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NCW IN THEORY AND PRACTICE: A human factors perspective on why it might work and why we might not get there.

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8) ABSTRACT

This report delves into some Human Factor issues pertaining to the organizational development towards Network Centric Warfare (NCW). It underlines the importance of a holistic approach, as organizational development rarely is successful without an understanding of, and sensitivity to, the human beings involved.

The report focuses mainly on three organizational variables defined in the NCW concept: Flattening of the organizational hierarchy, decentralization of decision-making, and self-organization- and synchronization of forces. These are evaluated against prior experience with established organizational forms. Then there is a look at current development and its possible consequences.

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1 INTRODUCTION

The US concept Network Centric Warfare (NCW), as descibed within the Command and Control Research Program (CCRP, see e.g., Alberts et al, 1999; Alberts et al, 2001) has increasingly become a buzzword within defense discussions in most NATO countries, as well as in partnership countries. However, the national approaches tend to vary a bit, as does the names employed. For instance, the UK usually refers to the concept as Network Enabled Capabilities (NEC, see, Ministry of Defence, 2004), while Norway and Sweden use the title Network Based Defense [1](NBD). This seems to be the results of slightly different approaches based in different military traditions evolved in different cultures. The goal here is not to focus on such differences, but to evaluate some of the main denominators of NCW and its counterparts. Nevertheless, it seems appropriate to have in mind that there are some slight national differences alluded to in the various terms.

NCW-literature often states, "NCW is all about organization". At the same time, the same literature spends by far most of its space on discussing technological aspects. In a recent report, a senior advisory panel to the US Department of Defense also draws attention to the abundant focus and funding for new technology and equipment, all the while very little is spent on training and preparing the users (Burger, 2003). This trend is equally visible in the funding of research. Human factors (HF) remains a very minor field in most countries. It is the aim of this report to look into this often forsaken side of NCW research.

Having a central focus on human factors in relation to NCW, the report will first present a case for why human factors are important. Subsequently, it will consider NCW theory and compare it to empirical evidence from the past as well as to present developments. Finally, there will be a discussion of some possible consequences of this development.

2 WHY ARE HUMAN FACTORS IMPORTANT?

One of the main challenges in organizational development is to understand the full consequences of the changes one is aiming to introduce. It is well known that organizations are a far cry from predictable mechanical systems. Its main ingredient is humans, and human behavior has thus far not been fully predicted by anyone within the field actually studying human behavior, i.e. psychology.

[1] This is a direct translation of the Norwegian "Nettverksbasert Forsvar" (NBF).

What we do know within the field of psychology is that human behavior is very complex, influenced by a multitude of individual and context factors. At the individual level, such factors include personality, intelligence, knowledge, and beliefs. Context factors are the social, cultural and organizational setting in which the individuals exist. Within these fields there is knowledge about influences to, and tendencies of, human behavior. However, as each organization is a unique complex system with a considerable amount of different factors exerting mutual and continuous influence on each other, it is difficult to make any accurate predictions. It is therefore essential both to take into account what we do know from the various fields, as well as follow up with further research on how the different factors affect each other in a given organization, culture and situation.

Thus, when attempting to create organizational change, one should include the knowledge that we do have about human behavior on all levels, as well as conduct the necessary local research to understand the unique processes of the organization of focus. This seems to be a considerable challenge, especially since much organizational development is driven by technology and not by human factors research.

2.1 Pitfalls of technologically driven organizational development

As is the case with much organizational development, the idea about NCW did not come about as a result of knowledge about human behavior in organizations. Rather, it appears to be the technological developments that are the motivators for change.

However, there seems to be some problems linked to technologically driven organizational developments. History is full of examples of technologically pushed changes that have brought about effects for the worse rather than the better. The Tavistock Institute's coalmining studies from the 1950's in Britain, is a classic organizational example (Emery, 1978; Trist & Bamforth, 1951; Trist et al., 1990). It was found that the introduction of new and better technology surprisingly could give birth to a host of negative effects, including significant *drops* in output. To fit the new equipment, work in the coalmines had been changed from being predominantly organized around the group to being organized around the individual[2]. Workers had to work alone, even though there were many reasons as to why working in groups made sense and were strongly preferred. The unsatisfactory results called for additional reorganizations of work, however, this time also taking human behavior into consideration. This meant reestablishing work groups. Being sensitive to the social needs and preferences of the workers, technology finally gave the anticipated advantage. Examples such as this illustrate how an appropriate organization is central in order to exploit the advantages that new technology may represent.

