

# Is Norway's New F35 a "Game Changer"?

## On interaction in Military Organizations

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### Abstract

De nylig anskaffede F-35 kampflyene representerer det største norske fastlandsinvesteringen noensinne, noe som innebærer en tilsvarende høy forventning om kraftig styrking av det norske forsvarets operative evne. Virkeligheten viser imidlertid utfordringer i implementering og nyttiggjøring av ny og avansert digital teknologi – i en organisasjon beskrevet som digitalt umoden. Denne artikkelen undersøker samhandlingen mellom to sluttbrukere av F-35; 332-skvadronen og Forsvarets operative hovedkvarter (FOH), etterfulgt av en diskusjon om utfordringer sett gjennom organisasjonsteoretiske linser. Gjennom studier av offentlige dokumenter og intervjuer har to funn utkrystallisert seg: For det første at norske myndigheter ikke får så mye operativ evne tilbake som kan forventes fordi kapasiteten F-35 er bundet i foreldede planprosesser. For det andre at et minimum av ytterligere investeringer i tilstrekkelig implementering av teknologien vil betale seg og gjøre denne massive investeringen til nettoppen en mye referert "Game Changer" for det norske forsvaret.

INTRODUCTION OF THE 5<sup>th</sup> generation F-35 jet fighters to the Norwegian Air Force has been referred to as a potential "game changer" for Norwegian security. However, the technologically advanced fighter jet risks being merely a 4<sup>th</sup> generation F-16 in new wrapping if not implemented adequately in the Armed Forces. A major issue is fitting this cutting-edge platform into a "digitally immature"<sup>1</sup> military force structure. This article scrutinizes the effects of the digital shift on the Norwegian Armed Forces' operational ability, with F-35 and 5<sup>th</sup> generation air force as a case study. The case exemplifies an immensely expensive digitalisation of one part of an otherwise relatively analogue military organisation that struggles with core technical and security issues.<sup>2</sup>

The Norwegian case is also relevant for four Nordic states that are about to integrate

their forces into a broader and more unified NATO-framework. The article analyses the interaction between F-35 integrated combat system, represented by the Royal Norwegian Air Force 332 Fighter Squadron (332 Sqdn), and the command level of the Norwegian Armed Forces, represented by Norwegian Joint Headquarters (NJHQ). The research question is: What characterizes the interaction between the 332 Sqdn and the NJHQ in utilizing the new F-35 technology, and how may this interaction be explained through the lenses of organization theory?

By identifying and analysing different perceptions in squadrons and headquarters, the analysis produces new knowledge on interaction between tactical and operational actors in the chain of command. This insight is gained by investigating the Norwegian defence organization's handling of the so-

called “digital shift”; a shift where new technology-based platforms substitute the old ones. Scrutinising the operational output of new technology is not a new phenomenon. Research on technological shifts in military organisations rests on a long tradition with valuable perspectives from history, culture, and experienced based accounts from officers.<sup>34</sup> More recent changes are well documented, as for the effects of the digital shift, in both civil and military industries.<sup>5</sup> Contemporary research focuses on topics such as the 6<sup>th</sup> revolution in military affairs (6<sup>th</sup> RMA)<sup>6</sup> and inevitable relations to the 4<sup>th</sup> industrial revolution (4IR)<sup>7</sup> focusing on commercial technology drivers for disruptive innovations and military change. But there are also critical voices in the technology-positive field of research like Schousboe’s critique of the 6<sup>th</sup> RMA notion.<sup>8</sup> Other research focuses on the impact of disruptive innovations, and the relationships between technology and organization, for example impacts on both hardware and architecture.<sup>9</sup> In a Norwegian context, Birkheim claims that the Norwegian Armed Forces has the technology but lacks the relevant organization.<sup>10</sup>

Less attention has been on studies of digitalization effects inside a military chain of command, between capabilities operating at the tactical and operational level. Recent research on the civil sector points out that there are differences in how organizations manage to adopt and exploit new digital technology.<sup>11</sup> The closest we get is the MoD-mandated 2020-*Svensden Report* emphasising the ability to obtain the right expertise among their employees for expected future challenges.<sup>12</sup> Any changes are deemed demanding, usually also implying confronting both power structures, cultures, and traditions.<sup>13</sup> These kinds of analyses are less common for military organizations and digitalization, thus the rationale for this article.

Conceptually, interaction is a contested aspect, as discussed by Torgersen and Heier.<sup>14</sup> This article uses Heier’s understanding as “the dynamic and sometimes unpredictable action undertaken when two or more services, as social groups, have an effect upon one another.”<sup>15</sup> Scrutinizing the interaction between the 332 Sqdn and NJHQ, the empirical analysis focuses on the end users of the technological innovation. This means leaving something out, excluding, among others, capacities from the Army, the Navy, and other parts of the Air Force, as well as the intelligence service, cyber defence, and logistical support.

