A socio-cognitive perspective on implementation and use of smart technology in the Norwegian home guard

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ABSTRACT

The Norwegian Defence Research Establishment (FFI) has developed a communications concept for the Norwegian home guard (HV). This concept, called "SMART" due to the emphasis on smart technologies, has been realized as a technology prototype on the Android platform. The concept includes blue force tracking, observation reports, and chat, and has been tested as an enhancement to the primary communications, which is voice radio. The prototype has been used in several field trials with HV.

This paper presents a qualitative study where the main purpose is to detect potential individual perceived barriers to using the SMART concept, and discuss these from a socio-cognitive perspective. Three semi-structured interviews were carried out with HV personnel. The data material was inductively analyzed and the results presented as "causal network". The results show four main interactions that explain potential perceived barriers to adopting the SMART concept in HV. These barriers are discussed from a solution-oriented perspective, and approaches to how the barriers may be overcome are presented. We argue that barriers imposed by technological factors can be mediated by employing appropriate social and organizational measures.

Keywords: Psychology, Situational awareness, Smart technology

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1. INTRODUCTION

At the Norwegian Defence Research Establishment (FFI) we are researching the *mobile complex*[1] for military use. In short, the technology aspect of the mobile complex is the eco-system arising around smart devices and the networks such devices utilize (e.g., the mobile Internet). In this paper, we explore the mobile complex from a socio-cognitive perspective.

In 2016, FFI conducted a Concept, Development and Experimentation (CD&E) project in collaboration with the Norwegian home guard (HV). The goal of the project was to investigate technological approaches to improving situational awareness on the individual soldier level. Due to the emphasis on civilian smart technology, the project was named "SMART".[2]

The main component of SMART was a map application where the user could obtain the positions of other users, and where observations could be reported in the form of images and text attached to locations on the map. The purpose of SMART was to leverage commercial smart technology, in the project exemplified by the smart phones using the Android platform, as a tool to enable individual soldiers to increase their situational awareness. The advantage of using commercial off-the-shelf (COTS) products was that one could get a low cost concept. Another benefit was that such technology is easy to use with a minimum of training.

The primary target group for SMART was the area forces in HV as these, due of the high number of personnel and limited time for training, could particularly benefit from such a concept. During the course of SMART, FFI tested different types of Android devices that were acquired and handed out to the participants in the experiments. Although SMART was intended only to support unclassified information exchange, it was desirable that the information should be protected well enough for users to have confidence in the concept. Hence, the concept was described as "trusted unclassified" since we applied a number of techniques to ensure confidentiality of the data, the most important being implementing our own map and positioning algoritm to avoid data leakage, as well as leveraging Virtual Private Networking (VPN) for integrity and confidentiality of communications between Android devices and the server.

It is worth noting that the SMART prototype served as a supplement to the primary communications channel (voice radio), and that the Android devices were not evaluated as a voice channel, but rather as a data carrier to automate information sharing; e.g., positions and observations of the forces. Using good applications (apps) was important to ensure ease of usability. So, in SMART we used a combination of third-party apps (for functionality where good apps existed, e.g., for VPN and Chat) and developed our own app for the functionality that could not be covered by third-party apps (e.g., blue force tracking and incident reporting tool aka the Communication Application with Geographical Element Data (CAGED)). See Figure 1 for the system architecture.