Nevertheless, history tends to repeat itself. There are plenty of examples of the forgotten human being operating in the technological environment. Taking the steps toward NCW, there

[2] More specifically, this refers to the shift from the "short-wall" method of coal getting to the "long-wall" method of coal getting (Emery, 1978; Trist & Bamforth, 1951; Trist et al., 1990).

is a need to understand what the proposed reorganizations and new technology will mean for the human being working within the organization. In line with this, we may learn much from following up on the actual changes being implemented and the processes taking place. Are the changes introduced taking the human factor into account, or do we see unplanned-for effects due to a lack of focus on the people and processes involved? Are the changes according to the hypotheses purported by the concept or are we getting unforeseen effects?

2.2 Fascination with technology

It may be a side step, but nevertheless interesting to consider the reasons why we, as humans, seem to have such a great belief in, and fascination for, technology. Is there an inherent interest? Could it be seen as a purposive instinct for human survival? Or is it merely a preference for clear answers? It could also just be that we, as creatures of habit, find it more than difficult to change our course. We are, after all, deeply influenced by our culture and tradition.

From a philosophical point of view, one may ask if there really has been any shift of thought in the western hemisphere since the modern era commenced over a century ago. A landslide of revolutionizing technological inventions gave birth to a way of thinking characterized by a belief in objective truths and predictability. This was accompanied by an optimistic view of the future based in a profound trust in technological inventions to solve all human problems. This is a tradition of thought that still seems to be the prevalent philosophical foundation in western society. And even though we have seen changes toward postmodernism[3] taking hold within the humanities and the social sciences, there has not been any real shift in society in general. We can see postmodern thought has impacted the least in societies where people most firmly hold on to the old beliefs of modernism: objective truths, predictability, and technical solutions to all problems.

3 CENTRAL THEMES AND EXPECTATIONS FROM NCW

NCW is often described as a “revolution in military affairs”. Knowledge superiority and speed of command are two central themes within the concept (e.g., Alberts et al, 1999; Alberts et al, 2001). It is supposed that new information technology will be able to connect people and provide real-time information and thereby information dominance. The aim is that “everyone can talk to everyone”[4] within the organization. The point of this is both to spread and to collect vital information, as for instance about the enemy, terrain, and own forces. With such a communicational system it is further purported that command and control (C2) will be much quicker. Automation is often described as a central part of this. Organizationally it is suggested that one should flatten the hierarchy and decentralize decision-making. Making the decision-

[3] Postmodernism is a collective denomination of a group of thought attacking the inherent beliefs of modernism. This includes a disbelief in universal systems of thought, a shift from the belief in objective truths to seeing subjectivity as unavoidable, understanding the world to be unpredictable rather than predictable, and a change in the understanding of phenomena as static to continuously changeable.

[4] The quotation marks indicate that there exists a wide variety of interpretations of this statement in the literature.

making cycle shorter is intended to make it faster. Self-organization and- synchronization of the forces is proposed along with decentralization. Furthermore, the literature does not only point to decentralization, but also calls for flexibility between centralization and decentralization. This implies that the needs of the situation are intended to determine the choice between centralized and decentralized command.

4 NCW FROM THE PERSPECTIVE OF MILITARY HISTORY

Placing central parts of the NCW concept like decentralization and speed of decision-making into a military historical context may help shed some light on the issues. Decentralizing and increasing the speed of decision-making are by no means new ideas. The German concept of ”Auftragstaktik”, or *Mission type orders*[5], is an old concept that also accentuated decentralization of decision-making and fast decisions[6] (see e.g., Linquister, 2002). This was a practical solution in order to save time, especially as communication often was difficult and/or slow, due to long distances and poor communicational technologies. Within the set frames of rules and common understandings[7], there was room given for individual initiatives down to lower echelon officers. The needed common understandings, or shared mental models, were mainly achieved through the drilling of procedures. The commander's intent became central.

