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# **Translating, verifying and prioritizing information**

## **Analysis of communication and interaction in a NEC experiment**

### **Abstract**

This paper presents empirical findings on interpersonal processes which were important in a Norwegian network enabled capability (NEC) experiment. Language barriers, differences in routines and differences in the ability to use technology posed problems for coordination and communication. Translating, prioritizing and verifying information facilitated coordination and communication. The paper thus enriches the understanding of the processes used to establish common ground in a NEC context, based on an inductive methodical approach. This approach could be particularly valuable for further organizational development based on empirical descriptions and analysis of the current state of coordination among military units and services.

### **1 Introduction**

Recent studies (McChrystal, 2009; White, 2009) states that one of the biggest challenges facing contemporary military forces is to, coordinate among their units, and with other organizations. This paper seeks to contribute to knowledge on this topic. We do this by focusing on findings of what hampers and facilitates interaction and communication at the tactical combat level during a networked enabled capability (NEC) experiment in Norway 2008: Multinett II (MN II) The experiment was conducted, within the frame of a military manoeuvre, by actual forces using real equipment. The technology introduced allowed for an increase in data and information exchange and delegation to the lower tactical levels.

Our fieldwork at the experiment suggests that tighter coordination at the tactical and combat level among services and units can be achieved through translating, prioritizing and verifying information (Valaker, Danielsen and Fidjeland, 2009). These interpersonal processes facilitated coordination when there were language barriers, differences in routines and differences in the ability to use technology.

Some of our examples show that mechanisms for achieving the processes were institutionalized, such as rewriting orders and using liaisons to translate. Other examples show improvised processes, such as determining right radio frequency during operations.

Earlier research both in general and in network enabled warfare contexts has pointed to the crucial role of task related communication as a foundation for coordination of complex joint tasks (Weick and Roberts, 1993; Eggenhofer et al., 2008). But there is scarce empirical work on communication and interaction in a network enabled context where real forces operate. However a notable exception is Ali (2006), and Warne (2008) whose findings from interviews with Australian soldiers participating in high uncertainty and high tempo environments suggest that:

In recent years, there seems to have been a shift in emphasis from “the network” indicating the information technology, to a “networker” or “to network” representing the human behaviour, the action, which should be the main focus. (Ali, 2006: 8)

Ali’s research findings is that willingness to collaborate and trust were important for building shared awareness, information sharing, agility and securing successful mission outcomes. Difficulties of sharing secure networks, interoperability technologically and lack of information management policies were impediments to these same desired outcomes. Social networks enhanced trust.

These findings resonate in our empirical material; willingness to share was noted by several of the participants as important. However we extend Ali’s perspective by providing an insight on the interpersonal processes, and not only the attitude, by which diverse actors enable interaction. These interpersonal processes are important empirical findings that shed light on what the obstacles to interaction were, which often resided in how to make use of others information and to understand messages. Importantly establishing shared interpretive frames, gain trust in information and agreeing on the priority of information were important in these interpersonal processes even when there were no security barriers to information exchange.

Implied in our analysis is the question of how the military forces can adapt their way of operating to meet the demands of unforeseen situations. In the experiment the forces needed to perform a set of novel tasks which demanded joint effort. They adapted to this demand

through translation, and verification and prioritization of information mainly. In an operation with a greater complexity, there is an even higher demand for adapting the way one operates. This extends beyond ensuring that existing forces are able to coordinate, to a reflection on how one structure the organization as well (Rothstein, 2006).

This is a case study, and the empirical context of our study is a limited experiment, still the complexity of the cultural and organizational challenges was striking. Such complexity is likely to be even more profound during real operations. Learning from this experiment can provide insights on how military forces and their partner organizations can take the advantage of not only new technology, but new ways of operating. Our analysis are contributions to an ongoing discussion concerning: the need for developing new frames of reference which can enable communication across units and services in common operations, and the usefulness of interpersonal processes aimed at cocreating a shared frame of reference.

The paper presents method, theory and empirical context in part 2, an analysis of the empirical findings in part 3 followed by a discussion in part 4 and conclusion in part 5.