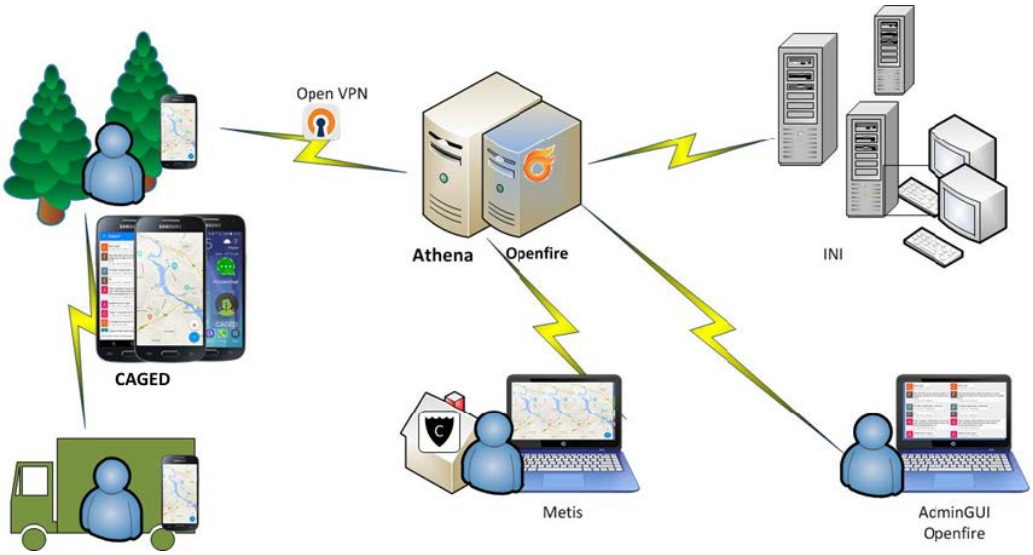

Figure 1. SMART prototype architecture: CAGED (app), Athena/Openfire (server), Metis (Web controlpanel).

We performed several experiments with the SMART concept prototype in 2016. Data gathered from operational experiments show that there is operational benefit from using the Android phone with selected apps as a tool.

In 2017, following the SMART project, the prototype app was improved in several areas. Improvements to CAGED included a simplified and more intuitive user interface, better maps and an optimized GPS algorithm.[3] This new, improved version was used for a follow-on CD&E project in 2018 (called "SMART II"), and it is also the technology foundation for the study of the psychological perspective on using smart technology in HV that we discuss in this paper.

The remainder of this paper is organized as follows: Section 2 provides an empirical and theoretical background of the present study, presenting previous research on the SMART concept and relevant literature on human-technology interaction. Section 3 presents the framework of the present study, including research questions and aims, and a description of the research design and methodological considerations. Section 4 gives a brief overview of the results, presented as a model of interacting technological and socio-cognitive factors. In section 5, the results are discussed from a psychological point of view. Finally section 6 gives some concrete suggestions for further development or implementation of the SMART concept, in addition to concluding the paper.

2. BACKGROUND

During the prototype experimentation in 2016, a survey based study was conducted to outline the HV soldiers' expectations, experiences and attitudes to SMART.[2] The survey was based on the theoretical and behavioral cognitive models "Unified Theory of Acceptance and Use of Technology" (UTAUT) and "Technology Acceptance Model" (TAM). Included in these models are several variables targeted at attitude and motivation as to why individuals choose to, or choose not to, use new technology. Such variables are "perceived usefulness", "user satisfaction", "information quality" and "system quality". Jointly these variables are found to correlate with observed behavior during implementation of new technology systems. The model subsequently predicts actual technology usage.[4,5]

The study in 2016 concluded that the HV soldiers are predominantly positive and favorable to SMART.[2,6] In spite of this, the results also showed a contradicting relationship between attitudes and actual behavior. While most people stated they perceived the concept as useful, only a few reported they actually used the prototype during the experimentation period to report observations.[2] In order to understand this, one might analyze what explanatory factors are being, or not being, accounted for.

Both UTAUT and TAM are criticized to overlook important socio-cognitive factors when explaining why some people adapt to and use new technology, whereas others do not. Firstly, they partly view the individual as a single and isolated user of the technology system, neglecting situations where the technology platform serves as a social network for several people to cooperate. Several studies,[7] found social cooperation to be a factor contributing to explain the use of new technologies. Secondly and finally, UTAUT and TAM have been criticized for using a limited understanding of the concept of human risk perception. Subsequently they have not been able to fully account for its potential effects on information sharing on technological platforms.[8] Questions related to risk perception were indeed included in the survey in 2016 by asking for different reasons as to why HV personnel chose to not share information via the CAGED app. This is a reason based and rational way of understanding risk perception. From a psychological perspective, risk perception is additionally linked to automatic, and often unconscious emotional response systems, making risk behavior not as rational as we might believe.[9,10] Based on this brief theoretical overview, there is evidence to claim there might be more variables to be accounted for to get a fuller picture of attitudes and behavior regarding smart technology in HV.