The roots of Auftragstaktik are documented back to19th century Germany (see e.g., Linquister, 2002). Count Helmuth Von Moltke is known for developing what was then called "Weisungführung" – the historical predecessor of Auftragstaktik. Rather than detailed orders, *Weisungführung* accentuated a more liberal commanders intent, affording the individual officers some initiative. This freedom and responsibility was, however, only given down to a certain hierarchical level (division level as a rule – corps occasionally). In the new doctrine of 1933, *Truppenfürhrung*, Auftragstaktik was described, and later implemented by the German Wermacht (see e.g., Linquister, 2002). Within this doctrine, freedom of initiative was handed further down in the hierarchy than previously under Weisungführung (squad level, or if necessary – the individual soldier; Linquister, 2002).

Some findings from cross-cultural psychology may lend some insight into the cultural basis that allowed these ideas to be developed and practiced in Germany and not somewhere else. According to the studies of Hofstede (1991), German culture has a very strong focus on rules and predictability. The culture has been found to be relatively more rule-based than command-based[8], and should accordingly be expected to favour an organization according to rules over

[5] This is the term employed by the US. It resembles the management theory known as "management by objectives" (e.g., Dekker, 2003; Morgan 1997).
[6] Another likeness between Auftragstaktik and NCW is the focus on joint operations (Condell & Zabecki, 2001, in Linquister, 2002).
[7] Rules of engagement (RoE) can be seen as current examples of this.
[8] Germany was found to score high on Uncertainty Avoidance (UA), which is a cultural dimension found by Hofstede (1991) to be linked to the psychological need for rules and predictability. At the same time they scored relatively low on Power Distance (PD), defined as the actual and experienced distance between people in a hierarchy (Hofstede, 1991). PD can therefore be linked to the degree of authority-based command. In comparison, Hofstede found Norway found to be less rule-based and even less authority based than Germany (relatively low

an organization based on hierarchical power. Auftragstaktik is indeed less authority-based than rule-based. Decisions are more based on a preset understanding of options than on the authority of someone higher up in the hierarchy. Such preset understandings, or mental models, are in other words rules of how to make decisions[9].

It may be interesting to notice that current US (FM 3-0) and Norwegian doctrines (FFOD) (respectively, US Army, 2001; FSTS, 2000)[10] now are both reflecting ideas from Auftragstaktik. There are of course some differences between the doctrines as to the interpretation of the ideas from Auftragstaktik, some of which may also be attributed to cultural differences much in line with the findings of Hofstede (1991) (see footnote 8). There appears to be more focus on decentralization of authority in the Norwegian doctrine - in line with Hofstedes findings of low PD in Norway. Comparatively, there seems to be more focus on strong leadership in the US doctrine - in line with their higher PD score. Although, the largest cultural differences are perhaps not found in the doctrines themselves, but rather in the practical interpretations of these.

In sum, the NCW ideas of decentralization and increased speed of decision-making seem to follow a tradition of military thinking that originated in German military concepts. The trend is towards an ever increasing empowerment of lower echelon personnel.

5 HUMAN FACTORS ASPECTS OF WHY NCW MIGHT WORK - EMPIRICAL EVIDENCE IN SUPORT OF NCW THEORY

There were pointed to three central NCW organizational variables in chapter 3: Flattening of the organizational hierarchy, decentralization of decision-making, and self-organization and-synchronization of forces. Studies from various areas point to many dysfunctions of established organizational forms, thereby lending support to central elements of the NCW theory.

5.1 Studies from organizational psychology

Organizational psychological studies (e.g., Morgan, 1997) have demonstrated that bureaucratic organizations, i.e. organizations based on hierarchy, centralized control and authority, division of work and responsibilities, bureaucratic accountability, etc (i.e. typical for military operations), are not flexible when faced with changing situations and unforeseen problems. Having standardized procedures and lines of communication does not seem to work efficiently under changing conditions. It usually has to be modified to deal with the current situation. And

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UA and low PD). The US was found to be the least rule-based, and somewhat more authority based than both Germany and Norway (low UA, medium PD).