However, in the light of the Norwegian Armed Forces’ Digitalization strategy and Heier and Mobeck-Hanssens, describing “low digital maturity” in the Norwegian Defence,<sup>16</sup> the acquisition of the advanced F-35 combat system seems to contrast the ambitions of the Norwegian armed forces. Low digital maturity does not seem to describe this highly advanced technology. This questions whether the Norwegian Defence, through acquisition and application of advanced weapon systems, proves more mature than what the referred article concluded, or if the lack of digital maturity is evident also to the organization’s ability to utilize the F-35s. If the latter is the case, there is a predominant risk that the advanced technology is not being properly exploited, thus the prestigious aircraft is merely a “new F-16” rather than a popularly labelled “Game Changer”.

In the next sections, theoretical and methodological regards are presented, followed by an empirical description of the interaction between the F-35 combat system and the operational headquarters. On this basis, an empirical analysis is presented through the lenses of organization theory before conclusions are deduced.

## Theory

How may the interaction between the 332 Sqdn and the NJHQ be described in theory?

The perspectives that form the analytical foundation are derived from scholars as Olsen, Bouckaert, Peters & Verhoest, Egeberg, and Christensen et. al.<sup>17</sup>, in addition to institutional perspectives from Thompson, Selznick, March & Olsen, Krasner, and Scott.<sup>18</sup> A related approach is found in previous analyses done on the Norwegian tax authorities, *Skatteetaten*, an organization that has been through massive but successful structural changes due to digitalization of its services and operations.<sup>19</sup> By using instrumental and institutional perspectives, the views of central actors from the 332 Sqdn operating the aircraft, and the NJHQ operationally tasking the capacity, becomes clearer. These different views represent valuable empirical data, contributing to clearing the picture of the Norwegian Armed Forces' ability to utilize new technology already at hand.

### An instrumental perspective

From an instrumental theory perspective, organizations are regarded as a tool, or an instrument, to maximize defined goals, and thus resting on a means–ends logic.<sup>20</sup> Formal norms and organizational structure are key in the instrumental perspective, defining the capacity to reach the defined goals, but also reducing individual freedom of choice and perceptions of challenges for a public organization. Instrumental theory thus discusses division of labour and division of power within an organization, typically a bureaucratic organization with a hierarchical management, and thereby the effects on the chain of command and of delegation and division of labour.<sup>21</sup> As a generic example, a sub-unit's focus on its tasks may possibly conflict with

the neighbouring sub-unit's focus on solving its tasks in cases where there is a need for coordination. Another predominant factor is the competition between sub-units in an organization, on the distribution of the limited resources available for the organization's operations. The competition naturally leads to a varying degree of power struggle between the units, to have the leader's attention and show the importance of one's deliverables. What tasks deemed important will be regarded differently depending on what part of the organization you belong to and the associated tasks.<sup>22</sup> The senior leader will have to prioritize on behalf of the sub-units in circumstances of conflict of interests, and shared issues may have to be lifted to a higher hierarchical level to avoid losing attention in the organization.<sup>23</sup>

By explaining the Norwegian case through the lens of instrumental theory, the organizational interaction may be identified as a consequence of labour division between two central military functions. Consequence of labour division means how the technology is being made relevant, considering different values for different actors, and how the F-35 capability and the Joint Headquarters are organized. This division contributes to increased vulnerability caused by coordination problems occurring between two organizational units that are becoming more and more specialized. More specialized means demands and resource needs in two, possibly conflicting, directions; both internal competency and proficiency, and, on the other hand, handling expectations on interoperability and cooperation proficiency.<sup>24</sup>

The empirical expectation from the instrumental perspective is that the interaction between the Norwegian jet fighters and their headquarters can be explained as a function of separate roles and coordination between the two entities, described as division of la-

bour, leading to capacity challenges, which again may risk reducing the jetfighter's technological edge.

## An institutional perspective

However, interaction takes different forms. An institutional perspective is therefore introduced to search for more explanatory nuances. From institutional theory, a cultural perspective can be employed to discern possibilities and constraints from cultures and traditions within an organization. By focusing on existing norms and expectations within organizations, the effects of both traditions and cultures are underlined. These mechanisms comprise institutionalized rules, values and norms that further inflict on decision-making behaviour and daily operations in a way that hampers, or gives energy to, the adaption to leaders' directions and governance.<sup>25</sup> New technology allows organizations to improve performance through new ways of doing things. But new operational patterns may be difficult to implement because existing procedures and routines have been institutionalized over time in a special manner. Change can therefore be demanding since various actors in a chain of command may have difficulties in seeing other solutions than those they are used to seeing through their perspective and experience.<sup>26</sup>

Through the lens of cultural perspective interaction may be understood as a consequence of different norms and expectations of what the cooperation is supposed to involve, as seen by specialists, pilots, and staff officers in the 332 Sqdn and NJHQ respectively. This contributes to increased operational vulnerability because different norms and expectations internally in the organization weaken the process of transition from old to new procedures, and as often pointed out in scholarly circles, military organiza-

tions are not only tough to change but are designed not to.<sup>27</sup>

The empirical expectation from this perspective is thus that the interaction between the F-35 fighter pilots and the operational headquarters can be explained as a function of separate cultures thriving within the two entities in the chain of command. Different cultures, norms and expectations, and lack of compatibility may thereby suboptimize the combat effectiveness of the F-35 investment.

