Technical Report 1099

Identifying Conceptual Skills of Future Battle Commanders

Shawn A. Noble
Kansas State University
Consortium Research Fellows Program

Jon J. Fallesen
U.S. Army Research Institute

March 2000

United States Army Research Institute for the Behavioral and Social Sciences

U.S. Army Research Institute
for the Behavioral and Social Sciences

A Directorate of the U.S. Total Army Personnel Command

EDGAR M. JOHNSON
Director

Technical Review by

Herbert F. Barber, Army War College
Robert E. Solick, ARI

NOTICES

DISTRIBUTION: Primary distribution of this Technical Report has been made by ARI. Please address correspondence concerning distribution of reports to: U.S. Army Research Institute for the Behavioral and Social Sciences, Attn: TAPC-ARI-PO, 5001 Eisenhower Ave., Alexandria, VA 22333-5600.

FINAL DISPOSITION: This Technical Report may be destroyed when it is no longer needed. Please do not return it to the U.S. Army Research Institute for the Behavioral and Social Sciences.

NOTE: The findings in this Technical Report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

REPORT DOCUMENTATION PAGE

1. REPORT DATE (dd-mm-yy)	2. REPORT TYPE	3. DATES COVERED (from. . . to)
March 2000	Final	March 1998 - February 2000

4. TITLE AND SUBTITLE	5a. CONTRACT OR GRANT NUMBER
Identifying Conceptual Skills of Future Battle Commanders	5b. PROGRAM ELEMENT NUMBER 62785
6. AUTHOR(S) Noble, Shawn A. (Kansas State University) and Fallesen, Jon J. (U.S. Army Research Institute)	5c. PROJECT NUMBER A790 5d. TASK NUMBER 1141 5e. WORK UNIT NUMBER HO1
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences ATTN: TAPC-ARI-RK 5001 Eisenhower Avenue Alexandria, VA 22333-5600	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences 5001 Eisenhower Avenue Alexandria, VA 22333-5600	10. MONITOR ACRONYM ARI 11. MONITOR REPORT NUMBER Technical Report 1099

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT *(Maximum 200 words)*:

This research was conducted to support the U.S. Army Research Institute-Fort Leavenworth Research Unit's ongoing DEVCOM program (Developing Commanders for the Future Battlefield). Specifically, this research was designed to supplement previous work done in the development of battle commanders' conceptual thinking (Fallesen, in preparation). The overall goal of this research was to identify, organize, and clarify examples of the conceptual skills that are important to the development of future battle commanders. Three data collections helped to develop a conceptual skills model called the S^3 (Situation Understanding, Simulation, Self-regulation). The S^3 Model helped to filter previous lists by separating task specific Conceptual Skills ("what to think") from those conceptual skills centered on general aspects of thinking ("how to think"). Of all the data collected, the most useful information was found by considering the inconsistencies between importance ratings and personal/historical examples. Inconsistencies were found where officers would rate non-traditional conceptual skills low on importance, yet they would provide an example of where possessing such a skill was essential. In general, officers were unfamiliar with conceptual skills that are directly represented in tactical decision making procedures or the estimate of the situation.

15. SUBJECT TERMS

Conceptual Skills | Battle command | Self-regulation
Situation Understanding | Human performance

SECURITY CLASSIFICATION OF			19. LIMITATION OF ABSTRACT	20. NUMBER OF PAGES	21. RESPONSIBLE PERSON (Name and Telephone Number)
16. REPORT	17. ABSTRACT	18. THIS PAGE			
Unclassified	Unclassified	Unclassified	Unlimited	69	Jon Fallesen (913)684-9796

Technical Report 1099

Identifying Conceptual Skills of Future Battle Commanders

Shawn A. Noble
Kansas State University
Consortium Research Fellows Program

Jon J. Fallesen
U.S. Army Research Institute

Fort Leavenworth Research Unit
Stanley M. Halpin, Chief

U.S. Army Research Institute for the Behavioral and Social Sciences
5001 Eisenhower Avenue, Alexandria, Virginia 22333-5600

March 2000

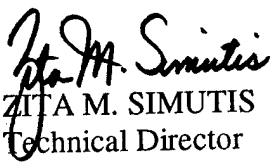
Army Project Number
2O262785A790

Personnel Performance and Training Technology

FOREWORD

The Fort Leavenworth Research Unit of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) has been actively involved in an ongoing program for Developing Commanders for the Future Battlefield (DEVCOM). The DEVCOM program has led to the advance of three complementary research approaches, deliberate practice, critical thinking, and self-insight, which all serve to provide a better understanding of conceptual thinking.

The research contained in this document was conducted to identify the key conceptual skills that future battle commanders should possess. Three studies were conducted to help identify, organize, and clarify conceptual skills. Data collected in the studies led to the development of a conceptual skills model, called the S^3 Model, that suggests three main categories of conceptual skills: Situation Understanding, Simulation, and Self-regulation. Results show that officers recognize the importance of traditional conceptual skills, but often do not recognize the relevance of those skills that are non-traditional. Findings have been coordinated with the Battle Command Battle Laboratory and the Center for Army Leadership where they have been used to direct the subject matter of leader development programs.



ZITA M. SIMUTIS
Technical Director

IDENTIFYING CONCEPTUAL SKILLS OF FUTURE BATTLE COMMANDERS

EXECUTIVE SUMMARY

Research Requirement:

This research was conducted to support the U.S. Army Research Institute-Fort Leavenworth Research Unit's ongoing DEVCOM program (Developing Commanders for the Future Battlefield). Specifically, this research was designed to supplement previous work done in the development of battle commanders' conceptual thinking (Fallesen, in preparation). The overall goal of this research was to identify, organize, and clarify examples of the conceptual skills that are important to the development of future battle commanders.

Procedure:

The data collection took place in three separate stages. Stage 1 took place at Fort Drum, New York, Stage 2 was at Fort Bragg, North Carolina, and Stage 3 was at Fort Hood, Texas. All three data collections were conducted to try to identify conceptual skills that are important for future battle commanders.

The research in Stage 1 was purely exploratory. Fifteen officers were asked to help organize, clarify, and "green-up" a list of conceptual skills by providing importance ratings and skill descriptions. In addition, group and individual interviews were conducted to gather further insight on the topic of adaptive, flexible leaders.

Stage 2 was conducted to further develop and refine a list of conceptual skills that was derived from a data categorization model. This new list of conceptual skills was less task specific and more centered on aspects of thinking. In addition, skill descriptions were made more "user-friendly" by using terminology that is familiar to military officers. Twelve officers were asked to help organize, clarify, and further "green-up" a list of conceptual skills by providing importance ratings and skill descriptions. In addition, the officers were also asked to provide personal or historical examples of each skill as well as insight to ways in which each skill might be developed.

The format used in Stage 3 was identical to Stage 2 except for two major changes. One change is that the list of conceptual skills used in this study was derived from consideration of a conceptual skills Model called the S^3 (Situation Understanding, Simulation, and Self-regulation). The second change is that the total number of skills presented to the participants was cut almost in half. This was done to reduce the effects of workload. In order to cut the list down, only a sample of the sub-components, from each internal process, was presented to the officers.

Findings:

In sum, Stage 1 was a broad-based research attempt that served as a guide for future data collections. The significant finding from this study was the development of a categorization model that could be utilized to better shape factors related to conceptual skills. Furthermore, the data from Stage 2 helped to further develop a more tightly defined conceptual skills model called the S^3. The S^3 Model helped to filter previous lists by separating task specific conceptual skills ("what to think") from those conceptual skills centered on general aspects of thinking ("how to think").

Of all the data collected, the most useful information was found by considering the inconsistencies between importance ratings and personal/historical examples. Inconsistencies were found where officers would rate non-traditional conceptual skills low on importance, yet they would provide an example of where possessing such a skill was essential. In general, officers were unfamiliar with conceptual skills that are not directly represented in tactical decision making models or in estimates of the situation.

Utilization of Findings:

The findings suggests that the S^3 Model, or an alternative model, be used as an aid for explaining the importance of conceptual skills to officers in the future Army. Utilizing a cognitive model helps to remove some of the abstractness of the conceptual skills by allowing such thinking skills to be better articulated. In addition, a cognitive model serves as a useful guide as it allows one to examine the factors involved in the process of thought.

The research also suggests that the Army needs to place a greater focus on conceptual skills development. As adaptability, flexibility, and versatility become more important for future leaders so too will the need for better developed conceptual skills. Today's leaders need to consider the costs of using highly analytic approaches in a world that is highly time constrained, information rich, and constantly changing.

IDENTIFYING CONCEPTUAL SKILLS OF FUTURE BATTLE COMMANDERS

CONTENTS

CONTENTS (continued)

Page

Page

LIST OF TABLES

LIST OF FIGURES

IDENTIFYING CONCEPTUAL SKILLS OF FUTURE BATTLE COMMANDERS

Introduction

Purpose

This research was conducted to support the Army Research Institute-Fort Leavenworth Research Unit's ongoing DEVCOM program (Developing Commanders for the Future Battlefield). Specifically, this research was designed to supplement previous work done in the development of battle commanders' conceptual thinking (Fallesen, in preparation A). The overall goal of this research was to identify, organize, and clarify examples of the conceptual skills that are important to the development of future battle commanders.

Background

Lately, there has been tremendous interest in trying to identify important skills that future military officers will need in order to lead effectively in the 21st century. This research has come on the heels of the development of new type of Army headquarters in which leaders will frequently operate in a volatile, uncertain, complex, ambiguous (VUCA) (Seetin, 1999) world. This topic has sparked much interest due to the highly probable environmental changes that are suggested to make an already complex decision making situation even more dynamic for future Army commanders.

To prepare for training officers to effectively operate in a VUCA environment, various meetings and conferences have resulted in expert military personnel and social science researchers trying to identify key leadership skills that future officers will need to possess. From such interchanges, it was suggested that current Army doctrine could be used to help outline the skills that are necessary for future commanders. However, there are a few doctrine-related areas in which some skills need to be upgraded more than others are.

The document that provides the framework of future leadership skills is the latest version of *Army Leadership* (Field Manual (FM) 22-100) (Department of the Army, Aug1999). The central focus of this publication is to provide a leadership manual that is comprehensive and adaptable for the 21st century leader. The FM identifies four categories of skills (technical, tactical, interpersonal, and conceptual) that represent that which a leader must KNOW to be a proficient leader. It is the common theme of FM 22-100 that each of the identified skills shares an equal weight in leadership importance. That is to say, a leader should develop each skill in order to lead with the most effectiveness and achieve excellence. However, out of all the skills identified is seems as though conceptual skill development has taken the least focus.

It is surprising that conceptual skills have received the least amount of attention from the Army. Obviously, such skills are important to leading effectively in the complex environment of the future. The skills are especially important when one considers that operations will consist of

factors such as: multiple missions, increased activity with joint forces, increased interaction with outside agencies, and an open environment that consists of media and civilians that are seemingly everywhere. Surely, all of these situations call for heightened conceptual skills in order for missions to be completed.

Operating in dynamic environments, such as those listed above, demands that the leader be proficient in conceptual skills such as critical and creative thinking, information filtering and cue recognition, and systems thinking. Thus, a leader who does not have such skills will most likely not be able to effectively complete future missions. Still, conceptual skill development does not seem to be a central concern of the Army. Why is this the case?

Perhaps one reason why conceptual skills development seems to have taken such little focus by the Army is due to the abstract nature of the skill. For instance, the type of words and examples used in FM 22-100 to describe conceptual skills are in sharp contrast to those used for interpersonal, technical, and tactical skills. As an example, consider that when reading the descriptions of the conceptual skills one encounters intuitive words like anticipates and improvises. Such words suggest that conceptual skills are innate rather than those that can be developed. In comparison, when describing the other types of skills, words such as: knows, demonstrates, and possesses are used as descriptor words. Such terminology suggests that these skills are much more concrete and can be acquired and maintained through training.

Another possible reason why conceptual skills have received limited focus might be due to the difficulty of identifying, defining, and measuring the skills. For instance, FM 22-100 provides ill-defined examples of the skill such as: demonstrates sound judgment, critical reasoning, creative thinking, and moral reasoning. These examples are provided without consideration of exactly what is "sound" reasoning or what provides the basis for critical/creative thinking or even what exactly constitutes moral thinking. Thus, the vagueness of the skills terminology serves as a hindrance to revealing its true relevance for future commanders.

Again, these examples of conceptual skill differ from those used for the other types of skills. The examples used for interpersonal, technical and tactical skills generally illustrate specific actions that result in a distinct outcome. For point of reference, consider some indicators of technical skills that state- A GOOD LEADER WILL- "conduct inspections or checks" or "correctly sets up, operates or employs, and maintains equipment." Obviously, such examples suggest that some types of skills can be well measured via observable objective criteria. However, conceptual skills do not have this luxury.

Having an outcome variable that can be directly measured is generally not practical or even possible for those who are working to identify and ultimately develop conceptual skills. It is generally the case that one must be comfortable operating with less measurable criteria. Thus, there is great difficulty when one must appropriately define and identify the conceptual skills of the leaders repertoire. Simply put, when dealing with conceptual skills it is often the case that one must do so while swimming in the murky waters of a sea of ambiguity.