3. OUR STUDY

3.1 Study aims

The main target of this study is to detect and explain potential individual perceived barriers to use SMART among the HV personnel. This is in order to understand why the HV personnel seems reluctant to use SMART

in spite of favorable attitudes, and consequentially bridge the gap between the reported attitudes and behavior. Based on the points in section 2, it might be desirable to broaden the scope of factors to consider, in order to explain this relationship. The aim is not to present an exhaustive explanatory framework, but rather to identify new factors not previously being accounted for. In order to do so, an exploratory and inductive approach is being used. Potential individual perceived barriers to using the SMART concept are being understood by analyzing how different factors that hinder and promote the motivation to use SMART interact. Further, the findings are discussed in a solution oriented perspective that might benefit further development of the SMART concept.

Based on the previous theoretical discussion, this study is designed around three overall research questions:

1. Are potential individual perceived barriers to use SMART rational and realistic?
2. Do barriers to using SMART emerge from technological or socio-cognitive and organizational factors?
3. What causes variation in attitudes to using the SMART concept among the HV personnel?

3.2 Methods

3.2.1 The participants

A total of seven participants were recruited via the HV Training Centre ("Heimevernets skole- og kompetansesenter (HVSKS)"). It was desirable to include participants to represent both the immediate first impressions of the concept as well as experience based opinions. Therefore, two of the participants were familiar with SMART and had already tested the different apps during the prototype experimentation, whereas the remaining five had no knowledge or experience with SMART. In order to cover a range of perspectives, all the participants were of different military background, rank and position. Jointly the participants represented both the HV area forces and the rapid-reaction intervention forces, as well as training officers and personnel at HVSKS. Service time in HV varied from two to ten years, whereas service time in other military branches ranged from three to 25 years. There will be no further descriptions of the participants due to ethical considerations. All participant were informed about the implications of the study before consenting to participate.

3.3 Data collection

Semi-structured interviews were conducted by Karud on 28 June 2018. The seven participants were divided into three groups, making three group interviews based on three, two and two participants respectively. The interviews were structured as a conversation between the participants, guided by the interviewer. Before each interview, Johnsen gave a short (ten minutes) conceptual and technical introduction to the SMART II project. This was followed by a practical demonstration of the prototype solution, where the participants could try out the different apps. Johnsen was also present during the interviews to answer any questions related to technology.

An initial interview guide was developed based on relevant literature, and the results from the previous studies of the SMART concept.[2,6] The interview guide contained 10-15 questions based on the "Strengths, Weaknesses, Opportunities and Threats" (SWOT) format. The purpose of SWOT is to guide the informants to evaluate different issues from a positive-to-negative perspective.[11] This format was thought to ensure a balanced discussion between factors that could hinder and promote the use of SMART. The conversations diverged from the interview guide where the participants introduced other relevant topics. The interviews lasted between 45-90 minutes. The interviews were recorded, and later transcribed to text.

3.3.1 Analysis

We conducted a qualitative analysis from a positivist/realist paradigm, based on a combination of two different methods. Initially the data was coded using an inductive thematic analysis.[12] This method enables a broad and exploratory approach, without being restricted by previous literature and theory. The data was coded and themed by an iterative reading of the interviews.[12] Whilst in the late stages of the coding process, we applied a second analysis method, the causal network case-oriented analysis.[13] The causal network analysis ties together discrete codes or themes into a meaningful pattern by analyzing how the themes function as dependent and independent variables that interact. This method is beneficial to use in complex situations because it visualizes

the deterministic relationship between factors in an intuitive way.[13] The causal network analysis was conducted to enable us to not just detect, but also explain the potential barriers to using SMART. A total of eleven interacting themes were extracted from the data. An overview of isolated themes and sub-themes is provided as an appendix to this paper. The interviews and analysis process were conducted in Norwegian. The results and the raw material provided in this paper were translated to English from the original data material.

