og Håkenstad 2017, 29). While it seems that nearly two decades of several measures in reducing costs and increasing efficiency have achieved certain notable successes, an enduring balance has yet to be reached. The problem of sustainability has been a major initial cause of reforms and continues to perhaps be the most important factor in explaining military change in Norway, reflecting a slow adaptation process and reluctant politicians in making radical transformations.

5.3.2 Organizational Transformation

During the Cold War, Norway was characterized by a territorial defense concept based on conscription and a large mobilization reserve. After the Cold War, the peacetime NAF were primarily a training establishment for the wartime forces; their equipment was old and insufficient, and the training standards were not specifically impressive in general. The Armed Forces were in serious financial difficulties, as the key problem was a large and increasing gap between organizational size and the resources available to maintain and renew it (Bogen and Håkenstad 2017; Johansen 2000). Service abroad was restricted to traditional UN peacekeeping, denoting a voluntary service with low prestige in the armed forces. The NAF were therefore ill-equipped when facing the new post-Cold War paradigm that called for more high-quality, rapidly projectable military forces.

In 1990, the Armed Forces commenced a relatively ambitious reform program (Børresen 2012). As mentioned above, because the Defense Commission emphasized the defense of northern Norway, it endorsed a cut in the brigades of the planned wartime Army – from thirteen to six – and in the battalion – from twenty-eight to seventeen – leaving the reduced land forces being more

heavily mechanized than previously. The number of Missile Torpedo Boats (MTBs) in the naval forces were to be cut from thirty-six to twenty-two, and coastal artillery fortresses from twenty-nine to thirteen. The Air Force would retain its size. While rationalizing the NAF to open for investments in new equipment, the commission did not signal any radical changes in neither the organization nor the NAF (Saxi 2013).

In the early 1990s, the NAF adopted a new maneuver warfare doctrine, though avoiding provoking the organization internally in reducing the size or number of wartime brigades. A significant problem in this doctrine was how to fight a numerically superior enemy invading Norwegian territory (Sæveraas and Henriksen 2007). Through the early and mid-1990s, several modifications highlighted the importance of participating in international operations, however the alterations in the military structure were rather small and incremental (Neumann and Ulriksen 1997). For example, the Norwegian contribution to the NATO's Immediate Response Force (IRF) comprised an infantry battalion, an F-16 squadron, a frigate and two mine clearing vessels, in addition a modest increase of troops from 1300 to 2000 (Saxi 2010, 33). This proves the Norwegian readiness for UN peacekeeping operations, in which forces were only trained, organized and equipped for classical UN operations – not warfighting.

From 2001 to 2010, several transformations of the NAF occurred which greatly affected the Royal Norwegian Navy (RNoN). These involved rearrangements within the defense staff, ultimately causing the Chief of Navy to move from Oslo to Haakonsvern in Bergen. Second, the two Defense Commands North and South Norway were closed down, making the latter into a Joint Operational Headquarter (later replaced with a Joint Warfare Centre subordinated to NATO's Allied Command Transformations) and the former reduced to a regional operational headquarters (HQ) which later was established a Norway's sole operational HQ at Reitan outside Bodø. And third, efforts were made in reducing the administrative overhead and pooling overlapping capabilities, which resulted in a joint Defense Logistic Organization with total responsibility for all defense acquisitions, maintenance and logistical support – as well as controlling the bases, naval and air stations, and barracks. One purpose of this was to adapt command and control of the NAF both at strategic and operational level to the requirements generated by the changed geopolitical situation and the resulting new tasks for the NAF. Another reason was to adapt to decreasing budget levels, by attempting to minimize strategic overhead and adjust to a much-reduced force structure.

5.3.3 Norwegian Military Technology and Capabilities

Revisiting the issue of burden-sharing within NATO, and the emerging gaps in capabilities through time, it should be noted that the lowered defense budgets of most European states over the years have primarily occurred because of national interests, in addition to some NATO-led operations

such as the "Resolute Support" in Afghanistan. The scope of the US contribution involves military power in parts of the world where Europe will not or do not have the interest of contributing. As Norway has moved away from territorial defense and towards operations abroad as part of its liaison with the US and NATO, it is a vital national interest of Norway to maintain and develop capabilities for ensuring national security, considering the international situation, its geopolitical position and challenges stemming from the occasionally tense relations to Russia (Bekkevold et al. 2015, 266).

With this in mind, and despite decreasing military spending after the Cold War, the NAF is still making advances in areas related to both its geography and the RMA core of military innovation. Emphasizing the strategic importance of the northern region of Norway, meaning safeguarding Norwegian interests at sea by maintaining territorial waters and protecting Norwegian sovereign rights, have gained priority, and the ability to perform these tasks has become a vital part of Norwegian security and foreign policy. Not surprisingly, this would shape how the RNoN alter its naval capabilities. Adding to this, coastal defense is crucial in protecting the national interests, and acquiring naval innovations like warships with offense-defense capabilities adjusted to littoral waters has been imperative for increasing the NAF power projection capabilities. As such, the Coast Guard has attained a more prominent role about naval presence on the Norwegian coast as well as in sea areas adjacent to Norway, with various capabilities and more sea time (Børresen 2012, 157).

Other warships, such as the multi-purpose *Fridtjof Nansen*-class frigates, have replaced the older *Oslo*-class frigates, and from 2012 the five frigates were equipped with the surface-to-surface Naval Strike Missile (NSM) – produced by the Norwegian Kongsberg Defense & Aerospace (KDA) company – designed for both littoral waters and open sea, including the incorporation of Lockheed Martin's AEGIS combat system, thereby increasing the Navy's interoperability and force projection capabilities. The frigates are also supposed to operate new NH90 helicopters. The six stealthy *Skjold*-class corvettes are equipped with NSMs, and combined with their high speed and excellent maneuverability, they have been crucial for coastal defense in addition to being seaworthy – meaning they can operate in broader terms. Finally, the six *Ula*-class submarines were modernized in during 2006 and 2008, whereas the preceding *Kobben*-class were mainly being scrapped. Most notably, they were equipped with new communication systems, as Link 11, new electronic warfare support measures and a periscope upgrade, thereby increasing interoperability (NMoD 2005). For securing national interests and securing Norwegian influence in NATO, the corvettes are highly important for Norwegian military capabilities (Børresen 2012). However, they are planned to be out-phased, and the six submarines are intended to be replaced but with only four of the German *HDW 212* in accordance to the latest Norwegian Long Term Plan (NMoD 2016), causing much debates in security policy circles and among military analysts.

Norwegian frigates, corvettes and submarines are constructed and equipped with high-technology weapon systems, thereby making the RNoN highly relevant and unique in the NATO arrangement due to its role as leading in sealift capabilities.[93] Adding to the naval capabilities, the recent procurement of the stealthy multi-purpose F-35 *Lightening II* (formerly called Joint Strike Fighter) would apply major combat force to both the Norwegian Navy and the Norwegian Air Force (NMoD 2016). Packed with advanced interoperable computer systems, stealth and radar signatures, they are enormously innovative and complex to build, making them a high-cost premier surface-to-air missile (SAM) capability uniquely equipped for missions with cutting-edge processing power, synthetic aperture radar integration techniques, and advanced target recognition. For the NAF, they are intended to replace the role of corvettes as they are being phased out in a few years. Nonetheless, the maritime capabilities of Norway are indisputably modernized, making its small navy way ahead of its numerous small power counterparts in various parts of the world.

5.4 Sea Power: The Modern Warship Innovation

When presenting the case of the modern warship innovation, it is crucial to emphasize "battlefleet warfare" as its predecessor as Horowitz entitles it, for an historical overview of its progress. It was introduced as a disruptive modernization after Admiral Nelson and his fleet wiped out the joint French and Spanish fleet at Trafalgar in 1805 – steering naval superiority through decades. The British Admiralty later issued a regulation deterring expansions of steam-powered boats, as they realized that any naval technological innovation would threaten their naval predominance. These regulations persisted, keeping the British Navy nearly uninterrupted through the next three centuries, dominated by ships of the line. Conversely, the British changed their ship production quickly after the French introduced their great ironclad – *La Gloire* – in 1858, in addition to the 1862 US naval ironclad clash between the *Monitor* and the *Merrimack*, to iron and later steel warships propelled by steam replacing the sail. Yet, most other basics remained as it was, regarding doctrine, education, organizational structure, upgrades and training (Horowitz 2010, 134).

Just before the World War I, however, the leading naval power of the world improved everything from its doctrine and training to force structure (Falk 2000). Thrust by the introduction of the HMS *Dreadnought* in 1906, this alteration denotes one of few cases where a prevailing major power deliberately restructures its core competencies that had ensured success without ever losing a battle. Sometimes referred to as the Fisher Revolution, named after the First Sea Lord John "Jackie" Fisher (Farley 2016), this change of the battleship warfare helps determining why it is

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[93] It should be noticed, however, that the denotation of sealift in this sense implies capabilities of escort contributing to sealift, as the true meaning of sealift is the capability of moving large military forces – a capability in which most militaries do not have, except for the US.

important to understand the diffusion of military innovation for better comprehending the development, spread and use of military power in general, as well as for selected states.

Moreover, the launch of the *Dreadnought*, accompanied by the organizational changes following battlefleet warfare, urged considerable adjustments in how major naval powers designed and planned for warfare. Technologically, numerous navies halted their production plans while processing the impact of the all-big-gun *Dreadnought* on naval warfare. The rising cost per unit of this type of ships also implied a navy's total amount of capital ships declined although the relative power of the navy increased, because of the ships' greater capabilities. Thus, the British Navy saved large costs. But as their number of ships declined, however, other naval powers emerged, Germany specifically, challenging British control more effectively than before (O'Connell 1991).

While the British Navy maintained their power at sea, those requesting transformation had to overcome a bureaucratic struggle in order to control instead of the Admiralty, which ruled the money and decision-making. Eventually, organizational shifts initiated by the naval leadership allowed Britain to effectively harness the power of the technological innovations in armor, force and weaponry (Morgan-Owen 2015). Organizationally, however, as battlefleet warfare signified a continuance of navies' critical tasks at that time – winning battles through gunnery – the core competencies of the average sailor changed extensively, thereby necessitating organizational changes crucial for benefiting from battlefleet warfare (Horowitz 2010). Even so, complexities in implementing shifts in recruiting, education and training that many navies experienced, as well as rising costs of ships, provided the British with a further competitive advantage the following years.

During the period between the *Dreadnought* launch and World War I, the British almost succeeded in advancing an even broader naval innovation, notably the flotilla system. The flotilla innovation was designed by Fisher with the intention of superseding the battleship by combining destroyers, torpedo boats and submarines, along with battle cruisers (Sumida 2006). This has been considered as a classic case of disruptive innovations. But implementation of transformational segments of this design faced difficulties, as it was hindered by bureaucratic politics and key organizational actors questioning its efficiency (Lambert 1999).[94]

Another case of disruptive warship innovations was the carrier warfare from the World War II era, combining the use of fleet aircraft carriers and various logistical ships for pursuing strikes

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[94] On a further note, the storyline of British naval innovation in the late nineteenth and early twentieth centuries is important for studies of diffusion of military innovations, both in general but also especially related to the spread of sea power. The transformation from a navy originally attempting to pause the status quo in the post-Nelson era to a navy breaking grounds into the industrial age, have typically been viewed as incremental by scholars, since several of these technological developments have been founded in stages of the Industrial Revolution which have brought alterations in the construction, drive, armament and firepower of naval vessels (Herwig 2001). Transformations in strategy are perceived as the inevitable result of a changing political landscape and technological advancements. Instead of regarding the late nineteenth century as involving clear-cut technological developments unsurprisingly causing shifts in production of naval power, it might be more precise to view it as encompassing rapid improvement in naval strategy combining new technologies with organizational transformations to alter the former international agreement concerning naval warfare.

against enemy naval assets and sustaining sea control (Goldman 2003). Compared to battleships, carriers enmeshed new hardware, that is the carrier itself and the integration of technological advancements also used in other military areas. They radically increased the greatest distances possible in naval warfare, requiring massive changes in planning for naval engagements (battlefield strategy and doctrine), especially in radar surveillance requirements for detecting positions of enemy carriers and vessels, but also large-scale transformations in recruitment and training at all levels for learning how to launch and recover airplanes (Rosen 1991). Also, carrier warfare did not just mean operating only one ship; it involved a complex systems integration task, comprising air assets and reliance on logistical support ships as well as other carriers (Horowitz 2010, 68), indicating the decisiveness of aircraft in future battle.[95]

Hence, World War II reoriented navies of the world into the next phase of war at sea, with the US in the lead. Adding to changes in the construction of naval vessels into more modernized warships, built for greater speed and easier maneuvering in blue waters as well as littoral zones, the pointy end of the spear became aircraft, guided weapons (missiles and torpedoes) and submarines – that is, not the guns aboard – thereby essentially ending the utility of battleships in open oceans (LaGrone 2014). The destroyer is generally viewed as the prevailing surface-combat vessel of most modern blue-water navies, by increasing force projection capabilities through low-observable technology – the most striking technological advancement in modern times.[96]

Yet, the once distinct roles and developments of cruisers, destroyers, frigates and corvettes have blurred. In recent years, most vessels have come to be armed with a combination of anti-surface, anti-submarine and anti-aircraft weapons, in which class labels no longer reliably indicate a displacement hierarchy, and the size of all vessel types has grown beyond the definitions used earlier in the twentieth century (Sloan 2008). With developments of precision-guided munitions and integrated weapon systems, delivering munitions on target has not only been a skill but also the critical task for most navies for increasing interoperability and real-time communication, thereby amplifying the organizational requirements in operating these new developments (Singer 2010). Another key difference between older and modern vessels is that all modern warships are "soft", without thick armor and bulging anti-torpedo protection of World War II and older designs. Although making military forces more efficient, such changes have brought large increases in cost per unit, as result of advanced weapon systems and robotics (Freedberg Jr. 2017; Singer 2010).

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[95] Adam Stulberg (2005, 510) also makes an important point, citing another source of evidence for the development of carrier warfare arising from civilian collections of naval power before, during and after the World War II. Fred T. Jane started in 1898 with publishing *Jane's*, a yearly catalog of international naval capabilities. This comprised an entry for each country with lists of its ships and their capabilities. After the World War II, the catalog started to put carriers first on its lists, which revealingly meant the end of a decade-old system of battleships first in any entry (Jane's Information Group 1950).

[96] Most recently, the futuristic *Zumwalt*-class guided-missile destroyer of the US Navy for example, with its twin 155mm naval guns able to launch a guided projectile more than four times the 20-mile range of the 16-inch guns of the old battleships, is 50 times harder to spot on radars than an ordinary destroyer (Kuehn 2013; Patterson and Lendon 2014).

Due to the major shift in naval warfare following the introduction of the aircraft carrier, warships have remained a military innovation, bringing a massive change in how large navies have sought to conduct what they have considered as their main mission: accumulating force to destroy enemy marines with gunfire, thus facilitating control of the seas. The technological components of the warship innovation stemming from innovations of battleships, in which steam turbines superseded the age of sail, have made substantial impact on the entire period of naval innovations. Comprising a range of varieties, such as aircraft carriers, cruisers, destroyers, frigates, corvettes, submarines and amphibious assault ships, modern warships leading up to and after the Cold War era generated large transformations in their design, organization and role, overriding the service of battleships. Only the deactivated *Iowa*-class battleships still exist as potential combatants, but battleships in general are unlikely to re-emerge as a ship class without redefinition (LaGrone 2014).

5.4.1 The Maturation of Warship Innovations

While Horowitz places the debut of battlefleet innovation to the launch of the HMS *Dreadnought*, a demonstration point at which other navies around the world recognized that the British had started doing something different, the introduction of *modern* warships and changes accompanying it occurred a bit later. Because the emphasis in this thesis is on the innovation of contemporary warships, and diffusion of sea power after the Cold War due to introductions of RMA-technologies, it is therefore natural to set the debut of the warship innovation to the World War II, which brought massive changes in the design and role of several types of warships, the first use of radar in combat and the decline of battleships.[97] As discussed above, these changes were the forerunners of the developments of warships into the Cold War-era, and more importantly, the military transformations in the post-Cold War security environment.

Even prior to the World War II, one could observe developments from Fisher's system of flotilla defense as leading to what has become the warship innovation of the post-Cold War era. However, it was not until the World War II that the major transformations of the warship innovation occurred, with the introduction of carrier warfare and the use of radars, altering the way of modern warfare (Horowitz 2010). For example, when the HMS *Furious* was first introduced, as a fully functional aircraft carrier in 1917, Britain leaped ahead the rest of the world, and both the US and Japan pursued to imitate the Royal Navy's advances. The US received Britain's plans for their new carriers, which came to be the basis of the first US-designed carriers (Hone, Friedman and Mandeles

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[97] Hence, it is important to note that even if the demonstration point of modern warships could be traced back to the World War II, it is though contemporary warship innovations of the information age – the post-Cold War period – that will be examined further. In avoiding further confusion regarding the demonstration point, this implies that as Britain is viewed as the first-mover of the modern warships in the World War II, the United States superseded the British lead during the War, making them the first-mover into the information age after the Cold War.

1999, 22). Later, the Japanese also came to learn about naval aviation from the Royal Navy, including extensive flight and air combat training, leaving the Royal Navy surpassed in the area of aviation by the mid-1930s (Peattie 2001, 19-21).

The following two decades after World War I, and almost six months of naval war in the Pacific theatre of World War II, carrier warfare matured in the Battle of Midway and its aftermath, because of the planning of the encounter – especially decisions about fleet compositions on both the US and Japanese side – and the organizational responses to the battle, making navies changing their force structure to assign task forces targeting the employment of aircraft carriers in combination with screening and logistical ships (Borneman 2012; Kernan 2005). The World War II was the only war through history in which battles occurred between groups of carriers. In more modern times, military encounters have often comprised smaller and more modernized warships, such as frigates, corvettes and submarines, which will comprise the case of modern warship innovation for further analysis of the spread of military power.