Thus, there are a number of obstacles a researcher must maneuver around in order to identify relevant conceptual skills of future commanders. Although factors like vagueness and elevated subjectivity do serve as hindering factors, such circumstances do not impair research entirely. It is often the case that instead of identifying and measuring conceptual skills directly, researchers must try to look at alternate, less direct, ways to reveal those skills that are necessary for the future commander.

A critical place to start understanding conceptual skills, via an indirect approach, can be achieved by gaining an understanding of the future context in which commanders will operate. Having a grasp of the emerging future environment helps identify those skills that are necessary for successful mission completion. Obviously, the most powerful predictions should consist of an accurate reflection of the future environment. However, it should be noted the predictions do not have to be precisely right to be useful. Predictions that maintain a close approximation to the future environment prove to be beneficial for identifying skills (Kelley, 1996).

Fortunately, the groundwork for understanding the future environment has already been laid by Army personnel as well as Army Research Institute (ARI) researchers. Two relevant Army documents, *Force XXI Operations* (TRADOC Pam 525-5, Dept of Army, 1994) and the Army After Next study (US Army, 1997) provide valuable insight as to the demands on cognitive abilities that leaders may face in the future. Fallesen's *Developing Conceptual Thinking: Facilitating Depth of Thinking of Battle Commanders* (in preparation A) provides a good summary and discussion of both these publications. In addition, Fallesen also addresses the implications that future environmental changes may have on developing future officers' conceptual skills.

Rumsey's *21st Century Lieutenants* (1998) also provides good insight to the future environment. In the document, Rumsey has identified eight major changes that will lead to an expansion in future complexity (see Table 1). These changes are derived from his review of the Army documents listed above as well as the 1996 Army symposium, *Leadership Challenges of the 21st Century Army* (Hunt & Phillips, 1996). Through comparison of current job requirements to likely future conditions, Rumsey is able to distinguish essential characteristics that commanders will need to possess to lead effectively.

All of these documents mentioned above support the idea that the current military environment is much more dynamic than in the past and it will continue to be more so in the future. Thus, predictions of an increase in complexity suggest that conceptual skills research should be a central focus of the Army. However, understanding the future environment only represents one piece of the conceptual skills puzzle. One must also be able to adequately define conceptual skills so that ambiguity and subjectivity are minimized.

Table 1- Derived from Rumsey (1998)

21st Century Commander Changes	Explanation of the Change
Information Ascendancy	There will be more available information that flows more quickly to soldiers and leaders.
Technology Ascendancy	Rapid technology advancement will cause the future officer to have work with and assimilate more advanced technology.
Operational Agility	Due to an expanding and more lethal battlefield, physical agility must be developed to be able move "rapidly and adroitly".
Less Predictable Operating Environment	Commanders operate in a much less static environment than ever before thus leading to difficulty in forecasting of the future.
Diversity of Missions	The era of developing a commander exclusively as a war fighter is over. One must now train for humanitarian assistance, peacekeeping, disaster relief, fire fighting, and a diversity of other missions.
Joint, Multinational, and Interagency Connectivity	It is foreseen that future military operations will involve a collection of services, nations, and agencies.
Downsizing	Downsizing has led to increased workload, limited capabilities for operation completion, reduced mentoring and job restructuring. Future downsizing can not be predicted, but its effects can.
Sociocultural Changes	This change refers to the transition in the Army as those members from "Generation X" take on advanced leadership roles and the offspring of this generation become recruits.

To be able to define conceptual skills it must be considered that multiple factors play a role. Fallesen (in preparation A) has looked at how aspects such as attitudes and dispositions, battlefield contextual factors, and common features of thinking skills help to characterize conceptual skills. Fallesen notes that since a number of factors go into shaping conceptual skills, simple lists or hierarchies do not do very well in completely defining the skills. In addition, Fallesen suggests that caution should be taken when defining conceptual skills because a rigid definition, such as those focused on treating such skills as specific tasks, will not provide an advantage in training commanders. Moreover, it is suggested that using hard and fast definitions may lead to training that is based on rote memorization of conceptual skills rather than application.

In summary, the challenge to identify battle commander's conceptual skills has been set. To adequately complete such a task, one must consider the future environment in which battle commanders will operate. In addition, gathering data that is organized on generating simple lists and does not take into account multiple dynamic factors will not be productive.

Research Overview

The research presented in this report is based on feedback from three separate stages of data collection that took place at Fort Drum, Fort Bragg, and Fort Hood. All three data collections were conducted to try to identify conceptual skills that are important for future battle commanders.

Stage 1 of the research was exploratory and broad based as it served to get feedback and direction from an exemplar list of skills that was derived from opinions of researchers at the ARI Fort Leavenworth Research Unit (see Appendix A). The data from Stage 1 also brought forth the development of a model that could be utilized to better shape concepts related to conceptual skills. Stage 2 was more focused as ambiguity was minimized and the skills began to develop around task-less definitions. In addition, the data from Stage 2 helped to further develop a conceptual skills model called the S^3. Stage 3 utilized the S^3 Model developed from Stage 2 and took a more focused approach to identifying skills. Stage 3 was a more direct approach and it was found that specific types of conceptual skills could be identified. A brief overview, methodology, findings/observations and limitations from each of the Stages are presented next. In addition, an overall summary of the research is provided as well as ideas for future research directions.

STAGE 1- DATA COLLECTION AT FORT DRUM

Brief Overview

This research was conducted as a purely exploratory study. The overall goal of this research stage was to further develop and refine an existing list of conceptual skills. Participants were asked to help organize, clarify, and "green-up" a list of conceptual skills that was based on opinions of researches at the ARI- Fort Leavenworth Research Unit. It should be noted that the objective was not just to filter down information on the list but also the aim was to build-up a conceptual skill information base. In addition, group and individual interviews were conducted to gather further insight on the topic of adaptive, flexible leaders. This study served as a guide for future data collections.

Methodology

Participants.

Fifteen officers stationed at Fort Drum, NY participated in the study. The sample consisted of 9 Captains, 4 Majors, and 2 Lieutenant Colonels. All participants were from the infantry branch. The group members had an average of 9 years and 6 months in service and had spent an average of 26 months in their current grade.

Materials.

Two types of data collection booklets (Type A and Type B) were used in this study. Both form types included a research overview cover sheet, a participant background information sheet, and an experiment instruction sheet (see Appendix B-1).

Each form type presented 17 conceptual skills along with a definition of each skill (see Appendix B-2 for the Stage 1 conceptual skill definitions). Both forms used a 5-point skill importance rating that ranged from Not Important to Critical. Also included was a column for an Unsure response. In addition, each form had a blank page attached so that the participant could make comments concerning the study and/or they could add any skills that were not on the list.

Form Type A (see Appendix B-3) had a blank column for participants to describe the skill in their own words to another person. Asking for descriptions was put in the survey to try to determine how closely participants' descriptions matched the descriptions they were provided. In short, this was to provide a baseline of participants' understanding of conceptual skills.

In addition, Form Type A asked for a personal or historical example of when it was obvious that a leader did or did not possess a specific conceptual skill. This task was conducted to extract some of the tacit knowledge that participants had about conceptual skills. It was

believed that deriving a group of personal examples would help both the researcher's and the participant's understanding by placing the abstract conceptual skills into concrete scenarios. Furthermore, the personal examples were collected with the intent of using the examples in future studies to try and give participants a less formalized introduction, in contrast to only providing skills descriptions, of conceptual skills.

Form Type B (see Appendix B-4) included a scale that allowed the participant to rate the adequacy of the conceptual skill description. In addition, the form included space in which revisions of the skill description could be made. Furthermore, Form B included 17 index cards that each contained one of the conceptual skills from the list. These cards were to be sorted into categories of the participant's choosing.

Procedure.

The officers were randomly assigned to groups. They were given a brief overview of why the research was being conducted and then, depending on group assignment, given either Form Type A or Type B. Each participant was given 2 hours to complete the survey.

All participants were instructed to read the research overview and then given time to ask questions if necessary. The officers were then "walked through" the procedure on the instruction sheet, and again were given the opportunity to raise questions. Next, all participants were asked to fill out the participant information sheet and complete the 17-item survey.

Once they had completed the survey, the officers with form B were asked to sort the 17 index cards into no less than three but no more than eight categories. Once the cards were sorted, all participants were asked to provide a label for each category. In addition, they were asked to provide an overlap rating from 0 to 4, where 0 equaled no overlap and 4 equaled complete overlap.

After the survey was completed, they participated in a brief (~1 hour) group discussion, or individual interview, in which the topic was centered around identifying and defining an adaptive, flexible leader. The interview and discussions were conducted via an unstructured interview that was focused on gaining a deeper insight of issues concerning understanding of leader adaptation.

Findings/Observations

Average Skill Importance Ratings

Means, standard deviations, and ranges for the skill importance ratings are presented in Table 2. Although some skills were rated higher, it should be noted that none of them had an average rating that suggested that they were "not important". Thus, it is suggested that the scales were subject to a floor effect. Although results were somewhat restricted, there were still some interesting patterns in the data.

Table 2

Descriptive Statistics of Ft. Drum Skill Importance Ratings

Conceptual Skill	N	Min	Max	Mean	Std. Dev
Situation Monitoring	15	2	5	3.53	0.833
Ability to Conduct Adversarial Reasoning	14	2	5	3.57	0.755
Finding Hidden Assumptions	15	2	5	3.60	0.910
Information Assimilation	15	2	5	3.93	1.099
Mental Willpower	13	2	5	4.00	0.912
Attending to Enemy Thought	15	3	5	4.00	0.654
Positive Attitude toward Change	15	3	5	4.00	0.654
Application of Concepts	15	2	5	4.00	1.000
Proactive Planning	15	3	5	4.06	0.883
Awareness of Implications from Actions	14	2	5	4.07	0.730
Communication of a Summarized Situation	15	3	5	4.20	0.676
Discriminating Relevant Cues	15	3	5	4.20	0.560
Capable of Dealing with Uncertainty	14	3	5	4.21	0.801
Maintaining Emotional Stability	15	3	5	4.33	0.816
Battlefield Visualization/Predict/Wargame	15	3	5	4.33	0.617
Dynamic Thinking	15	4	5	4.73	0.457
Situation Understanding	15	4	5	4.73	0.457

One finding is that participants rated skills that were consistent with current doctrinal terminology (e.g., Military Decision-Making Process) as being the most important. Rating doctrine consistent skills higher is not a surprising result as it is often the case that people will "go with what they know" when performing a rating task. Since doctrine-related conceptual skills are more familiar, they were more likely to be rated higher.

Another finding was that global conceptual skills (e.g., Situation Understanding and Dynamic Thinking) were rated much higher than those conceptual skills which are more specific (e.g., Decentering and Finding Hidden Assumptions). This was an interesting finding because global concepts are more difficult to identify, measure, and train yet they were being rated as the most important. An officer can receive training to find hidden assumptions (Cohen, Freeman, Fallesen, Marvin, & Bresnick, 1996), however there is no clear-cut path to thinking dynamically.

Although group averages of skill ratings can provide some insights, the ratings can best be understood by considering them at the individual level. Individual skill ratings have a wider response range since there were a number of individuals who rated certain conceptual skills at the lower end of the scale. In addition, further insight can be gained by considering the skill ratings in connection with the participants' skill descriptions and personal/historical examples.

Individual Skill Ratings, Descriptions, and Personal/Historical Examples (Form A)

This data collection resulted in 250 skill ratings, approximately 170 Skill Descriptions, and 170 Personal/Historical Examples. For the most part, those skills that received low importance ratings are the central concern. Researchers and military personnel, who have a high interest in leader development, have invested numerous hours trying to determine those conceptual skills that are necessary for the future leader (e.g., the Strike Force and Training Leader Development and Soldier Support (TLS), project in1999). Thus, the reason the low rated skills get more attention in this report is that it seems that all the conceptual skills that were surveyed should be rated near the high end of the scale. In sum, lower rated skills (e.g., not important or somewhat important) seemed more interesting than those skills which are rated on the high end.

One way to examine the data is through a consideration of the relationship between ratings, descriptions, and examples. Specifically, insight can be gained by examining situations where responses seem to be inconsistent. For example, consider the officer who provided an importance rating of two (Somewhat Important) for the conceptual skill of *Finding Hidden Assumptions.* The officer adequately described this skill as

> "Not deceiving yourself by allowing yourself too much confidence or trust in an assumption. Ability to keep an assumption from creeping into a fact."

Such a definition shows that the officer was not confused about what this skill represented.

Given the previous information (skill description and rating) it can be inferred that (1) the officer can adequately describe this skill and (2) he felt that this skill is not very important. This result seems straightforward until one considers the personal example that is provided by the officer. The examples goes as follows:

> "A plan based on an assumption that a certain area was impassable, which was never checked, and proved to be wrong when the enemy moved through that area."

Such a personal example seems paradoxical considering the low importance rating given for *Finding Hidden Assumptions*. How can it be that a skill, which was linked by the officer, as serving to avoid a catastrophic outcome, can be so important yet end up being rated on the lower side of the scale? It is difficult to determine why such inconsistencies occur.

However, it is not always the case that lower rated skills do not deserve such ratings. Thus, another way to examine the data is by looking for consistencies between an individual's importance ratings, descriptions, and personal/historical examples. Correspondence in these areas helps to show what skills are truly less important. For instance, consider the skill that received the lowest ratings- *Situation Monitoring*. One officer, who provided this skill with a rating of 2 (Somewhat Important), provided the following definition

> "The ability of a senior commander to know the status of a plan while not becoming so engrossed in the details that he loses the big picture."