To better understand the interaction between two central parts of the F-35 components in Norway's digital chain of command, this section has presented an analytical framework based on two theories from instrumental theory and institutional theory. The question now is how the different variables can be expressed more explicitly. In other words, how can division of labour and culture be operationalized? And how can indicators from this operationalization be used to gather reliable data?

## Methods

The dependent variable is defined as the interaction between F-35 pilots, specialists, and officers in the 332 Sqdn and their counterparts operating as specialists and staff officers in the NJHQ. Interaction can be operationalized along the following explanatory factors:

- standard operation procedures (SOPs),
- operations plans/orders,
- tasking and targeting processes and procedures, and
- informal communication.

These factors can be seen as the "linkage" between the organizational entities in their everyday cooperation, and in that way can be seen as adequate for the dependent variable.

The independent variable identified through the instrumental perspective is

“division of labour”. This concept can be operationalized into the following indicators:

- specialization,
- resource competition, and
- capacity and coordination challenges.

Specialization implies that actors in different parts and different levels in the organization are given separate roles in order to fulfil specific tasks and reach specific goals. This in turn implies specific responsibilities for the tasks, achievements, and competition over the organizational resources that comes with the task and thereby capacity challenges. Specialization, resource competition, and capacity challenges therefore seem relevant for the research question and the expectations from this.

The independent variable identified through the institutional perspective is “culture”. Conceptually, “culture” can be operationalized as:

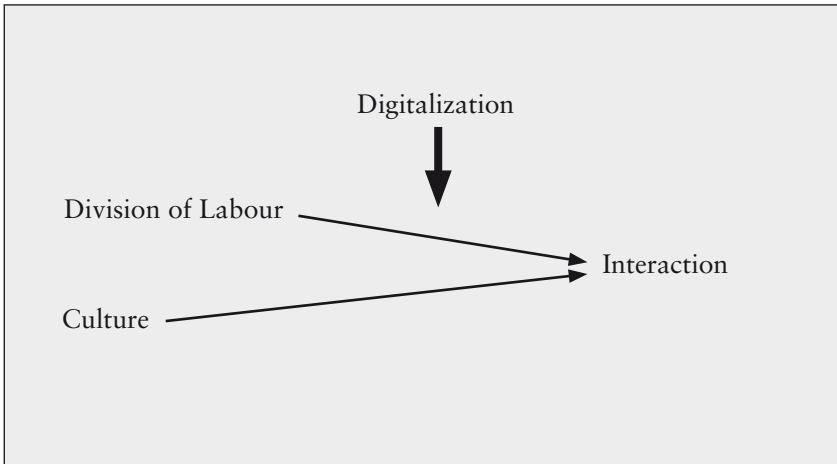
- tradition, historical roots, which leads to path dependency,
- social norms, appropriateness, institutional loyalty, and
- different tasks and procedures leading to compatibility challenges.

Different institutional affiliations in 332 Sqdn and NJHQ implies that military units in the chain of command have separate perceptions about how operations can be planned, managed, and executed. They also have different organizational loyalties and will inherently follow their usual patterns leading to conservatism and rigidity rather than new ways, and thereby reduce organizational compatibility. This may lead to less coordination, cooperation, innovation, and integration and thus insufficient interaction. The operationalisations therefore seem relevant for the research question and the expectations

from this, and thereby valid expressions for the empirical expectations.

The data material includes both official documents, internal documents, press releases and articles, in addition to interviews, mostly open sources. The utilization of multiple collection methods, both primary and secondary sources, represents a triangulation of methods: (1) Official documents as Long-Term Defence Plan 2021–2024<sup>28</sup> and National Budget 2022,<sup>29</sup> (2) unofficial documents as Norwegian Armed Forces Joint Doctrine,<sup>30</sup> Norwegian Armed Forces’ digitalization strategy,<sup>31</sup> and (3) interviews with key stake holders such as Chief of NJHQ, and Chief of 332 Sqdn. There are advantages and disadvantages with all three sources to be aware of. The official documents clearly indicate the official government intent, but at the same time will inherently hold political biases from the government’s political position. Similarly, unofficial documents can be expected to hold institutional biases, although visualizing organizational and professional views, as the interviews provide expert views and experiences on the one hand, but simultaneously with a perceived bias.

The analysis is delimited to the relationship between pilots, specialists, and officers in 332 Sqdn, and specialists and staff officers in NJHQ. The downside of this delimitation to only two entities is that the research gives a picture of only parts of the organization since other parts are being left out. However, in a question of clarity versus lack of nuance, the research is reduced to the central actors only to illustrate. In this regard, other parts of the defence organization may be seen as facilitators rather than central actors, as they are assumed to affect the survey objects through underlying effects rather than directly. This is not to suggest that 332 Sqdn is operating in isolation from Chief of the Norwegian Air Force or Chief



of the Air Force's tactical command, the National Air Operations Centre (NAOC). In this context, the NAOC, although being Chief of the Air Force's tactical interface to NJHQ, is regarded as facilitator rather than an explicit actor. Although discussing interaction between sub-tactical and operational levels may seem like comparing apples and pears and leaving out the Chief of the Air Force's tactical command level and NAOC, this is deemed sufficient for this specific analysis. Further, the other parts of Norwegian Armed Forces may represent confounding effects, through influencing both the dependent and independent variables and thus causing a spurious association. For the purpose of this analysis, the disadvantages seem outnumbered by the advantages.