## **2 Method, theory and empirical context**

### **2.1 Method**

A crucial characteristic of our research approach is to base our theoretical considerations and practical evaluations on a qualitative inductive empirical field study. This allows for taking into account what was typical about the actual context of the experiment rather than our preconceived notions of what could be important in the experiment.

We had a research focus which was based on previous theory, but we did not preconceive of what could be important to provide insights on this theme. Rather we did observations, interviews and discussed our emergent findings within our own group and with military observers from The Norwegian Battle Lab and Experimentation. Our approach constituted a dialectic process of analysis, building our scientific understanding on a dialogue between our emergent notions, and the officers own understanding of the context. This involved discussing our preconceived notions and adjusting our notions of the field according to these insights. Through the field work we built an understanding of selected aspects which

we then discussed in relation to theory (Eisenhardt, 1989; Bateson, 1972). We take a holistic approach on this experiment, but it is not an aim to cover all aspects of interaction. It is rather to single out what was typical and important features of the empirical context and discuss it within the frame of the complexity of the field.

There were several reasons for choosing this method. The complexity of the experiment which was in its essence exploratory rather than controlled did not permit a rigorous testing of hypotheses of causal relationships. Making detailed hypothesis could also have diverted our attention away from what could have been important in the setting. Working inductively gives openness to what emerged as important features of the context and necessitated a qualitative approach. This methodological approach also allowed following the traces that could lead us to new and interesting insights.

Such an approach needs to be grounded in empirical examples and our analytical claims demand a thorough description. Thus our analysis part describes in detail the examples on which our findings are based (Glaser and Strauss, 1967).

In essence this method permits to take into account the challenges as they appear in the actual context of human interaction. Such analysis can be the starting point for a process of reflection with practitioners and researchers on how to preserve or change ways of coordinating and communicating.

## **2.2 Theory**

Some of the general reasons for what hampers and facilitates communication and coordination are discussed in other research and relates to the challenge of different perspectives as well as the opportunities of mutual meaning making in turn taking and dialogue (Brodbeck et al., 2007; Clark, 1996). Differences in perspective and situation awareness can make it difficult for units and services to cooperate, as it makes it difficult to understand others work and information (Beckhy, 2003; Danielsen, 2008).

A perspective on the challenges of communication and coordination that has been useful in our empirical studies in the context of strategic international crisis management is knowledgementalities (Danielsen 2008). Knowledgementalities focus on the

institutionalization of knowledge in a professional context. A concept related to knowledgementalities is the notion of communicative genre which suggests that communication is structured according to the tasks they are sought to accomplish (Bakhtin, 1986). Both of these concepts provide insights on the constraints and possibilities of different perspectives and frames of reference.

We had these thoughts in mind when approaching this field study and were interested in the cultural and organizational mechanisms that made an importance both in terms of what constrained as well as what would facilitate communication, thus our research question was:

*What hampers and facilitate communication and interaction among units and services?*

This focus could be interesting as recent research suggests that surprisingly little research has been done on interorganizational coordination working in distributed conditions of which the experiment was an example (Ren et al, 2008). Given that we did not know what would matter as important constraints and facilitators in the actual experimental context we approached this research problem inductively.

### **2.3 Empirical context**

The experiment itself had a technical focus. The aim was to test and experiment with technical interoperability between the various information systems and communication protocols used by the Air Force, Army, Navy, Home Guard and Special Operations Forces during fictive scenarios. The operational ambition was increased situational awareness by improving tactical situational pictures as well as connecting sensors and effectors from different systems.

Units and services that had not cooperated earlier were brought together to perform common tasks. The tasks consisted of protecting national military bases using air, navy and land assets, as well as performing counter-terrorism tasks.

These characteristics of the experiment suggested that cooperation among services were an essential feature of the experiment. Investigating this cooperation was important and

possible. The scenarios also suggested the cooperation among heterogeneous and distributed actors as an important feature of the context.

### **3 Analysis**

This part elucidates those aspects which we found to hamper and facilitate communication and interaction during the experiment. The general aspects that seem to shed most light on this research theme are what we have defined as translation, verification and prioritization of information.