As before, the description provided by the officer showed that there was adequate comprehension of the skill. However, the personal example that was provided seemed more in-line with the rating that was given. The example went as such:

> "Bde Cdr wanted continuous updates on the progress of a defensive emplacement. However, he lost all perspective on whether the enemy would even go there."

Such an example highlights when a skill may exist more as a hindrance than as an aid. Thus, the officer provided proper justification with the low rating of *Situation Monitoring*.

Another way in which the data can be examined is by looking for consistency between researchers' and officers' descriptions. In addition, consistency between officers' descriptions can be examined. Yet, since this was an exploratory study designed to identify abstract conceptual skills, the aspect of consistency seemed less relevant. This initial stage of research had many "rough edges" that needed to be chiseled down. A consistency analysis would be better suited for a study that was more focused. Thus, consistency between descriptions is only considered briefly in this Stage.

An initial examination of the data revealed that there was high similarity between the skill descriptions presented by the researchers and those provided by the officers. It is not known specifically if this similarity occurred because of a prior exposure effect (i.e., the researchers' skill descriptions), but since the officers had little previous background about conceptual skills, such an assumption can be made. In addition, it was interesting to note that the descriptions provided by the officers were often highly shortened versions of the researchers' descriptions. Many of the officers provided only the gist of each skill in their descriptions and did not incorporate a lot of detail. Such a finding suggests the reason why many of the officers felt that there was a great deal of overlap between the skills. Each skill seemed to be filtered down to its bare structure thus making it difficult to be classified as distinct.

Adequacy Ratings (Form B)

This procedure was performed to help clarify some of the descriptions that would be used in further experiments. However, based on the results, there was not a lot of insight gained from this approach. Most of participants indicated that the majority of the descriptions were adequate. Yet, there are several reasons why they could have made such ratings.

One reason is that marking the skills "adequate" reduced the amount of time that they would have to spend on the task. If the skill description was marked as inadequate, then the participant had to provide a revision that made the description better. If the skill description was marked as adequate then they could proceed to the next item.

Another reason for such rating could have been due to confusion. Clearly, this rating task is not in the officers domain of expertise. Many of the skills contained cognitive psychology jargon and it was far easier to mark adequate then try to translate the terminology into that which could be best understood by the military.

Yet another reason for high adequacy ratings could be that the description truly was adequate. However, it is difficult to partial out if this really was the case. Nonetheless, the main finding was that such an approach was not worth while for future data collections.

Sorting Task and Categorization Model (Form B)

The sorting task did not prove insightful, at least at the direct level. A major pitfall of this task resulted from the fact that there was no consistency between the number of categories and the labels of categories. This was not surprising as the study was exploratory and little information concerning skill structuring was provided to the participants.

However, finding such a diverse classification by the officers suggested that the skills should be presented in a more organized framework. Thus, a categorization model was developed to provide more direction for the participants in future studies (See Appendix B-5).

It should be noted that the model is not trying to depict thinking as a linear process as there is no specific starting or stopping place for thinking. The background of this model is being presented as it provides the foundation for the development of a future conceptual skills model.

One important aspect of the model is that there must be an understanding of the situation (or problem, goal). When trying to discern a situation, one commonly deals with "facts", sensed information, what is typical and/or what can plausibly be inferred. Discrimination is the key to noticing the difference between the current and desired state.

Beyond understanding the current situation, one envisions something different (what if?), anticipates or imagines a different future situation (what is it, what might it be, what could it be, how would it look, how would it work?). Different strategies could operate here - one might decide on "optimal" (Course of Action) COA; try something very different and unusual; try a familiar, safe COA; just wait to get more information, resolve uncertainty; try something for the purpose of determining if it will work, how well it would work (try a little, test a little); etc.

Depending on the current situation, by using whatever strategy the decision maker deems appropriate, the desirable future is translated into a plan and COA to achieve the result intended (result might be outcome or process oriented).

Also, one needs to keep in mind assumptions and make assumptions to fill in gaps where knowledge is lacking about current and future situations. It is here that self-regulation and other question asking, checking functions play a major role. As stated before, these concepts will be explored in a later developed model.

Interview

The interview was centered on identifying an adaptive, flexible leader and considering the skills that such a leader would need in the future. Since the interview took an unstructured format, the conversation was free to go in any direction that the group desired. The task was not specifically designed to identify conceptual skills, but it was felt that this format would lead to valuable insight.

Although this format was productive, there were a few restrictions to the interview process. First, the study was designed to have no more than four members in the interview group, however due to scheduling conflicts, there were two groups of seven and one interview was conducted with a single officer. The large groups made it impossible to obtain input from everyone and the single officer interview was limited in that there was a narrow perspective.

Another restriction came from the fact that that the large groups were often dominated by the highest-ranking officer. Since the discussions were free to go in any direction, this usually meant that the discussion went the route in which the senior officer took it. This was problematic in the fact that the higher-ranking officers did not see the importance of identifying a leader as

adaptive. For example, consider these two quotes given by the highest-ranking members when asked to define an adaptive leader.

> "Do we really want to label this 'adaptive'? An adaptive leader implies someone who will change-, which is good. But it may also mean that it is someone who will not stick with it in the face of adversity. Maybe we don't need to go with 'adaptive' leader as just as much leaders and leaders are adaptive."

> "We can apply the same concepts of leadership that we have used in the past. As long as leaders have a good fundamental understanding in principles and doctrine, whether it is Force XXI, Bosnia, Kosovo- I don't see a need for a new label- it is already what we are."

In contrast, it seemed as though the younger officers were more comfortable with the issue of identifying and training an adaptive leader. However, since the interviews were dominated by the senior officers, alternative views were not explored in detail. With the conversation stifled, in many cases, the information gathered mostly consisted of comments about how digitization would affect the Army of the future. Thus, the focus of adaptability was put on the environment rather than the individual.

Yet, even with the restrictions mentioned above, the interviews led to some quality information concerning adaptive, flexible leaders. One officer, when asked if there was a need to develop an adaptive leader based on the future outlook of the Army, replied

> "Definitely, it is almost sad to think about when we talk about our MDMP. It is very fixed and rigid process and that was the biggest problem that we had. You are trying to follow these steps and everyone understands the doctrine and the point that you want to get to, but there is so much going on that gets into that that process half the time is thrown out the window. Even now, the leader has to be totally adaptable to be able to cut things out here and there, to change his focus entirely 90 degrees if needed. And as we get these tools that help us gather more and more information along the way it is going to become a more fluid process. I foresee the MDMP just kind of totally decreasing to the point where there are steps along where based on information we are going to get from some new source we make a fluid decision then. Go with that plan while we can and get more information. Change it, plan it.

This was an interesting insight the officer suggested the shortcomings of using a "fixed and rigid process." Not only did the officer take into account that the environment is going to be more complex, but also he implies that the information processing (i.e., cognition) will need to be equally complex. Such a statement reinforces the need for further development of conceptual skills.

Finally, one of the more interesting comments that came out of these interviews dealt with the role that experience plays in adaptability. One officer stated

> "And I think that a lot of times people's experience worsen their ability to keep adaptable. A lot of times past success leads to repeatability. Everyone wants to succeed. All leaders have gone though some level of training and confidence. Everyone knows what to do to succeed and they will do whatever it takes to change and adapt. The downfall is that once they have succeeded they become lock step and want to do that all the time"

This comment was engaging because it seemed paradoxical to the traditional views of how to develop anything adaptive. It has often been the case that the "solution" to training an adaptable leader was to just give them more experience. This statement outlines the pitfalls of only providing experience (i.e., practice) in that not only will such a method not produce an adaptable leader but it may in turn produce one who is less adaptive!

Limitations

A major limitation of this study was that there seemed to be an existing language barrier. No common language existed in which both military officers and cognitive psychologist could discuss these conceptual skills. It seemed as though the definitions were loaded down with cognitive psychology jargon. Of course, this led to confusion as well as disinterest for many of the participants. This was not an unexpected limitation as a main purpose of this study was to refine the current list of skills so that they might be expressed more in lay terms for future data collections

Another limitation of this study was that it was a broad-based attempt at research. That is to say, that all the data collected was purely exploratory and there was no literature, previous theory or experiments to direct the research, which made it difficult to have compelling results from such a study. Again, this limitation was not unanticipated.

Yet another restriction of Stage 1 came from the fact that many of the conceptual skills used in the list were too task specific. That is to say that the skills used in this study were focused around "what to think" rather than "how to think". Taking a focus on skills that represent "what to think" only sheds light on those skills that the Army already effectively trains. A desire of this research project was to identify those skills that have traditionally not been explored; thus, it was clear that less task specific skills needed to be used. However, it should be considered that the researchers were caught in a Catch 22. They wanted to gain insight on those conceptual skills that were not tied to specific tasks, yet the task specific examples provided richer responses.

Another shortcoming of the study came from the fact that officers felt that there was a considerable amount of overlap among the skills used in the study. Although researchers could

identify distinctions between the skills, those with less exposure to the concepts had difficulty distinguishing one conceptual skill from another.

Finally, another obstruction to the study was that the list of 17 conceptual skills made for an extremely long and mentally taxing task. This had an effect on the data, as responses became shorter and less clear with the increase of time.

STAGE 2- DATA COLLECTION AT FORT BRAGG

Brief Overview

The research in Stage 2 was conducted to further develop and refine a newly derived list of future commander conceptual skills. The list of conceptual skills used in this stage was based on the data categorization model that was developed from data collected at Fort Drum. Based on findings from the Fort Drum data collection, the original conceptual skill list (Appendix B-3) was altered to make the items less task specific and more centered on aspects of thinking. In addition, it was also attempted to make skill descriptions more "user-friendly" by using terminology that is familiar to military officers.

As in the previous study, participants were asked to help organize, clarify, and further "green-up" a list of conceptual skills. This was done by having participants derive descriptions of the skills as well as provide an example of the skills. This attempt was exploratory since there was no direct testing of skills being conducted. However, this attempt was much more focused than the broad-based exploratory study that had already been conducted. Of course, this more focused approach led to a better organization of the skills list. In addition to providing assistance with the skill descriptions and examples, the officers were also asked to provide examples of ways in which each skill might be developed.

Methodology

Participants.

Twelve officers stationed at Fort Bragg, NC participated in the study. The sample consisted of 2 1st Lieutenants, 5 Captains, 4 Majors, and 1 Lieutenant Colonel. Ten participants were from the infantry branch, one was military intelligence, and one was signal corps. The group members had an average of 13 years and 4 months in service and had spent an average of 25 months in their current grade.

Materials.

Two data collection booklets/surveys (Form A and Form B) were used in this study. Both booklets included a research overview cover sheet, a participant background information sheet, and an experiment instruction sheet (see Appendix C-1).

Each survey presented 17 conceptual skills along with a definition of each skill (see Appendix C-2 for the conceptual skill definitions). The only difference between the two booklets was that items 1-8 in Form A were items 10-17 in Form B and items 9-17 in Form A were items 1-9 in Form B.

The survey was arranged so that it first had a blank area in which the participants could revise the Skill description if they found it incomplete, vague, and/or awkward. Next, participants were asked to make importance ratings based on a 5-point rating scale that ranged from Not Important to Critical, also included was a column for an Unsure response. The survey then asked participants to describe the skill to another person in their own words. After that, the officers were asked to give a personal or historical example of when it was obvious that a leader did or did not possess this conceptual skill. Lastly, the forms asked the participants to provide insight as to how each skill might be developed. A blank page was also attached to the end of the survey so the participant could make comments concerning the study and/or they could add any skills that were not on the list. For an example of the questions asked see Appendix C-3.

Procedure.

The officers were randomly assigned to groups. The participants were given a brief overview of why the research was being conducted and then, depending on group assignment, given either Form A or B, which they were asked to complete. Each participant was given 2 hours to complete the survey.

All participants were instructed to read the research overview and then given time to ask questions if necessary. The officers were then "walked through" the procedure on the instruction sheet, and again were given the opportunity to raise questions. Next, all participants were asked to fill out the participant information sheet and complete the 17-item survey.

Findings/Observations

Average Skill Importance Ratings

Means, standard deviations, and ranges for the skill importance ratings are presented in Table 3. As in the previous rating task, none of the skills had an average rating that suggested that they were not important. In addition, the same pattern of results was found in this study that were found in the first. That is, doctrine related skills were generally rated as being more important than non-doctrine related skills and global conceptual skills were rated higher than specific conceptual skills.