[9] Note also that the rules can be detailed or general, and adhered to in various degrees. The German form of auftragstaktik has later been interpreted differently in various cultures. Norway, for instance, may, according to the national cultural understanding, have relatively less rule-focus in their interpretation of the concept than what Germany had. See also the subsequent paragraph.

[10] Prior to the current doctrines, there was more focus on centralized command and attrition warfare.

as such modifications slow the process, problems often are solved too late. Bureaucratic organizations have furthermore been found to perturb critical and creative thinking. The division of responsibilities does not only motivate people to fulfill their responsibilities in a premeditated fashion, it also motivates people to limit their efforts to stay within these frames.

5.2 Studies of past US military operations

Several historical studies of US military operations show negative effects of hierarchic and centralized control/authority. In a review of US military organizations at war, Roman (1997) found such organizational practices to be obstructing the sharing of information, as well as being an obstacle for flexibility - both central parts of the NCW concept. Furthermore, he found initiative and ingenuity in the lower ranks of the organization to be stifled under such conditions. Thus, Roman's findings from military settings corroborates the findings from organizational psychology, pointed to under the previous headline.

The decision process in US military operations have often been described as being too slow (Roman, 1997; Gordon & Trainor, 1995); it has not followed suit with the technological developments of weapons and transportation, where there has been considerable changes. Gordon & Trainor (1995) presents a relatively recent example from the first Gulf War, of the US Air Force decision-making cycle being too slow. The Air Tasking Order (ATO) decision-cycle was 72 hours. As it did not take too long for the Iraqis to figure this out, they managed to save their stationed airplanes from being bombed by the US forces simply by moving them a little every day.

Many military experts and authors have therefore concluded that operations increasingly demand faster decision-cycles, and that this means they must become shorter (e.g., Roman, 1997; Gordon & Trainor, 1995). Tempting to do this by cutting the middle part of hierarchy and pushing their decision-making authority upwards to the top of the hierarchy, will necessarily lead to an overload there with a subsequent danger of break-down in the decision-making processes (Roman, 1997; Vego, 2003). Hence, maximum speed is interpreted to be obtained when decisions rather are made where action is done, indicating a decentralization of decision-making. This clearly supports the reasoning within the NCW concept, where decentralization is pointed out as a key to an NCW organization.

5.3 Studies of international crisis relief organizations

International crisis relief organizations are, similar to military organizations, organizations with a political function, hierarchically centralized organization, and an importance put on bureaucratic accountability (Dekker, 2003). In the organizational procedures described by Dekker, there seemed to be little evidence of ideas from "Auftragstaktik". However, when the organizations of his study were confronted with reality, there was a renegotiation of authority. Authority migrated downwards in the organization, to where the resources were. First, this was found to happen because knowledge and authority rarely coincided in the organization, meaning that the people who had the knowledge of what to do in order to solve a problem

rarely had the instituted authority to do so, while the people who did have the authority did not have the knowledge. Second, the migration of authority was found to have been generated by time constraints; solving the problems in time meant avoiding going through the hierarchy. Finally, people were often unable to fit the actual problems encountered, into the organization's bureaucratic division of responsibilities, indicating that it was often difficult or impossible for people to know where in the hierarchy to turn in order to solve a real-life problem.

Interestingly, improved technology did not have the power to alleviate this organizational problem. This could be attributed to the gap between any technologically mediated knowledge and the richess of the knowledge achieved through "being there"; the latter being based on the well of details provided by the use of all senses, including a holistic understanding of the emotional setting. Furthermore, valuable time is lost in the process of producing and mediating information upwards, even though technology is improved. And finally, it will often be difficult to achieve contact with the top of the organization as they quickly become overloaded with pending decisions – all of which is not a question of technology.

5.4 Studies of communication between officers and their superiors

A study by Jacobsen (1996) focuses on the communication between officers and their superiors in Norway. It is exemplifying a lack of understanding and discussion between officers within the hierarchy, thus pointing to some inherent problems of communication. The organizational processes may therefore be seen as less than ideal.