5.4.2 The Power of Frigates and Corvettes

As stated above, it is not an easy task to distinguish certain modern warships due to their coinciding roles and capabilities. Additionally, navies around the world tend to name their vessels differently although they might correspond. Still, some discrepancies are possible to detect – in size, displacement and armament – for assessing power projection capabilities. Furthermore, differing capabilities of power projection, in combination with improved technological developments, are crucial in attempting to predict the diffusion of these warships.

Notably, modern frigates are only related to earlier designs by name with the term "frigate" being readopted during the World War II by the British Royal Navy to describe an anti-submarine escort vessel larger than a corvette, yet smaller than a destroyer (Britannica 2017). The first corvette, on the other hand, appeared as an easily built patrol and convoy escort vessel – such as the British *Flower*-class (Keegan 1989, 277). While equal in size and capability to the US destroyer escort, frigates have typically been less expensive to build and maintain (Price 2014). The frigate first introduced was meant to alleviate certain shortcomings inherent in the corvette design; limited armament, a hull structure incompatible with open-ocean work, a single shaft limiting speed and maneuverability, and a lack of range. It was first designed and built along similar construction standards as the corvette, leaving production by yards unused for warship constructions. Early frigates of the Royal Navy's *River*-class were mostly two sets of corvette machinery in one larger hull, armed with the latest Hedgehog anti-submarine weapon (Macpherson 1989, 6-7).

During the World War II, the frigate held less offensive firepower and speed than a destroyer. However, such abilities were not necessarily required for anti-submarine warfare (ASW).

Submarines were relatively slow while submerged and sets of ASDIC – a sonar – could not operate effectively at speeds over 20 knots (Britannica 2017). Indeed, the frigate was austere and weatherly, suited for mass-construction and equipped with the latest innovations in ASW. Since the frigate was chiefly assigned for convoy tasks, and not deployment with the fleet, it held limited speed and range. The role and significance of corvettes during this period have also been vital for maritime history. Initially, they were developed for specifically fitting the need of allied powers to successfully combat the threat and attacks of German warships during the Battle of the Atlantic (Dunmore 1999). And while construction of corvettes was not resistant to German torpedoes, it laid the grounds for structures of modern corvette warships.

After the end of World War II, the introduction of surface-to-air missiles enabled frigates to also adopt an anti-aircraft role, thus adding surface-to-air missiles and radar to its ASW equipment. Moreover, several modern navies instigated during the late twentieth and early twenty-first century a tendency toward smaller and more maneuverable surface capability (NATO 2012). For the most part, they are armed with medium- and small-caliber guns, and combinations of surface-to-surface missiles, surface-to-air missiles and anti-submarine weaponry. Some of them can even accommodate a small or medium sized ASW helicopters.

In recent years, striking stealth technology has been introduced in contemporary frigate design by the French *La Fayette*-class, designed to offer a minimal radar cross section, which can allow camouflage amidst civilian ships, or that of a much less capable corvette, leading an enemy to miscalculate the ship's capabilities (Potts 2017). Also, the first operational corvettes with stealth technology was the Swedish Navy's *Visby*-class and Norwegian Navy's high-speed *Skjold*-class, thereby improving their navies with far-reaching power projection capabilities. Moreover, advancements of such power projection capabilities, meaning developments of high-tech precision-guided munitions, sensors, sonars, and other integrated weapon systems, have become more expensive in cost per unit through past decades, thereby making the R&D programs and new modes of production even costlier (Hove and Lillekvelland 2016).

5.4.3 The Power of Submarines

Before and during the World War II, the key role of the submarine was conducting anti-surface warfare (ASuW), meaning attacking either on the surface (using deck guns) or submerged (using torpedoes). They were remarkably effective in sinking Allied transatlantic shipping, and to disturb Japanese supply routes and naval operations in the Pacific theatre during the World War II (Blair 1975; Williamson 2010). Submarines were also employed for inserting and removing covert agents and military forces, gathering intelligence and for rescue missions during air attacks. They could carry cargo through hostile waters or serve as supply vessels for other submarines (Morison 2001).

By and large, submarines could locate and attack other submarines only on the surface, even though the British Royal Navy's HMS *Venturer* managed to sink the German *Type IXD2* U-boat, "U-864", using a four-torpedo spread while both were submerged (Polmar and Moore 2004). After the War, their submarines improved to be capable of hunting each other more effectively, as developments of the homing torpedo, better sonar systems and nuclear propulsion emerged. Moreover, progresses of submarine-launched ballistic missile (SLBM) and submarine-launched cruise missile (SLCM) provided submarines with significant, long-ranged ability to attack both land and sea targets with different weapons comprising cluster bombs and nuclear weaponry.

The main defense of submarines encompasses its ability to remain hidden in the depths of oceans. Early submarines could be detected by their sounds (since water could carry sound far better than air), and due to improvements through time, they are capable of tracking and detecting comparatively loud surface ships from long distances. Modern submarines are constructed with an emphasis on stealth, advanced propeller designs, extensive sound-reducing insulation and special machinery, facilitating their low-observable presence in the ocean and making them difficult to detect (McHale 2008). It requires specialized technology to locate and attack them, such as passive and active sonars, inertial guidance system for navigation while submerged, life support systems based on nuclear power or air-independent propulsion, and offense capabilities such as ballistic missiles. For example, the US' *Virginia*-class and Britain's *Astute*-class submarines use high-tech photonic masts, instead of hull-penetrating optical periscopes, for being much harder to locate visually by radars. And in terms of offense abilities, the Germans have started installing a torpedo tube-launched short-range IDAS-missile on their *Type 212*-class, which could discharge ASW helicopters and operate in shallow waters (Roblin 2017). As with the technology applied on surface combatants, submarines and their technologies are increasingly expensive. Not surprisingly, this would affect how naval innovations spread through the international system (Kirkpatrick 2004).

5.4.4 Expecting the Diffusion of Warships

Adopting the warship innovation has required a large degree of financial resources, especially on the part of potential adopters. In Britain and the US, as well as in other countries, the relative cost per unit has encountered an ongoing increase ever since the World War II (RAND 2006). The *River*-class frigates, for example, were expendable compared to the costly destroyer. But the cost per unit amplified the more technological advanced they became over the years (Kirkpatrick 2004; Arena 2006).[98] While the warships themselves might not be the most expensive of naval innovations, it is

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[98] The *River*-class is by some also classified as a patrol vessel (IISS 2015, 150). The *Type 23* frigate, or *Duke*-class, was first commissioned in 1989 (and the last one in 2002) at a cost of about 180 million dollars (UK HoC 2001). The superseding *Type 26* frigate, or *City*-class, is currently in production (planned for service in 2021) at an estimated cost per unit of between 334-468 million

though the sensors, weapons and other systems required for surface combat being more specialized and interoperable, that are the primary factors of rising costs, and which also make up a substantial part of the total costs (Bangert, Davies and Watson 2017).[99] This will boost the financial intensity required for implementation. As stated, these are not the most expensive warships of states' naval fleets. Aircraft carriers are far more expensive than frigates and corvettes, facing even higher cost escalations. This is also true for the expenses of destroyers. Therefore, one must assume that increases in costs of wireless communications technology, training for personnel needed in engineering and operating warship innovations, and other technical specialists required for navies and naval industry since the World War II – as compared to predecessors and other types of warships – and the cost per unit required to implement the innovation have been medium.[100]

Regarding the underlying technologies of warship innovations, it would appear that they are a mix of those designed for commercial and military purposes. They could also contain dual-use technologies, meaning technology that has both military and commercial application (Stowsky 2004). However, deciding this is not a clear-cut process. The core technologies applied to warships will vary, meaning some technologies will not necessarily have civilian spillovers. This is especially so for stealth technology, having very few, if any, significance for commercial applications (Alic 1994). Still, innovations like wireless communications and gas turbines – as well as nuclear marine propulsion and electric engines – though heavily supported and subsidized by national militaries, have presented vibrant commercial opportunities. Conversely, armor and armaments have been entirely military. Consequently, the cost of each unit of power combined with the underlying technologies make the financial intensity rated as medium.

The organizational capital required to implement warship innovations, for potential emulators, might be higher than some have assumed. As previous discussions demonstrate, modern warship warfare has involved training to combat at much longer range and simultaneously managing complex tasks requiring new technical and operative skills than prior to the World War II. Given

the advances in torpedoes and later missiles, propulsion and high-technological weaponry, the naval forces had to prepare for fighting over much longer distances (Horowitz 2010). Secondly, the development of wireless communication systems, and more recently, advanced computer systems improved for increasing interoperability between various military platforms, have necessitated military organizations to develop the capacity for managing larger amount of data and at the same time coordinate actions of different types of ships, leading to new demands on intelligence organizations along with certain shifts in the relationship between vessels at sea and naval bureaucracy at home (Singer 2010).

With consideration to navies critical task focus, organizational age and level of experimentation, the British Royal Navy in particular, viewed its critical tasks controlling the sea by defending homeland and national interests such as trade routes across the oceans and allied cooperation through the War, thus encouraging its ability to adopt new warship innovations. Harding (2005) sees the Royal Navy as being focused on its core functions, wasting few resources on speculative investments in new technology that do not shape up in early experimentation or that lack operational value. Still, they invested in research and attempted to maintain the ability to stay on the cutting edge of naval developments. However, and with reference to organizational age, Till (1996, 198) observes that "in contrast to British policy, the Japanese and American, being newer in the business, were willing to make boulder departures". This combined with changing operational requirements and financial limitations made the British lead superseded by the US during the War, and even more so into the age of information. All the same – with the United States as the first mover – marking the general level of required organizational capital for adopting the warship innovation, the above discussions suggest a medium level required for implementation.

5.5. Chapter Conclusion

This chapter has systematically reviewed the military changes and transformations within NATO, but also in Norway, in effort of revealing certain mechanisms driving innovation processes and requirements of adopting particular naval innovations. Capability gaps within the Alliance have emerged due to differing political strategies of member states in adapting to the shifting geostrategic environment after the end of the Cold War. What appears to be obvious, is that the political backdrop in post-Cold War era matters for how countries plan and structure their armed forces, both in terms of the political will to fulfil NATO commitments, threat perceptions and the preservation of national interests. This is crucial for grasping innovation processes of both overall military naval capabilities in states' pursuit of maritime power in the international system. By demonstrating linkages between such processes of innovation and the relationship between national and alliance politics, it is possible to make predictions of how sea power – meaning warship innovations – diffuses through the

international system. The next chapter will demonstrate diffusion patterns in general, but also how selected states choose to adopt naval innovations.

6. Post-Cold War Transformation and Diffusion of Military Power in NATO

Whatever the doctrine the [British] Armed Forces are working on now, they have got it wrong.

What matters is their capacity to get it right quickly when the moment arrives.

(Michael Howard in Ledwidge 2011, 266)

Within the field of international relations, technology is highly relevant when studying matters of security and the spread of military power. During the Cold War, technology was essential in notions of the threat of war. Advances of nuclear weapons and missile technology were interpreted into fears of missile gaps and strategic thinking, contained within conceptions of nuclear rollback, mutually assured destruction, escalation of dominance, arms control and strategic defense (Rappert 2007). Longstanding debates regarding the relationship between offense and defense, meaning conducts of war, were altered by new technological opportunities (Lynn-Jones 1995; Kier 2006; Glaser and Kaufman 2012). Indeed, this is not to say that international security was driven by technology alone; the important thing was the way in which particular innovative skills were formed and understood. Strategy became key in political debates concerning technology and security, although it simultaneously created "experts" often accorded special status in deciding upon these belligerent political and principled issues (Dalby 1992, 95).

After the Cold War, notions of threats to security changed dramatically with the demise of the Soviet Union, thus changing the entire security environment regarding strategic thought and how states planned and transformed their militaries for future wars. Shaped by new sources of threats and the US' pursuit of the information revolution in military affairs, the geopolitical and geostrategic landscape have changed considerably – imposing great implications on the capabilities and political will of NATO allies in how they should change their militaries (Matlary and Petersson 2013). In an ever-changing security environment, this is an ongoing challenge affecting international politics and the balance of power.

Much attention has been given to avert undesirable diffusion to potential adversaries. An equally central issue is ensuring that what the United States desires to diffuse in fact does spread. Currently, this poses a major challenge to NATO. Whilst the US maintains the pursuit of the information RMA, it must safeguard interface principles and interoperability with its allies. The

political backdrop is how the US has tried to ensure some level of interoperability within NATO by governing the diffusion process, which could be traced back to the Soviet's introduction of the MTR in the 1970s (Goldman and Eliason 2003a). For NATO, the issues at stake comprise the denationalization of European militaries and the organization of their defense industries (Matlary and Østerud 2016). Consequently, it could be expected that the Europeans have not fully embraced the information age RMA-technologies at the same rate that the US military has experienced. This holds for the case of sea power as well. This chapter begins with an effort to construct an overarching rationale for the diffusion of military power in the post-Cold War era, which demonstrates the importance of threat perceptions to security matters and its significance for military transformation. This lays the foundations for further examinations on what determines states' interest in innovating their military naval establishments, state capacity to adopt warship innovations, other strategic choices for states facing innovations, and consequences for a small navy such as Norway in the NATO alliance due to shifts in adoption capacity requirements.

6.1 Rationale for Diffusion of Military Power

War, as well as peace, has several contexts. Gray argues, for example, the most prominently ones includes political, social, economic, cultural and technological (2005, 2). However, it would also be necessary to add the strategic environment. In discussions on how the conduct of war has changed, and thereby the spread of military power, it is crucial not to fall into the error of treating this issue as if it were an autonomous phenomenon.[101] We see from the past chapters that some of the "grammar" of war has assuredly changed since the end of the Cold War, to put the matter in Clausewitzian terms, though not the dominance of the logic of policy.[102] According to Gray, there is a perpetual pull towards a misunderstanding of recent and contemporary trends in the nature of warfare as indicators of certain momentous, radical shifts. On the contrary, he asserts, the character of warfare in a period is as often as not shaped – even driven – by political, social and strategic contexts in a greater scale than it is by changes integral to military science.

On that note, there is evidently more to war than warfare. The end of the Cold War, as stated above, imposed a new security environment on the international system of states, thus challenging how they should prepare their military forces for waging war. The demise of the Cold War bipolarity triggered the rise of new threats and challenges to international security and spread of globalization initiated a redistribution of power in the international system (Baylis and Smith 2007; Brown and Ainley 2009). Classic wars gradually shifted into modern wars, and security challenges

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[101] Gray (2005) treats this as one of four caveats in his research on military transformation of especially the US. The other caveats he makes includes defense establishments preparing for the problems they prefer to solve (rather than those of an astute enemy might pose), trend spotting as not necessarily a reliable guide to the future, and that surprises occur.
[102] For further accounts on this matter, see Clausewitz (1976).

characterizing this different geopolitical environment were no longer existent on a state-to-state level as sub-state actors became increasingly prominent, thereby affecting the changing perceptions of military force and capability, war and security (Kaldor 1999; Shaw 2005; Smith 2006).[103]

Therefore, in examinations of the spread of military power, it is crucial not to overlook the importance of changing threat perceptions regarding new security challenges, which could ultimately alter the entire international balance of power. This relates to notions on internal and external threats, in that states aim to balance each other's military power and threats. Revisiting Waltz, it is the international environment that is the main driver for states' seeking to maximize their security for external threats (Waltz 1979). Following this realist tradition, a paradox in core assumptions about each state focusing on survival and military means to this end, is the putative knowledge that European member states of NATO after the Cold War do not seem to upkeep their own security. For example, Blagden and Menon (2012, 3-4) stress that instead of suffering from strategic blindness, Europe continues to evaluate their own security in terms of national territorial defense. Thus, they are devoted to sustaining continental security, yet the focus of Europeans is merely misunderstood. Arising from this is the belief that states will focus on military capabilities wired for territorial defense the more exposed they are to external threats.

Claims of states' security being a combination of relative geographical distance from a potential threat, physical barriers and the effectiveness of the military force available, could provide useful insights on choices of national military strategies in responding to threatening changes in the international system. Corresponding with notions on the balance of threat, the line of reasoning above contains that states will be more concerned for territorial security in periods of great vulnerability to external threats.[104] Because of limited resources, this translates into a concern for territorial protection at the expense of out of area capabilities (Blagden and Menon 2012, 8-9). However, there might be periods where states perceive themselves to be so susceptible to threats that internal balancing seems impossible. Under such conditions, they could depend on external balancing in a greater extent. Accordingly, focusing on territorial defense would be replaced by a focus on expeditionary forces. Those states most vulnerable to a perceived threat will not be motivated in pursuing ambitions, or goals, outside their proximate region – yet, they will emphasis

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[103] The total war concept that dominated strategy during the Cold war has also changed into concepts promoting wars for limited strategic objectives. This is, to certain degree, a return to the cabinet wars of the 17th century or the wars of Bismarck between 1864 and 1871. This development is a natural consequence of the nuclear annihilation threat, i.e. nuclear wars cannot be won, and the need to use all available means, hereunder military power, to promote strategic interest (stated by Tor Ivar Strømmen, commander and assistant professor at the Royal Naval Academy, in conversation at his office 6th of June 2018).