Table 3

Descriptive Statistics of Ft. Bragg Skill Importance Ratings

Conceptual Skill	N	Min	Max	Mean	Std. Dev
Decentering	12	2	5	3.25	0.866
Finding Hidden Assumptions	12	1	5	3.33	1.230
Information Assimilation	12	2	5	3.58	0.792
Attending to Enemy Thought	12	2	5	3.75	0.965
Positive Attitude about Change	12	2	5	3.91	0.996
Self-Understanding	12	2	5	3.91	0.900
Discriminating Relevant Cues	12	3	5	3.91	0.792
Awareness of Implications from Actions	12	3	5	4.00	0.738
Situation Monitoring	12	2	5	4.00	1.044
Communication of a Summarized Situation	12	3	5	4.08	0.900
Proactive Planning	12	2	5	4.16	1.029
Concentration of Thought	12	2	5	4.25	0.965
Battlefield Visualization/Prediction	12	3	5	4.25	0.753
Mental Wargaming and Simulation	12	3	5	4.25	0.753
Situation Understanding	12	4	5	4.58	0.514
Maintaining Emotional Stability	12	3	5	4.58	0.668
Dynamic Thinking	12	4	5	4.66	0.492

Individual Skill Ratings, Skill Descriptions, and Personal/Historical Examples

This data collection resulted in 204 skill ratings, approximately 180 skill descriptions, and 180 personal/historical examples. When examining the data, one interesting aspect is that the Skills with lower individual importance ratings are usually accompanied with blank descriptions and blank personal/historical examples. Such a finding is interesting because those Skills which received lower overall ratings are usually those that are not doctrine related (e.g., *Decentering* and *Finding Hidden Assumptions*). Thus, it seems as though an officers' familiarity (prior exposure) with conceptual skills can, at times, dictate how important they will rate such skills.

As in Stage 1, another way in which the data can be examined is by finding inconsistencies between importance ratings, descriptions and examples. For instance, consider the officer who gave an importance rating of two (Somewhat Important) to the conceptual skill of *Decentering*. When asked to provide a definition for this skill, the officer wrote:

> "This is what staffs are for. A commander is hired for his viewpoints and perspectives. It is nothing more than holistic thinking."

Although this officer did not actually describe *Decentering,* the words used (along with the importance rating) made it clear that it was felt that this is not an important conceptual skill for commanders. However, the personal/historical example made the viewpoint a little bit cloudy as the officer wrote:

> "Montgomery during WWII was never able to do this → particularly when faced with possibilities of maneuver by US forces that were more favorable than his own maneuver plans."

This example is engaging because it is in direct competition with the description and skill rating provided by this officer. When considering the example, it is clear that the officer can see the downside of not being adept at this skill. Yet, the officer rates the skill as being not overly important.

Another example of an inconsistency can be found by examining an officer's importance rating, description, and personal/historical example for *Finding Hidden Assumptions*. The officer provided an importance rating of 2 (Somewhat Important) for this skill and further went on to define the skill as:

> "Know the facts."

Although the description was highly condensed, it could be rationalized that the officer had an adequate grasp of the core concept of this skill. Thus, it was surprising when the officer provided the following personal/historical example:

> "During a JRTC rotation my battalion S2 was new/inexperienced to tactical intelligence and had the bad habit of using the enemy's doctrinal template to brief the commander of the current/actual enemy situation. My battalion commander quickly realized this, and more importantly, realized that the S2 was briefing assumptions-not facts. The commander then got his company to give him facts/ground truth."

It is interesting that the officer provides an example that clearly delineates the pitfalls of not having such a conceptual skill, yet the skill is only rated as being somewhat important.

As in Stage 1, most all of the skill descriptions were similar to the descriptions given by the researchers. Again, the major difference between the descriptions was the officers' descriptions were much shorter than the researchers'.

Conceptual Skill Development

Since there is little known about identifying conceptual skills, asking participants to provide ways in which such skills might be developed seemed almost unjust. Yet, based on their background it was still felt that the officers could provide valuable insight on conceptual skills development. In fairness, the participants were told that this was probably the most difficult part of the exercise and that they should not get discouraged.

As a rule, the officers were asked to refrain from suggesting that the main source of development was "experience". Rather, the participants were told that the specific type of experience should be reported. Although, some still only listed experience, many participants provided detailed responses.

It can be argued that the most challenging conceptual skills to develop are those that are global (e.g., *Situation Understanding* and *Dynamic Thinking)*. That is to say, it is difficult to find a specific way to develop Skills that are broad based and seem to have an innate structure about them. For instance, consider this commentary on developing *Situation Understanding*

> "First, not everyone can develop this skill. Those that have the God-given talent can improve and refine it through historical study and training → experiencing different things and situations under different environments."

This is a pessimistic view of what the Army is capable of being able to develop. The above statement implies that *Situation Understanding* is something that should be selected for since it can't be trained. In this study and the previous one, the officers recognized this skill as one of the most important.

Fortunately, the majority of the officers do feel that conceptual skills such as *Situation Understanding* can be developed. For example, consider these two development suggestions:

> "By paying attention to details and asking the right questions- seek knowledge relentlessly and follow what's going on around you."
>
> "Maintain contact and open communications with your unit during garrison and field operations."

Thus, there are constant reminders that a commander must be able to update their knowledge base with the most current information possible. It should be noted that developing an officer's abilities to ask the right questions and keep an open communication link are only small parts of fully developing Situation Understanding. As stated before, Situation Understanding is a global concept, and thus it will take a multi-faceted approach for development.

From the development suggestions given above, an obvious essential component is that the officers are operating in a dynamic, constantly changing environment. However, not all the officers seem to realize the complexity that is involved in developing such conceptual skills. Consider the following recommendation

> "Know what is important- what questions must be answered. Make a checklist."

The ability to "know what is important" is relevant to *Situation Understanding,* however the suggestion to develop checklists is simply a bad choice. Relying on a highly analytical tool such as a checklist is not appropriate. An officer would be relying on a static device to try to interpret a complex event and thus much information would be lost.

As seen above, ideas for developing *Situation Understanding* seemed to be difficult to generate. Moreover, getting suggestions for developing *Dynamic Thinking* seemed to be even more challenging. Difficulty in generating developmental ideas is interesting because *Dynamic Thinking* was rated as being the most important conceptual skill in this as well as the previous study. Thus, one might think that clear development ideas exist. However, not only were there not many direct ideas, but also there were suggestions that this skill could not be trained. One of the more despairing comments on development was:

> "I don't know of any way to develop this. This is one that you are blessed with."

However, not all of the participants felt that it was impossible to develop conceptual skills. For instance, consider the comments of one officer who obviously feels that *Dynamic Thinking* can be developed

> "Through challenging training exercises that force a person to radically change his plans to accomplish the mission"

Although this idea of developing *Dynamic Thinking* is vague, it still does suggest specific components of a training strategy (e.g., challenge complexity and situational turbulence) that the Army can use to help develop important conceptual skills.

Limitations

Like the previous study, a limitation came from the fact that the participants felt that there was a great deal of overlap between the skills used in the study. The interconnectedness of the conceptual skills led to great difficulty in participants' abilities to differente. Although experienced researchers could separate terminology, this was a difficult task for military officers.

Another restriction came from using a list of 17 conceptual skills, which made for an extremely long and cognitively taxing task. However, it was felt that a somewhat large number of skills needed to be used, as this was still an exploratory-based study. The use of two data forms helped to alleviate some of the effect from the long task. In addition, many officers gave comments relating to the fact that they were involved in a worthwhile data collection; thus, motivation was high for at least several of the officers.

Yet another constraint of the study came from the fact that many of the conceptual skills used in the list were, once again, too task specific. The disadvantages of using task-specific skills were previously discussed in the limitations of the first study. It is suggested that this restriction occurred because the researchers were not working from a fully developed conceptual skills model. Although a categorization model had been developed, the details of the model were to ill-defined and unable to direct the data collection. Thus, task-specific concepts were used to provide clarity of the issues, while in turn limiting the study.

Finally, another limitation came from putting too much emphasis on those conceptual skills that dealt with warfighting. It has been noted that the future battle commander will have to work with numerous situations that involve operating in VUCA environment where missions are difficult to define. Thus, the future commander needs more than skills that revolve around warfighting.

DEVELOPING A CONCEPTUAL SKILLS MODEL

Based on the limitations of the two previous data collections it was clear that a new approach was needed to help identify conceptual skills. The focus of this new method was centered on a model that suggests "how to think" rather than on task specific descriptions that outline "what to think". Thus, based on the previous effort of building a classification model, developed from Stage 1, a new model (called The S^3 Model (see Figure 1)) was developed that took into account relevant conceptual skills in a VUCA environment.

The S^3 Model is centered on Norman Anderson's dictum that "thought is purposive" (1996). That is to say, that thinking aspects can be looked at under the context of goal-directed behavior. It is therefore suggested that the purpose of thought can be linked with the aspect of either approaching or avoiding a goal. In addition, Fallesen (in preparation B) represents the goal of thinking as addressing a question at issue, a problem to be solved, or an opportunity to recognize and take advantage. He suggests that representations may be derived from within ("wondering, imagining, and sensing differences that exist in the environment") or they may be presented or assigned by other people. Thus, with its relevance to understanding thought, the goal is placed at the center of the S^3 Model.

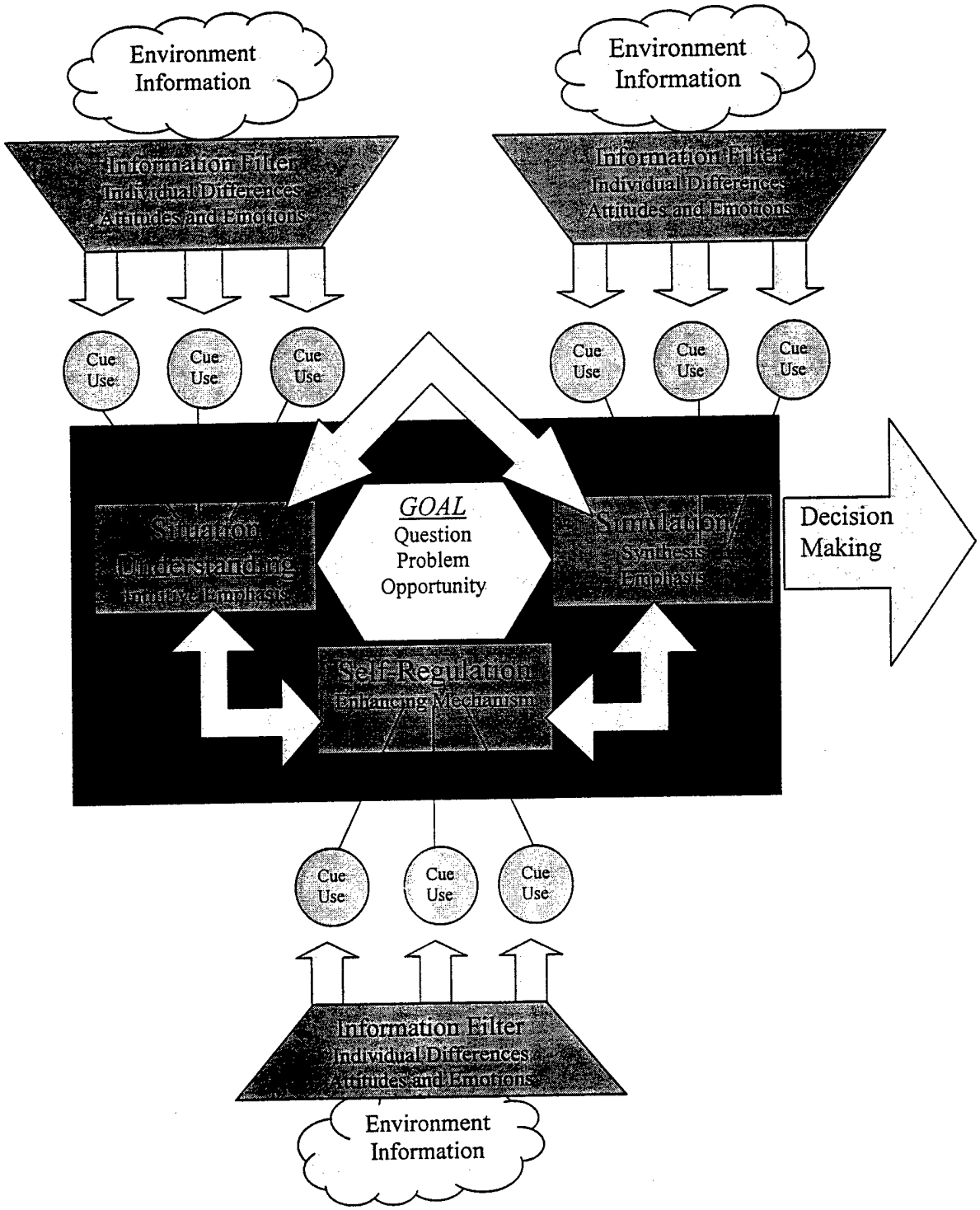
The goal is apt to be influenced by both internal and external (environmental) factors. However, since this model is being used as a framework for conceptual skills the internal influences (i.e., cognitive processes) are considered as the significant factors. Nevertheless, since many external elements can play an influencing role some of the alternative influences are considered as well.

Internal Aspects (Cognitive Processes)

The S^3 Model expands on three major cognitive processes that influence the goal. These processes include: Situation Understanding, Simulation, and Self-regulation. Based on previous descriptive psychology research it has been well documented that Situation Understanding (pattern recognition) and Simulation (mental model building) are important components that help experts make decisions in naturalistic environments (Klein et al, 1993). In fact, these two processes have become the two central components of Klein's Recognition Primed Decision (RPD) Model of decision making (Klein, 1997). However, it should be noted that Klein's model is built around research that is conducted around how experts make decisions.

Situation Understanding has strong parallels with procedural knowledge. That is to say experience is a necessary, but not sufficient, component of this process. Development of Situation Understanding comes from performing tasks repeatedly. Thus when one encounter a similar situation he or she is able to act quickly with little deliberation. It should be noted that this process is used in situations that are familiar to the officer. Thus, such a process is not overly useful to officers working in a truly novel environment.