3.3.2 Methodological limitations

The extraction of themes was performed solely by Karud. In addition, and due to a restricted time frame, all the interviews were conducted on the same day. Together, this hindered a proper triangulation and iteration between the data collection and analysis. In order to compensate for this, Karud and Johnsen (with backgrounds in general psychology and informatics, respectively) discussed and re-evaluated the interview guide between the interviews.

4. RESULTS

4.1 Interpretation of the model

Figure 2 visualizes the eleven themes and their interconnected relation. Isolated, each theme adds a positive or negative motivational value for the HV personnel to use or not use SMART. The themes are marked in different colors. Green themes promote, while red themes hinder the motivation to use SMART. According to the causal network analysis method,[13] the inter-thematic relations and causal directions are illustrated with arrows. A green theme can reinforce the positive value of another green theme or reduce the negative value of a red theme. Similar, but opposite for red themes. The arrows also illustrate whether a theme primarily is caused by the SMART concept or HV. The model is divided into four "tracks" of causal relations and interactions. These are separated by the grey, horizontal dashed lines. This is primarily to highlight the relations of most theoretical and practical interest. The results are then discussed from a psychological perspective according to these main tracks from top to bottom, as visualized. An in-depth description of the eleven themes is provided in the appendix to this paper.

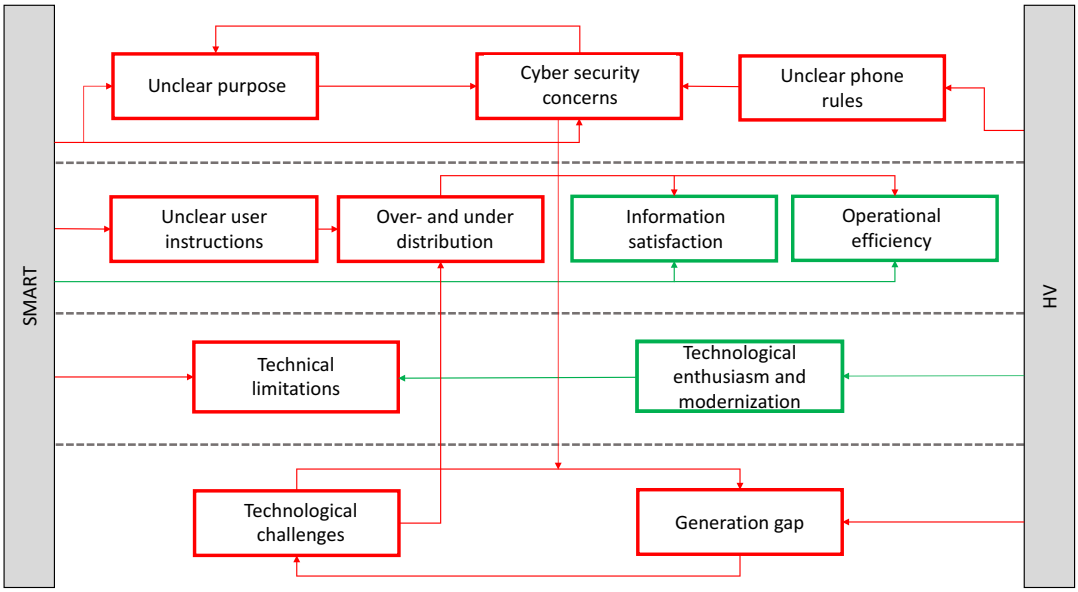

Figure 2. Results: The extracted eleven themes visualized in a causal network

5. DISCUSSION

5.1 Enhanced cyber security concerns

The first main track of themes shows three negative motivational values. The first two are linked to the SMART concept. The HV personnel is experiencing an "unclear purpose" of the SMART concept, and enhanced "cyber security concerns" towards using it. The theme "unclear purpose" includes a confusion regarding when and in what situations SMART is to be used. "Cyber security concerns" covers by and large factors that compromise information security, such as fear of hacking, tracking and espionage. These two themes function as mutually reinforcing. This is illustrated by one of the informants:

> "You could include something about the purpose and intention with ... the areas of use. 'Cause I was thinking like ... this is useless because of the signals, the phone is always left at home anyways. But you mentioned it's trusted unclassified, which is basically the same thing as unclassified. That sets the bar for areas of use."