[104] The divide between external and internal balancing denoted the difference between forming an alliance with other states to counter a threat (external balancing) or domestically attempt to increase national power (internal balancing) (Levy and Thompson 2010, 23). Moreover, He (2012, 189-90) extends this notion by proposing a negative balancing model, in which the real reason for the US and the Soviet Union to actively engage small, "ignorable" states during the Cold War was not for pooling resources but to prevent these countries from falling under the influence of the other side. Put differently, the US and the Soviet Union engaged in a negative balancing competition through undermining each other's' power and influence in the periphery.

expeditionary forces on some level in aiding the major power, notably the US. States not susceptible to such threats will pursue non-local goals and thereby focus on deployable forces.

This dynamic is important for grasping influences on how states transform their military forces and incorporate new military innovations. The immediate consequences following the end of the Cold War, was that NATO found itself without the threat it had been created to deter (Wallander 2000). As Jamie Shea, one of the leading thinkers of the Alliance, noted:

> *In the post-Cold War era security has become muffled. Although the classic threat has disappeared, new security threats and challenges have proliferated, and allies do not necessarily have the same perceptions as to what they are. The threats are today latent and whether or not to address them is voluntary as opposed to the imperatives of the Cold War threats exemplified by Soviet tanks on the inner-German border.*
>
> <div align="right">(Østerud and Toje 2013, 76)</div>

The Cold War's end led to new security challenges, changing states' notions of military force as new sources of security threat arose (Smith 2006; Shaw 2005), including regional conflicts and humanitarian crises during the 1990s and the increasing prominence of nonstate actors and cyber threats in the post-9/11 era. Moreover, in a geostrategic sense these threats include more precisely unbridled proliferation of nuclear weapons and ballistic missiles, terrorist actions, sabotages and hybrid warfare – imposing different challenges for how states prepare for war. Still, how states perceive these new security challenges fluctuate among nations, due to diverging national strategic interests and goals, governing how states innovate and why – meaning what capabilities they choose to invest in for altering their role and status in the international system. It also connects with the strategic interests of their alliance, in which mutual interests in deterring a common adversary create a form of security interdependence between allies (Matlary and Peterson 2013).

Evidently, threats are crucial for military transformation. For NATO, facing the new challenges in the security environment after the Cold War has involved expansion of membership states – incorporating most of its former adversaries in Eastern Europe – and crisis management beyond NATO's border as well as internal transformations in addressing the capability gap, interoperability problems and adaptability to new threats and future operations. As the strategy of NATO has been revised several times since 1991, the organization has been transformed drastically and revealed increased internal disagreement and divergence among the allied states, thereby contesting NATO's overall rationale (Østerud and Toje 2013, 77).[105] This divergence, discussed

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[105] The new Strategic Concept adopted in 1991 consequently recognized the replacement of the Soviet threat with a "new strategic environment", in which risks to the Alliance's security are "multi-faceted […] and multi-directional" (NATO 1991). Some components of NATO were still viewed as unchanging, meaning the Alliance endured as the main institution for transatlantic relations, it endured in promoting the strategic balance in Europe and it endured in deterring and defending against any threat of aggression against NATO members' territorial ground. Similarly, NATO would continue to promote security through dialogue, cooperation, conflict prevention and crisis management, and initiate evaluations of force deployments, command structures and capability requirements – including a lessened reliance on nuclear weapons (Webber, Sperling and Smith 2012, 3).

closer further below, could also be viewed as an outcome of alliance expansion – hence, it is a two-folded relationship complicating the process of how states (and in this sense NATO allies) transform and prepare for challenges to new international security issues.

Consequently, threatened states may respond by forming alliances, yet they may also respond internally by mobilizing military resources. This in turn could require military innovation (Farrell 2008, 780). In fact, threatening developments could in itself be an adversary's military innovation, meaning a new weapon or a way of war – demanding an innovative response (Zisk 1993). As one of NATO's – and the US' – main adversaries, Russia has felt compelled to counter their eastward expansionism in that NATO has been pushing towards the territorial borders of Russia (Kanet 2007). In response to fears of a NATO military build-up along its Western border, Moscow has developed new types of ballistic missiles, leading to NATO establishing a long-range ballistic missile defense in Europe (Hildreth 2008; NATO 2018). Moreover, states could be especially sensitive to external military threats in the shadow of a war, as a defeat or major setback can be a great inducement for military innovation (Posen 1984). Even militaries being victorious in war, although at a very large cost, could attempt to innovate for making future victory less costly. As French notes, the British General staff, alarmed by the human cost of the World War I, embraced new technologies during the interwar period with the purpose of winning next battles with "the maximum of machinery and minimum of manpower" (French 2000, 80).

As such, it might not be immediately obvious how threats have appeared after the Cold War. In relation to for example British military innovation, Britain has fought two large-scale conventional wars against Iraq (in 1991 and 2003), participated in numerous smaller-scale humanitarian conflicts (Bosnia, Sierra Leone and Kosovo), and joined simmering wars in Iraq (after 2003) and in Afghanistan (after 2002). However, Farrell (2008) explains that in none of these conflicts has Britain faced a direct threat. Thus, these have been considered "wars of choice", rather than previous "wars of necessity" like the world wars (Freedman 2005, 93-108). Nevertheless, realist approaches still have relevance in emphasizing the rationale imperative for military change: military organizations need to innovate for encountering new operational challenges, although such challenges are faced by states' choices instead of strategic necessity (Avant 1994).[106]

However, one should not be too hasty claiming that threat perceptions are the sole international driver for military innovation. While it could be the main factor, emulation of foreign militaries is also important to highlight in this (Farrell 2008, 781). Generally, militaries mimic the military models and methods of major powers, especially those who have worked well in war (Resende-Santos 2007). Yet, the thrusting motive in this sense is not fear, meaning it is not about

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[106] Rationalist perspectives also outline that current campaigns might bring challenges from tactical losses and operational setbacks which demand innovative responses.

responding to a threat.[107] Instead, it would concern imitating the powerful and successful, much like in the business world or other aspects of civilian life. Military emulation could be rational if the specific innovation has been through experimentations and tests by another first, and the emulating state has the resources required for the innovation (Goldman and Eliason 2003a).

Warfighting capabilities are effective in that they enable state leaders to impose their will on adversaries, existing or potential. The larger logical framework behind examinations of the diffusion of military power is closely related to studying national power, security and strategic orientations, which could be applied writ small to assessing how states' military establishments generate effective military forces. Hence, key to the spread of military power is how successfully military organizations can be transformed into effective military power. While threat perceptions lie at the very heart in understanding global spread of military innovations and the balance of power – the latter comprising internal and external responses to threats – as being shaped by the geopolitical and strategic context, it is how states' military organizations take raw technologies and use them that creates military strength and shapes diffusion patterns (Goldman and Eliason 2003a).

6.2 Military Transformation and Alliance Adaptability

Understood in realist terms, "alliances should not outlive the threats they were created to address" (Wallander 2000, 705).[108] As the previous chapter discusses, NATO has made great efforts in adapting to both internal changes as in revisions of strategic concepts and to external changes in the security environment after the Cold War for improving its military forces and capabilities. Rather than retelling this story, this section will in a military-strategic sense chart the impact of the American-guided military transformation on NATO as a whole and on individual allies. Moreover, it examines Alliance adaptation relating to new missions and capabilities, and how this has brought difficulties NATO currently experienced in how to innovate. It explores the magnitude and variation in how the US' military transformations are interpreted, or emulated, by some member states, and finally how this relates to their maritime strategies for enhancing military power.[109]

Much of the transformation in NATO has involved playing "catch-up" with the US ever since the World War II, with its worldwide military obligations and reach followed by the lead in

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[107] Commonly, responding to intimidating innovations of foreign militaries could take the form of emulation, as perhaps the most dramatic case in recent history being the Soviet atomic bomb built using a stolen US design (Horowitz 2010). However, the purpose of this external impetus is to emphasize non-realist reasons for military innovation.

[108] Several scholars have expected a dissolution of NATO after the Cold War, as the common threat from the Soviet Union was seemingly evaporating after its collapse. As Glenn Snyder has remarked, "alliances have no meaning apart from the adversary threat to which they are a response" (Snyder 1997, 192). Even Kenneth Waltz expected in the early 1990s that NATO would dwindle at the Cold War's end and ultimately disappear (Waltz 1999, 75-76). Yet, it sustained. This have caused vast discussions concerning NATO's survival, and is of such character that it would be subject to another thesis, however, it is still relevant mentioning in that it connects with how NATO has been able to adapt to new issues of security, in improving military effectiveness.

[109] This is relevant, since transformation in strategic thinking and concepts is key for how states adapt their military organizations to external changes, by influencing their postures and abilities to advance their military capabilities. Thus, in this case, postures concerning commitment to contribute to NATO's collective defense and capabilities.

transforming its military organization for the information age (Farrell and Rynning 2010, 674). Recalling that transformation after the Cold War has been directed at generating deployable forces capable of functioning alongside US military forces in carrying out NATO's new security role and joint missions, NATO established Allied Command Transformation – aimed at escorting Alliance and member states' military transformation and adaptability. Despite all the organizational and conceptual changes in advancing their military forces, the Europeans have simply not been able to match levels of US procurements of new military capabilities (Sloan 2002; 2008; Singer 2010; Matlary and Petersson 2013; Schilde 2017; Leonard 2005). Consequently, critics have for long emphasized a growing transformation gap between the US and its allies (Mitchell 2006).

Indeed, Farrell and Rynning (2010) accentuate that there is in fact two core transformation gaps. The first one represents, as noted earlier, a transatlantic gap in force development caused by disparities in European commitment to, and investment in, military transformation along US lines. The second is denoting a gap between the transformation programme itself and current operational challenges. Originally, transformation in the US military was designed to prepare its forces for potential conventional warfare – a design which essentially updated NATO's transformation agenda as outlined in the PCC from 2002. However, the main challenges facing NATO during the latest years have appeared from low intensity conflicts, especially in conducting counterinsurgency and stabilization operations in Afghanistan. These two transformation gaps have threatened to disrupt Alliance adaptability and effectiveness. The buzzword seems to be *commitment*.

As NATO focused on the enlargement process and the fragile Euro-American balance during the 1990s, its multiple tasks created a form of "strategic ambiguity", preventing the Alliance in reaching agreement upon systematic military reform (Farrell and Rynning 2010, 678). As new sources of threat emerged, notably challenges in the event of the terrorist attacks of 9/11 in 2001, struggles with incorporating the American agenda into NATO have continued to persist until this day due to ongoing inadequacy in defining what transformation means for an alliance as opposed to for a single nation. A solution to this has been, as proposed by Secretary Rumsfeld in 2002, the introduction of a "transformation package" for NATO with essentially two linchpins – Allied Command Transformation and the NRF – for satisfying the European allies' political and institutional concerns while endorsing NATO into the transformation agenda (Sloan 2008; Velde 2006). Despite agreement, the political guidelines have been left vague as heads of states had disparate ideas of what transformation was, reflecting member states' different military standards and national outlooks (Matlary and Petersson 2013).

Yet, transformation was more apparent after the 2004 Istanbul summit where NATO heads approved the Alliance's version of effects-based operations (EBO), supporting a somewhat more specific transformation agenda, notably effects-based approach to operations (EBAO) which linked

anticipated effects to not merely joint and integrated military power but also the full spectrum of national security means.[110] However, NATO's political level deflected such transformation agendas by becoming entangled with high politics of NATO-EU-UN relations, in which advanced military planning endangers doing diplomatic damage. Put differently, NATO's engine of transformation – the Allied Command Transformation – has turned up isolated and with a holistic agenda (Terriff 2010). Neither is encouraging change, perhaps much less transformation. How well the Alliance encounter future challenges will be revealed in the years to come. Nevertheless, hasty incorporation of American transformation agenda has evidently set the footings for the Alliance predicaments, as echoed in de Hoop Scheffer's call for fundamental strategic rethinking (NATO 2009).[111] In this troubled organizational context, European allies embarked on transforming their military forces, which inevitably has facilitated different outcomes in relation to military innovation adoption.

Finally, the durability and adaptiveness of NATO tell us much about the US power and influence. The ability of the US to extend the life of, according to some, a declining arrangement of alliance neatly elucidates how international institutions are created and maintained by stronger powers for serving perceived or misperceived interests (Wallander 2000). More specifically, it shows how the US has prompted military transformation for increasing military capabilities of the Alliance to meet new challenges in the post-Cold War security environment.

6.2.1 Redefining Tasks and Differing Capabilities

It is well-known that states through history have emulated innovations of the major powers, both because it assures increased military effectiveness and because it assures to bring legitimacy on the emulating state by upholding the professionalism of its military organization (Farrell 2005; Resende-Santos 2007). Much quantitative research support global emulation of the US military model, meaning adopting comparable doctrinal concepts and investing in RMA-technologies for empowering their military forces (Demchak 2003; Goldman and Mahnken 2004). As part of this trend, European allies have emulated the Americans. They have merely done so to some extent, however, focusing on primarily the innovations connected to NCW and EBO, and thus shaping them to correspond with their national agendas (Farrell and Rynning 2010; Sloan 2008). Consequently, military transformation (although commonly accepted) loses clarity and impact.

As noted above, all NATO allies have committed to transform their militaries, and the majority has developed plans for networking their military forces with the induction of effects-based

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[110] Effect-based thinking pledged a more effective way of using military force and involved to some extent a paradigmatic shift in approach for military planners: Away from causing maximum damage to using force more precisely with the purpose of minimizing physical damage whilst still accomplishing the desired strategic effects (Lewis 2003, 505-6).
[111] Introductory remarks by former NATO Secretary General Jaap de Hoop Scheffer at the Opening of the Strategic Concept Seminar in July 2009, stating "I believe strongly that the new Strategic Concept has to demystify this notion and state clearly where and how NATO needs to transform its forces".

concepts and doctrines. For example, in Britain, the 2003 Defense White Paper (DWP) obligated the military forces to improve network-enabled capability (NEC) and effects-based planning and operations (Farrell 2008). These core innovations were crucial to the British military's operational concepts in the future, further developed by all three services. Additionally, the Germans also adopted a transformation plan in 2004 in the same way, as did the French.

In fact, the European allies had throughout the 1990s been experimenting with digitization of their military forces. NATO's Multinational Digitized Interoperability Exercises played an important part to this. Experiences from the Kosovo War in 1999 buttressed the assurance of network and effects-orientated forces, in addition to the need for advancing capabilities in order to fulfill this promise (Farrell and Terriff 2002). In 2002, discussions between US and European military leaders began for encouraging the NCW concept, and by the beginning of 2000, European militaries started to become familiar with the US ideas about NCW and EBO – especially those working with development of doctrine and force improvement (Farrell 2005).

While European allies recognized the main content of these concepts, they did not adopt the US idea of NCW. Instead, they started developing NEC, a far less impressive concept of networked operations which reflected allied inability to meet the level of US military investments as well as European caution concerning the operational effectiveness of a complete NCW approach to operations and missions (Adams and Ben-Ari 2006). The European allies also had a diverging perspective on effects-based doctrine. The US concepts and EBO doctrine focused on applying a system of systems evaluation. Early European engagement involving American concepts did try to introduce this approach and was centered on taking advantage of such enemy networks. However, British employments of the US approach in 2005 demonstrated that EBO was staff-heavy, semi-scientific and essentially unfeasible. During the same period, the French also started advancing an approach resembling EBO, which they called "synergy of effects", yet they remained profoundly doubtful of the effectiveness of the American version (Farrell and Rynning 2010, 685).

Despite diverging approaches among the European allies to the US-led transformation of military forces, Europe in general is evidently ripe for transformation. The US military, through its own transformation agenda, has offered the Europeans a model for emulation. Also, NATO has formally adopted concepts for network-enabled and effects-based operations. Nevertheless, the variation among the European allies in their commitment to developing doctrine and devoting significant financial resources in new technologies for advancing their military capabilities and power, remains substantial. This could primarily be explained by the consistent cuts in defense budgets and military expenditure following the Cold War's end, but also by the domestic policies including strategies for preserving vital national interests of individual states. Correspondingly, this

is true for the maritime domain as well, not only military transformation in general.[112]

The above discussions demonstrate the indispensable role and significance of the strategic context in explaining how military power diffuses through the international system. Regarding the case of sea power, examining maritime strategies of both the Alliance as well as selected states is important for a better understanding of the determinants of states' capacity to adopt and implement naval innovations for advancing their power projection capabilities at sea. This is especially so in an era of rapid technologic and organizational change, making it increasingly important to adapt in the ever-changing and complex security environment.

6.2.2 NATO Maritime Strategy and Transformation

Fundamentally, NATO is a political and military alliance, yet as it very name suggests, it is also a maritime alliance. The Alliance's members and geographic areas of interest are accordingly linked by the sea (Horrell, Nordenman and Slocombe 2016). As its allies are the primary recipients of globalisation, they are dependent on accessible and open sea lanes of communication, in addition to – whenever needed – the ability to project power across the maritime domain (Alderwick and Giegerich 2010, 13). At a time when about 95 percent of global tradable goods and 80 percent of global hydrocarbons flows depend on shipment by sea, it is imperative for NATO to safeguard sea transit routes (Parry 2014).[113] Thus, maritime forces have a inimitable and unmatched capacity to display global reach and flexibility and to establish continuing presence if necessary (NATO 2016).

In a Cold War context, although the US and the Soviet Union were the prevailing naval powers for many years, they were not the only ones – indeed, the navies of the US' larger NATO allies must be viewed as far from negligible. However, it was overwhelmingly their interests, fears and capabilities that defined the maritime environment during the Cold War era (Miller 1992, 112-13). At base, US perceptions were embedded in a longstanding self-image as primarily a maritime power. In this traditional perspective, the US is essentially an "island nation" to whom the seas are immensely important for both political, economic and political reasons, and for whom naval power – even command of the seas – is consequently crucial if its overseas interests are to be safeguarded. Even though this view is cast in rather broad, and perhaps vague, terms and even though it might not lead directly to any particular naval policy or posture, it has nonetheless a powerful hold over

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[112] Figure 6.3 and 6.4 in Appendix B could demonstrate this.