In the following we will discuss these aspects based on our empirical findings. It is important to note that the interaction we observed can be analyzed in different ways. What we do in our analysis is to focus on some aspects of interaction. These aspects are not hierarchically ordered, but rather represent parallel processes which sometimes affect each other.

#### **3.1 Translation**

If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat (Sun Tzu).

Translation in this context means to make information comprehensible across units and services. It concerns making information clear both linguistically, in coherence with procedures and in relation to the way joint activities are carried out. The examples clarify the fact that translation processes were carried out in different ways and in different contexts.

### **3.1.1 Simultaneous translation**

Translation was an important aspect of the communication in the coordination between ground based surface to Missile system (NASAMS) and the Frigate. In these kinds of joint operations, using Missile systems, there is always a liaison officer from the Navy present.

The Missile base (Air) and the Frigates (Navy) systems and terminology were quite different. The systems were configured differently and had different user interfaces. The role of a liaison is filtering and making the information understandable from the Missile system to the Frigate and vice versa, in other words translation. The translation and filtering happened more or less simultaneously, depending on the liaisons competence with regard to the Missile system and the Frigates terminology and procedures.

Translation worked well when done by a navy liaison who had participated in so called cross-training and had a course in “air language”. School practice does not happen systematically. One of the liaisons did not receive the same degree of cross-training and used more time on solving the translation task.

The officers working the Missile system and the ones onboard the Frigates had different terminologies and defined words differently – they had service specific communicative genre. One example is that the operators of the Missile system usually say “report birds” to designate a distinct weapons system, whereas the Frigate operators talk about “report sugar” for the same weapons.

The officers told us that the challenge was not only the differences in concepts and procedures, but also how the computer systems worked. Liaisons were placed close to the systems operated by the Missile system operators. Translations meant not only to relate information to language and terminology, but also to the physical appearance of displays and the computer systems.

The liaisons thus needed to be able to translate between several levels of navy and air “language”: terminology, specific use of procedures and different technological interfaces. In other words the liaisons ought to be “bilingual” at several different levels.



### **3.1.2 Translation of orders from a professional Army Battalion to a Home Guard unit**

A process which exemplifies another type of translation is a Home Guard unit's translation of orders. The orders were written in the format of professional Army Battalion who led the HQ of the whole operation. The Battalion are professional soldiers whereas the Home Guard is a unit composed of part-time soldiers so they have quite different status and competence. The professional Battalion, the Home Guard, as well as other land, air and navy assets, were cooperating in a joint scenario where protection of a base was central.

An officer from the Home Guard units headquarter told us that they spent lots of time translating these orders to the Home Guard units. We discussed this with the leadership of the Home Guard unit. They reflected upon how they could translate the orders from the professional Battalion so that their own unit could develop a comprehensive understanding of the operation.

The leader of the Home Guard unit emphasized that they tried to present the orders in such a way as it conveyed what role the Home Guard units had in the overall scenario, they translated the orders from English to Norwegian, as well as translated the orders from military terminology to civilian terminology.

The Home Guard forces are usually employed in civilian jobs. They do not know the military terminology as well as the personnel of the Battalion who have their focus on international operations. This necessitated the detailed translation. The leader of the Home Guard unit put it this way:

The others probably have a common language. Our challenge is that we have to start all over again in every exercise. The others have a focus on international operations. So it is understandable that they use English. English is the common language in international operations.

He added, however:

We receive an order and go through it with the platoon leader of the Home Guard. In this respect I must give praise to the *map* of the Battalion.

The map which is referred to was the kind where circles are placed on specific areas of the terrain indicating what should happen in that area according to the plan. The professional Battalion named these circles Areas of Responsibility (AoR). The map was not a “regular” map, but adapted to the procedures of the Battalion and their way of communicating orders. The abbreviation AoR was however not known for the Home Guard units and so the leaders of the Home Guard designated by hand what was important areas for the Home Guard. Another person from the Home Guard staff added:

I have never seen anything being presented so well, the intention is so clear for the whole scenario. We have to present a comprehensive understanding for our Home Guard units, and then the map is useful.