The study is a survey from 1989, based on a randomized sample of 2296 officers[11], representing 20 % of all officers in Norway at the time. Only half of the officers in the sample experienced that they were provided with the reasons for their superiors' orders/intentions, perhaps indicating problems in downward communication. The majority[12] of the other half, the officers that said they *were* provided with the reasons for their superiors' orders/intentions, reported to be critical to, or disagreeing with, their superiors' decision. This may suggest that the opportunity for upward communication also may have been too scarce. These officers would probably not have benefited much if just being provided with more information about the decision, but rather seem to want a voice in the decision-making process. Such feed-back from people with other viewpoints within the organization, including subordinates, is often essential in order to ensure that the best possible decisions are made. Indeed, there are ample findings of feedback being critical in order to avoid faulty decisions[13].

Seen together, the findings from this study may be indications of a lack of understanding and discussion between officers in the hierarchy. The subordinate will not be able to do a good job

[11] Of which they had a return rate of 75%.
[12] I.e., 27 % of the total.
[13] For instance, the phenomenon known as "group-think" has been shown to be detrimental to success (Janis, 1979). This is where homogeneity of group-members and authoritative leadership leads to a collective agreeing with the leader, leaving no room for dissident voices. When critical feedback is held back, it is found that decisions easily become faulty.

unless he or she understands the decision and the reasoning. This is not a question of technology, but rather of how it is used.

Jacobsen's findings may suggest a need for a democratization of military organizational processes. Is the organizational system providing motivational factors for the superiors to discuss with their subordinates? A hierarchic, centralized organization is in itself an incentive to focus efforts upwards, while a flat decentralized organization is more open for other communicational lines, like a network. The idea in a network is for people to communicate with those they need the assistance from directly, and not have to go through their boss, that speaks to his or her boss, etc, until finally someone (hopefully) reaches the right person[14]. Jacobsen's findings may therefore be seen as a support of the decentralized organization proposed in the NCW literature.

6 WHY WE MIGHT NOT GET NCW - CURRENT TRENDS IN MILITARY ORGANIZATIONAL DEVELOPMENT

Thus far, I have focused on the content of NCW and a body of evidence from the past supporting the concept's suggestions to organizational changes. I would like to change the focus onto the current trends in military organizational development and attempt a general evaluation of the present development[15].

6.1 Organizational experimentation

Compared to other countries, the US is spending by far the most time and money on NCW research and development. Roberts & Smith (2003) have reviewed some l10 recent US empirical experiments related to the NCW concept, performed between 1998-2003. They concluded that there had not been any new organizational concept exercised in these experiments. There were only cosmetic changes made to the organization in the experimentation; established C2 structures were still employed. Assuming that this is correct, it may be in its place to question whether there exists any will to achieve any real change. At least, it seems difficult to find evidence of this will when reviewing US literature on current development.

Focus is rather on the mediation of information up, and orders/intent down, in the organization. The experimentation is thus primarily experimentation with technology (Roberts & Smith, 2003)

[14] The issues of facilitating collaboration and discussion downwards in the hierarchy, seem to be largely omitted topics within the NCW literature. There is little or no focus on this in theory, research and current development. The study of Norwegian officers by Jacobsen, does however, demonstrate a need for such a discussion.
[15] This is mainly based on US empiric reports.

6.2 Flexibility between decentralization and centralization

When there are high stakes, as at the onset of a military operation/war, there is a demand for central decision-making and clear accountability. In some cases, this demand for central decision-making may even go up to the political level. However, in the midst of an operation, there will be more decisions to make than central commanders can cope with, and more local knowledge needed for the handling of them, thus creating a need for a decentralized decision-making.

The *goal* in NCW may be this kind of flexibility between centralized and decentralized decision-making. However, there are some apparent dangers attached to it. When new technology is implemented in order to improve centralized command, it is by definition facilitating, not only the *use* of power and control at the top, but also the abuse of it (see e.g., Bolia, 2003; Cohen, 1994; Roman, 1997; Vego, 2003). This is the problem of micromanagement, which becomes especially prominent when the technological facilitation of centralization is combined with a hierarchic organizational structure, which by definition is promoting its use[16].