The interaction between "unclear purpose" and "cyber security concerns" could be explained in the light of how the psychological concepts of perceived benefit and risk perception of a technology is linked. From an objective perspective, the benefit of using SMART and the following risk regarding information security, varies more or less as independent measures. For instance, the CAGED app can ease the flow of communication between HV personnel in a range of different operational settings *regardless* of any possible situations where the technology may serve as a threat to information security. From a cognitive perspective, perceived benefit and risk perception is often negatively correlated.[9,10] It is found that by enhancing perceived risk of technology, our perception of benefit is lowered. Similarly, by altering perception of benefit to be greater, we regard the technology as of lesser risk.[14] This negatively correlating relationship is driven by an affective component, independent of rational judgment and central for our overall motivation to use a specific product.[10] In this case, such an affective component could possibly be the fear and concern derived from both the "unclear purpose" and "cyber security concerns", ultimately enhancing the perceived risk and debilitate the perceived benefit. This is not to undermine possible and critical technological caveats of the SMART concept, but rather highlight the probable positive effects of clarifying the purpose of the SMART concept and the following areas of use.

The third theme is associated with HV and is called "unclear phone rules" and negatively enhances "cyber security concerns". This theme covers a great variation in attitudes, opinions and actual behavior, when it comes to the use of cell phones both in missions and training missions. One informant explains:

> "You know, whether we're on a mission or training, people wear their phones anyway. We use phones quite often actually, to talk to the squad commander and so forth."

Another informant says:

> "When it comes to security on training, well, they are using the phone. That's obviously not good, but they don't have any other option, so you're stuck. You could excuse this by arguing it's just training, but it's not a good way to prepare for a mission."

A third informant adds:

> "Others (officers) confiscate the phones before practice because of that security thing."

One could argue that an unclear set of guidelines or rules allows for the HV personnel to make individual judgments, have different experiences and attitudes regarding when to use or not use the cell phone. Subsequently judgments of risk and benefit could also, to some extent, become individual. This could further create an uncertainty and reinforce concerns regarding information security ("cyber security concerns"). We propose that making clearer rules for the use of cell phones both under training and missions could reduce "cyber security concerns".

The interaction between the three themes in the first main track contributes to answer research question 1 "Are potential individual perceived barriers to using SMART rational and realistic?" and 2 "Do barriers to using SMART emerge from technological or socio-cognitive and organizational factors?". Regarding research question 1, it is possible that the perception of an unclear purpose of the SMART concept among the HV personnel, and also unclear regulation of phone use in HV, emphasizes uncertainty and doubt regarding the security of using SMART. It could be that this is impeding a cognizant way of perceiving the potential benefits of the SMART concept, hence hindering the motivation to use SMART. This issue may also answers question 2. The motivational barrier is clearly a compound of technological, and socio-cognitive and organizational factors. As for question 3 "What causes variation in attitudes to using the SMART concept among the HV personnel?", we can attribute this to what the informants call "unclear rules for using the phones", which again leads to uncertainties in using the SMART protype as a communications tool.

5.2 User guidelines and distributed cognition

The second main track of themes shows that the SMART concept leads to positive "information satisfaction" and "operational efficiency". "Information satisfaction" implies that the HV personnel perceive the CAGED app to create a lower threshold, and an increased motivation to share information. Thus, it simplifies planning, assessment and decision-making with more base information. The most important aspect of "operational efficiency" is that the HV personnel experience that the CAGED app leads to a faster and more coherent and shared situational awareness, and better team work and planning. On the other hand, the HV personnel regard the SMART concept to have "unclear user instructions" that subsequently leads to "over- and under distribution" of information via the different apps. These two themes are negative. "Unclear user instructions" covers a general uncertainty as to what kind of information that should be shared via CAGED or the other apps. "Over- and under distribution" points primarily at the three following problems: First, the information being shared via CAGED or Chat is occasionally non-relevant to the operation, such as useless chatting. Second, the HV personnel report to sometimes being reluctant to share important information, because they are uncertain about whether e.g. a specific observation in fact is useful for other squad members or not. Thus, information is being held back and the distributed information is not sufficient enough to build a satisfactory situational awareness. Third, the uncertainty leads the HV personnel to doubt the validity of other people's observations. The negative effects of "unclear user instructions" and "over- and under distribution" leads to a poorer "information satisfaction" which further impedes "operational efficiency". Three of the informants illustrates this issue. One of them says:

> "Wow, this is brilliant, you get the picture in the background to do reconnaissance, measure distances ..., the live tracking and so forth. In that sense this tool is genius."