Figure 1 The S^3 Model



Simulation relies on declarative knowledge (i.e., factual knowledge) to help drive the process. Also included is a complex semantic network that shows associations between ideas, concepts, and objects. The foundations of Simulation can be found in a constructivism approach. Constructivism, suggests that one does not simply store all information but rather retrieves blocks of old knowledge relevant to the situation to construct a new, more meaningful understanding. This process is most efficient when one is able to build on a foundation of previously learned knowledge, and preferably is actively involved in the process to increase the level of association with that knowledge.

Obviously, Simulation is enhanced as expertise level rises, but it is not necessary to have as much expertise/experience as compared to the Situation Understanding process. In general, Simulation is more deliberate than Situation Understanding. Simulation is most likely to be used in situations where an immediate solution/action is not recognizable. Furthermore, such a process can be used in a novel environment, but it will be a time-consuming process that has high potential for error.

What is Self-regulation?

Given the simplest interpretation, self-regulation is **adaptation to change** (Mithaug, 1993). Furthermore, it is the "process by which people initiate, adjust, interpret, terminate, or otherwise alter actions to promote attainment of personal goals plans or standards" (pg 91) (Heatherton & Baumeister, 1996).

Self-regulation involves the logic of goal directedness and the use of feedback loops to serve as a guide for altering behavior (Carver & Scheier, 1996). In general, there are three mechanisms responsible for effective self-regulation, which include:

1) Test variables that define preferred states (e.g. Standards/Goals)

2) Internal feedback that compares system conditions with those standards. (Note: It is suggested that negative feedback loops be used to identify discrepancies between preferred state and current state.)

3) Response systems that have the ability to change internal (system) and external (environmental) events.

An example of self-regulation principles can be found through a consideration of physiological homeostasis. For instance, consider that the human body makes numerous physiological changes to maintain a temperature of around 98.6 degrees Fahrenheit. If the temperature is above this level perspiration occurs, if it is below the level then goose bumps and shivering appear. Thus, the body regulates itself to a desired goal state.

Although the above example provides a nice framework for understanding self-regulation, studying cognitive self-regulation is a great deal messier. In the physiological

example, the goal state is well defined. Standards and goals are not always so well defined when it comes to thinking. Standards are generally set at the individual level.

Why is Self-regulation important?

Self-regulation is important due to the high expectancies that have been imposed on leaders today and furthermore those that will lead in the future. Leaders need effective methods in which they can adjust to changing environments, process an absurd amount of data, and maintain some level of control of both the system and the environment. Teaching future leaders the importance of setting goals (intrinsic and extrinsic), evaluating those goals, and implementing changes is a crucial step to develop better leaders of tomorrow.

Furthermore, having a developed set of Self-regulation skills are critical for those leaders who are operating in truly novel environments. Cognitive skills that are related to Situation Understanding have a strong foundation in procedural knowledge; thus such skills will be of little benefit when making decisions in original environments. In addition, Simulation skills will not be overly effective as a novice's semantic knowledge structure may not be defined enough to make an effective decision. Thus, developing self-regulation skills may help fill necessary gaps that appear in the decision making process.

Due to the limited amount of time an officer spends at each command position, many military officers simply do not have enough experience to be classified as an expert. Thus, Self-Regulation is an additional component that may assist experienced, yet still novice, leaders to perform their job functions better.

Exploring the Internal Components

Exploring the S^3 Model's internal components is troublesome for a number of reasons. One reason is that there is so much interconnection between each process. That is to say, it is difficult to fully partial out a variable when it is being studied in a non-laboratory setting. An additional difficulty comes from the fact that the S^3 Model is designed to explore VUCA environment. Such environments are tricky to understand because they are ill defined and there is no clear or absolute answer.

Furthermore, oversimplification of the task may lead to a research dead end since results that are based on artificial lab tasks often do not generalize (Hammond, 1992; Woods, 1992). Thus, the research challenge is to maintain the complexities of the environment in which the participant operates.

Yet another difficulty is that it is nearly impossible to determine when thinking begins and when it ends; thus, it is usually the case that much of the research is based on speculation. Working with abstract terminology can quickly lead to misrepresentation and confusion of concepts.

Even with the restrictions noted above it is still possible to explore the S^3 Model's cognitive processing components. One such way is by identifying the subcomponents of each model. For instance, *Situation Understanding* might have the following subcomponents associated with it: *cue discrimination, sensemaking*, and *problem detection*. Whereas *Simulation* might have the following: *information assimilation, story building, analogical reasoning, exploration, proactive planning*, and *battlefield visualization*. Moreover, *Self-regulation* may have the following: *finding hidden assumptions, question asking, decentering*, and *self-understanding*. Obviously, gaining an understanding of these subcomponents can help to shed light on the overall model and may serve to support it (a derived list of subcomponents is found in Table 4). Thus, data collection can be driven by a theory, which gives the research effort a more distinct purpose.

Table 4

Subcomponents of the 3 Internal Processes of the S^3 Model

Internal Process		
Situation Understanding	Simulation	Self-Regulation
Pattern matching	Mental Wargaming	Metacognition
Intuition	Battlefield Visualization	Decentering
Situation Awareness	Prediction	Question Asking
Detecting Solvability	Story Building	Adversarial Reasoning
Discriminating Cues	Information Assimilation	Self-Understanding
Problem Detection	Analogical Reasoning	Introspection
Sensemaking	Dynamic/Systems Thinking	Concentration of Thought
Recognizing Typicality	Conceptualization	Dominance Structuring
	Exploration	Finding Hidden Assumptions
	Diagnosis	Awareness of Implications from Actions

Another way to explore the model is by representing the components so that *Situation Understanding* is an intuitive-based strategy, *Simulation* is a synthesis-based strategy and *Self-regulation* acts as an enhancing mechanism that assists during the shortcomings of two strategies.

Traditionally, researchers have explored the issue of switching, or oscillating, between intuitively and analytically based mechanisms (Payne et al. 1994; Beach 1990, 1998; Hammond, Hamm, Grassia, & Pearson, 1987). However, analytic methods are often not effective when making a decision in a VUCA environment. Naturalistic Decision Making (NDM) researchers suggest that analytic methods are often too formalized and rigid, as they simply are not designed to work effectively in a changing environment (Klein, Orasanu, Calderwood, Zsambok, 1992). Furthermore, Schmitt and Klein (1999) state that analysis is a "rational, decompositional" process that is based on principles of optimization. Furthermore, they state that rationalistic models have a "built-in dysfunction" as they "attempt to proceduralize those creative cognitive processes that cannot be proceduralized."

Thus, in the S^3 Model, the term synthesis is preferred to analysis. Synthesis is a product of experience, conjecture, and imagination and is often limited by procedure (Schmitt and Klein). Synthesis leads to the evaluation of ideas when a decision cannot be reached through an intuitive process such as pattern recognition. In addition, synthesis is not built around a rational view of optimization, but rather it relies on satisficing principles (Simon, 1976).

Payne, Betteman, and Johnson (1994) broke new ground in the field of judgment and decision making a little over 10 years ago by stating that we switch strategies when facing varying environments. Since then, the majority of research has tried to determine **why** (i.e., environmental issues) we switch rather than **how** we switch.

Previous research has taken the view that switching takes place only as a response to the environment and thus people are only being reactive. However, through development of Self-regulation processes one may become more proactive and better adapt their goals based on internal causes. The S^3 model has the potential for exploring this issue.

Consideration of Alternative/External (Environmental) Influences

As seen in Figure 1, the S^3 Model also includes a number of external factors like emotions, attitudes, and individual difference variables such as locus of control, self-efficacy, and cognitive style. These factors are put into the model to serve as a reminder that there is a great amount of complexity that is involved in thinking. In addition, it should be recognized that factors such as time and uncertainty also play a role in shaping one's thinking.

When considering all the factors included in this cognitive model, it can be seen how analysis and interpretation can get messy in a hurry. Trying to account for all the moderating variables involved in making decisions in a VUCA environment is quite challenging, if not impossible. In fact, due to the number of interactions that one might need to account for is not

readily apparent how one can go about testing the entire model. Furthermore, it is not clear what might be gained from being able to test the S^3 Model in its entirety. Future research will look more closely at the benefits of considering the role of these external factors.

STAGE 3- DATA COLLECTION AT FORT HOOD

Brief Overview

As in the previous two studies, this research was conducted to further develop and refine a newly derived list of future commander's conceptual skills. In addition, ideas on conceptual skill development were also collected. The format used in this study was identical to the second study except for two major changes. One change is that the list of conceptual skills used in this study was derived from consideration of the S^3 Model described previously. Using the S^3 Model helped to filter previous lists by separating task specific conceptual skills ("what to think") from those conceptual skills centered on general aspects of thinking ("how to think"). The second change is that the total number of skills presented to the participants was cut almost in half. This was done to reduce the effects of workload. In order to cut the list down, only a sample of the sub-components, from each internal process, was presented to the officers.

Methodology

Participants.

Twenty-eight officers stationed at Fort Hood, TX participated in the study. The sample consisted of 16 Captains and 12 Majors. Three officers were currently serving in an infantry branch, eight were field artillery, six were armor, six were Signal Corps and five were engineering. The group members had an average of 11 years and 5 months in service and had spent an average of 37 months in their current grade.

Materials.

Two data collection booklets/surveys (Form A and Form B) were used in this study. Both booklets included a research overview cover sheet, a participant background information sheet, and an experiment instruction sheet (see Appendix C-1).

The survey used in Stage 3 was nearly identical to the one used in Stage 2, except that each survey presented 9 conceptual skills along with a definition of each skill (see Appendix D-1 for the Stage 3 conceptual skill definitions). The booklets differed in that items 1-4 in Form A were items 6-9 in Form B and items 5-9 in Form A were items 1-5 in Form B.

Procedure.

The officers were randomly assigned to groups and given 2 hours to complete the survey. Upon arrival, the participants were given a brief overview of why the research was being

conducted. In addition, each group was presented the S^3 model and the inter-relation of the skills was explained. The officers were given time to ask questions about the model and then, depending on group assignment, given either Form A or B to complete.

All participants were instructed to read the research overview cover sheet and ask questions if necessary. Then the officers were "walked through" the procedure on the instruction sheet, and again were given the opportunity to raise questions. Next, all participants were asked to fill out the participant information sheet and complete the 17-item survey.

Findings/Observations

Skill Importance Ratings

Means, standard deviations, and ranges for the skill importance ratings are presented in Table 5. As in the previous two rating tasks, none of the skills had an average rating that suggested that they were not important. In addition, the same patterns of results were found in this study that were found in the first two studies. That is, in general doctrine related skills were rated as more important than non-doctrine related tasks and global conceptual skills were rated higher than specific conceptual skills.

Table 5

Descriptive Statistics of Ft. Hood Skill Importance Ratings

Conceptual Skill	N	Min	Max	Mean	Std. Dev
Decentering	26	1	5	3.42	1.026
Finding Hidden Assumptions	27	1	5	3.62	0.966
Question Asking	27	2	5	3.85	0.863
Discriminating Relevant Cues	26	2	5	4.23	0.862
Information Assimilation	26	3	5	4.26	0.666
Self-Understanding	28	2	5	4.32	0.772
Battlefield Visualization/Prediction	28	2	5	4.50	0.838
Mental Wargaming and Simulation	25	3	5	4.52	0.653
Situation Understanding	25	3	5	4.76	0.597

The uniformity, across each study, of non-traditional conceptual skills being rated lower is interesting. As seen in this study such ratings happen even when officers are considering a highly filtered down list of skills and given insight to how the skills were derived (via a framework model). It may be the case that skills such as *Decentering, Finding Hidden Assumptions,* and *Question Asking* are consistently rated lower because the officers are not used to these metacognitive, indirect skills. Consider the following description provided by an officer who gave *Decentering* an importance rating of 1 (Not Important)

> "This is that touchy feely empathy-based stuff that is going to be the downfall of the Army. Intell people may need to understand other cultures etc, but we should center everyone else's view on the goals, values, and beliefs of the Army."

Thus, it seems as though some officers hold a bias against the conceptual skills that will most likely assist an officer in being flexible and adaptive. Some officers see these skills as important for other Army personnel but not important for battle commanders. Some suggestions of why a bias might be held are:

1) The non-traditional skills do not appear directly in Army doctrine and therefore are deemed unimportant.

2) The non-traditional skills are not centered directly on warfighting, which makes application difficult to see for some officers.

3) The non-traditional skills seem to be too "soft" and too abstract.

Individual Skill Ratings, Skill Descriptions and Personal/Historical Examples

This data collection resulted in 240 skill ratings, approximately 220 skill descriptions, and 220 personal/historical examples. As in the previous two studies, inconsistencies between rating, description, and example are explored. However, it should be noted that there were fewer inconsistencies found in this data collection than were found in the previous studies. One reason for fewer inconsistencies is that those participants who provided low importance ratings generally did not provide descriptions and personal examples.

One example where inconsistencies exist between importance rating, skill description, and personal example can be found is by considering the comments of an officer who gave *Decentering* an importance rating of two (Somewhat Important). The officer sufficiently described the skill as

> "Stepping outside your shoes and looking at a situation from many different angles".