One of the Home Guard staff members had been employed by the professional Battalion earlier. Therefore he knew their concepts; he could translate them, and had started to give orders to Home Guard soldiers in ways similar to what they did in the Battalion. But he had adapted this procedure to Norwegian and made it easier to understand for “part-time” soldiers. The combination of Home Guard leader’s bilingualism and the map was useful mechanisms in the translation process.

In practice the Home Guard leaders used a lot of time reading through what they called a “massive load of information” from the Commander of the HQ, i.e. comprehensive and detailed orders. Even if the Commander’s brief was given to the unit leaders at a short meeting at 6 pm, the Home Guard was not finished translating the order until four hours later. The process of conveying the orders to the Home Guard units was a process involving four stages: Prior to the order meeting the Home Guard leaders had read through the written orders carefully, then they listened to the Commander’s brief, then they gathered to make clear what was essential take aways for their units, and then they finally briefed the Home Guard units. When they briefed the Home Guard units they allowed for clarifications and discussion of the meaning of the orders. They explained the orders using their local knowledge in Norwegian and using civilian terminology. They did not present all the information from the Battalion to everyone, but selected relevant information and prioritized to only communicate that information, such as focusing on this information by pointing on specific Areas of Responsibilities in the map.

This process resulted in a very good learning experience for the Home Guard units enabling them to contribute in the complex joint scenarios.

### **3.1.3 Translation attempts**

Not all kinds of translation worked equally well. Some times the translation was not completed, but the challenge as such became clearer through discussion and attempts at clarification.

One example was the lasting problem of coordinating radio frequencies between the professional Battalion and the Frigate. The main obstacle for solving this technical problem was that the Battalion and the Frigate had different terminology for setting up the frequencies and used different frequencies. These differences were not known thoroughly by the other unit before the operation started. During the operation this lead to confusion, although there were some attempts at clarification. Due probably to the high task load and the unclear responsibility for who should communicate and translate and make agreements on frequencies this problem lasted throughout the exercise. However being exposed to this challenge revealed a need for translation.

### **3.1.4 Awareness of a need for translating**

Awareness of a need for translation was present in the HQ. At the first night of the experiment, when the leaders of the units were gathered at the Battalion headquarter, to receive their orders, the Commander concluded in his inbrief by asking:

The key is to share information and achieve handover. That is our goal. We have used army language, is that ok by you?

All the leaders of the other services and units answered yes to this question. The Commander added:

To be honest: I don't know how we will communicate tomorrow, but the key is sharing: same situational picture and handover. Sharing information on the enemy is important.

This remark illustrates the focus on communication. It was an explicit focus of the leaders of the first inbrief. After that operation, the communication became an explicit question. In the aftermath of a scenario it was discussed why the Battalion and the Frigate did not enable sharing map coordinates. One of the officers in the Battalion asked the following question:

The Navy talk in lat/long?

The leader of the Battalion answered the question this way:

I suspect we have to adapt to the Navy. What frustrates me is that we do not find out how lat/long is converted. We have to communicate in the language which is comprehensible to our own forces.

This answer indicates a double set of problems concerning sharing map coordinates: technically the coordinates had to be transformed to the army system, and presented in a way familiar to the army (x and y coordinates). There is technology enabling translation between lat long and x y coordinates in place, but it was not utilized during the first days of the exercise.

### **3.2 Verification of information**

In addition to the importance of translation, verification of information emerged as an important phenomenon related to communication and interaction. Verification of information concerns developing trust in information through double checking information. It is both about checking the information received by others, as well as trust in others understanding of their own information.

One example which illustrates verification of information from others was the use of voice communication to ensure the correctness of map positions in the *Battle Management System* (BMS). The BMS provided the possibility for a common operational picture to be displayed on computers in both the Commanders HQ (composed mainly of personnel from the Battalion) and the Home Guard HQ. There were BMS terminals placed in headquarters

and vehicles and connected through a datalink. Interviews and observations in the Home Guard headquarter highlighted this. Personnel from the Home Guard Headquarter emphasized that the Battle Management System was a system they were not confident in. Because they were not trained in the use of the system: they had a need to know whether the positions in BMS were real. In order to ensure the correctness of the positions the operators in the Home Guard headquarter spent a lot of its resources on updating the BMS system manually. They did this through calling their units via radio.