[113] Additionally, with 95 percent of internet traffic and communications moving through more than 200 undersea cables, and about 80 percent of marine traffic passing through critical "choke points" – notably the Mediterranean, the Black Sea and the Red Sea – it is vital for NATO to secure these SLOCs (NATO 2016, 2). The prompt increase in scope and scale of various forms of trafficking over sea routes by both adversary states and organized criminal networks also threatens the external and internal security interests of all Allied states. Especially concerning potential terrorist acts against Allied assets at sea and different actors using the international sea transit in proliferating WMD.

the majority of the US security elite (as well as the US naval establishment), and has heavily influenced US postures towards naval matters.

Moreover, this general impetus was translated into more definite interests and fears which continues to hold importance. Some concerns have been overriding in this sense. First, the US – and with it, NATO – was during the Cold War deeply fixated with the safety of the North Atlantic sea lines of communications (SLOCs). This is not only because of a generalized concern with protecting the maritime lifeline that connects the US to Europe, but even more because the military strategy of NATO in Europe has been founded on a mobilization arrangement that necessitated (and in fact depend on) sea-borne reinforcements and resupply from the US (Miller 1992). After the Cold War, and thus the absence of the Cold War threat altering the balance of power in Europe, NATO's focus on the transatlantic SLOCs lessened. However, if this militarily critical sea lane could be disconnected or disrupted by an adversary such as Russia, the NATO's prospects for a victory in a potentially large-scale conflict in Europe would be severely reduced. Accordingly, the US and NATO have been exceedingly sensitive to any potential threat to the SLOCs, thereby giving the preservation of SLOCs a high priority in shaping new naval doctrines and the maritime policy of the Alliance (NATO 2016). Therefore, they have justified a large portion of their naval acquisitions by reference to the need of protecting the sea lanes.

Hence, for preserving the vital SLOCs, command of the seas is therefore increasingly necessary for the Allied security as the post-Cold War environment has involved increasing strategic competition – not only amongst NATO member states but also from adversaries and competitors such as Russia and China. NATO's strategic nuclear deterrence is ensured by its naval forces, playing a pivotal role in demonstrating NATO's resolve regarding its "deterrence posture in the seas along its northern, eastern, southern flanks" (NATO 2016, 1).

Since 2008, debates in NATO regarding maritime security has been anchored in negotiations around the Alliance Maritime Strategy (AMS) approved in 2011 and a general Maritime Security Operations (MSO) concept, seeking to face and limit current and potential critical security challenges in more efficient ways (Alderwick and Giegerich 2010).[114] In broad terms, an effective AMS need the principal capabilities of forward presence, manoeuvre and power projection.[115] The advantages of these capabilities are not only clear-cut in protecting and projecting Allied interests,

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[114] The AMS was developed in full consistency with the overarching 2010 Strategic Concept announced at the Lisbon Summit that year, and affiliates broadly with its central tenets: deterrence and collective defense, crisis management; and cooperative security (Smith-Windsor 2013). Additionally, the AMS sets out a fourth area, notably maritime security (NATO 2016). The publication of the 2011 AMS was a momentous upgrade from the original strategy dating back to 1984.

[115] For maritime security, it is crucial having ships deployed and thereby communicating readiness which enables unrestricted usage of international SLOCs for trade and transit. The significance of naval manoeuvre at sea involves deployment of maritime assets whenever and wherever anticipated, in addition to rapidly redirecting assets to incipient crisis areas. Lastly, for protecting assets at sea and even influence the consequence of incidents on land, naval power projection is vital because it enables joint operations by putting assets from all domains – air, land and sea – into effect in conflicts. Along with accelerating combat, naval assets could also function as to denying competitors maritime access by providing mobile anti-access/area denial capabilities (NATO 2016).

but also in deterring potential enemies or competitors. At all levels, power at sea is elementary for NATO power. However, since 2011 much has changed in the security environment in which the 2011 AMS does not reflect, such as Russia's military actions in Ukraine, crises in the Middle East and piracy outside Africa, the increasing geopolitical importance of the European Arctic – or the High North – and climate challenges (Horrell, Nordenman and Slocombe 2016, 1). Consequently, the 2011 AMS appears to be outdated, by failing to address challenges and missions that have emerged during the intervening years.

Obviously, NATO needs a revised AMS that proves able to locate the policies, capabilities and operations that will protect the Alliance's interests in the maritime domain within the context of current strategic realities, and most essentially, the irrefutable return of a potential confrontation with Russia's aggression (Nordenman 2017). Moreover, the changing operational environment in the maritime realm, comprising state competition at sea, skilled nonstate actors, persistent capability gaps in the West and rapid technological change, should not be seen as momentary. It is the naval feature of the international security environment after the 2000s for which NATO should prepare itself so as to safeguard the Alliance's interests at sea. For responding better to future operations, defense-capability planning has been crucial in preparing allied forces for being capable of facing a wide range of existing challenges scenarios within economic structures (Spiegeleire 2011). Future operations could require this as well, and most likely something different – denoting the continuing need to innovate collective as well as individual capabilities of allied states.

6.2.3 Norwegian Maritime Strategy and Transformation

The development and application of the Norwegian maritime strategy could in several respects correspond with that of NATO, as Norway ever since its inception has been an unrelenting ally, placing great emphasis on contributions to the Alliance's collective defense and cooperation. Of course, the overall Norwegian defense and security policy after the World War II has for the most part been defined by membership of the Alliance. This membership endured after the end of the Cold War, and notions of the alliance were imperative in outlining Norwegian defense policy – both during the Cold War and after (Rottem 2007). As the end of the Cold war generated a new balance of power in the international system, it created an entirely different state of affairs which altered the challenges to states' security and thus the military-strategic planning of their militaries for facing these new realities of security.

During the Cold War, Norway had upheld a substantial defense structure designed for territorial defense, based on male conscription and a pedantically planned total mobilization of all aspects in the society in case of war (Bogen and Håkenstad 2017). Norway perceived its security situation as being highly exposed militarily and geostrategically, as a small state next to the Soviet

Union and because of the proximity to its strategically important base complex at the Kola Peninsula. Having large sea territories – primarily in the North – Norway pursued offsetting of its disadvantages by extensive mobilizing efforts and a total defense concept within the framework of an integrated alliance (Håkenstad 2010; Matlary 2013). Membership in NATO, and especially the bilateral relationship to the US, has long been a true bedrock of Norwegian security policy (Tamnes 1997). With this, the defense concept from the Cold War denoted complete dependence on allied support, meaning massive US and allied aid in armaments, infrastructure and funds, implying a strategy of withstanding for as long as possible (Børresen, Gjerseth and Tamnes 2004, 52-53).

In the post-Cold War era, much have changed – yet some things have remained the same. As challenges to Norwegian security derives from its geostrategic situation, maritime security and defense policy have therefore necessitated the capacity to provide a "threshold of resistance" to any incidental strikes, and "maintaining Norway's sovereignty, territorial integrity and political freedom of action" which comprises a vital strategy to its national security (NMoD 2012b, 8). This reflects a traditional security and policy stance, where state integrity is key in protecting its border and deter against potential adversaries. Because of its vast sea areas, NATO membership has therefore remained crucial as a basis of deterrence (Matlary 2013, 281). As Norwegian economy and welfare hinge on maritime resources (oil, gas and fish), and advanced maritime industries and global shipping, having capabilities for securing SLOCs and vital strategic interests are imperative for controlling national sea territories (Ulriksen 2013).

However, the ability of managing future challenges to maritime security must be planned for being able to deal with these alone because of the absence of any invasion scenario in Europe. With the Cold War threat being diminished, NATO began in the early 1990s to center on other areas than the SLOCs and northern areas, leaving Norway in a "fear of abandonment", as Glenn Snyder terms it (1984, 466-68). The fear of being downgraded in NATO and ignored by its key guarantor – the US – brought about a state of continuity which is fundamental to the Norwegian strategies throughout the post-Cold War era. As the historian Rolf Tamnes puts it:

> *"Among the enduring features are the primacy of the High North and transatlantic*
> *dimensions, and the balancing act between internationalism and aloofness."*

(Tamnes 2014, 65)

Hence, the relationship with US and the Alliance remains key for the Norwegian maritime strategy and security to this very day. As an Atlantic coastal state with robust historical ties to the West, Norway has sought to the major powers within NATO – in previous times from Britain and later the US – for leadership and military assistance. Although the restructuring of Norwegian military into more flexible and expeditionary forces for meeting new security challenges took time, it did not change the relationships to NATO and the US (Græger and Lindgren 2017). Moreover,

the increasing activism of Russia in the High North during the recent years have necessitated the strengthening of NATO's northern flank, which have encouraged enhanced Norwegian contributions in its priority of being "NATO in the High North" (NATO PA 2018).

6.3 Diffusion Outcomes of the Modern Warship Innovations

Although NATO has adopted its name from one of the greatest oceans in the world, the Alliance have traditionally been a military alliance primarily centered on both land and sea. While many allied nations have built and maintained outstanding navies, seapower has for the most part served as a flanking force for what was envisioned as the main Cold War battle on the central front. After the collapse of the USSR, land warfare continued to act as a key focus of the alliance – first in managing the disintegration of Yugoslavia, and then as NATO anticipated a key role in the Afghan War. Nevertheless, naval power has historically been a defining feature of the Alliance, in which the US have dominated with its technological advances since the World War II.

The US' naval planning during this period have mainly focused on Russia as the most likely enemy of the United States (and NATO), while the rise of China's naval power has proved itself to bring substantial competition to the US technological lead as well. While several allies, including Britain, France, Germany, Spain and Italy, have created fleets with increasing power projection, they struggle to pose notable competition to the American vanguard. However, despite diverging commitment and investments in new capabilities among the European allies, they have shown interest in pursuing transformation and improvement of their militaries with different outcomes, which could in certain areas compete with US capabilities. Others pursue niche capabilities to extend the striking power of larger fleets, such as the coastal naval powers of Norway, Denmark, the Netherlands, and Portugal, as they are largely organized around the focus on expeditionary forces for the purpose of fulfilling a role within NATO. This is so except for Norway, as its navy is structured for defending national coastlines as well. The major and smaller navies – such as the coastal ones – are the universe relevant for the next discussions. Table 6.1 in Appendix A demonstrates changes in the distribution of naval power from the Cold War's end until present.

After the US-led victory in the 1991 Gulf War, which initiated the information age RMA and new innovations associated with NCW, the construction programs of naval powers across the world have moved in different paces and directions in response to the technological lead of the United States. Many altered construction plans for already-planned warships and incorporated new advances of the RMA-technologies, attempting to follow in the US' footsteps. Still, it is not just about playing catch-up in the pursuit of increased maritime power – the picture is a lot more complex. These advances are also being made in regards to national and alliance maritime courses of action, changes in strategic concepts and doctrines, and defense budgets, reflecting states'

differing strategic interests and choices due to new threats and changes in the security environment. Consequently, the mesh of these factors inflict challenges in varying degrees on how states prepare their militaries for contemporary warfare.

For example, Germany faced great challenges in overcoming constitutional constraints, as the RMA remained a moot issue throughout most of the 1990s, thereby hindering the Germans in incorporating RMA tenets into its military doctrines and naval strategies (Sloan 2002, 72). It was not until 1994 that alterations began by deploying German forces beyond its borders, and by 1995 they actually undertook such a deployment into Bosnia. Yet, the strategic and policy plans for transformation were not integrated until after the turn of the century.

Technologically, as Germany had engaged extensively in advanced intelligence, surveillance and reconnaissance systems (especially related to UAVs), it had begun developing unmanned reconnaissance aircrafts, also for the maritime domain, for supporting surface warfare, electronic warfare, antiship missile defense, amphibious operations and antisubmarine warfare (Aguera 2000). Moreover, of the eighteen Type 205-class submarines built for the Bundesmarine (West German Navy) during the 1960s, twelve were modernized in the early 1990s, and redesignated as Type 206A-class. A major mid-life modernization was conducted, with substantial upgrades involving the fitting of a new sonar, new periscopes and a new LEWA weapon control system. GPS navigation was installed, and the rebuilt submarines were armed with new Seeaal-torpedoes as well as having the propulsion system being comprehensively refurbished and other improvements being made to the accomodation (Jane's Information Group 2003).

Furthermore, Britain also started to make several improvements consistent with the information age RMA, centering on enhancing their ability to apply long-range precision force using precision-guided munitions (Sloan 2002; 2008). Alterations were made on the Type 22-class frigates, reflecting the lessons learned in the Falklands, changing the weapons fit in becoming more optmized for a general warfare role: the ships were fitted with improved guns, missile launchers and a greatly advanced weapon system. The mid-life refits of the succeeding Type 23-class frigates were massive, with refurbishments improving top speed and fuel consumption, sensors, missile system, and upgraded command and communications systems (Aquilina, Michell and Pearson 2010). For both Britain and Germany, these transformations required substantial financial resources and investments in R&D as some technologies were noncommercial, in addition to putting increased demands on shipyards building in fitting these new improvements. The introduction and integration of the RMA-technological upgrades also forced a range of naval policy changes, not only in Britain and Germany, but in other Western and non-Western states as well.

The spread of the technological elements of the RMA-technologies applied to modern warships after the Cold War have occurred relatively more swiftly and thoroughly than the spread

of the complete innovation of NCW. Given the medium levels of financial intensity and organizational capacity required to adopt, it could be asserted that the spread of modern warships has been relatively consistent after the Cold War, with the technologies related to the RMA and NCW spreading more quickly in some areas while somewhat slower in other, as demonstrated in the table above. However, it should be pointed out that "relatively consistent" in this sense refers to the United States still being in the technological lead ahead of both allied states and adversaries in most areas, whilst the discrepancies across Europe and among the US and its allies are still prevalent. Nevertheless, since the technological side of innovation should spread fairly quickly to those with financial capabilities, it is not surpising that the advantage for the first mover, the United States, would be shorter in this case than for technologies harder to adopt. Yet, on the organizational side, the lag between the innovation of modern warships and widespread adoption is longer.

6.4 The Impact of Modern Warship Innovations

Although few military innovations have had the same reach of impact on the security environment as the HMS *Dreadnought* had, the impact of modern warships during the information age have also been significant due to the application of high-technological weaponry and communication systems (Horowitz 2010). Led by Admiral Cebrowski, the US Navy attempted to maximize its first-mover advantage from developing modernized platforms incorporated with interoperable technologies by limiting the release of crucial information and intelligence. By purposefully shielding the results from sea trials that demonstrated faster propulsion and speed, and more accurate targeting at longer distances using precision-guided munitions, the general belief is that upholding secrecy will delay efforts of foreign navies to mimic, especially regarding adversaries, new technological innovations – helping the US in sustaining and widening its relative naval advantage (Carlisle 2015).[116]

The Americans have gained important advantages from their first-mover status, despite the lack of a comprehensive transformation strategy to guide their vision and future evolution in the 1990s (Sloan 2002). After the success in the 1991 Gulf War, information technologies and network-centric way of war seemed to indicate a revolutionary change, representing a new "gold standard" of military power as with the British HMS *Dreadnought* in 1904 and the German blitzkrieg in 1940 (Singer 2010, 188). Modern warships would come to mean not merely the ships or vessel themselves but also the package of capabilities they contained. It was perhaps even more evident in the early stages of the American invasion of Iraq in 2003, as it took half the time at 0.59 percent the cost

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[116] Still, joint intelligence and elaboration on military innovation have been crucial for the spread of new technologies among NATO allied member. Joint research programs and doctrines have been established in response to the RMA during the 1980s and the 1990s, allowing rapid dissemination of time-sensitive information to decision-makers and combat commanders, while allowing for the consolidation of intelligence resources in central locations (Carlisle 2015, 350). Nevertheless, states will always have an interest in holding back certain types of information in keeping their military edge, regardless of alliance politics.

compared to the occurrences during the Gulf War. Boot (2006b) has argued that the key was not only the US utilizing profoundly different weapons than previously, but that networking into information technology had proven "central to American military dominance". The transformation movement guided by Cebrowski had ostensibly established a real revolution in war.

Although the United States are still the prevailing naval power, these advantages have in some respects been short-lived. Within a few years after the launch of RMA-technologies, several European allies begun modernizing their militaries, even if this must be comprehended in accordance to alliance politics for enhancing expeditionary defense capabilities, cooperative relations and interoperability in NATO (Farrell and Rynning 2010). However, the declining numbers of ships in the joint fleet, due to rising costs and budget cuts reducing the naval fleets of most individual allied states, could arguably have made it easier for other major navies like the Russians or the Chinese to gain on the US Navy, though the it has managed to stay ahead (NATO 2016). While the United States gained a large relative advantage in military power, the adoption requirements could have shortened the first-mover advantage sustained by the US Navy.

The implementation of RMA-related organizational changes, especially the streamlining of command and control structures, enlarged professionalism toward more rapidly deployable expeditionary forces and changes in battle practice, also increased the combat efficiency of the US Navy (Sloan 2008). For example, the incorporation of organizational RMA tenets into fleet redeployment facilitated elimination of outdated vessels and thus investing financial resources in faster warships that would more effectively allow for projection of power, sea control and sea command (anti-access/area denial capabilities). Maintenance of aging ships imposed large costs on military readiness, while the potential benefits of improving overseas force deployments became increasingly more important as new challenges in the security environment required new measures in confronting them (Button et al. 2015).