There are arguments against the use of the F-35 case, as the system still being under implementation, planned to be fully operational capable (FOC) by 2025. Thus, the effects of the implementation of the system in the Norwegian Defence is still not fully known, and the conclusions of this article may be regarded premature. Also, the sheer cost and prestige related to the F-35 may influence and bias the answers from inform-

ants, as may the possible negative attention the research findings may get. On the other hand, the findings from the study may contribute to an agile implementation of F-35 and other capacities, observant on innovation in military forces, and elevated knowledge of the effects on Western military from the digital shift.

## The Characteristics of Digital Interaction and its Actors

Digitalization is most commonly referred to as the process of introducing and fully utilizing information and computer technology, often in novel and innovative ways, in performing the organization's core tasks and creating value.<sup>32</sup> Implementation of digital technology does provide advantages for organizations, but generally takes time, and there are factors and mechanisms that hamper development.<sup>33</sup> The digital shift's purportedly positive effects on the core deliverable of the Norwegian Defence – operational capability – has been elusive, according to both the former Chief of Cyber Defence, Major General Inge Kampenes,<sup>34</sup> and the Norwegian Defence's digitalization

strategy.<sup>35</sup> Firstly, according to the general, “it is challenging due to a lack of a combination of fear and curiosity for the repercussions of the digital shift, and secondly a lack of recognition of the challenges, missing out on the big picture as a result”.<sup>36</sup>

## F-35 Lightning II

The F-35, a 5<sup>th</sup> generation multi-role combat aircraft, has the capacities that represents a 5<sup>th</sup> generation air force, able to share all sensor data and computed data simultaneously and continuously with other systems and platforms.<sup>37</sup> This shared data contributes to enhanced common situational awareness with potentially large knock-on effects for a small defence organization such as the Norwegian Armed forces. The F-35 is described as a lot more than merely a replacement of the previous F-16 fighters providing the Norwegian Armed Forces with a range of sensors and weapons that can detect and engage the enemy before the enemy can detect the F-35s. In combination with the new P-8 maritime patrol aircraft, new submarines, and major investments in the new land forces, a credible threshold against coercion or military aggression is evolving.<sup>38,39</sup> The Norwegian Chief of Defence, General Eirik Kristoffersen, has illustrated this higher ambition as the F-35 as a hub in the new Armed Forces, where all parts of the organization, including the individual Home Guard soldier, will be capable of utilizing the capacities.<sup>40</sup> Challenges arise, though, when the new star of the organization is expected to fill the void in the organization after the decommissioned F-16, a different technology from a different time, with a different use.

This represents a complex picture, and as pointed out by Major General Tonje Skinnarland, former Chief of the Air Force (2017-2021), “It is not a question of a number

of aircraft, but rather an entirely new, highly digitalized, combat system that involves vast parts of the military organization”.<sup>41</sup> This also proves to be of both military and academic interest due to representing not only new ways of utilizing technology, but also a change in ways of thinking as the new technology requires a different mental view of possibilities and challenges.<sup>42</sup> Improperly implemented, however, the F-35 “risks becoming the world’s most expensive and useless system.”<sup>43</sup>

In many ways, despite military peculiarities, the implementation of F-35 renders similarities with digitalization projects and digitalization processes in both public and private sectors, characterized by both great costs and great risks, but with a similarly high potential for great effects. This demands an extensive knowledge and competence enhancement to qualify all levels of the organization to a level where the potential of the technology is recognizable by the employees and the organization capable of utilizing the potential, as pointed out by the Svendsen-utvalget.<sup>44</sup>

## 332 Squadron

The F-35 jet fighters are operated by the 332 Sqdn, a sub-unit in 132 Air Wing.<sup>45</sup> The squadron, having exclusive responsibility for the tactical use of the aircraft and for its combat system, houses specialists and officers to facilitate the tactical utilization of not only the number of aircraft but also the F-35 combat system as a whole. This task is given the organization by the Chief of Defence, through the Chief of the Air Force and further through 132 Air Wing commander, with the responsibilities that follows, to safeguard the operability of the system with all its technical components, but also to maintain a highly skilled, trained, and

ready staff of specialists and officers.<sup>46</sup> The squadron is given this task being the only unit specialized to do this. Being specialized means other units in the Air Force are also specialized in their activities, for example the air defence, specialized in shooting down enemy military airplanes, drones, and missiles, or the base operations, specialized in all aspects of operating and maintaining all necessary ground structures essential for F-35 operations.<sup>47</sup>

### Norwegian Joint Headquarters

The NJHQ is a joint headquarters on the operational level, holding command and control over all Norwegian military activity, regardless of their geographic location. The headquarters ensures the Norwegian Defence is asserting national sovereignty and sovereign rights, while representing the prime advisor for the Chief of Defence in military operational matters. This means all operational functions of the Armed Forces converge in NJHQ, air operations with F-35 being only one of these. Incoming information is fused in the NJHQ, which in turn establishes a common situational picture, shared with the remaining parts of the national defence, and with NATO allies.<sup>48</sup> To manage these tasks, highly skilled personnel of specialists and officers are manning the NJHQ 24/7.