The fact that the officer rated *Decentering* low on the importance scale and adequately described it is not that interesting. However, the interesting point is that the officer provided the following personal/historical example

> "A good commander must get inside the enemy's decision cycle and needs to see his main point by decentering."

The above example stands in paradox with the importance rating that is assigned. Nearly all officers would agree that getting inside the enemy's decision cycle is an essential aspect to being able to obtain a military advantage. This officer even states directly that *Decentering* is skill that a "good commander" should possess. Thus, it is a concern as to why the non-traditional skills get lower ratings.

Content of the Personal/Historical Examples

Due to a tighter research focus and the use of fewer skills, all of the personal/historical examples were examined to see if they could be classified as a certain type. Overall, it was found that each example could be classified as one of six different types (see Table 6). The six types of personal/historical examples fell into the categories of: War Operations, Operation Other Than War, Historical, Non-specific, Other, and Blank/No Response.

Table 6

Breakdown by Frequency of the Personal/Historical Examples Collected at Ft. Hood

Conceptual Skill	War-Related Operations	Operations Other than War	Historical	Non-Specific	Other	Blank	OUTCOME +	-	0
Decentering	9	7	4	2	3	3	17	2	6
Finding Hidden Assumptions	12	7	0	2	0	7	8	6	7
Question Asking	4	13	2	5	2	2	14	9	3
Discrimination Relevant Cues	13	1	0	9	0	5	6	5	12
Information Assimilation	6	11	2	6	1	2	17	1	8
Self-Understanding	6	12	0	6	2	2	11	13	2
Battlefield Visualization/Prediction	23	0	3	0	0	2	16	7	3
Mental Wargaming/Simulation	16	2	0	2	3	5	14	4	5
Situation Understanding	20	1	3	0	0	4	11	7	6
Total	**109**	**54**	**14**	**32**	**11**	**32**	**114**	**54**	**52**

As can be seen in Table 6, the majority of the examples were related to War Operations. In fact, when discounting the blank responses, War Operations examples accounted for 49.5% of all those provided. In addition, the Historical examples, which were closely related to the War Operations, accounted for 6% of the data collected. The second most occurring examples involved Operations Other than War, which accounted for around 25% of the examples. In all, operations related examples accounted for 80% of all the data.

An interesting finding from the above data set is that the War Operations examples were most prevalent in the more traditional Conceptual Skills such as *Battlefield Visualization/Prediction, Mental Wargaming/Simulation,* and *Situation Understanding*. This pattern differed from examples provided for the non-traditional skills, which had a more even distribution. This is an important finding because the officers continually rated the traditional/familiar skills as being the most important. However, as stated in the introduction and throughout the paper the officers are facing a changing environment where they will be asked to perform duties that expand beyond warfighting. Thus, one should realize that the future commander must be able to rely on those conceptual skills that will assist during a broad range of multiple missions, not just those related to warfighting.

Out of the remaining personal examples, the Non-specific category consisted of 16% of the data. This category included those examples that were extremely non-descriptive. For instance, consider the following Non-specific personal/historical examples:

"We ask many of our questions during rehearsals" – *Question Asking example*

"We all do it on a daily basis, which can cause a mixed suspense." - *Discriminating Relevant Cues example*

"BDE CDR was able to defeat enemy because he was always thinking one step ahead of the enemy CDR." - *Mental Wargaming/Simulation example*

"Every time soldiers came to you with problems, you must have this skill of information assimilation to help them quickly solve the problem." - *Information Assimilation example*

As can be seen in the instances above, the Non-specific personal examples were shallow in detail. Such examples extracted limited tacit knowledge and provided limited benefit for future use. Little insight was gained from these examples about the personal understanding or the true benefit of the skills.

It is interesting to note that the Non-specific examples primarily occurred for the non-traditional conceptual skills. One possible reason for this is that the officers were more knowledgeable of the traditional skills. Thus, it was easier for the officers to provide examples that are more detailed for the skills in which they had some background.

The "Other" category seemed to be one of the most interesting of all the categories, yet it only consisted of 5% of the data. The examples provided in the Other category seemed a bit more creative as the responses looked outside of traditional doctrine, for instance:

"Swiss watchmakers in the 1900's failed to understand how quartz could improve their business- consequently they lost a huge share of business to Japanese firms who revolutionized the industry. " - *Self-Understanding example*

"The current TV commercial where a worker is describing to his boss the benefits of switching telecommunications systems and bombarding him with a bunch of facts and technical data. The boss said basically "What does this mean to me?" The worker replies with "For every dollar we spend we will get back two". " - *Information Assimilation example*

"A commander wanted to fire a live round from a cannon. Because he was a commander, he was too proud/embarrassed to ask the NCO's for help or generally ask about the procedure. When he pulled the lanyard he was standing in the path of the recoil and sustained and injury." – *Question Asking example*

"Refer to teaching my 5-year old daughter how to read a clock. Obviously, this is very easy to me. I struggled showing her my techniques. I finally asked her what she saw when she looked at the clock (Big Hand/Little Hand/12 numbers). Once I knew what she focused on, I was able to narrow my scope and use those mutually understood features of the clock and teach her what she needed to learn to read time." - *Decentering example*

"In Vietnam, a captured LTC who spent most of 4 years in solitary, kept himself sane by playing a round of golf in his mind every day. When he returned home and hit the links his first round he shot a 4 over par (76)." - *Mental Wargaming/Simulation example*

Being able to find examples of conceptual skills outside of doctrine is important. Although doctrine covers a great deal of what officers will encounter, it is safe to say that doctrine can not be all encompassing. Thus, it is important that the officers are able to transition their knowledge bases to a much broader scope when needed.

Positive, Negative, and Neutral Outcomes

In addition to breaking the examples into 6 categories, they were also examined to see if they resulted in a positive, negative, or neutral outcome (see Table 6). Positive outcomes provided a description of why it is important for officers to have the specific skill. Whereas the negative outcomes detail the possible shortcomings of officers who do not posses the skill. Table 7 contains a sampling of the officers' positive and negative personal/historical examples. An outcome was classified as neutral when the provided example did not suggest if there was a benefit of having or a decrement of not having a skill. The neutral outcomes were usually coupled with the Non-specific examples.

One of the more engaging observations from these data is that a large number of positive outcomes were provided for those skills that had been rated lower in importance. For instance, 60% of the personal examples provided for *Decentering* (which is the lowest rated skill) were positive. This finding is worth noting because it suggests that although many officers did not rate some skills are Extremely Important (4) or Critical (5), they can still see their value. This finding supports the previous data that showed specific inconsistencies between individual importance ratings and personal/historical examples.

Table 7

Positive and Negative Personal/Historical Examples for each Conceptual Skill

Conceptual Skill	Skill Focus	Positive Instance	Negative Instance
Situation Understanding	Intuitive w/ high knowledge base	A BN commander that I worked for as an Armor PLT Ldr possessed this skill. He controlled the training battlefield with his knowledge of the enemy situation and likely COA in combination with the known friendly situation. Time after time he would move forces at the right decision point using this skill in order to gain victory.	During a battalion tactical movement after Desert Storm ended, the lead Tank Company ran into a minefield that was unmarked. The battalion commander ordered all following vehicles to stay directly on the paths made by lead mine-plow tanks. A vehicle commander failed to understand the situation and for some reason veered off the lanes. The vehicle struck a mine and casualties occurred.
Discriminating Relevant Cues	Intuitive w/ high knowledge base	Fire support at brigade level. Numerous "cues" from multiple agencies weight the decision making process for determining who will receive indirect fires. A PLT Leader, who is being shot at by an enemy tank PLT, thinks his is the most important battle of the war and he should receive the most resources. The brigade commander, who is aware of 95% of direct fire engagements, must weight all "cues" and determine the allocation of resources.	As a company commander, my unit was given the mission to attack to seize the objective. I failed to adequately analyze some of the implied tasks necessary to accomplish the mission. I planned for the attack itself in detail but did not pay attention to the implied mission of moving my unit to a position from where I could begin the attack. Consequently, my tank platoons were disorganized and unprepared by the time we launched the attack.
Information Assimilation	Synthesis	Brigade Commander who was able to review a 50 slide briefing and pull out the 10 or 12 pertinent points that he needed to know to answer the question asked by the Div Cdr @ a later meeting.	I had a battalion commander once who would take 3 or 4 days to make a decision that could have been made on the spot. "Patton:" A good plan executed now violently is better than a perfect plan next week."

Mental Wargaming/ Simulation	Synthesis	Heavy vehicle movement. The artillery BN was conducting a vehicle movement to a local training area. The munitions were loaded on heavy equipment transportation trailers. The section chiefs were instructed to perform roll over drills because unit leadership was concerned about slippery conditions due to rain. The crews performed the drills. During off load a Howitzer slipped off a trailer and rolled two times. A sometimes fatal accident. The crew drill directed by leadership saved their lives.	As a new 2LT, I found myself at the NTC in command of a tank company during a night attack. Knowing the enemy was on the far side of a ridgeline, I crested the ridge with my whole formation and lost half of my tanks in a matter of minutes, later, when asked, I knew I shouldn't have crested the hill.
Battlefield Visualization/ Prediction	Synthesis	Leaders must anticipate a highly uncooperative and aggressive enemy who will seek to identify friendly strengths and weaknesses and avoid strength and attack weakness. A battalion commander's most successful mission at NTC revolves around his successfully identifying that the enemy would try to penetrate along our flanks first and would choose not to continue attacks where we had positions and forces in depth. We prepared in depth throughout the sector and forced the enemy to attack elsewhere after inflicting heavy casualties. Knowledge of enemy tactics and anticipation of his tactics, techniques, and procedures was key to our success.	During our recent LTP for our upcoming NTC rotation, based on the attack plan, it was clear we (BCT) failed to have a clear understanding of the enemy's effect on METT-T factors and failed to consider how he would employ against us. Unexpected enemy FASCAM employment virtually halted the task force advance and led to its destruction. The BCT was caught fully off guard.

Self Understanding	Mental Guidance	Coming from a light unit, I realized I was very weak in both maintenance and self-propelled artillery operations. I took time during my staff time to do "mini-OPDs" with the BN Maintenance Officer and experienced NCOs.	A major I've recently served with believes the best way to make things happen is to use a very negative leadership style, belittling subordinates and employing foul language. In some cases, he caused or exacerbated problems without realizing that his own demeanor was at least partly to blame.
Question Asking	Mental Guidance	A good command climate in my unit enables us to ask "What if?" No single person has all the answers; therefore some things are overlooked. Asking questions insures that the decision made is valid and passes the common sense test.	BN operations order was issued and the BN prepared for execution. Although numerous rehearsals were conducted, a key leader failed to ask a question, "What is the most dangerous threat to my ammunition PLT?" As a result, the PLT was unprepared for an anti-tank ambush that destroyed 50% of the unit's basic load.
Finding Hidden Assumptions	Mental Guidance	During a recent inventory when asked by the commander as to the status of property, the incoming BC stated "its accounted for". However the unit commander did not accept a vague comment as factual and requested documentation to ensure proper accountability.	We assumed that the enemy would aggressively attack during a movement to contact mission. They were famous for achieving great offensive successes. This led our commander to fail to recognize that they had gone to a hasty defense (despite information made available). Because a defense was not considered to be an option for the enemy.
Decentering	Mental Guidance	I use the 180-degree rule- try to look at a situation from the completely opposite side, whether that is the enemy view/opinion of whomever I am dealing with. If a division staff officer wants something- I determine what we can do/why we can't; but try to see from his side why it needs to bedone.	TF attack through central corridor at NTC toward Brown Pass against MRB security zone – assumption that the enemy would be oriented East - failed to consider the possibility of enemy defenses oriented west – designed to engage flanks: rear as TF passed through - If known a more deliberate approach would have enabled success.

In addition to looking for inconsistencies in the data, skill descriptions and personal/historical examples were examined to see if their content is consistent with the subcomponents in the S^3 Model. That is to say content consistent descriptions and examples will show that *Situation Understanding's* subcomponents have an intuitive focus, *Simulation's* subcomponents have a synthesis focus, and *Self-regulation's* subcomponents are focused on mental guidance. When reviewing the data it was found that only personal/historical examples were useful in showing the focus of the conceptual skills. The skill descriptions were generally too condensed to be able to extract relevant information concerning the skill's focus.

Based on a consideration of the data, it was felt that the personal/historical examples did have three distinct focal points. Examples provided for *Situation Understanding* and *Discriminating Relevant Cues* mostly seemed to focus around a leader who had an intuitivesense of knowing the right choice to make. Examples provided for *Information Assimilation, Mental Wargaming/ Simulation* and *Battlefield Visualization/Prediction* mostly focused on the act of synthesizing sources of information to come to the right choice. And examples for *Self Understanding, Question Asking, Finding Hidden Assumptions,* and *Decentering* centered around the idea that the decision maker can utilize an active process to guide the type of information (e.g., assumptions vs. facts) that they must process. In addition, the examples of the Self-regulation skills showed how development of mental guiding skills helps to avoid making catastrophic errors.

Conceptual Skill Development

From the findings in the previous analyses, it was hypothesized that the conceptual skills development ideas would center on an intuitive, a synthesis, or a mental guidance focus. This section shows some support for this hypothesis as development ideas from each internal process of the S^3 is considered.

As in the previous experiment, participants were asked to try to avoid only providing "experience" as the core source of development. Furthermore, participants were asked to provide as many specifics as possible. For the most part, participants did well at providing explicit examples.