6.2.1 Micromanagement

The flood of combat information to higher command prompts commanders to change targets or tactics at the last moment. Bolia et al. (2003, p19) described the problem as follows: "Technology have enabled high-level commanders to give tactical- and operational-level orders to field commanders, regardless of their level of competence or the presence of adequate information." In the first Gulf War, micromanagement created much uncertainty and confusion for the pilots (Cohen, 1994). They continuously received new changes to the plans from their commander. These updates did not always make sense, but they always created increased uncertainty and lowered control for the pilots flying the missions (Cohen, 1994). This problem at the sharp end is further explained by classical findings from psychology (e.g., Karasek, 1979). People have a basic need for control over their own situation, which, when undermined, leads to a decrease in their ability to deal with stressful situations.

The probability of micromanagement seems, not surprisingly, to increase with a centralized information system (Cohen, 1994). Indeed, it lies in its very nature to facilitate command. Reports from Operation Enduring Freedom in Afghanistan exemplify this. Vego (2003) observed that centralization of decision-making increased in this operation; Central Command often interfered with directly tactical decisions[17].

[16] The problem of micromanagement may become even more apparent when a hierarchical structure is strengthened by culture. (For more on this, see chapter 5.5, on cultural differences.)

[17] During this operation, the organization had been flattened by the cutting of a level of command. However, as decision-making responsibility was pushed upwards rather than downwards in the organizational hierarchy, this change facilitated a centralization of the decision-making rather than a decentralization (Vego; 2003).

Micromanagement is by no means a new problem. For instance, General George Patton, in his Diaries about WW2, explained it like this (Beaumont, 1986, in Roman, 1997): “The hardest thing I have to do is nothing. There is a terrible temptation to interfere.” And frequently this temptation became too great to ignore.

The result of micromanagement, irrespective of at which point in time it takes place or what technologies help facilitate it, it represents a removal of the initiative of subordinate commanders (Roman, 1997; Roberts & Smith, 2003). A system where micromanagement is the norm will breed dependence rather than independence, and learned helplessness[18] may be a result. Hence, accommodating for centralized governing in the organization may also damage the ability for decentralized governing[19].

6.3 Automation – a question of control

In the current development, at least based on what reports from the US can reveal, focus seems to be on the automation of C2-processes rather than on a decentralization of power and authority. Accordingly, control is increased at the top of the organization (e.g., Roberts and Smith, 2003; Roman, 1997).

Automation is predictable – human behavior is not. For this reason, many decision-makers may prefer automation to a decentralization of power. It will actually allow the commander to have *more* downward organizational control than he or she had previously. However, as automatic responses by definition are rule-based, it will also make it easier for the *enemy* to predict future reactions. So in this sense, increasing ones power at the top may indeed backfire through the simultaneous ceding of control to the adversary. One may therefore understand the increased control at the top to be somewhat illusory, as it gives birth to a greater uncertainty – concerning the very efficiency of the automatic responses towards enemy initiatives.

In essence, this is a question of control; more control to the top of the organization, necessarily means less to the bottom (e.g., Roman, 1997; Schmitt, 1994 [20]). As indicated above (chapter 6.2.1), the lack of control at the sharp end will give augmented vulnerability to stress (e.g., Karasek, 1979). The problem is that humans inherently seek to increase their control. And the ones who get it, meaning, the ones possessing the power to take it, may not be those who are in

[18] Learned helplessness is the phenomenon of learning through experience that ones initiatives and actions are futile; in other words, the learning of passivity instead of active response.