One of NJHQ's responsibilities, as both an organization and a central part of the strategic leadership of the Norwegian Armed Forces, is to clarify tactical force commanders' and service commanders' responsibilities versus NJHQ responsibility, which is embodied in standard operational procedures (SOPs) and operations plans. In the case of Air Force capabilities, the Chief of the Air Forces' tactical command, the NAOC, executes tactical dispositions of Air Force assets on behalf of the commander, in close

cooperation with NJHQ. NJHQ's tasks are given the organization by the Chief of Defence, with the accompanying responsibilities, to safeguard the operability of the headquarters with all its technical systems, but also to maintain a highly skilled, trained, and ready staff.

F-35 capacities mean more possibilities, but also more information to be processed, requiring more resources in NJHQ to utilize the new technological possibilities. Betten claims that this "seems challenging to NJHQ since it is already over-strained and not properly resourced to adapting its own organization in such a way that tasks can be solved more effectively".<sup>49</sup> Instead, it is a headquarters sized for handling the previous generation F-16 aircraft capability rather than the 5th generation F-35s as a result of lack of staffing. According to one respondent, advanced digital technology "[...] may be more staff-intensive",<sup>50</sup> which stands in contrast to a general resource-maximizing focus when implementing digital technology. This picture is amplified in NJHQ, where a lack of qualified personnel leads to an unintentional "lean manning" in the headquarters. A picture used by the organization itself is a red-hot hamster wheel, describing NJHQ employees struggling to manage everyday tasks, reducing ability to taking on development tasks. A result is NJHQ, although having an in-house development section, J-10, lacks ample resources to look and think ahead, with regards to utilize new technology.

### The Troubled Interaction

In principle, the F-35 can be part of a network of tactical units that share their data internally and, with the operational headquarters enabling a common tactical and operational picture. This picture enables



a truly joint intelligence, surveillance, and reconnaissance (ISR) and targeting<sup>51</sup> capability that in theory will lead to a more efficient use of resources and quicker decision-making processes, commonly known as the OODA-loop.<sup>52</sup>

According to a tactical level respondent, the Norwegian defence has “acquired cutting-edge technology for both ISR and fires through the F-35 acquisition, but it is not capable of utilizing this through placing it adequately in the organization”. No one, the respondent adds, “has been given the task to establish the cooperation and interaction across the defence organization, and the attitude is that this has to be solved at the tactical level”,<sup>53</sup> and as one scholar has pointed out, “Until now there are not sufficient resources to *actually* utilize and coordinate these initiatives in a way that utilizes the operational potential”.<sup>54</sup> This view is confirmed from several directions. One is the Norwegian Ministry of Defence view on lack of digital maturity<sup>55</sup>, confirmed by the so-called McKinsey report,<sup>56</sup> statements from previous Cyber Defence chiefs<sup>57</sup>, and an internal report on cyber.<sup>58</sup>

Among central processes as targeting, and intelligence, surveillance, and reconnaissance (ISR) operations, an example of interaction mentioned by several respondents in both 332 Sqdn and NJHQ is the Air Tasking Order (ATO). ATO is routinely issued by the NJHQ to thoroughly plan for effective operation of scarce and costly air resources. The plan, leading to a tasking order to involved air assets, is issued on a 72-hour basis. This time span is perfectly sensible when planning for helicopter transportation of army units and air policing tasks for fighter jets. But for a 5<sup>th</sup> generation fighter system, where multiple capacities opt for multiple tasks, and split-second changes in flight plan, a three-day planning horizon

loses some of its meaning, asking for a re-design of concepts.<sup>59</sup>

As this empirical description suggests, there is a gap between capacities in the new combat system and the possibilities by the new digital technology, and the capability of 332 Sqdn and NJQH to utilize these possibilities. The organization thus seems immature in its capability to exploit this possibility. More explicitly, the Armed Forces seem immature in its capability to utilize the digital technology on a higher organizational level, even though the technology in itself is very advanced, and seemingly well adopted on combat and tactical levels. This leads to the second part of the research question, which is how such a troubled interaction can be explained?

## Explaining Challenges of Digital Interaction

The empirical expectation from the instrumental perspective, that interaction between Norwegian jet fighters and the headquarters can be explained as a function of separate roles and responsibilities between the two entities, is often described as resource competition, which again may risk suboptimizing the jetfighter’s technological edge. Conversely, the empirical expectation from the institutional perspective is that the interaction between the F-35 fighter Sqdn and the operational headquarters can be seen as a function of separate cultures thriving within the two entities in the chain of command. Different norms and expectations, often described through culture, risks suboptimization of the combat effectiveness of the new generation jet fighter. The analysis starts with the instrumental perspective, followed by the institutional perspective, to give an idea of which perspective provides the strongest explanatory power.