This example can be an indicator that BMS did not work as intended and that the trust in the system was not particularly good. This may have been caused by the fact that the Home Guard had recently been introduced to the system, and had received little training in using it. In addition there were technical problems replicating the data from the Battalion to the Home Guard. The technological problems lead to even less trust in the system, and some of the officers became sceptical. The scepticism may have been caused by the expectation that immediate updating of information in the BMS was not fulfilled. The technical updating took more time and was perceived as more slowly than what was achievable through radio.

It was commented at different occasions that the radio was essential to gain situation awareness. It was reiterated that just by listening to the conversations on the radio one was able to gain understanding of the situation. The radio was established as a transmitter of information of high importance. Radio is a tool they trust, because they are trained to use it.

The fact that verification of information was a problem was evident in the remark by the Commander cited above from the order meeting. He wanted a confirmation that the army language was understandable. He did not unconditionally trust that he himself was understood.

This scepticism was also evident during the conduct of operations where one of the Battalion staff members walked to the Home Guard headquarter to make sure that the information going out from the Battalion to the Home Guard was properly understood. This was easy to accomplish as the headquarters were collocated, and underscored that face to face communication was valued even more than radio communication.

The main point in these examples seems to be that information from other units transmitted through new technology was not always trusted. It was indeed a need to communicate through well known media in order to verify information.

As with translation, verification of information concerned making other's information useful in one's own context and situation awareness. The difference from translation consisted in the fact that the uncertainty did not always concern differences in terminology, procedures and work methods but rather the format or the media by which the information was conveyed.

### **3.3 Prioritizing information**

A third aspect of communication and interaction was prioritizing information. This aspect concerned making judgements on and choosing which information was necessary for the conduct of own and others work.

Prioritizing information is exemplified by how the Commander led the operations. He pointed out the importance of prioritizing in order to make use of the information that was now technically available:

We need to define higher Commanders critical information requirements. It becomes even more important to analyze and prioritize this on beforehand.

Even though live video from different sensors was introduced in the headquarter we observed that work was done according to quite usual routines most of the time. The Commander had the focus on his role as a leader. They discussed that the new information sources got too much attention when displayed on a large screen, but this seemed to have been a temporary problem. In the HQ they discussed what kind of information to show on the different screens, in order to not focus too much on the live F16 video streams.

Introducing the army information to F16 pilots digital maps during a scenario where land and air cooperated constituted another situation in which prioritizing information became a critical issue. What kind of information was important to the pilot, became a point for discussion. In the headquarter the problems of sending all information to the F16 using the army's map scaling was discussed. The airplanes have larger range and much lower resolution in their maps than what the army uses in their maps, which resulted in all observations and blue force tracks cluttering the F16 pilot's computer screen. They told us it looked like a huge "chewing gum". It was neither useful nor important for the pilots to get all the available information – in fact it was counterproductive. Everyone, both sender and receivers of information, had to prioritize information. Otherwise they would overload the other services.

There was an explicit intention to prioritize information before operations, and it was also a focus during operations. It was a focus regarding actors from other services and it was a concern whether the other players were overloaded with information.

Prioritizing information was about whether one was able to provide the right information at the right time. It seemed to be a challenge to know what information to prioritize when they cooperated with new actors solving new tasks. In this respect prioritizing information do have similarities with translation and verification. Understanding the meaning of the others information in a new context are an important similarity. The resemblance concerns the problem of how to relate to answers to questions one has not asked. Prioritizing of information seems to be a distinct aspect of interaction however. It did not concern differences in terminology or language, or the usability of media, but rather whether information was useful in the conduct of one's work as such.

#### **4 Discussion**

This paper has described and analyzed what hampers and facilitates communication and coordination among military units and services in a NEC experiment. In particular these interpersonal processes were important facilitators:

- Translating
- Verifying information
- Prioritizing information

Differences in service specific terminology and procedures, lack of technological skills and difficulties of processing information were constraints.