[19] Additionally, there are cultural differences in how the hierarchy and one’s role in it is interpreted. People from cultures with high PD are more adapted to centralized decision-making than people from cultures with low PD. (See footnote 7 for a definition)

[20] Schmitt and Roman’s point of departure is how people relate to uncertainty in the organization. It is found that *centralized* control gives less uncertainty at the top of the organization, at the same time as it gives more uncertainty at the bottom. Increased centralized control is found to be an impediment for initiative, ingenuity and flexibility at the lower end of the organization. Information controlled from the top is found to be slow, as is the decision-making process. On the other hand, Schmitt and Roman explain that *decentralized* control produces more uncertainty at the top of the organization and less at the bottom. This opens for a free flow of information and initiative, giving flexibility and speed of decision-making - which is how Roman sees a network organization being realized.

the greatest need of it. Power and control are closely linked. This is perhaps the essential part of the actual organizational development towards NCW. Will people in power ever be willing to give away their control, in order to make the necessary changes towards decentralization and self-organization at all possible?

6.4 National cultural differences in trends

The same organizational structure may be very differently understood and practiced in different cultures. This is true with past and current NATO-organizations and may certainly be expected to be so also for the interpretation and implementation of the NCW concept. An example from Norway on the understanding and subsequent practices of the hierarchy may help to illustrate this. Many officers report[21] that the hierarchy often is not used. When they find it impractical to go through the hierarchy in order to solve a problem or get something done, they rather contact the person sitting directly on the resources or the information that they need (quite in line with the findings of Dekker, chapter 5.3). This is not according to what the organizational structure is dictating, but can be understood to be the practical interpretation of the organization, based on people's background for organizational understanding, i.e. their cultural basis.

The degree of centralization and bureaucratic accountability are a couple of the organizational variables linked to NCW that it is reasonable to expect culture to impact on. The goal of flexibility between centralized and decentralized decision-making in NCW may further increase the room for culturally based interpretations, meaning that the cultural differences may be exacerbated in practice.

Considering a couple of cultural dimensions and some possible hypotheses can help exemplify the impact of culture on organizational variables. Power distance (PD), defined as the actual and experienced distance between persons in an organizational hierarchy (Hofstede, 1991), is a dimension where for instance Norway and the USA wee found to score differently (see also footnote 8). Actual and experienced hierarchical distance was found to be moderately large in the USA (i.e. medium PD), while this was found to be small in Norway (i.e. low PD). Glenn & Glenn (1980) defined the dimension of *Guilt*, which indicates the degree of focus on placing guilt/responsibility versus the experience of shame in a society. This can be understood as the way in which human behavior is regulated in relation to responsibility. The USA is referred to as having a high focus on guilt, indicating that there is a considerable focus on the placing of responsibility in this culture. Comparatively, Norway is described as being more towards the shame side of the dimension. This means that there is a cultural difference between these countries both in how they relate to each other in a hierarchy and in their relative focus on placing guilt/responsibility.

[21] This was communicated at different occasions from sources that worked or had previously worked within the Norwegian Army or the Norwegian Air defense.

From this, one may hypothesize that a lower focus on the placing of responsibility and lower distance within the hierarchy in Norway as compared to the USA will permit more decentralization of responsibility and decision-making. In other words, can we expect relatively more use of decentralized decision-making in Norway as compared to the USA, even though both cultures are aiming to implement the NCW concept?

Indeed, there is a question as to whether NATO ever will be able to develop according to NCW. The cultural-, interest-, and money differences between the various countries may be more than difficult to surpass. It therefore seems important to look further into cultural issues in order to better understand the cultural conditions influencing cooperation within NATO. This should affect training, doctrines, etc within and between NATO-countries. As NCW is founded more on close international cooperation, "old" problems of cooperation may otherwise become even more prominent in the future. Furthermore, the concept goal of "flexibility" may well also produce a wider range of variation in interpretation. However, this can be little more than speculation on my part; empirical research into these matters is needed.[22]

6.5 In sum

The literature reviewed above reveals a primary focus on improving the mediation of information and orders/intent on the road toward NCW. In practice, this means that technology is employed in order to facilitate an increased amount of information about the unfolding situations at the bottom of the organization, at "the front line", to be produced and sent to the top of the organization[23], and to facilitate the mediation of orders/intent from commanders at the top of the organization down to the bottom of the organization. Information and orders are distributed more quickly, and contains more and more details. Additionally, there has been a focus on the automation of the C2 processes.

Such developmental trends means that command and control is made easier for the decision-makers at the top of the organization. More information and automation is increasing their control, and the clarification of orders/intent is facilitating their command.