## Instrumental perspective

From an instrumental perspective, both 332 Sqdn and NJHQ are expert organizations within their respective fields, contributing to interaction through expertise and *specialization*. In the case of F-35 combat system, procedures in both 332 Sqdn and NJHQ need to alter, or at least be adjusted, to contribute to the optimal conversion from F-16 operations and utilization of F-35 as an integrated system. This, in turn, means that some fields and functions in the services may disappear entirely, while other experience establishing new tasks. On an individual level, this may mean losing power, impact, or status in one's position. In isolation, this may seem inexpedient and risky, from a specialist perspective. Nevertheless, it may be right, from a holistic perspective, for the benefit of the whole organization, avoiding risk of suboptimizing the combat effectiveness of the new generation jet fighter. However, specialization may also lead to an excessive focus on one's own field, often referred to as stove piping.<sup>60</sup> Stove piping may result in entities losing view of the common goal. Another concept for this phenomenon, local rationality, indicates the perfectly rational behaviour but on the same time the lack of will or ability to overlook own internal goals.<sup>61</sup> Even if the effect of stove piping seems present among the survey entities, the negative effect does not seem to outweigh the positive effects.

On the other hand, *capacity challenges* due to resource restrictions may affect the ability to develop and implement new procedures, meaning that an organization is falling back to "old", established procedures. Being a specialized organization means a fight for resources in a "competition" between other organizational entities on the distribution of the limited resources availa-

ble for the entire defence organization's operations. In the Norwegian Armed Forces, the *Services* are the administrative entities in this competition. The competition naturally leads to varying degree of power struggle, also for the NJHQ, being administratively organized as equal to the Services.<sup>62</sup> Further, as the description indicated, a "lack of clear strategy from strategic level seems to be a general feature in the Norwegian Armed Forces".<sup>63</sup> This is also visible from both 332 Sqdn and NJHQ. Lack of overarching implementation strategy strengthens the power struggle, since a dissensus seems clear between the services on responsibilities when it comes to interaction and utilizing the possibilities in the F-35 system. This apparently aligns with the impression of an organization lacking digital maturity (Heier & Mobeck-Hanssen, 2020).

On the other hand, *competition for resources* may have the effect of motivating and structuring organization's efforts to optimize economic operation and visualize and argue for organizational needs. In doing this, the organization needs to be well structured and able to refer to good results. However, an exaggerated focus on resource competition may distort the organizational focus from a sound competition to inter-service rivalry<sup>64</sup> and conflict. This may in turn lead to a target offset, a mission creep, from the organizational deliverables towards a non-productive activity. From the description of the two organizational entities in the survey, risks of target offset do not seem represented, although a healthy competition is expected.<sup>65</sup> Within the Air Force, the different units are financed through the same budget – keeping the F-35 acquisition costs out of the picture. This means an inherent competition for resources within the organization, a power struggle between entities, to justify the resources needed and reasoning the relative

importance of own contributions to the organization's deliverables as illustrated in the Government's Long-term plan for the defence sector.<sup>66</sup> However, competition for resources does not seem prevalent in high-prestige units as the 332 Sqdn, delivering the F-35 capacity, being a prioritized unit.

With regards to NJHQ, competition for resources seems visible through described manning issues. The description indicates an apparent coordination challenge between 332 Sqdn and NJHQ caused by capacity challenges within the NJHQ. This is caused by, on the one hand, insufficient competency and manning in the organization causing challenges in following up, utilizing, and developing the new F-35 capacity.<sup>67</sup> Capacity challenges lead to near-sightedness because the most imminent and urgent problems need to be solved first, meaning leaning to well-known and well-established routines rather than developing new routines suited for utilizing the new technology. The headquarters' capacity challenges mean potentially suffering from limited rationality through not being capable of evolving own organization in a way that renders the delegated tasks executed in a more effective manner. Reduced capacity leads to superficial knowledge within the NJHQ on the capacities in the new technology represented by the F-35s,<sup>68</sup> thus an imbalance in the Norwegian Armed Forces' implementation efforts.

The NJHQ has until recently been trained to excel in utilizing the previous-generation F-16 fighter jets. New and different technology, though, demands different ways of thinking and utilizing the capacity. Change of focus from one generation fighter jets to another represents a major shift for the headquarters. The change of mind for the highly skilled staff represents in itself a major challenge, and a risk for "old" thoughts and cultures to be taken into the "new" or-

ganization, hampering development, adaptation, and new routines, and thus a swift and safe transition to utilizing the new capacity.<sup>69</sup> This view may seem like capacity challenges within NJHQ, such as insufficient resources allocated to developing new operational procedures. This challenging balance is expressed by the chief of the NJHQ, Lieutenant General Yngve Odlo, underlining that "the headquarters does have focus on the basic military functions in their daily service, but at the same time needs to continually evolve own processes".<sup>70</sup> As long as the competition for resources does not result in adequate resources in NJHQ, this hampers the processes of adapting organization, routines, processes, and doctrines to the new reality. Thus, this may seem as the most predominant indicator.