At the system level, it is arguable whether the impact of modern warships has been restricted to the interaction of major powers. Put crudely, Western austerity and global economic changes have generated higher levels of asymmetries between major powers and minor naval powers, several states – especially in the Western hemisphere – with middle and minor power have built and maintained impressive navies (Raska 2016). Nevertheless, as discussions above demonstrates, there are great differences in power and capabilities among both the European allies and the United States, and between the Alliance (and the US) and its adversaries. Modern warships with information age technologies have inflicted shifts in the speed of interactions along with expectations of the timing and outcome of operations, which had spillovers into broader strategic planning (Sloan 2002). Despite the overall shrinkage of naval fleets after the Cold War, the military build-up between the United States and Russia, in addition to the diverse types of conflicts over the years, could be well-

established examples of incentives to transform the whole military establishment (NATO 2016). This includes defense-capability planning postulating the worst about adversaries leading to inevitable increased tensions and encouraging more flexibility of militaries in responding to new security threats and complex challenges in the ever-changing security environment (Fitzsimmons 2006; Sloan 2008).

Additionally, with increased naval power accompanying the technological upgradings of individual ships as the cost per unit increased, the military cost of adversaries gaining advanced knowledge about such new technologies will increase as well. The growing complexity of naval operations have posed challenges to Allied naval interoperability (Farrel and Rynning 2010; Fiott 2017). Horowitz (2010, 152) explains that battles in the age of sail, such as Navarino in 1827, demonstrated that even though collaboration between the British, French and Russian navies was tense, it correspondingly did not require massive preplanning. Battleships sailed into the battle space being visible to others, and consequently the likely disparities in tactics and external differences between the ships were fairly small. During the machine age, and more importantly the information age, all such factors have changed. There are large variations in strategies and ship capabilities, and the size and character of battle spaces have made it increasingly more difficult for navies to cooperate or interact in operations without extensive preplanning. Consequently, this will shape the different diffusion patterns of military innovation among NATO members as well as other competitors and adversaries in the international system.

6.5 Responses to Modern Warship Innovations

As stated above, the post-Cold War US defense establishment has been at the frontline of military transformation. Despite its unmistakable military advantage over adversaries and allies alike, US leaders intend to not only upkeep but also increase the nation's military dominance (Dombrowski and Ross 2008, 13). The longstanding message to military competitors has been clear; challenging the United States proves ineffective.[117] Yet, military change – or innovation – diffuses, whether slowly or rapidly. According to Goldman and Eliason (2003a), innovators such as the United States struggles in maintaining their competitive advantage, as allies and competitors – even adversaries like Russia and China – will emulate, adapt and improve as well as counter their innovations.

Hence, the spread of military innovations from the US to Asia, Europe and the Middle East has been apparent for some time. Into the first decade of the twenty-first century, transformation – as in military transformation – became a familiar buzzword among scholars of American and allied

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[117] In making the case for transformation, former Secretary Rumsfeld, the United States' foremost civilian champion of transformation in the beginning of the 2000s, was truly explicit when he stated that "we must develop new assets, the mere possession of which discourages adversaries from competing." (Rumsfeld 2002, 27).

militaries (Sloan 2002). Although the US was the first to set off military transformation by applying information age technology and developing new structures and concepts, it seems that almost all states began to embark on the transformation bandwagon (Terriff 2010). The NATO Alliance is no exception of this trend, yet there are diverging interpretations among the European allies as well as other competitors outside the Alliance. For example, China has during the last decade pursued military advancement through the taxonomy of "informatization", a process much alike that of US transformation, emphasizing information intensive warfare (Cimbala 2016). As Richard Bitzinger has noted, China's adoption of transformation depends on:

[…] short-duration, high-intensity conflicts characterized by mobility, speed and long-range attack, employing joint operations fought simultaneously throughout the entire air, land, sea, space and electromagnetic battlespace, and relying heavily upon extremely lethal high-technology weapons.

(Bitzinger 2006, 2)

The sections reflecting alternative strategic choices above, validate assumptions of that given the medium levels of financial intensity and organizational capital required to adopt this innovation, states ought to engage in various internal and external response strategies to modern warships associated with the information age RMA and NCW. While the system-level outcomes offer support for the adoption capacity theory, this section provides a closer analysis of three allied states in attempting to seek out specific national impacts of modern warship innovations, notably Britain, Germany and Norway, as portrayed below.

Country-Specific Responses of Allied States

BRITAIN

Britain started undertaking several initiatives consistent with the information age RMA and military transformation, driven by a desire of being capable in providing an effective contribution to US-led international security operations and thus remaining an important player and an esteemed ally in the international system (Sloan 2002). Numerous of ensuing decisions were not taken and advanced until the Strategic Defense Review (SDR) was released in 1998. Still, claims have been made that of the European allies, Britain has been at the forefront of these efforts towards a network-enabled, effects-oriented and expeditionary force posture (Sloan 2008; Porter 2013).

The dynamics of British military transformation have involved innovation in military doctrine (EBAO), organizational concepts and technology (NEC).[118] As driving forces of British military transformation largely are international, a main one has been the altered strategic landscape

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[118] It should be noted, however, that the term "military transformation" has faced difficulties taken roots in Britain (Farrell 2008, 778). In 2004, the former Chief of the Defense Staff (CDS), General Sir Michael Walker, explicitly spoke in his annual lecture of the transformation of the armed forces yet it is barely cited in the 2003 DWP. Notwithstanding, the DWP offer an influential policy direction for the British military transformation along US lines of change, making the EBAO a new paradigm for British force development and the conduct of operations. The 2003 DWP also clearly placed NEC at the heart of British transformation, integrating sensors, decision-makers, weapon systems and support capabilities in achieving the desired effect.

accompanying the post-Cold War security environment. The demise of the Soviet threat eliminated the core mission of British military, urging invention of and revision to meet new operational challenges. This inferred a return to – in a historical sense – traditional mission-sets of the British armed forces, notably expeditionary warfare (Farrell 2008). Another central international driving mechanism has been the transformation of the US military, both as an essential, in the constant interest of British armed forces being capable of combating alongside US forces, and as a source of ideas, principally concerning networking of forces and effects-based thinking (Demchak 2003).

Simultaneously, Britain has not merely emulated their US ally. As previous discussions have shown, it has rather adapted American ideas for fitting them to British conditions and sensibilities (Farrell 2005; Adams and Ben-Ari 2006). There have been mainly three national forces influencing Britain's capacity to adopt new innovations, namely resource constraints, military culture and domestic politics (Farrell 2008; Sloan 2002; 2008). It would be unrealistic of Britain to anticipate matching the level of US military transformation. Although the British had aspired it, it would be impossible to aim at a US-designed fully networked military force. Due to severe budget cuts during the 1990s and well into the 2000s, the British military proves unable to afford developing most advanced weapon systems dependent on next generation technologies, such as the US FCS (Farrell 2008, 805). This have been reinforced by British military culture, such as the command culture (which sits agitatedly with complete network-centrism) and in terms of overall disbelief regarding the promises of new such technologies. Therefore, Britain planned to extend a NEC approach instead of NCW force structure, adopted EBAO thinking rather than warfare science and has been advancing new platforms incorporating new – still relatively mature – technologies.

On a further note, even though Britain has made significant efforts in improving its military in line with US transformations, declining defense budget combined with rising cost of ships after the Cold War's end have placed constraints on the British Royal Navy.[119] For example, from 2010 to 2015, the Royal Navy experienced a thirty-three percent decline of the total of carrier and amphibious ships, a seventeen percent decline in submarines and an extra seventeen percent decline in destroyers and frigates, making its contemporary fleet smaller than the fleet challenged by the Falkland Islands War in the 1980s (Kuehn 2015; NATO 2016). Despite the shortfalls, they still have a large enough naval budget to build necessary NCW technologies into existing platforms, and as recent measures seem to have at least frozen cuts to the Royal Navy, there is a decisive impetus toward reinvesting (NATO 2016). The commitment to operate two new aircraft carriers and investments in the new *Type 26*-class frigates (also known as Global Combat Ship) will enhance British maritime power projection extensively, although placing enormous strains on funding of

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[119] See Figure 6.1 and 6.2 in Appendix B.

smaller escort vessels and substantial pressure on exercises, manning and skills.

Domestic politics have also played an important part in Britain's capacity to innovate and transform its military, especially concerning shifting toward expeditionary capability. As the end of the Cold War eliminated the core mission of armed forces, however, it did not define what would replace it. The British government under the former Prime Minister Tony Blair determined to include an ethical dimension to Britain's foreign policy in outlining the military's new role, thus using military force for humanitarian purposes (Kampfner 2003). However, the events of 9/11 underlined the need for countering terrorism abroad, thereby embracing effects-based thinking.[120]

Nevertheless, as adoption capacity theory assumes, while modern warships have provided a noteworthy first-mover advantage for the United States in relation to the Royal Navy, Britain has had necessary financial intensity and organizational capital to adopt the innovation and starting to catch up. As an old naval power, the Royal Navy have commonly invested in important naval assets, but because of its budgetary constraints after the Cold War and old organizational age, it took some years for the British to incorporate information age technologies into its naval strategies and concepts. Yet, looking at commitments to the Alliance, the Anglo-American relationship and investments in new capabilities, Britain remains a crucial global player in international politics.[121]

GERMANY

Of the United States' Western allies, Germany might be the one who has faced the greatest challenges in responding to new military innovation and the US' transformation in the post-Cold War environment. Forty years of being a traditional land power in any potential Cold War battle, together with a post-World War II tradition of conscription for maintaining military ties to the civilian society, have implied that Germany had to undertake dramatic change in strategic thinking in responding to the American-led RMA transformations – notably a highly mobile expeditionary military capability (Sloan 2008, 70-1). The need for this capability was expressed already in the 1994 Defense White Paper. However, even with several initiatives during the 1990s in addition to a staggering advice from a "Blue Ribbon" commission report in 2000, it was not until the events of 9/11 that Germany's policy starting to truly reflect the notion of state security as being beyond

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[120] Beyond the level of grand strategy, the US is central to how the British designs its own forces. Britain plans around the US-led coalitions, building it forces to be interoperable with those of the United States. Porter (2013, 129) argues that ever since the US-UK Mutual Defence Agreement in 1958, its nuclear deterrent has been reliant on the US for strategy and purpose, procurement, infrastructure and satellite guidance. Related to a logic of how to connect Britain's power to its commitments, British strategy has by tradition not been categorized or embodied in formal committees or policies. Hence, a gap between theory and practice surface in an ironic way. In attempt of formulating a unique British world role, British strategic planners look to the US for inspiration, seeking largely institutional solutions to strategic problems.

[121] In comparison to the Dreadnought era, Britain was no longer a "Great Power" in a traditional sense after the World War II, or even after Cold War (Porter 2013, 122). Rather, it acted within the limiting parameters of the US grand strategy. In the World War II, the United States had entered the international system as both an ally and adversary, underwriting the British' capabilities to fight but also dismantling their empire. Notions of a British autonomous grand strategy in recent years have been problematic surely because Britain became a constrained client in a world order dominated by the US after 1945.

territorial defense triggering participating in full spectrum operations abroad (Longhurst 2005).

This change in thought remained reflected in most recent policy documents, yet simultaneously, Germany sustained for a long time focused on conscription with the result being that although military transformation was underway, it was arguably advancing in a slower rate than in other allied states.[122] As structural change of the armed forces has been central to German military transformation efforts, dramatic reductions and reforms have influenced its organizational capacity to innovate (Dyson 2006; Sloan 2008). Affected by declining defense budgets, cuts placed large pressure on Bundeswehr leadership in reducing manpower, which also resulted in downsizing the level of ambitions in terms of expeditionary forces and military capabilities (Schreer 2013, 173).[123] For instance, prior to the 2000s, Germany's military force has been reduced from about 340 000 to around 182 000 by 2015 (IISS 2015, 97). Moreover, Germany maintained a capable fleet with clear strengths in some areas yet abandoned the idea of investing in full spectrum fleet due to rising costs of new technology and severe reduces in military expenditures (NATO 2016).

Albeit the enduring focus – in terms of personnel – on territorial defense, the Bundeswehr has though placed some noticeable importance on military transformation. For improving its operational capabilities, the emphasis has concerned developing capabilities in areas crucial to the Bundeswehr's ability in pushing toward advances of NCW capabilities, although placing pressure on maintaining exercises, manning and skills (Sloan 2002). As with Britain, Germany have still managed to have a sizeable naval budget able of innovating in new naval capabilities. By committing to the procurement of new and costly K130 corvettes, or the *Braunschweig*-class – as well as developing improved tactical submarines and frigates – the Bundeswehr proves its capacity to improve and will enhance its maritime power projection significantly as these new ships are similar in function to the US Littoral Combat Ship (LCS) – capable of competing with US precision target engagement ashore (Sloan 2008, 74). This is also closely tied to alliance politics, as a new batch of these ships were decided on in 2016 in response to NATO requirements expecting Germany to provide increased levels of readiness for littoral operations (Naval Technology 2018).

As with the case of Britain, domestic politics and military culture have been vital to the German military's capacity to innovate and transform (Zapfe 2016). As Bundeswehr started taking steps in transforming into a more expeditionary force, Berlin decision-makers were at the same time assertive in deciding how to use force from a purely nationalist perspective, leading to its antagonism regarding the Iraq War and NATO's Libya campaign (Schreer 2013, 174). While elements of a

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[122] In great contrast to France, for instance, Germany's decision to maintain conscription has been under much debate as many would view these forces as ill-suited to the post-Cold War world, and undoubtedly to the ability of rapidly deploying military forces to operations across the world. Moreover, sustaining conscription could restrain advancements in capabilities in other forces because resources are committed to conscripts which could otherwise be allocated to new technology and equipment (Sloan 2008, 71). However, in 2010 new reforms made a switch to an all-volunteer force, thereby ending the old conscription model (IISS 2015).

[123] See Figure 6.1 and 6.2 in Appendix B which demonstrates overall declining military expenditures over the years by country.

culture of military restraint partially primed these decisions, they were also founded on beliefs that these operations were not in the best interests of Germany. Hence, Germany was skeptical about engaging in "wars of choice" outside NATO territory. Consequently, its military transformation process has been driven into only limited expeditionary capability, leaving Germany a selective, or even a reluctant, NATO ally (Noetzel and Schreer 2009; Keller 2012).

Nonetheless, despite organizational constraints facing Germany in incorporating information age technologies into its naval strategies and concepts, and moreover, into strategies and concepts of the overall military in the short-term, they eventually had the necessary financial intensity to adopt modernized warships due to considerable efforts in upgrading its power projection capabilities during the 2000s as it built organizational capacity over time. Thus, because of budgetary constraints after the Cold War, in addition to political and strategic reluctancy hindering new technologies in being adopted quickly, the pace of diffusion of modern warships in the Bundeswehr seems to be slower as compared to innovation patterns in the militaries of its European allies – leaving the US with a notable first-mover advantage in relation to Germany. Finally, consistent with the country-specific expectations, Germany bandwagoned with the US in attempting to remain an important naval power and NATO ally.

NORWAY

Deriving from the previous chapter and empirical literature, Norway seems to be an example in which the connection between system-level imperatives in the international security environment and state-level policy response has been hesitant and implicit (Dyson 2010, 122). Transformation of the Norwegian military and policies could in several ways follow what one might expect given the distribution of capabilities and military power in the international system. Conversely, the planning and complexity of restructurings have been deeply connected to changes in defense budgets, accentuating the importance of such domestic factors in explaining responses to and the pace of military transformation after the Cold War (Bogen and Håkenstad 2017).

Norway has, since the inception of NATO, upheld close ties to both the Alliance and the United States – thereby making significant transformational efforts in responding to the American transformation agenda by incorporating highly advanced information age technologies into its strategic concepts and doctrinal policies (Matlary 2013, 279). However, Norway was very slow to modernize in the first decade after the Cold War's end. While acknowledging the US introduction of NCW-related capabilities in the beginning of the 1990s, it was not until the end of this decade, and more importantly, in the beginning of the 2000s that major and rapid transformation towards expeditionary forces began, as set out by a government White Paper released in 2000 (NMoD 2000, 6). Arguably, there are much support for identifying factors as national security concerns, domestic

politics and financial constraints as the main drivers in shaping the dynamics of the Norwegian military transformation (Bogen and Håkenstad 2017).

Restructuring and advancing military capabilities in the NAF is essentially a reflection of Norway's geopolitical situation of being a small state next to Russia and of having sea areas much larger than the land mass, mostly in the North (Bekkevold, Bowers and Raska 2015, 266).[124] Yet, it could also echo Norwegian concerns of being "marginalized" in NATO, thus forgotten by its key ally and affiliate – the US (Heier 2006). This has resulted in what Rolf Tamnes (2014, 65) labels as deep continuity, which has been crucial to the Norwegian security policy after the Cold War. Consequently, the relationship with both the US and NATO alliance remains vital to the policy reforms shaping the military transformation of Norwegian naval capabilities.[125]

The onset of planning major transformations in capabilities coincided with the Bosnian and Kosovo operations, which brought great changes in strategic thinking regarding the importance of contributing to NATO efforts. However, it could rather have been a catalyst for transformation more than a root cause (Larsen 2011). Continuities in Norwegian policies were not only the outcome of dispassionate strategic assessments, as strategic thinking reflected the military and strategic culture. Denial of warfighting realities regarding international operations and deployment created a kind of "cognitive dissonance" in making reformers sceptic and reluctant of military modernization, thereby delaying the organizational capacity to innovate (Matlary 2013, 295).[126] Yet, large contributions in the 2011 Libya campaign turned this around, placing Norway between the Germans and British in relation to the scope and swiftness of military change and use of force.