Little or nothing appears to be done in order to flatten the hierarchy, induce local initiative, and create a network organization. In the present development, there are rather indications of the hierarchical structure being strengthened. Indeed, there were pointed to many US reports that indicate a centralization of C2-processes, power, decision-making, control, and information-

[22] In line with this, cultural issues are currently being addressed in a NATO CD&E (Concept development and experimentation) project called "Leader and team adaptability in multinational coalitions: Cultural diversity in cognition and teamwork". The focus is on cross-cultural team cooperation, and how to best train for this.

[23] However, more info does no always mean less ambiguity; it may also mean more interpretations. Because humans have a very limited information-processing capacity, they automatically select what they interpret as the most relevant information, based on their frames of reference (i.e. cognitive schema constructed from prior experience and knowledge; see e.g., Fiske & Taylor, 1991). This is the process referred to as sensemaking by Klein (e.g., Klein et al, 2003). Hence, even if everyone should receive the same information, it does not mean that everyone will have the same understanding.

flow. When hierarchy is cut, power seems to be centralized, not decentralized. There seems to be a greater willingness to cut hierarchy by automation rather than delegation; also increasing authority and control at the top level.

Thus, current military organizational development, at least as the US is concerned, seems to be a far cry from what the NCW concept is suggesting. Little flattening of the organizational hierarchy is taking place. No decentralization of decision-making is taking place. Therefore, self-organization -and synchronization of forces is neither enabled nor taking place.

There was alluded to some reasons for the current development. First, there is the problem of human beings having a basic need for control over their own situation, and when given the opportunity through a centralized command system, it is not surprisingly taken. This is underlying the problem of power and authority; people are not willing to give it up freewillingly. Secondly, there are the political demands for bureaucratic accountability. And finally there are the problems connected to cultural differences; it may be harder to give up control and trust subordinates in some cultures as compared to others, as well as it may be more natural for some than others, to have a more rule-based organization as opposed to an authority-based organization.

6.6 Effects

Considering the indications of where the current development is going, it seems that central military NATO organizations (US) are *not* moving towards a NCW as theory describes. But what effects may we expect to get?

From the literature presented above, it seems that one may anticipate, either some limited positive effects of the improved technology, and/or a host of unwished for effects allowed for by the new technology. The increase we have been seeing in the centralization of power and decision-making, i.e. more decisions at the top of the organization and less at the bottom, has been observed to have some important consequences.

First, bureaucratic power and responsibility is strengthened. And although decisions may seem more appropriate in the bigger picture, they may be less so from the local point of view. Secondly, this has been linked to a stifling of local initiative and ingenuity. Third, increasing centralization leads to a potential overload both of information and demands for decision-making at the higher end of the hierarchy. Hence, the total flexibility of the organization may be sacrificed for the increased control at the top. Finally, the automation of decision-making, something that is more of a direct effect of technology, clearly has its limitations. Such technological solutions have been shown to make people complacent and overconfident, sometimes leading to accidents that were supposed to be easily avoided (Noyes, 2003; Bolia, et al, 2003). Additionally, automated decision-making has the potential of making our actions more predictable for the enemy.

6.7 Alternatives

According to Roman (1997) and others (referred to above), new technology demands a new organization for its full exploitation; i.e. NCW demands a flattening of the organizational hierarchy, a decentralization of decision-making and lowered central control. This is advocated to result in initiative, ingenuity, information availability, decision quality, speed and flexibility, which are all more than often figuring on the “wished for effects-list” in the NCW literature (e.g., Alberts et al, 1999; Alberts et al, 2001).

7 CONCLUSION

The development towards NCW entails a host of Human Factor organizational dilemmas of interconnections and dependencies that demand a holistic approach. Organizational development is rarely successful without an understanding of, and sensitivity to, the human factors involved. Indeed, organizational changes brought about by technological inventions, have often given unfortunate results.

I have attempted to evaluate some central human factor issues of the NCW concept through the presentation of reports from both past and present as well as discuss some consequences of current development. It seems fair to conclude that the central NATO military organizational development presently is not moving towards NCW.

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