### Institutional perspective

For both the 332 Sqdn and NJHQ, several decades of experience operating the F-16 means being expert organizations when it comes to utilizing 4<sup>th</sup> generation fighter jet technology. At the same time this expertise, based on experience but also traditions and historical bonds, may act conservatively on the organizations and thus stand in the way as new routines, procedures, and doctrines for the F-35 are implemented. New operational procedures create resistance within NJHQ caused by changes inflicted from outside.<sup>71</sup> An F-35-driven change may be seen as inexpedient and inappropriately challenging a field that has been optimized and perfected for operating F-16s since the 1970s and rather sees that other parts of the organization should adapt to this fine-tuned instrument of operational art. The change of mind for the highly skilled staff represents a major challenge, and a risk of "old" thoughts and cultures to be taken into the

“new” organization, hampering development, adaption, and thus swift and safe transition to operating a new system.

A specialized culture one would expect leads to *path dependency*, but apparently not so with new F-35 environment. Being a highly specialized organization also means that a specific culture evolves. One can just imagine it takes a certain focus and culture to handle such high-end, high-cost, and high-effect equipment. It also takes a certain focus and culture to operate this kind of high-potential weapon technology in a way that makes it ready for both possible defensive and offensive military operations, with the sheer speed, complexity, and risks that come with these kinds of tasks. Further, the Squadron need be both organizationally and culturally set for handling both national sovereignty assertion tasks and NATO patrolling on a daily basis, as in the High North, in a challenging climate both regarding weather conditions and security.<sup>72</sup> According to Skinnerland, “there is a very agile culture on sub-tactical level in the Air Force that is handling the technological development well”,<sup>73</sup> even though representatives from the squadron level claims that there still is a way to go to utilize the potential in the F-35 technology through exploiting the possibilities at hand.<sup>74</sup> Further, one F-35 fighter pilot points out that the lack of interaction and the uncertainty related to the possibilities may partly be explained by the surrounding organizations having little knowledge about the new technology as a result of much information being held close by the F-35 environment due to cultural constraints, turning the F-35 into a mere “black box” for the rest of the organization.<sup>75</sup>

Similarly, being a highly specialized organization like NJHQ means that a specific culture evolves. It takes a certain focus, knowledge base, and culture to handle such

high-level information, and the strains of the command authority and responsibility. It also takes a certain focus and culture to handle the sheer amount of information, with a high degree of time pressure, high demands of knowledge and specialization, and complex decision-making processes for military operations. New technology allows organizations like NJHQ to improve performance through new ways of doing things, but new operational patterns may be difficult to implement because existing procedures and routines have been institutionalized over time in a special manner, by experts. Change can therefore be demanding since various actors in a chain of command may have difficulties in seeing other solutions than those they are used to seeing through their perspective and experience, leading to *path dependency*.

The ATO, as previous mentioned, may stand as an example of path dependency, as conservatism and rigidity, just as thoughts and ideas related to data security, accessibility and authorizations may thoroughly “challenge established ideas related to military organization and organization levels”.<sup>76</sup> This is further confirmed by the commander of NJHQ, Lieutenant General Yngve Odlo, pointing out that “processes need to be rebuilt to make the headquarters able to act faster in their command, control, and support to the tactical units, also lifting the question of further digitalization and possible automatization of processes”.<sup>77</sup> As pointed out, path dependency represents constraints to organizational change.<sup>78</sup> However, at a lower level of analysis initiatives are continually being taken within the NJHQ to enhance processes through both the development section and the Norwegian Battle Lab and Experimentation (NOBLE). This is a defence organization that is doing testing and development processes on behalf of the NJHQ. The presence of such a specialized

organization for testing and development rather indicates an opposite culture, a dedicated culture for change and innovation.<sup>79</sup>

Culture may have an impact on how organizational entities like 332 Sqdn and NJHQ are able to interact. As an example, joint operations with F-16 fighters have created set procedures over the last 40 years, procedures that are prevailing although not adequate for operating 5<sup>th</sup> generation fighters. An established scepticism towards altering established standard operating procedures (SOPs) and routines would be describing for a conservative organization. As pointed out by Kampenes, a change of culture is needed "...to alter the way air power is utilized and enable the utilization of 5<sup>th</sup> generation combat aircraft system within the whole of Norwegian defence, in the big picture." However, the General claims, "this culture sits deep, and will be challenging to alter."<sup>80</sup> This joins a pattern of lack of digital maturity as pointed out in the Cyber report.<sup>81</sup>

Moreover, a strong and healthy organizational culture usually means a strong pride related to own business and trade, leading to deliverables of high quality.<sup>82</sup> Again, both the survey entities may be seen as relatively similar, being "[...] military organizations with a history and with good reputations for their competency and operations".<sup>83</sup> In this way, this seems almost contradictory to the description of the challenges concerning the interaction between the two. However, a strong culture may also lead to the opposite of high-quality deliverables. A culture predominant of how to and how not to do business, based on a logic of appropriateness, may put strong constraints on 332 Sqdn and NJQH ability to change and adapt. With an internal focus, the 332 Sqdn and NJQH may experience a mission creep from core deliverables towards internally inflicted social norms and rules.<sup>84</sup> This does not seem

to describe 332 Sqdn and NJHQ. From the descriptions given by respondents both within and outside the two organizations, neither seem to be constrained in the interaction, from cultural reasons.