Another adds:

> "But there has to be some rules regarding what I can share. If not I would be very insecure to share anything at all, if everyone could see it."

The third informant argues:

> "But this is kind of twofold, because on the other hand we struggle to make people, say, apprehensive enough, to make them report enough observations ... This could be fixed by for instance establishing a command post to filter out irrelevant observations ... If so, this platform would definitely lower the threshold to report observations (in comparison to ordinary voice radio)."

Regarding interpretation of information validity the first informant says:

> "A lot of the reported stuff (during the prototype experimentation) were things you didn't really trust, and at that point we were about 40 men. So, if we were, say, 150 men, I would be really skeptic about everything popping up on CAGED."

It is both intuitive and understandable that that "over- and under distribution" of information could make the SMART platform a insufficient aid for situational awareness. "Unclear user instructions" could, as mentioned, lead to uncertainty, individual decision-making and judgments of informational importance, or an overall reluctance to share information. In addition, there could be an interpersonal and damaging effect of the requirement to make individual decisions. Dominating research and theory on shared situational awareness and effective communication often regard the quality of collaboration from a "distributed cognition"-perspective.[15] This perspective emphasizes how we regard and value information that is distributed or part of a shared system. Creating a common set of rules for information sharing, makes all participants evaluate information in the same manner. This could reduce reluctance to share observations. Another, and just as important aspect of the benefit of a common set of rules, is that it alters how we evaluate the information other participants share. A prerequisite for a shared and common situational awareness is that every participant interprets the significance of information the same way. If a set of rules also clarify the purpose of the information that is being shared, it emphasize our trust in the information we receive.[16]

The second main track of integrated themes is especially relevant to research question 2 "Do barriers to using SMART emerge from technological or socio-cognitive and organizational factors?" It is probable that "over- and under distribution" and "unclear user instructions" is not a result of the technology itself. Rather, it is most likely a cognitive and organizational phenomenon due to an insufficient framework of rules for using CAGED and the other apps.

5.3 Problem solving at technical limitations

The third main track consists of the negative theme "technical limitations", that could be directly drawn from the technological design of SMART, and the positive theme "technological enthusiasm and modernization", which is tied to attitudinal factors in HV. Several informants raised their concerns about different "technical limitations" of the SMART concept. This includes low battery capacity, limitations of network coverage, the fact that you cannot share classified information via the different apps and that the cell phone is easily destructible. In another aspect, most of the participants expressed that HV, for the past couple of years, has been going through a phase of modernization. This has been defined by younger personnel and more positive views on the introduction of new technology in their work. Overall, this seems to promote commitment and work engagement among the HV personnel. It seems like this modernization generates a collective eagerness to facilitate the integration of new technological tools into the work in HV. This is illustrated by one of the informants:

> "You could also include a compass with degrees, or integrate a live route planner or a time estimator ... Or a notebook function? ... And you could upload all the different protocols that we have in these paper pamphlets ... I could probably come up with another 100 different ideas on functions that could be beneficial (to integrate in the SMART prototype)."

It may also be that this leads the HV personnel to adapt a positive and solution oriented attitude when facing technical limitations. Several of the informants came up with different solutions to meet technical limitations, such as using power banks and docking stations in the vehicles to counter limited battery capacity, or including an insurance plan to cover costs of damage to the phones. In this way, "technological enthusiasm and modernization" reduces the negative effect of "technical limitations".

The effect of the themes "technical limitations" and "technological enthusiasm and modernization" could help answer research question 2. "Do barriers to using SMART emerge from technological or socio-cognitive and organizational factors?" It is apparent that the "technical limitations" are fundamentally technical barriers. On the other hand, it might be that these technical barriers to using SMART are being softened by "technological enthusiasm and modernization", which could be defined as a socio-cognitive and organizational factor.