As with most European allies, the NAF was affected by heavy and enduring budget cuts through the 1990s and well into the 2000s. For Norway, the main reason was a large and increasing gap between organizational size and financial resources available in maintaining and renewing it (Gjeseth 2014, 70). Key capacities were near the end of their life cycles while the cost of new technology and ships was increasing abruptly, as revealed by gaps in procurement plans and actual investments (Johansen 2000, 15). Hence, cuts placed large pressure on the RNoN leadership in

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[124] This encompasses with the concept of "external balancing" of Walt (1985, 4-8), as Norway as a small state bordering a powerful neighbor appears especially relevant for the Norwegian case.

[125] It should be noticed, however, that balancing the Soviet or Russian threat by retaining guaranteed military assistance from the US and the Alliance has for long been the bedrock of Norwegian security policy (Tamnes 1997, 61-4). But it was not interpreted into Norwegian interests in restructuring or modernization at the end of the Cold War. Instead, Norway was centered on a residual threat from the former Soviet Union well into the 1990s, and viewed it as necessary to sustain core capabilities of the traditional Cold War defense structure (Saxi 2010; Græger 2007). Still, its efforts in convincing important allies to upkeep traditional tasks of the Alliance occurred while the US simultaneously pursued the American RMA and increasingly putting demands on European allies to move "out of area" (Børresen et al. 2004; Hilde and Widerberg 2010; Bogen and Håkenstad 2016).

[126] This occurred when Norwegian soldiers were fighting and suffering losses and injuries in especially the Kosovo campaign and in Afghanistan post-2001, as the communication about the security rationale of ISAF at home was absent in the political vocabulary because Norwegian politicians and public would rather speak of Norway as a nation promoting peace instead of war (Nordvik 2009; Winge 2009). However, this later changed, making the cognitive dissonance disappearing quickly. In the words of the former General Robert Mood; "It is a very good thing that they [Norwegian soldiers in Afghanistan] succeed without losses and with minimal use of force. I know that they can be lethally effective when they have to" (Matlary 2013, 295).

reducing personnel, further resulting in downsizing expeditionary forces and military capabilities though not the quality of new capacities as naval budgets have been substantial enough to endorse the NCW innovations deriving from the US transformation agenda. Despite declining military expenditures – which have seen a fairly increase in recent years due to latest investments – the RNoN has grown into being one of the most up-to-date technological small navies worldwide with its *Nansen*-class frigates comprising upgraded combat systems and missile technology, the high-speed *Skjold*-class corvettes with remarkable stealth technology and maneuverability and submarines with improved sonars and maneuverability.[127] These are all technologies greatly appreciated by NATO and the US ally in confronting new challenges in the post-Cold War security environment (Matlary 2013; NMoD 2016).[128]

On this note, Norway has been military able in transforming and modernizing its military – in all three services – although experiencing periods of political unwillingness and reluctant reformers stalling the pace of transformational processes and harnessing of new technological capabilities. Even with organizational and budgetary constraints, they ultimately had the necessary financial intensity to quickly adopt modernized warships due to considerable efforts in upgrading its power projection capabilities during the 2000s as it, like Germany, built organizational capacity over time. Because of this, the US maintained notable first-mover advantages over Norway, which has over the years struggled to meet the demands of sustaining and improving its capabilities in NATO. Still, due to an integrated US-Norwegian relationship, and consistent with country-specific expectations, Norway has for a long time attempted to bandwagon with the US regarding military innovation. Due to its current level of capability, it remains a valued small navy and NATO ally.

6.6 NATO's Contested Mission and Differing Designs

During the last two decades, NATO's membership and mission have expanded, placing increased pressure on the need for transformation of the overall coalition and modernization of its capabilities due to shifts in the geostrategic landscape. As discussions above have shown, transformation of strategic concepts and strategic thinking has been vital for the adaptation of NATO allies in the changing security environment following the end of the Cold War. It obviously corresponds with the different ways states within the Alliance, and in the international system as a whole, make

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[127] Table 6.2 in Appendix B demonstrates this, meaning how the distribution of funds in *naval* capabilities in recent years has provided surface combatants and submarines with significant shares of financial resources.

[128] It is important to note, however, that the recent procurement of F-35 *Lightening II* fighter jets has had a contributing effect on the naval budgets the last years. While they arguably are a disruptive yet undeniably high-technological multirole capacity, which will have an immense impact on the Norwegian military power in the years to come, they have been of such an importance for strategic planners that the overall military expenditures has given priority to the air domain over the maritime domain, leading to cuts in the quantity of naval capabilities. The F-35 fighter jets are intended to overlap the capabilities of *Skjold*-class corvettes, which in turn are planned to be decommissioned in favor of these planes. Decisions like these influence investments in naval capabilities, and thereby the overall development of innovative capability adoption, and are likely to continue dominating budget discussions in the years ahead (NMoD 2016; Matlary 2013). See Figure 6.1 in Appendix B.

choices in how to transform and innovate their militaries to encounter these new challenges. However, initiatives to reform strategic concepts, reflecting the image, responsibilities and functions of the Alliance, could be observed as another burden to an already over-burdened alliance, as members evidently have different outlooks of what purpose NATO should have. As the numerous transformations and the constantly altering purpose are straining allies – requiring resources many of them are unable to offer – the political support suffer. Consequently, means-end assessments could lead to states to opt domestic strategies over collective action, as national forces also shape foreign policy decision-making and reform, determining limitations and form the rationality. Because the interests and motives of states influence their military commitment to NATO's missions, national orientations were a priority, resulting in limited or slow transformation and innovation for many of the allies which further enlarge the capability gaps in the Alliance.

The implications of NATO's changing purpose are leaving the Alliance in a continuing state of uncertainty. As Webber et al. (Webber, Sperling and Smith 2012, 10) argue, adaptation to face "new security challenges", being the end of the Cold War, Bosnia, Kosovo, 9/11, Afghanistan, Libya or Crimea, remains a persistent matter of debate within the Alliance. Although NATO apparently has surmounted such events that influences transformation and innovation patterns, it could be noted that the Alliance is permanently in a state of flux, denoting the increasing heterogeneity between allies with divergent strategic orientations and perceptions of NATO's purpose as portrayed in discussions above (Yost 2000). Despite this continuation, the US remains interested in furthering the cooperative nature of the Alliance and encouraging its agenda of transformation for advancing the joint military capabilities of the alliance. Still, as the US' notice of embarking on a Third Offset Strategy is intended to create a military-technological gap between the US and its adversaries, it might nonetheless lead to an even larger capability gap within NATO – unless NATO itself, as well as individual member states, also engages with the Third Offset Strategy (Fiott 2017; Marino 2017).

Hence, the country-specific responses to new military innovations within the Alliance have been of a mixed character. As states differ in their military organizations, policies and economy, they will have different incentives and abilities to adopt and implement new innovations and technologies. As noted, there are great variations across the international system regarding military strategies, strategic concepts and defense budgets which influence innovations patterns of how and why states transform their military forces. This has been reflected in some key areas: notably perception of security threats; definitions of main missions and tasks; the extent, structure and material of forces; modes of military recruitment; and image of military professional (Kriz 2015).

Nevertheless, NATO is in the need of reinventing itself. Its rationale from the Cold War is archaic. NATO, apart from the US, is not able to defend itself against a conventional confrontation. However, this threat is also gone. The Russian (and Chinese) military build-up enables the

possibilities of asymmetrical circumstances, which currently is the largest threat facing the US and the West. Currently, the reality is that navies of the Allies are increasing in capability yet decreasing in size. However capable a ship may be, it can only be in one place at a time. Further, the rise in costs and complexity encourage furthering of the capability gap. Very few countries, other than the US, maintain full spectrum capable navies in sufficient numbers for projecting power in multiple theatres of operation, while others have developed high-level capabilities in specific areas (NATO 2016). Given the clear importance of maritime capabilities to national and, therefore, Alliance or system-level power, it is time for NATO member states to review investments in their navies at home as well as their alliance contributions more broadly.

6.7 Chapter Conclusion

Military innovation is highly paradoxical. If militaries are to stay ahead of the game, it is imperative to innovate (Farrell 2008, 779). Yet, from the discussions above some seem slow to innovate, as established organizations with deeply incorporated routines and standardized operating procedures, tend to be resistant to major change – and therein lies the paradox. Accordingly, most previous literature has generally targeted single, specific innovations such a new technology, a new doctrine or approach to operations, or a change in organizational structure. Moreover, the majority case studies have investigated military innovations from either the two world wars or the Cold War era.

As such, it is important to emphasize the difference between earlier cases and the current processes of military change. Notably, they involve *simultaneous* innovations in technology, doctrine and organizational structure. Moreover, changing organizational, doctrinal and material set-ups of states' militaries is immensely challenging. In a multinational setting, as presented in this thesis, impediments to modernization are multiplied. In most outlines of international security and defense cooperation, at least those including democratic states (as the NATO allies), decision-making is founded on tenets of state sovereignty and consensus (Bekkevold, Bowers and Raska 2015). Combining this with differing threat perceptions, national interests and strategic orientations, potential outcomes are perpetually limited, thereby making innovation difficult. Still, like militaries of individual states, multinational military establishments such as NATO must adapt to altering requirements in order to stay relevant.

Nevertheless, previous literature on the spread of military innovation has facilitated this study in testing a set of theories and assumptions on the case of sea power and modern warships, in efforts of explaining contemporary military innovation in the post-Cold War NATO. Essentially, this study has demonstrated military innovation as a dynamic process comprising a mesh of international (system-level) and national (state-level) features influencing militaries to embark on major change and shape how they do so.

7. Conclusion

The information-driven revolution and its associated technological innovations continue to transform several aspects of social life as well as warfare. As these innovations spread around the world, probing deeper into an ever-broadened circle of communities, they are similarly changing the way we interact. Hardly any organizations will be left unaffected by the impact of these innovations – and the military is certainly no exception. The conflicts in Afghanistan and Iraq the past decades gave profusely demonstrations of the remarkable US military capabilities (Goldman and Eliason 2003a, 30). However, the United States should not presume to remain the sole power capable of congregating its current superior power. Potential adversaries are also likely to learn from encounters with top-notch military capacity, both in regard to technology and to organization. For example, NATO allies are planning for their own military transformation – thus partly because of US policy intended to secure its unremitting hegemonic role. Regardless of the comprehensive studies of diffusion in previous literature, the ways in which these changes will influence the international system and the global balance of power will be hard, impossible even, to predict with precision. Nevertheless, it seems convincing that a greater understanding of the range of variations in how military innovations have spread in the past – and the mechanisms that have facilitated or hampered their successful integration though the international system of states – will increase our preparedness to meet new security challenges in the future.

7.1 Main Findings

As the previous chapters demonstrate a capability gap within NATO, it has been apparent for some years that the disparities between the US and its European allies has been widened since the 1991 Gulf War. The NATO peacekeeping operation in Bosnia highlighted the differences in force development of communications, intelligence and surveillance capabilities, while the Kosovo operation emphasized substantial shortfalls in PGMs and missiles, long-range bombers and stealth aircraft (Sloan 2002, 80). The widened gap is partly due to the markedly reduced defense budgets across Europe after the Cold War's end, as noted earlier, in which budgetary constraints in turn have reduced the ability of European NATO members in procuring capacities such as attack and transport helicopters, air and sea lift assets and sufficient stocks of advanced precision munitions – all vital requirements to address challenges in the post-Cold War security environment (NATO 2016; Webber, Sperling and Smith 2012). This, in combination with increased cost per unit of information age technologies has delayed the ability of individual states to transform their military forces, thereby hampering the overall adaptiveness and military efficiency of NATO.

The overarching narrative of most states' military organizations, and defense policies in particular, is obviously the drive to transform – a process which remains inexorable. It is driven by cultural impulse, by technological opportunity, and by a narrow – yet comprehensible and praiseworthy – fortitude to perform more efficiently. Whether or not it is inspired by strategic need is another matter, though it is very much an imperative part of the way military organizations prepares for war and how they respond to innovations.

Deriving from the naval innovations introduced in the events of the World War II, the spread of certain modern warship innovations (hereunder frigates, corvettes and submarines) during the post-Cold War era have occurred relatively in line with the adoption capacity theory. Key financial and organizational constraints, combined with potential benefits from and commitment to alliance relationships, have anticipated the timing and pace of technological adoption and the scope of organizational adoption by different powers in the Alliance. With varying degrees of delay, European NATO members – as well as other states outside the Alliance – have adopted the innovation. However, as many of the technologies have spread further than the major powers, the European allies have experienced difficulties in being able to adopt the organizational framework of network-centric warfare. Moreover, the implications for the international balance of power have also acted as assumed. The asymmetrical relations between major and minor powers, and especially between the US and its European powers, have increased as the discussions regarding the capability gap have emphasized. This has left US as the first-mover a significant lead in naval dominance in the years after the Cold War's end.

Nevertheless, even though asymmetries of the overall US-European relationship in NATO seems to grow bigger, there are momentous divergencies between the European allies in the country-specific responses to the innovation and how each state transform their militaries. On the financial side, the general pattern explaining the financial constraint to adopt innovations is primarily because of substantial budget cuts in military expenditures as the cost of new technology rises simultaneously, while organizationally it is chiefly due to bureaucratic hurdles of democratic domestic politics and political reluctancy. Yet, the levels of these constraints vary across the international system, and they vary across time. From the analysis above, for example, Germany seems to be the most reluctant ally due to hesitant and antagonistic decision-making in facing new technologies and issues of contribution regarding allied operations. Still, they invest in top-notch naval innovations, such as the costly K130 corvettes. Britain has demonstrated great efforts in adopting new innovations of both technological and doctrinal character in remaining a prominent naval power and faced constraints of similar kind as the ones of Germany, yet their domestic policies and reasons for emulation differ. As with Germany and Britain, Norway has in similar ways faced financial and organizational limitations to its adoption capacity, but is the unique geostrategic

situation as a small state bordering Russia and relationships to both the US and NATO that assertively have shaped the NAF's restructuring and capability improvements. Although national divergencies, common to all these countries regarding incentives for military transformation is the importance of safeguarding vital strategic national interests and their commitment to the transformation agenda and the burden-sharing in the Alliance.

In the end, the introduction of warships associated with the information age and NCW has influenced the global naval balance of power. The medium levels of both financial intensity and organizational capital required for adoption have brought distribution of technological elements of the innovation at a steady, yet somewhat slowly, pace. The adoption of the full innovation, the NCW, has lagged as it does for almost every innovation, leaving the European allies unable to match the adoption capacity of the US. But it has not lagged close to what is for innovations like carrier warfare, which requires massive organizational requirements overpowering most naval powers. While consequences for most states have been reduced fleet sizes because of financial constraints, it has not necessarily implied reduced quality of new investments, as most navies can compete with major powers in certain areas in addition to having own niche power projection capabilities to readily face new challenges to security in an ever-changing security environment.

7.2 Implications for Norway in NATO

This is where the thesis arrives at the second part of the puzzle the research question poses. From discussions in previous chapters, it has become evident that Norway has not always contributed militarily to the satisfaction of other allied states. Ever since Norway joined the Alliance in 1949, NATO has functioned as the state's "insurance policy", by becoming increasingly entangled within the alliance. However, Norwegian military ambitions could be viewed as rather vague (Rottem 2007, 623). Efforts to stay a relevant and noticeable player within the Alliance politically, but "non-committally" militarily, encompass with its general self-image – if not tradition – of being a peaceful nation (Leira 2005). And while NATO has adapted to the new security environment, despite allies' diverging efforts, and shifted focus away from the Northern flank, Norway has sought to remain a loyal ally regardless of shortcomings in the military domain.

Moreover, the balance of and interaction between military forces moving "out of area" and homeland defense has remained extremely important, as Norway has continued to sustain stability in the High North, providing the NAF with tasks requiring vital capabilities important to the collective defense of the Alliance. As some of the overall priorities of the Norwegian defense policies are to strengthen the national defense, NATO's ability for collective defense and contributing to international crisis management, transforming its Armed Forces into a smaller, deployable and advanced force with essential equipment and training needed to address changing

challenges both at home and abroad, has been exceedingly important for increasing their overall capabilities and contributions to NATO operations.

Through the last decade, Norway has made significant investments in new maritime capabilities, such as the *Nansen*-class frigates with improved combat systems and missile technology, and the *Skjold*-class corvettes with outstanding stealth technology and maneuverability, making the Norwegian Navy one of the best equipped in NATO (Matlary 2013). Adding to this, investments are made in new submarines, maritime patrol aircraft and new F-35 fighter jets, which also will favor the maritime domain in providing Northern Europe with increased maritime security. The contributions and capabilities are integral to NATO's collective defense and situational awareness in the North Atlantic – a region which is of growing importance for the Euro-Atlantic area – and reflect a leadership role in advancing transformational efforts for strengthening the Alliance's maritime posture and capabilities.

In contrast however, some of the policies advanced by the Norwegian government in especially the aftermath of the Ukraine crisis, could seem counter-productive. Most notably, the last Long Term Plan foresaw the disbanding of the Coastal Range Commando – a force optimal in facing Russian infiltration – and the decommissioning of the corvettes, determinations expected to set back not only national capabilities but also those collective of NATO (NMoD 2016). Despite these decisions, Norway has historically been a pragmatic ally, which never seeks antagonizing an adversary like Russia without utmost necessity, the state remains a considerable source of stability in Northern Europe and a valued ally of the entire NATO establishment.

7.3 The Way Ahead: The Future of Warfare

It is impossible to escape the central role of the US in discussing national perspectives on military transformation. However, the changing debate has propelled a variety of opposing perspectives in the US strategic thought, shaping divergent views and beliefs regarding the use of military power in the twenty-first century. Consequently, because of the intellectual push for a debate centering on the US and great powers, the scholarly field on the spread of military power lacks considerable research on diffusion paths and patterns in differing strategic settings, and especially concerning its impact on military innovation adoption in smaller and middle powers. This is key when discussing the spread of military power through the international system, thus attempting to add to the academic and policy-oriented literature in strategic studies and political science by also addressing the large puzzle on the diffusion of RMA-related military innovation. This means how processes of global transmission, communication and interaction of RMA-oriented military concepts, organizations and technologies, has influenced the responses, strategies and extent of military innovation in the

European states, including small states such as Norway.