The change of mind for the highly skilled staff represents in itself a major challenge, and a risk for "old" thoughts and cultures to be taken into the "new" organization, hampering development, adaption, and new routines. This inflicts swift and safe transition to new ways of interaction to utilize the new capacity. According to Kampenes, "the whole picture of possible effects from F-35, beyond the isolated possibilities for the Air Force, has not yet been properly acknowledged by the Norwegian defence, and a change of culture is needed to get there."<sup>85</sup> This was also underscored by Skinnarland, claiming "the real effect of the F-35 lies in the interaction with the remainder of the defence organization and there are technical challenges, but the strategic leadership of the Norwegian defence is not yet at a maturity level to acknowledge this."<sup>86</sup> This view is echoed at the tactical level, where Hanche claims that there is a "lack of strategy at the strategic level for utilizing the F-35 combat system".<sup>87</sup> It is also confirmed by the F-35 pilots, claiming that "apparently no single entity in the Defence has the overarching responsibility for implementing interaction into the organization and into doctrines".<sup>88</sup>

Tactical level and sub-tactical level units are usually characterized by a high level of activity, shorter time span, impatience and will to act.<sup>89</sup> The "hands-on" culture in a sub-tactical level unit may be in opposition to a higher-level headquarters, leading to possible conflicting views in approaching matters regarded more or less important or time critical. The cultural differences between the squadron training and operating the F-35 aircraft and the headquarters thus

represents cultural compatibility challenges,<sup>90</sup> leading to an apparent imbalance in implementation efforts. Culture may also be different depending on organizational level. According to Skinnarland, the strategic leadership level in the Norwegian defence is “[...] not mature enough to acknowledge the need for an agreed ambition for utilizing the F-35”.<sup>91</sup> This may indicate a culture resistant to change and development. Making the most of F-35 means digitalization and moving towards concepts like Joint All Domain Operations (JADO),<sup>92</sup> possibly proving operational level of command old-fashioned. This, though, calls for a culture of innovation rather than conservatism.

## Conclusions and Future Research

Using Norway’s F-35 as a case study, this text has scrutinised effects of the digital shift on the Norwegian Armed Forces’ operational ability. What findings can be deduced?

Firstly, from an institutional perspective, there is apparently a culture for change on the tactical level, as the operational level is stuck in path-dependency due to resource restraints. Secondly, from an instrumental perspective, the interaction is hampered by inadequate strategic leadership: at the tactical level, the 332 Sqn possesses equipment and ideas, but the operational headquarters suffers from inadequate resources and priorities from the MoD at the strategic level. The two findings complement each other by explaining different elements in the inter-organizational interaction, thus both perspectives prove relevant and necessary to understand and explain the utilization of the F-35 combat system on the path towards enhanced operational capability.

In sum therefore, interaction can be characterized as immature and slowly evolving as

the acquisition process has lasted for more than two decades. Although on a good path of evolution, the organization is in need for stepping up to meet reasonable capacity expectations on time and cost. The Norwegian Armed Forces still has a considerable job to do in priorities, restructuring its organization, reengineering business processes, redesigning procedures, and rewriting doctrines, to maximize the potential of the enormous investment – bearing in mind Bowers and Kirchberger point out that operational transformations have occurred only when new technology has been accompanied by new doctrines and operational procedures.<sup>93</sup>

This is, however, a tall order. Firstly, from an instrumental perspective, where resource competition stands in the way until the implementation of the F-35 integrated combat system has been made paramount objective and priority for the entire organization. Secondly, from an institutional perspective, facilitating joint positive cultures for change in both organizational entities, seemingly restrained by strategic priorities. Joining cultures stands in close connection with the conclusion from an instrumental perspective, as both demand centralized initiative. The findings seem related through the two chosen theoretical perspectives, where resource strains seem to contain the strongest explanation power, and which may be explained by fragmented strategic leadership in the Norwegian Armed Forces in handling the digital shift due to lacking digital maturity.

In sum, the study brings forward two important conclusions. Firstly, that Norwegian Defence Authorities does not get as much operational capability in return as expected from the investment, because the F-35 capability is locked into a situation of suboptimal planning processes based on capacities from a bygone era. Secondly, low digital maturity stands in the way of proper prioritization,

resource allocation, and organizationally implementing the valuable technology. It may seem like a paradox that a minimum of further spending on sufficient technology implementation, possibly enhanced by an earmarked and visible change agent, would pay off manifold in the utility of this costly tech through increasing digital ability, and obtaining “Game-Changing” effect.

The conclusion points at a bigger and more universal phenomenon, making military organizations understand and prepare for the challenges related to organizational changes that come with digital technology implementations. These challenges reach far beyond the technology itself, and do not stop as soon as the technology is at hand – this is when it all starts, comprising changes of structures, doctrines, mind-sets and cultures, becoming visible through enhanced knowledge.

This limited study leaves questions unanswered for further research. Firstly, among

several interesting topics – and more unconventionally – the conclusions may suggest a diametrically different approach; That the joint command level is “old fashioned”, calling for restructuring military command and control. Secondly, as pointed out, there are similarities between military and civil sector digital implementations. Of special interest from a military perspective, though, is the expected reduction operational capability due to capacity dips during technology implementation – commonly known as “the valley of despair”. This dip is paramount for military organizations to avoid,<sup>94</sup> although apparently not deemed adequately important in economy-biased peacetime perspectives.

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