5.4 Generation gap and technological challenges

The fourth and last main track consists of two negative, interacting and mutually reinforcing themes — "technological challenges" and "generation gap". "Technological challenges" comprises specific and unforeseen technical errors that were present during the previous prototype experiments, such as server overload. The theme also

includes different difficulties of getting used to unfamiliar technology. The latter point being related to general technological inexperience. The theme "generation gap" is referring to a considerable age variation among the HV personnel which creates an age related gap primarily in two main areas: Older HV personnel have less technological competence and are less favorable to the idea of integrating smart technology into the existing practises and work routines in HV. As mentioned, it seems like the two themes are mutually reinforcing. Firstly, age related differences in general technological competence affects how each individual works out ways of tackling unforeseen technological challenges, such as server overload. Subsequently, technological errors in SMART emphasize an age related contrast in the practical use of CAGED and the other apps. Whereas some try to work around an obstacle, others choose to discard the SMART concept in favor of the usual communications system (voice radio). Second, due to either software issues or lack of general technological competence, some of the HV personnel have had troubles mastering CAGED and the other apps in a productive and time efficient way. It appears that technological challenges like these reinforce already existing negative attitudes to the implementation of new technology. This reinforcement is most apparent in older HV personnel, thus boosting a generation gap in attitudes. Several of the informants illustrate parts of these issues:

> "It could be difficult because people in HV range from about 19 to 45 years, it's usually the older guys who struggle with the technology."

A second informant says:

> "If you could trace back to the main cause of the negative attitudes, I think you would find those unfortunate technological issues."

A third informant adds to the second:

> "... But we don't have that much time to learn to use new systems, it needs to be intuitive. We cannot afford to fumble around with it."

The second informant continues:

> "But eventually you'll have a new generation in HV, there are coming more and more young people who are born with a phone in their hand. They are used to a totally different, and far more digital way of communicating than the older generation. They have a more open and proactive mindset, in addition to having more competence."

It is worth noting that some of the informants argue that "age related" negative attitudes could be reduced by highlighting the potential benefit of mastering CAGED and the other apps of SMART:

> (On people who find SMART difficult to use, and what could be done) "They should be presented the benefit in an adequate way, that they understand the purpose behind, and what you could expect to get out of it. I think that's all it takes, really."

The interaction between "technological challenges" and "generation gap" provide answers to research question 2 "Do barriers to using SMART emerge from technological or socio-cognitive and organizational factors?". It is obvious that the "technological challenges" are inherently a technological barrier. At the same time, these challenges might be reinforced by personal attitudes and previous experiences. The interaction between these themes is also related to research question 3 "What causes variation in attitudes to using the SMART concept among HV personnel?". The "generation gap" emphasizes a division, not just attitudes to the implementation of technology, but also to what extent the individual is willing to use it.

6. CONCLUSION

The purpose of this study was to find new factors to explain potential barriers to using smart technology as a tool for increasing situational awareness, as perceived by the individual. This was because previous surveys evaluating the SMART concept and prototype showed that attitudes towards using SMART did not correspond with actual use in prototype experiments during different training sessions. Whereas most HV personnel were generally positive, several reported not using the SMART prototype.[2] We propose that the results of this study could help bring understanding to why this attitude-behavior gap occurs.

We created a model divided into four tracks of causal relations and interactions. In the first and second main track, the thematic interactions revealed that positive and favorable attitudes were weakened by the lack of organized and clear regulations for using SMART. In track one, this is attributable to the specific situations where SMART is appropriate to be used. Track two points to how communication at an inter-personal level should be organized. In both cases, the lack of guidelines seems to accentuate reluctance, doubt and ambivalence when is comes to practical use. Tracks three and four issue mainly technological challenges that could be burdensome and hinder the use of SMART in an efficient way. While track three points out that positive and forward thinking attitudes could ease these perceived challenges, track four highlights that positive attitudes do not vary randomly, but are mediated by age related experiences and mindsets.