Translation can be seen as a mechanism for clarification in situations where actors have different perspectives and different modes of knowledge, is supposed to share information. Carlile (2004) points out that translation is a necessary communicative process if it is not possible to transfer information in known ways:

When common lexicon sufficiently specifies the differences and dependencies of consequence at the boundary, the boundary proves "unproblematic"; the primary concern is one of "processing" or transferring knowledge across it. What is not always

acknowledged from such a perspective are the stable conditions that allowed a common lexicon to be created and to adequately function as common knowledge. (Carlile, 2004, s. 558)

The different military services and branches did not have a common lexicon. Daft and Lengel (1986) suggest that it might be a need for organizational structures and communication conditions that allows discussion in situations where the information is unclear. The liaison function exemplifies that specific need for translation is sometimes occurring unexpectedly and have to be dealt with ad hoc. It could therefore be important to see translation both as a process and a function related to organizational and cultural mechanisms allowing this mode of communication. Common vocabularies and procedures need to be developed but ambiguity as an inherent feature of language and variety of specialized units need to be taken into account when using a common lexicon. And common lexicon should include a dictionary of synonyms.

Verifying information suggests that information sharing using novel technology does not automatically give the users information they can trust. The problem of developing trust in a NEC context has been noted by several researchers and Gavrieli and Scott (2005) points to this challenge:

If we can study the ways in which the transactions themselves can be structured to enable trust and facilitate interactions in spite of a short history, some of these problems may be overcome. (Gavrieli and Scott (2005: 13)

It is an important question how trust can be an enabler for communication and coordination.

Our findings may contribute to our knowledge of how transactions are structured so as to enable trust. Voice communication ensured the officers not yet familiar with transmission of digital map data through a battle management system. Validating data by voice has also been identified as important by NOBLE (2007). Using multiple communication media allows for familiar ways of communicating and not solely relying on new media may enable trust in a military context.

Prioritizing information suggests that it is a challenge for the organization to process the information using new technology. Technology does not solve all cultural and interpersonal challenges. This was explicitly discussed during the experiment and priorities



made according to the task at hand. It should be noted however that increasing the capacity to process information may be important to allow for new type of information to be operationalized. This implies that the ability of processing information may increase if the requisite variety of the organization also increases (Weick, 1995).

Our analysis in summary suggests that the officers use local strategies to cope with, and take advantage of, the new technological possibilities. In the context we investigated interpersonal processes aimed at understanding, securing and prioritizing information were important. It is a challenge to develop new concepts, as documenting and describing what happened demands attention and a methodical approach. However such descriptions can prove to be important as a foundation for reflection and future development of the organization. Focusing on a thick description of the way the organization actually coordinated, their way of communicating, their organizational forms, their knowledge and their tasks should therefore be important in further research.

## **5 Conclusion**

The empirical findings of this paper may extend the understanding of the interpersonal processes involved in coordinating operations that are network enabled. In an environment where units with differences in knowledge mentalities and genre are brought together information cannot always be transferred directly. It also needs to be translated, trusted and new priorities for the information given.

Knowledge and skills in the different interpersonal processes could be important for coordination in military operations. Focus and processes directed at gaining a deeper understanding of concepts and procedures before operations are still necessary.

The interpersonal processes we have analyzed were important in this situation, but there is a need to emphasize that an empirical analysis should not limit itself to this focus in other operations. The changing demand of the operational environment poses different challenges for the organization and so a reflection on these new challenges should complement the processes we have described. The question is thus not only about most efficiently using the existing organization, but also about developing that organization so as to be able to adapt to the changes in the environment (Nagl, 2005).

There is a challenge to gain trust in new technology and cooperate with new units. This point was emphasized in an interview with officers from the operational headquarter coordinating the experiment who said the biggest challenge they faced were the human aspects:

*When the technology works we see more clearly the underlying cultural challenges among the services.*

Increasing the knowledge on how cultural and organizational challenges affect communication and coordination can therefore be a useful focus both for practitioners and researchers.

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