However, the officers seemed to have the most trouble giving specifics for developing those skills that have an innate focus (e.g., *Situation Understanding* and *Discriminating Relevant Cues).* There were a total of 21, out of a possible 58, officers that either left this section blank or simply responded "experience". Yet, this finding is neither all that surprising nor disappointing as these Conceptual Skills seem to be focused on trial and error learning. Thus, skills that fall under the category of *Situation Understanding* are often best developed through practice and experience. Officers who actively work to obtain a deep knowledge base and are who are allowed to take command in training exercises and realistic simulations will most likely develop those conceptual skills with an intuitive focus.

A large number of the development ideas for the synthesis based conceptual skills were not original. Many of the notions were based on the type of development system that the Army is currently providing. In fact very few, if any, of the development ideas for *Battlefield Visualization* and *Mental Wargaming* were different than what is provided in Army doctrine. Once again such a finding is not all that unexpected. The skills, mentioned above, are focused around warfighting, which is an area that the Army trains efficiently.

However, as the skills moved away from the concept of warfighting, the more novel the development ideas became. For example consider the insights offered by one officer for developing *Information Assimilation*

> "Give them time restrictions, also have them listen to stories from soldiers. Have them answer all of what could be called basic questions like "what is the problem," "when did it happen," "why did it happen," "Is it preventable." the leader must be able to grasp the information in a timely manner without missing any critical points."

Although the above statement has shades of Self-regulation (mental guidance focus) development, it clearly delineates a method in which *Information Assimilation* (a synthesis focused skill) can be developed. Clearly further development of synthesis based conceptual skills will need to be done by stepping away from the current doctrine and a dominant warfighting perspective.

Finally, the officers' development ideas for non-traditional conceptual skills, which are based on Self-regulation principles, are the most interesting to researchers and hopefully to military personnel. These skills are important, as they seem to have the most potential for preparing a versatile, flexible, adaptive battle commander in the future. In addition, Conceptual skills such as *Self-Understanding, Finding Hidden Assumptions, Question Asking,* and *Decentering* are probably foreign to most officers, as such terminology does not appear in doctrine. Thus, development ideas have a decreased chance of being influenced by previously learned standards.

Based on the data provided, it was found that Self-regulation conceptual skills did indeed produce development ideas that seemed to be more creative than the ideas for development of the other skills. For example, consider these ideas for developing *Question Asking*

> "Get others to talk by asking questions. See if you can have a five-minute conversation with one of your men without making a single statement – all questions."

> "Role play as a reporter or a prosecuting attorney; practice counseling techniques."

Obviously, these are not the usual development methods of the United States Army.

In addition, solid acumen of what is expected of the future commander was provided in the development suggestions. Consider this statement presented by an officer who gave good development insight for *Decentering*

> "Constantly interact with soldiers, family members, civilians, etc. The real skill is understanding and appreciating the views of others, while still accomplishing the unit's mission. By exposing yourself to a variety of backgrounds, leaders can hopefully avoid being constrained by purely military views."

Although the above development idea seems basic, these simple issues of development should not be overlooked by current doctrine. Being sensitive to others' background becomes more important as commanders must deal with the coordination of multiple international forces, multiple agencies, and multiple branches. In addition, with the heightened presence of the media, not knowing an enemy's or an allies' background may prove disastrous.

Limitations

The major limitation of this study is that the conceptual skills are abstract in nature and thus difficult for some to grasp. Of course, this limitation holds true for the previous two studies. To counteract the abstractness of the skills, future studies hope to utilize the personal/historical examples that were collected from the officers.

Another limitation of the study is that only impressions of skills were collected. Based on results of this study, one is not able to tell if a certain conceptual skill is truly crucial for leading effectively. Thus, future studies will need to make more direct measures of those processes and subcomponents found in the S^3 Model.

Data Collection Summary Table

Table 8

Summary of the Fort Drum, Fort Hood, and Fort Bragg Data Collections

Summary Point
The data collection helped identify, organize, and clarify conceptual skills.
The data collection went from a broad based to a narrow approach.
Many development ideas were similar to the current (doctrinal) approach.
Zero new skills were added to the list based on officer recommendations.
In general, non-traditional skills (e.g., *Decentering, Question Asking*) had a wider range of importance ratings than traditional skills.
The most useful information was found by considering the inconsistencies between importance ratings, skill descriptions, and personal/historical examples.
Some officers had a strong bias against non-traditional skills.
Standard tasks & MDMP language for skills were difficult to overcome.
The majority of descriptions and examples were related to daily Army operations.
Officers provided skill descriptions that were similar to the researchers' descriptions.
The development of a cognitive model helped to better represent a conceptual skills ideology.
The cognitive model helped keep focus on "how to think" rather than "what to think."
Personal examples were better developed after an integrating model was presented.

Recommendations

One recommendation is that the Army needs to take a much greater focus on conceptual skills development. As stated previously, of all the leadership skills, conceptual skills have been given the least amount of attention. As adaptability, flexibility, and versatility become more important for future leaders so too will the need for better-developed conceptual skills. Today's leaders need to consider the costs of using highly analytic approaches (e.g., MDMP) in a world

that is highly time constrained, information rich, and constantly changing. In addition, one must consider the best method to prepare the leader who has to operate effectively in a VUCA environment that may force the officer to quickly change COAs. Providing a leader with better thinking skills allows them to be more flexible and adaptive when such situations arise.

Another recommendation is that the S^3 Model, or an alternative model, be used as an aid for explaining the importance of conceptual skills to officers. Utilizing a cognitive model helps to remove some of the abstractness of the conceptual skills by allowing such thinking skills to be better articulated. In addition, a cognitive model serves as a useful guide as it allows one to examine the factors involved in the process of thought.

A third recommendation is that the personal/historical examples collected in the three studies be utilized to pass on "tacit" knowledge of conceptual skills. Using examples is more promising than using descriptions simply because they are richer in context and more memorable. Researchers such as Schank (1990), Pennington and Hastie (1993), and Klein (1998) have advocated that the "power of stories" be utilized to pass along knowledge. As long as the core concepts are included in the personal/historical examples, they might prove to be a much better vehicle to inform future commanders.

Future Directions

Even though this research effort provided some insights to the development of conceptual skills, much more work needs to be done in this area. Fallesen (in preparation A) has provided extensive comments on conceptual skill development. In addition, Conceptual Skill development is a central focus of the DEVCOM program at the ARI- Fort Leavenworth research unit.

A more direct test of conceptual skills is the next logical step. One direction this research hopes to take is exploring specifically how self-regulation principles can enhance thinking. In order to accomplish this, officers would need to receive training in self-regulation and then perform tasks in which processes such as *Situation Understanding*, *Simulation*, and *Self-regulation* are stimulated and are evaluated.

In addition, there are a number of ways, mentioned previously, in which the S^3 Model might be tested. For instance, each internal process can be explored separately in laboratory-based studies. In addition, looking at the external influences is another promising way in which the model might be explored.

References

Anderson, N. H. (1996). *A functional theory of cognition.* Mahwah, NJ: Erlbaum

Beach, L. R. (1990). *Image theory: Decision making in personal and organizational contexts.* New York: Wiley.

Beach, L. R. (1998). *Image theory: Theoretical and empirical foundations.* New Jersey: Lawrence Erlbaum Associates

Cohen, M., Freeman, J., Fallesen, J., Marvin, F., & Bresnick, T. (1996) *Training critical thinking skills for battlefield situation assessment: An experimental test.* (ARI Technical Report 1050). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

Carver, C. S., & Scheier, M. F. (1996). Self-regulation and its failures. *Psychological Inquiry*, 7, 32-40.

Department of Army. (1994, August). Military operations: Force XXI operations. TRADOC Pam 525-5. Fort Monroe, VA: Training and Doctrine Command.

Department of Army (1999, August) Army Leadership. Field Manual 22-100 Washington, DC: Headquarters

Fallesen, J. J. (in preparation A). Developing Conceptual Thinking. In *Human Dimensions of Battle Command.*

Fallesen, J. J. (in preparation B). Improving thinking. In *Human Dimensions of Battle Command.*

Hammond, K. R. (1992) Naturalistic decision making from a Brunswikian viewpoint: Its past, present and future. In G. A. Klein, J. Orasanu, R. Calderwood, C E. Zsambok (Eds) *Decision making in action: Models and methods*, pp. 205-227 Norwood, NJ: Ablex Publishing.

Hammond, K. R. Hamm, R. M., Grassia, J., & Pearson, T. (1987). Direct comparison of the efficacy of intuitive and analytic cognition in expert judgment. *IEEE Transactions on Systems, Man, and Cybernetics,* SMC-17, 753-770.

Heatherton T. F., & Baumeister, R. F.; (1996). Self-regulation failures: Past, present, and future. *Psychological Inquiry*, 7, 90-98.

Hunt, J. G., & Phillips, R. L. (1996). *1996 Army symposium: Leadership challenges of the 21st century army. Executive summary.* (Research Note No. 96-63). Alexandria, VA: U. S. Army Research Institute for the Behavioral and Social Sciences.

Kelley, J. W. (1996). Brilliant Warrior. Research Paper. Air Force 2025.

Klein, G. A. (1997). The Recognition-Primed Decision (RPD) Model: Looking back, looking forward. In C. E. Zsambok and G. A. Klein (Eds) *Naturalistic decision-making.* Mahwah, NJ: Erlbaum.

Klein, G. (1998). Sources of power: How people make decisions. Massachusetts: MIT Press.

Klein, G., Orasanu, J., Calderwood, R., Zsambok, C. E., (1993) *Decision making in action: Models and methods.* Norwood, NJ: Ablex Publishing.

Mithaug, D. E. (1992). *Self-regulation theory: How Optimal adjustment maximizes gain.* Westport, Connecticut: Praeger Press

Payne, J. W., Betteman, J. R., & Johnson, E. J. (1994). *The adaptive decision-maker.* Cambridge, England: Cambridge University Press.

Pennington, N., and Hastie, R. (1993). A theory of explanation-based decision making. Hammond, K. R. (1992) Naturalistic decision making from a Brunswikian viewpoint: Its past, present and future. In G. A. Klein, J. Orasanu, R. Calderwood, C E. Zsambok (Eds) *Decision making in action: Models and methods,* pp. *188-201* Norwood, NJ: Ablex Publishing.

Rumsey, M. (1998) *21st Century Lieutenants.* Paper presented at Cadet Command Study Group, Norfolk, VA

Seetin, R. E. (1999) *The media, intelligence, and information proliferation: Managing and leveraging the chaos.* Strategy Research Project. U. S. Army War College, Carlisle Barracks, PA

Schank, R. C. (1990). *Tell me a story: A new look at real and artificial memory.* New York: MacMillian

Schmitt, J. F. & Klein, G. A. (1999) How we plan. *Marine Corp Gazette, 83,* 18-28

Simon, H. A. (1976). *Administrative Behavior.* New York: McMillan

US Army, (1997, July). *Knowledge and speed.* The annual report on the Army After Next project to the Chief of Staff of the Army.

Woods, D. D. (1992). Process-Tracing Methods for the study of cognition outside the experimental psychology laboratory. In G. A. Klein, J. Orasanu, R. Calderwood, C E. Zsambok (Eds) *Decision making in action: Models and methods.* New Jersey: Ablex Publishing.

Zsambok, C. E. & Klein, G. A. (Eds.) (1997) *Naturalistic decision making.* Mahwah, NJ: Erlbaum.

Appendix A. Illustrative cognitive skills.

1. **Open attitude toward one's battlefield concepts**. Once one has developed an opinion on what is happening on the battlefield or what is the best course of action, how willing is one to change that view? In the face of how much contrary evidence? An opposite extreme of the tendency might be a reticence to form opinions in the face of uncertainty. Overall, this skill is probably not unrelated to a general trait e.g., overconfidence. Still it is conceivable that a person may be open in fields where he/she does not consider himself an expert and closed minded in the battlefield domain.

2. **Dynamic Thinking (Planning, visualization).** In battlefield visualization one must wargame a variety of METT-T factors and mentally simulate their interactions to reach a visualization of future states. When doing so it is desirable to account for changes in the entities being manipulated, e.g., attrition of units, fatigue of soldiers, degradation of terrain, movement of enemy, changes in visibility, etc. Many planners seem to have difficulty incorporating this level of complexity to visualization.

3. **Discerning Key Aspects of A Situation.** An important skill is to quickly be able to discern the key elements of a situation - the ability to pick out what is important and identify those elements that define the structure of the problem. This is a common attribute of expertise and is probably a combination of pattern recognition, thought habits, and the ability to perform rapid mental simulations of high level (i.e., schematic and without details) plans. Some examples include sequencing a set of preparations, possibly leaving out the trivial ones, specifying the critical subordinate element in a mission and describing why the other elements are dependent upon it.

4. **Ability to Develop Concepts Within The Structure Of Commander's Intent And The Framework Of The Larger Organization**. Better planners are aware of the effect their actions have on other friendly units and on the plan's compatibility with the mission of the larger unit.

5. **Developing Active Model of a Thinking Enemy**. The usual enemy model incorporates a too cooperative opponent during the planning phase, and in decision making during execution, enemy intents and plans are often not sufficiently regarded.

6. **Information Assimilation.** How quickly can an officer take in and retain a large amount of tactical information.