It is important to not undermine possible technological caveats of the SMART concept that could be critical to informational and operational security. But to study an issue from an interactional point of view provides the opportunity to approach the issue from different angles. In this case, both technological or socio-cognitive and organizational factors. The results in section 4 show that most barriers to using the SMART concept, as perceived by the individual in HV, either occurs as, or are being mediated by socio-cognitive or organizational factors. Based on the discussion in section 5, we suggest promoting a clear and coherent framework of the purpose, expected benefits, user instructions and user regulations of the technology. Although this framework could be tentative and experimental, it should be provided to the HV personnel at an initial introduction of the SMART concept and *before* any practical use integrated in realistic settings. Several of the informants pointed out that such guidelines must be developed within HV. The goal should be to create a shared understanding of the intentions and use of smart technology in every specific situation. As one of the informants says: "I think that is all it takes, really".

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APPENDIX - EXHAUSTIVE LIST OF THEMES AND SUBTHEMES

Unclear purpose

- When and in what situations should CAGED and the other apps be used.
- At what point does it transition from supplementing to replacing radio communication systems.
- Clarify the necessity of the system.
- Fear of losing the human aspect during operations.
- Fear of losing basic competence.
- Inexpedient to use CAGED during exercise, only for exercise.
- Possible areas of use for CAGED includes, guerrilla warfare, terror, emergency situations, military deployment and reconnaissance.

Cyber security concerns

- Fear of surveillance.
- Fear of hacking from third-party software.
- Fear of tracking and wiretapping.
- Fear of getting dependent on vulnerable and unstable systems.

Unclear phone rules

- Some use the phone during exercises even though it is not allowed, since it is only an exercise.
- Some confiscates the phones.
- Some consider the need of phones to be greater that the perceived risk.
- Some take it for granted that the phone will be used both during exercises and missions.

Information satisfaction

- The individual gets better situational awareness.
- CAGED creates a lower threshold, and increased motivation for sharing information.
- Simplifies planning, assessment and decision-making with more base information.
- CAGED creates a more efficient information flow.
- Information gets more specific due to the visualisation in CAGED, this decreases misunderstandings.

Operational efficiency

- Visualisation of observations increases the situational understanding.
- CAGED has an intuitive and user-friendly interface.
- CAGED creates a common understanding of the situation.
- CAGED creates more accurate planning.
- CAGED creates faster situational updates.
- CAGED increases cooperation between and within squads.
- SMART prototype needs little training in apps and functions.

Unclear user instructions

- Uncertainty about what information that should be shared on CAGED and one does not know how many the information is being shared with.
- Uncertainty about what information channels different information should be distributed to (area, logistics etc.).
- It feels unsafe to distribute information with a lot of people.
- Skepticism to the validity of other users observations.
- Different combat units need different rules for communications on the different channels.
- Instructions for the use of CAGED need to be made.
- The development of user instructions for CAGED and similar apps need to be centralised in HV.
- It must be prevented that the system is used as a chat group.
- Fear of more chit-chat if SMART is given to every individual.

Over- and under distribution

- Misinformation and unnecessary information can hinder performance during operations.
- Under-sharing due to fear of sharing unnecessary information.
- Irritation due to others sharing unnecessary information.
- Chat and CAGED becomes a distraction when users over-share unnecessary information.

Technical limitations

- Low battery capacity.
- Coverage limitations.
- You cannot share classified information via apps.
- The cell phone is easily destructible.

Technological enthusiasm and modernization

- Positive that HV has been given more equipment the previous years.
- Access to new technology engage and motivates for extra commitment and work.
- HV are going though modernization in different areas.
- Proactive and solution-oriented attitude to new technological dilemmas.
- Easy to see the pros of using the system.
- SMART is a symbol of progress in HV.

Technological challenges

- Hard to utilize unknown cell phones during exercises.
- Fumbling around with cell phones can be distracting.
- Inaccurate positioning.
- Overloaded server.
- Hard to readjust to new technology.

Generation gap

- Large differences in views on technology.
- Large differences in experience and familiarity with technology.
- The generation gap represents an indispensable, but positive change in HV.
- Passive attitudes to the generation gap.