A fundamental point must be reiterated regarding this thesis' analysis of diffusion of military power after the Cold War. In general, the spread of military innovations in the information age, accordingly the revolution in military affairs, is pungently shaped by the United States. Defense expenditures and R&D efforts of the Americans outshine those of all other great powers – in fact, it outshines everyone. Indeed, we might not even have talked about an RMA if it were not for the US trying to outrun its own capacity for maintaining the qualitative edge it experienced during the 1990s and up until the present. As a definite phenomenon, and not only technological potentialities, the RMA is consequently heavily influenced by the US strategic context. Meaning, the need for developing a blueprint for power projection that could operate under more complex circumstances than the one during the 1991 Gulf War.

As explained in the first chapter, discussions in the various defense communities continue to involve how the character of future warfare could evolve along with implications for the international security environment. After hard-learned lessons about counterinsurgency warfare in both Afghanistan and Iraq, crucial debates have concerned those regarding future warfare as most likely being characterized by irregular military operations versus those favoring a focus on conventional military operations (Mazarr 2008; Nagl 2009). While terms as MTR, RMA, NCW and transformation has shifted in the years after the Cold War, how information age could impact conceptions and uses of military power is still relevant (Krepinevich 2002). Arguably, technologies such as deep-strike weapons, PGMs, GPS surveillance and other innovations of electronics could, or even have to some extent, initiate an incremental shift away from "direct ground combat" that occurred during the past two centuries and toward stand-off, long-distance warfare. Moreover, information technology could open even further non-dynamic areas of warfare (Horowitz 2010).

In determining how the current information age truly represents a revolutionary change, one has to consider how "revolutionary" is defined, in addition to which level one is studying. From a broad strategic level, encompassing fundamentals, the current changes might be – using the analogy by Gongora and von Riekhoff (2000, 5) – a "ripple on a calm sea", meaning the new operational art enabled by the RMA could be coherent even for military intellectuals such as Napoleon and Clausewitz. However, developments at the level of personnel and organizations responsible for transforming the technological potential of RMA into new weapons, information systems, doctrines and organizational arrangements, are undoubtedly eligible as a "sea change".

Nevertheless, it is indisputable that the information age RMA are shaping history, although it often takes a while to bear fruit, as demonstrated in this thesis. But the pace and duration of these transitions appear to happen at a faster rate than those occurring ages ago. Transformations generated by gunpowder played out through centuries, those of steam engines, telegraphs and railroads

(notable the first industrial RMA) transpired over a century, and changes of internal combustion engines, radio and flight (the second industrial RMA) surfaced over a few decades (Singer 2010). Further, this is why the emergence of hybrid technologies provide a reliable indication of the current RMA. While there are always early and late adaptors of any given technology, hybrids want it both ways – by layering new technologies onto old platforms. For example, steam-powered warships in the British Navy still mounted sails until 1880, demonstrating the symptom of an older RMA. Boot (2003, 175) describes such a hybrid "the military equivalent of a duck-billed platypus"; while marginally better than the old ones, they are far less effective than technologies fully transitioned to the new RMA. Indeed, although old technologies remain persistent, it does not imply that a revolution has not occurred or will do so in the future.

Admiral Cebrowski could seem like a fortuneteller of a new era, yet seemingly he turned out to be inaccurate. War is still far from perfect, nor are the networks that supposedly would rise as the most revolutionary or historic. It could be argued that information technologies such as robotics and interoperable systems of command and communications are revolutionary in that they have changed war as we once knew it. However, the fog of war is still apparent, just as it has been in every previous revolution in military history (Singer 2010, 203). More broadly, the current RMA will be like the ones before it, meaning it will continue to create variations of new questions, dilemmas and concerns that move beyond the boundaries of the battlefield. For example, when President Roosevelt agreed to develop of the atomic bomb in the beginning stages of the World War II, it was possible to anticipate how it could be a powerful weapon – even perhaps potent enough to end the war (Gosling 1999). It was harder, though, to anticipate how this new technology would provoke second-rate effects like a new form of cold war, or even third-rate effects of a space race. Hence, RMAs are not simple pebbles thrown into the pond of history, but boulders. And the information age revolution could potentially be the same, yet in a whole new way.

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Appendix A

Table 3.1 Underlying Forces of Financial Intensity

		Underlying Basis of Technology	
		Civilian	*Military*
Cost per Unit	*Low*	Low Financial Intensity	Medium Financial Intensity
	High	Medium Financial Intensity	High Financial Intensity

Source: Reproduction of Horowitz (Horowitz 2010, 33).

Table 3.2 Diffusion Assumption at the System-Level

		Level of Organizational Capital Required to Implement MMI	
		Low	*High*
Level of Financial Intensity Required to Implement MMI	*Low*	Rate/extent fast	Rate/extent medium
	High	Rate/extent medium	Rate/extent slow

Source: Reproduction of Horowitz (Horowitz 2010, 40).

Table 3.3 Assumptions of Strategic Choices and Adoption Success in Response to MMIs.

		Level of Organizational Capital Required to Implement MMIs	
		Low	*High*
Level of Financial Intensity Required to Implement MMIs	*Low*	• More attempted adoptions • More successful adoptions • Faster underlying diffusion rate	• Medium attempted adoptions • Relative success for minor powers in adoption • Medium underlying diffusion rate
	High	• Medium attempted adoptions • Relative success for major powers in adoption • Medium underlying diffusion rate	• Few attempted adoptions • More successful adoptions • Slow underlying diffusion rate

Source: The author's own. Based on the adoption capacity theory of Horowitz (2010, 30-60).

Table 3.4 Assumed Relationship between the Spread of Military Power and the Balance of Power

		Level of Organizational Capital Required to Implement MMIs	
		Low	*High*
Level of Financial Intensity Required to Implement MMIs	*Low*	• Rapid diffusion • Short-term impact, and not likely to be structurally important • Relatively smaller first-mover advantage • Example: chemical warfare	• Medium diffusion • Risks moving global power balance in ways likely to threaten existing powers • Fairly larger first-mover advantage • Examples: suicide terrorism, Napoleonic warfare, blitzkrieg (combined arms warfare)
	High	• Medium diffusion • Risks bolstering existing global power balance • Fairly smaller first-mover advantage (ex. extreme cases) • Fairly positive for existing powers • Example: nuclear weapons	• Slow diffusion • Likely to have considerable and long-term disruptive impact on balance of power • Relatively larger first-mover advantage • Example: carrier warfare

Source: Reproduction of Horowitz (Horowitz 2010, 49).

Table 4.1 Case Selection of Possible MMIs, 1800-Present.

Timing	Revolution
Nineteenth century	Napoleonic revolution/levée en masse
Nineteenth century	Strategic communications/mobility
Nineteenth century	Professional staff personnel and procedures
Nineteenth century	Prussian open-order tactics: Railroads/rifles/telegraph
Early twentieth century	Battlefleet warfare
Nineteenth to twenieth centuries	Tactical fires (machine gun and artillery)
Nineteenth to twenieth centuries	Medical
Nineteenth to twenieth centuries	Fortifications (trenches)
Twentieth century	Chemical weapons
Twentieth century	"The modern system"
Twentieth century	Total industrialized war
Twentieth century	Blitzkrieg
Twentieth century	Carrier warfare
Twentieth century	Tactical air attack
Twentieth century	Air warfare (bombing)
Twentieth century	Submarine warfare
Twentieth century	Nuclear weapons
Twentieth century	Mao Tse-Tung's "people's war"
Twentieth century	Unconventional war/suicide terrorism
Twentieth century	Microelectronics/genetics engineering
Late twentieth century	**Information war/network-centric warfare**
Late twentieth century	Fourth-generation warfare

Source: Reproduction of Horowitz (Horowitz 2010, 61).

Table 6.1 Estimated Distribution of Maritime Power, 1990-2017

Country (1990)	Frigates	Corvettes or Patrol Combatants	Submarines
United States	100	-	127
Britain	35	5	32
France	35	22	20
Germany	8	5	24
Soviet Union	148	70	323
China	90	37	93
Norway	5	2	12

Country (2003)	Frigates	Corvettes or Patrol Combatants	Submarines
United States	30	-	72
Britain	20	21	15
France	20	1	10
Germany	12	10	12
Russia	10	23	53
China	42	108	69
Norway	3	12	6

Country (2017)	Frigates	Corvettes or Patrol Combatants	Submarines
United States	8	-	68
Britain	13	3	11
France	11	10	10
Germany	3	5	6
Russia	12	48	62
China	57	27	57
Norway	5	6	6

Source: Jane's Fighting Ships (1991) and IISS (1991; 2004; 2017).

Appendix B

Figure 2.1. Potential state responses to MMIs
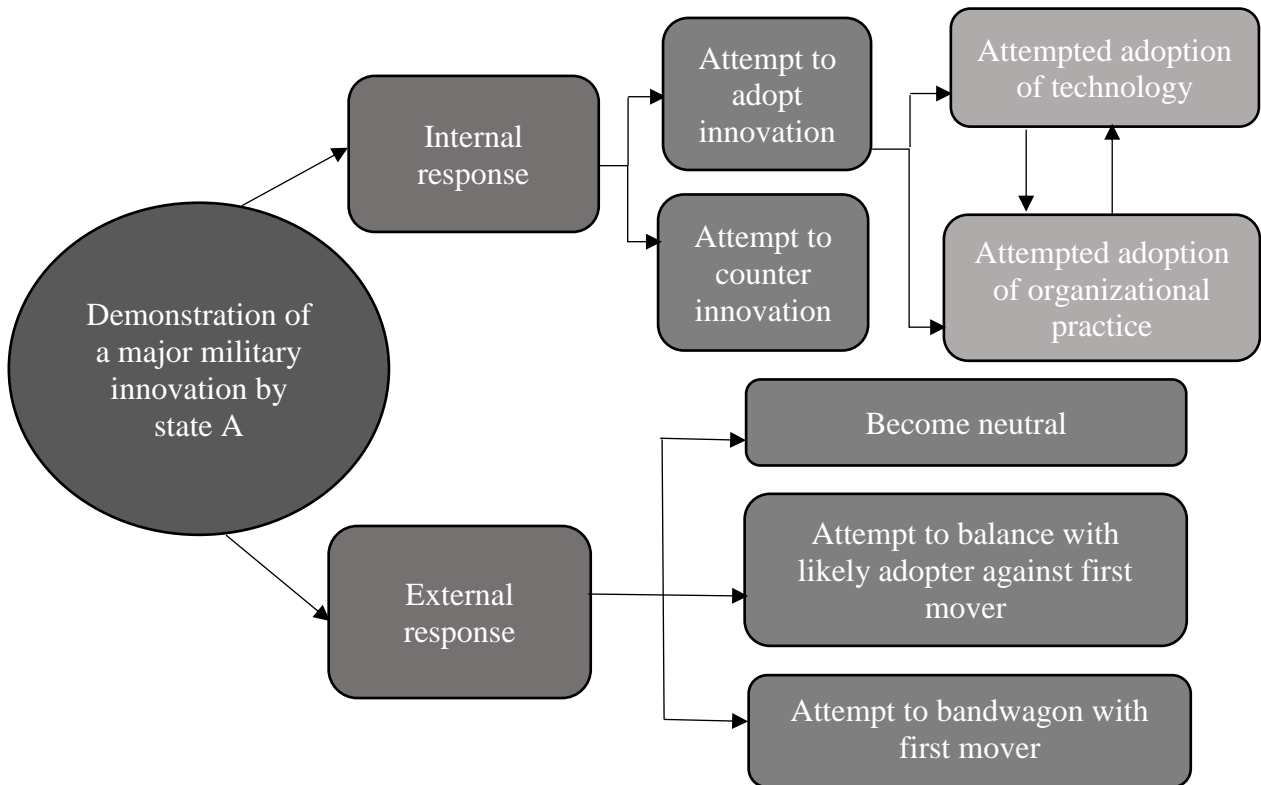
Source: Reproduction of Horowitz (Horowitz 2010, 27).

Figure 2.2. "Ideal" state response to demonstration of MMIs.
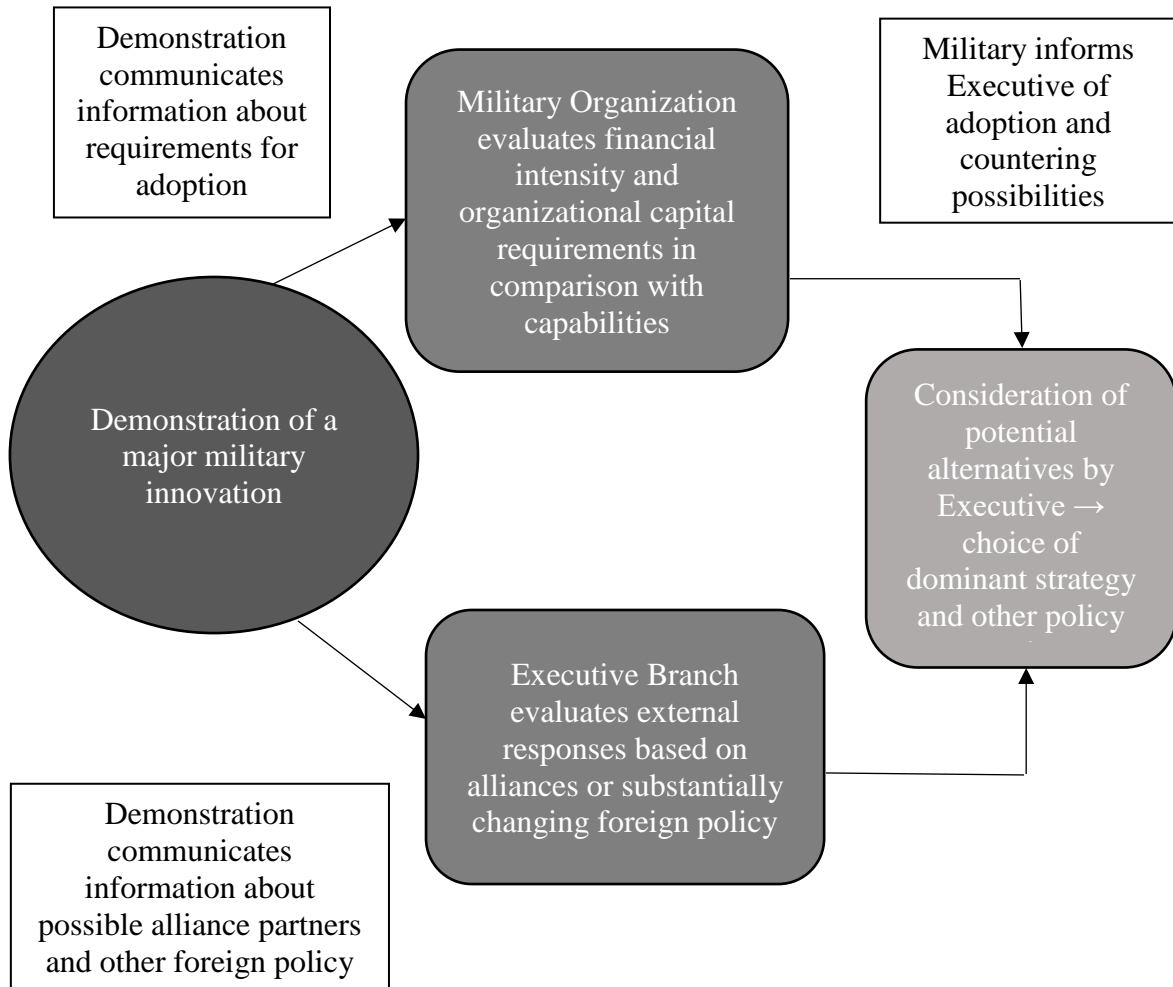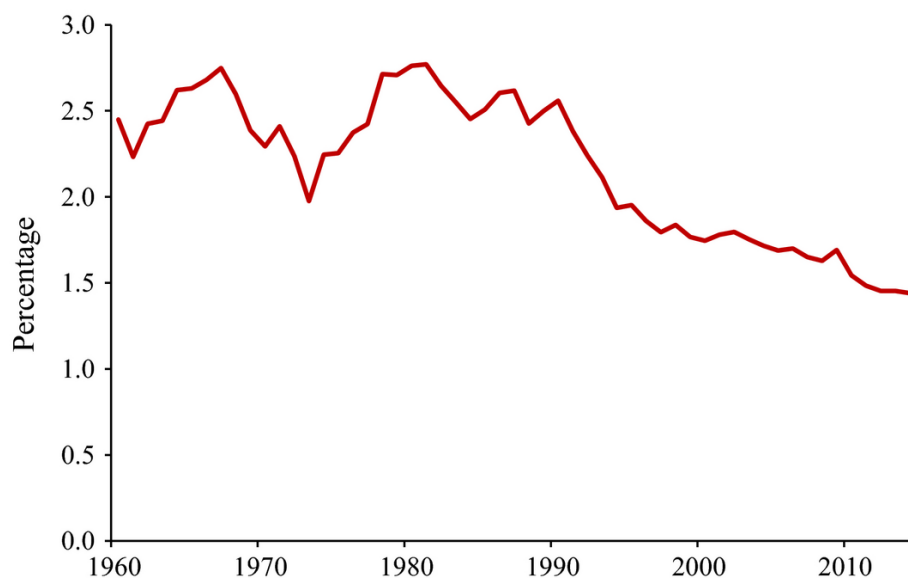

Source: Reproduction of Horowitz (Horowitz 2010, 29).

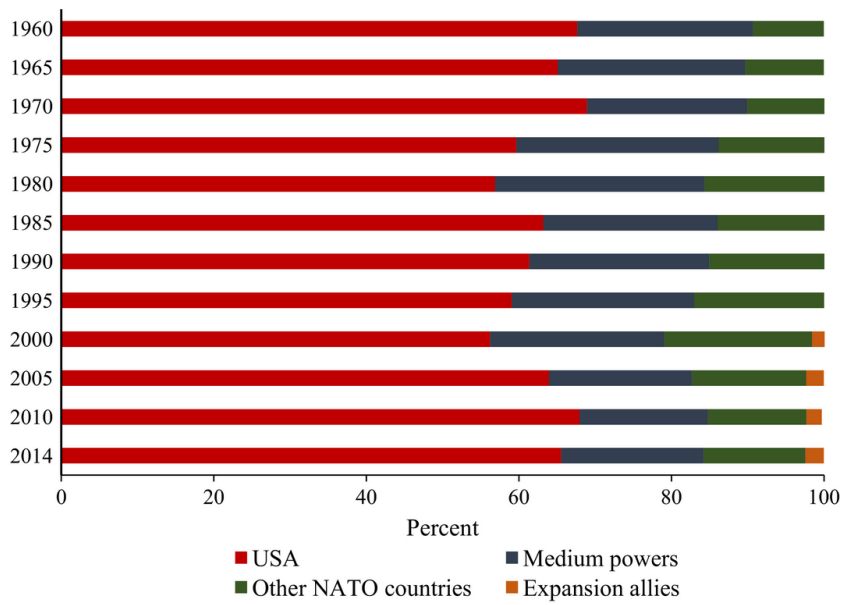Figure 5.1 Total Military Expenditure, 1960–2014.
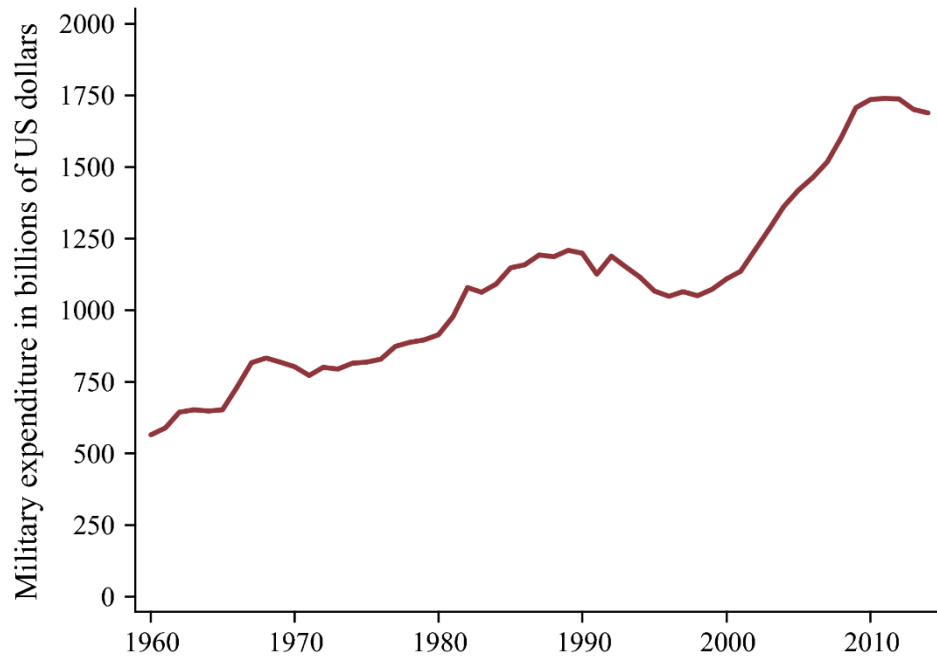
Source: Sandler and George (2016).

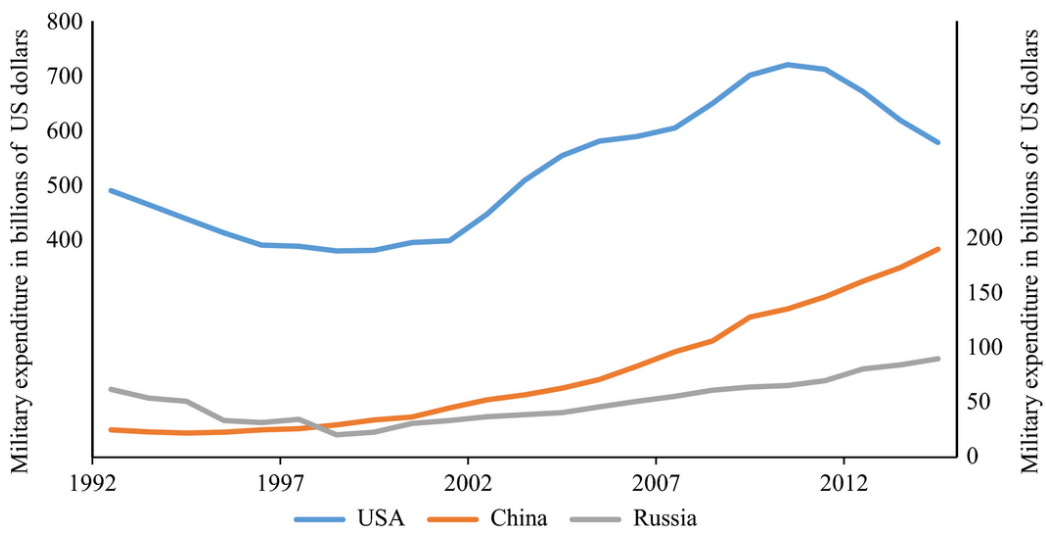Figure 5.2 Median Share of GDP Devoted to Defense, 1960–2014.

Source: Sandler and George (2016).
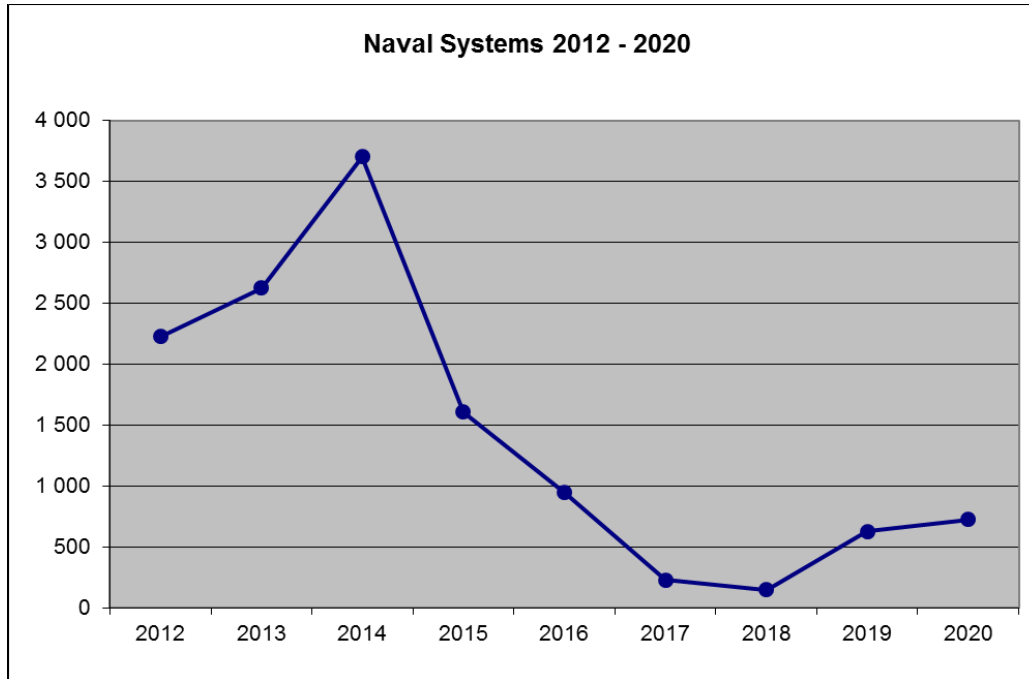
Figure 5.3 NATO Allies' Shares of Alliance Expenditure, 1960–2014.

Source: Sandler and George (2016).
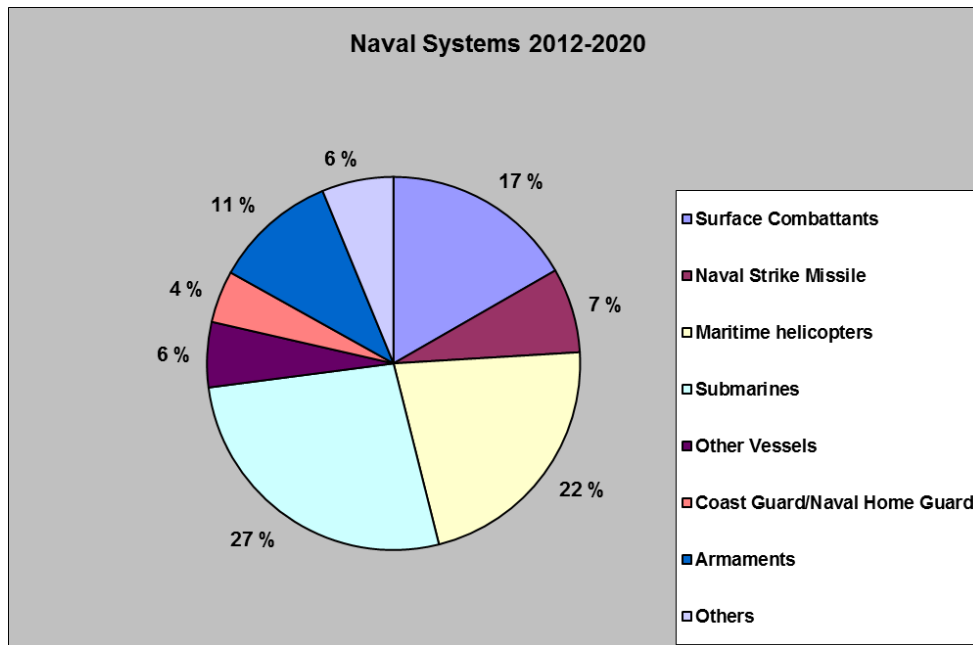
Figure 5.4 Major Power Military Expenditure, 1960–2014.

Source: Sandler and George (2016).

Figure 6.1 Annual Allocation of Funds (NOK mill.).

Naval Systems 2012 - 2020

Source: NMoD (2012).

Figure 6.2 Allocation of Funds Per Main Category.

Naval Systems 2012-2020

- Surface Combattants 17 %
- Naval Strike Missile 7 %
- Maritime helicopters 22 %
- Submarines 27 %
- Other Vessels 6 %
- Coast Guard/Naval Home Guard 4 %
- Armaments 11 %
- Others 6 %

Source: NMoD (2012).

Figure 6.3 Military Expenditure by Country.
(Adjusted for Inflation and expressed in 2000 US Dollars)
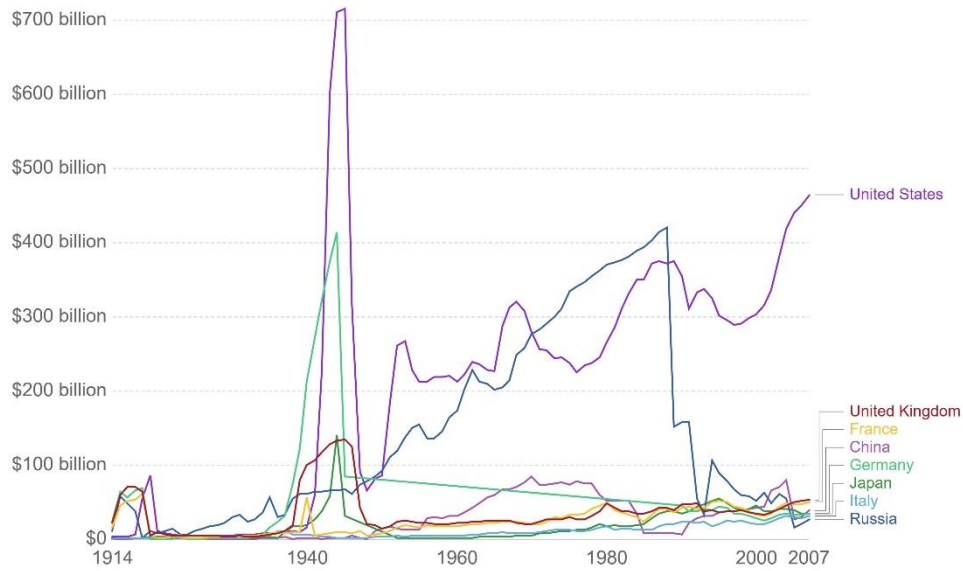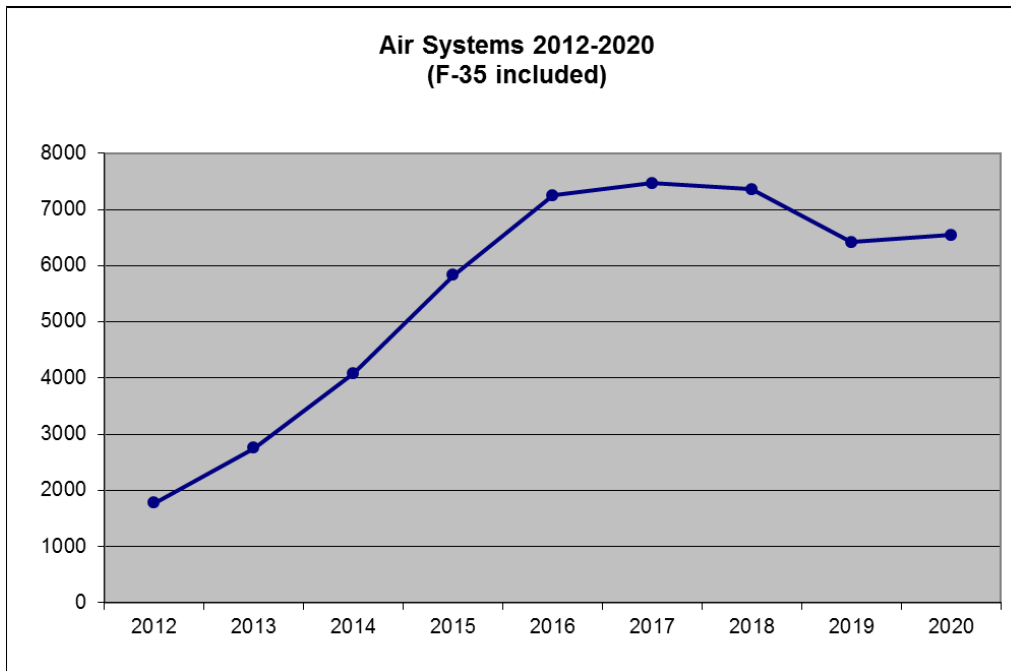

Source: Correlates of War: National Material Capabilities (v0.4) + Measuring Worth.

Figure 6.4 Military Expenditure as Share of GDP.
(Military expenditure, given as the percentage of each country's gross domestic product
(GDP)).
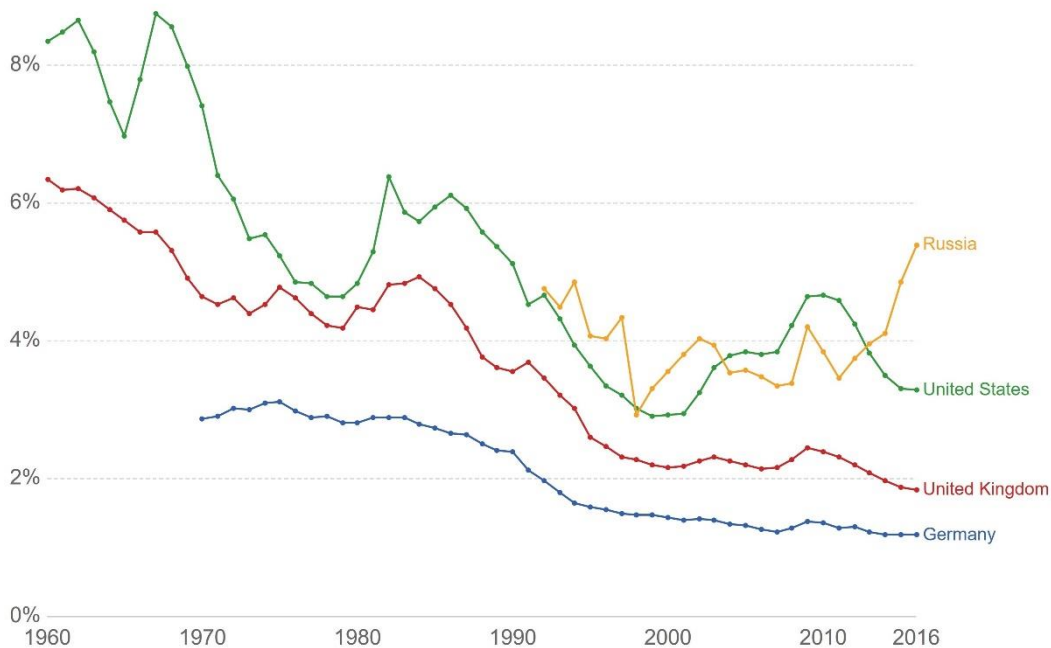
Source: Correlates of War: National Material Capabilities (v0.4) + Measuring Worth.

Figure 6.3 Annual Allocation of Funds (NOK mill.).

**Air Systems 2012-2020
(F-35 included)**

Source: NMoD (2012).