7. **Battlefield Visualization/Prediction/Wargaming**. This skill is based largely on specific domain content knowledge.

8. **Rapid Decision Making.** This skill is called Dynamic Decision-Making by the Marine Corps. The Marine definition is "the process of making a series of decisions with serious consequences under conditions of stress, uncertainty, and immediate time deadlines". It involves the ability to improvise an action in very fluid conditions, in reaction to unanticipated events, or in circumstances where a plan is evidently failing.

9. **Proactive planning.** This skill represents a tendency to attempt to influence enemy behavior. To what extent does an officer, in his planning, (or during execution control?), attempt to shape enemy behavior instead of merely predicting it

10. **Flexibility in Planning.** As officers develop plans they should consider how adaptable and adjustable they are. If one part of the plan fails how robust is the remainder? How resilient is the plan to enemy deviations from predicted behavior? How much latitude do subordinate units have? How rich a contingency set do concepts have?

11. **Incorporate Principles of War.** This is more than a single skill but is really a collection. To what extent does the officer's ideas incorporate the principle of mass? Of surprise? Etc.

12. **Mental Willpower.** This is one of the more difficult thinking skills (or dispositions) to explain. Mental willpower describes a tendency to find ways to enforce your plans despite your opponent's threats. That is, instead of simply responding to the threats, one strives to overcome the threats and continue with your conception - to force this conception on your opponent..

13. **Keeping track of minor - but potentially critical events.** Monitoring aspect is important so as not to be caught up in deception or chaos.

14. **Ability to communicate a summary of a situation.** Absorb and understand a current situation, condense knowledge and package it for transfer to someone else. Skill involves comprehension, gisting, and discerning critical information.

15. **Ability to infer what will happen next in a sequence of actions.** A subset of general prediction ability, focused more on adversarial reasoning skills. Figure out what opponent's intent/goal hierarchy is and apply knowledge of how events are contingent upon goals. A key component skill in deciding what information is needed for critical decisions, for monitoring a situation and quickly deciding that something has gone wrong, for systematic planning.

16. **Being able to see possibilities and problems outside the "box" that higher has drawn.** This may relate to creativity and maintaining a questioning attitude toward assumptions.

Appendix B1. Instruction Sheet for Stage 1- Fort Drum Data Collection.

Instructions: On the following pages you will find a listing of 17 conceptual "skills" that have been deemed important for commanders at the battalion level or higher. 1) Please look over each "skill" and read its accompanying description. 2) After considering the "skills" please rate them on their overall importance. 3) In the space below the rating, please provide your personal interpretation of the skill. In other words, if you were involved in a discussion where you wanted to illustrate the important "skills" that a battle commander should possess, explain how YOU would describe each of the "skills" below. 4) Next, consider the various leaders that you know, or have known, throughout your professional career. Please provide a personal example (i.e., anecdote) of a commander who possessed or did not possess a certain "skill". If you are unable to come up with an example from your personal experience then please try and create an example the would describe a commander who exhibits (or fails to exhibit) the described "skill". 5) Finally, please provide a list and description of key conceptual "skills" that do not appear on this list

Appendix B2. Conceptual Skills and Descriptions for Stage 1- Fort Drum Data Collection

1) Proactive Planning

This "skill" represents a tendency to attempt to influence enemy behavior. This concept involves one's attempt to shape enemy behavior rather than predict it.

2) Ability to conduct adversarial reasoning

This "skill" relates to maintaining a questioning attitude toward assumptions. Commanders' with this "skill" do not accept facts, information, analysis, etc. without exploration of other possibilities.

3) Situation Understanding

This "skill" suggests that it is important to be able to quickly discern the key elements of a situation. In other words, one has the ability to pick out what is important and identify those elements that define the structure of the problem. An example includes sequencing a set of preparations, while excluding the trivial aspects. Another example includes specifying the critical subordinate element in a mission and explaining why other elements are dependent on it.

4) Awareness of implications from actions

This "skill" suggests that better planners are aware of the effect their actions have on other friendly units and on the plan's compatibility with the mission of the larger unit. One should have the ability to develop concepts within the structure of the commander's intent and the framework of the larger organization. Largely this is a thought habit; less skilled planners focus on the actions of their own units in greater isolation.

5) Battlefield Visualization/Prediction/Wargaming

This "skill" is based largely on specific content knowledge. This includes the ability to wargame a variety of METT-T factors and mentally simulate their interactions in order to reach a visualization of future states. High accuracy of the prediction and the integrating of complexity are crucial aspects of this "skill".

6) Attending to Enemy Thought

This "skill" involves the development of an active model of a thinking enemy. Often the enemy model incorporates a too cooperative opponent during the planning phase. During a consideration of mission execution enemy intents and plans are not sufficiently regarded. One need to have the ability to anticipate such questions and develop though patters that build a more adversarial enemy.

7) Information Assimilation

This "skill" refers to the brevity in which an officer can take in and retain a large amount of information. As an officer develops and gains experience, their knowledge structures will become better organized and they will be able to assimilate increased information at a higher speed.

8) Dynamic Thinking

This "skill" involves the process of making a series of decisions with serious consequences under conditions of stress, uncertainty, and immediate time deadlines. It involves the ability to improvise an action in fluid conditions, in reaction to unanticipated events, or in circumstances where a plan is evidently failing.

9) Maintaining Emotional Stability

This "skill" refers to ones ability to remain calm while encountering a stressful situation. Possession of such a quality can lead to effective operation during time constrained or other stress related situations.

10) Positive Attitude Towards Change

This "skill" includes having an open attitude towards one's battlefield concepts. Once one has developed an opinion of the current battlefield situation or developed a plan of action, how willing is one to change that view? As officers develop plans, they should consider how adaptable and adjustable they are willing to be.

11) Mental Willpower (concentration of thought)

This "skill" describes a tendency to find ways to enforce plans despite threats from the opponent. Instead of simply responding to the threats, one strives to overcome the threats and to continue with their conception.

12) Communicating of summarized situation

This "skill" consists of one being able to absorb and understand a current situation and then condense this knowledge so that it can be transferred to someone else. Components of this "skill" include comprehension, gisting, and discerning critical information.

13) Application of Concepts

This "skill" involves a commander who is able to incorporate principles of war. Solving problems and then determining how the concepts relate to the solution or how the solution employs the concepts helps to develop such a skill. In other words, one is able to actually carry out the principles that are important on the battlefield.

14) Situation Monitoring

This "skill" involves the continual monitoring of progress as reflected in the course of implementing a new plan or pursuing a particular goal. It is suggested that thorough monitoring allows for the revision or replacement of faltering plans as well as helping to define goals more sharply. Monitoring lets one use feedback as a way to control progress.

15) Discriminating Relevant Cues

This "skill" involves the ability of a commander to search through environmental cues (i.e., information) and partial out that which is relevant to the decision task. One is able to discriminate the most important cues from information rich environments that provide multiple contrasting cues.

16) Finding Hidden Assumptions

This "skill" involves the ability to make it explicit to oneself when information exists as assumption or an assertion rather than a fact. One who possesses such a "skill" will actively question such assumptions.

17) Capable of Dealing with Uncertainty and Ambiguity

This "skill" involves the ability to make a decision while realizing that information is lacking and being unsure of the exact outcome of the decision. This "skill" is important to those leaders who recognize that they often operate in an environment that is full of uncertainty, complexity, and ambiguity.

Appendix B3. Example of the Data Collection Form A for Stage 1- Fort Drum

1) Proactive Planning

This "skill" represents a tendency to attempt to influence enemy behavior. This concept involves one's attempt to shape enemy behavior rather than predict it.

How important do you find it that an Army commander possesses this "skill"? (circle the number)

Not Important	Somewhat Important	Moderately Important	Extremely Important	Critical	Unsure
1	2	3	4	5	0

*How would **YOU** describe this "skill" to another person?*

Please provide a personal example where it was obvious that a leader possessed or did **not** possess this "skill".

2) Ability to conduct adversarial reasoning

This "skill" relates to ones ability to dominate or outwit an opponent. Commanders' with this "skill" do not accept facts, information, analysis, etc. without exploration of other possibilities.

How important do you find it that an Army commander possesses this "skill"? (circle the number)

Not Important	Somewhat Important	Moderately Important	Extremely Important	Critical	Unsure
1	2	3	4	5	0

*How would **YOU** describe this "skill" to another person?*

Please provide a personal example where it was obvious that a leader possessed or did not possess this "skill".

Appendix B4. Example of the Data Collection Form B for Stage 1- Fort Drum

1) Proactive Planning

This "skill" represents a tendency to attempt to influence enemy behavior. This concept involves one's attempt to shape enemy behavior rather than predict it.

How important do you find it that an Army commander possesses this "skill"? (circle the number)

Not Important	Somewhat Important	Moderately Important	Extremely Important	Critical	Unsure
1	2	3	4	5	0

What is your opinion concerning the description provided? (check all that apply)

___ The description is inadequate, it does not capture the way I would personally represent the term

___ The description is inadequate, it does not go into enough detail

___ The description is inadequate, I find the wording unclear and/or awkward

___ The description is inadequate, because: _____.

___ The description is adequate.

If you marked that the description was inadequate, please provide a revised or alternate description below.

2) Ability to conduct adversarial reasoning

This "skill" relates to maintaining a questioning attitude toward assumptions. Commanders' with this "skill" do not accept facts, information, analysis, etc. without exploration of other possibilities.

How important do you find it that an Army commander possesses this "skill"? (circle the number)

Not Important	Somewhat Important	Moderately Important	Extremely Important	Critical	Unsure
1	2	3	4	5	0

What is your opinion concerning the description provided? (check all that apply)

___ The description is inadequate, it does not capture the way I would personally represent the term

___ The description is inadequate, it does not go into enough detail

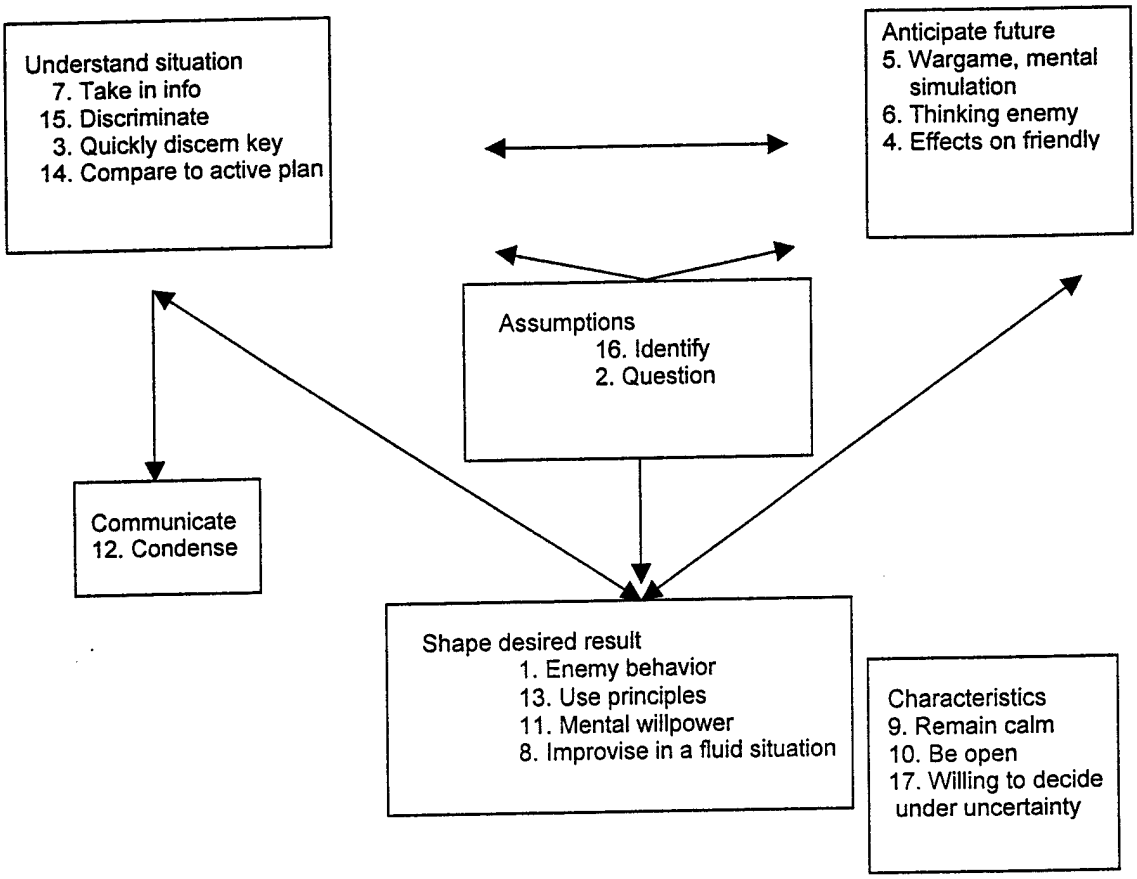
___ The description is inadequate, I find the wording unclear and/or awkward

___ The description is inadequate, because: _____.

___ The description is adequate.

If you marked that the description was inadequate, please provide a revised or alternative description below.

Appendix B5. Clustering of Conceptual Skills used in Stage 1- Fort Drum



Appendix C1. Instruction Sheet for Stage 2- Fort Bragg Data Collection.

***Instructions*:** On the following pages you will find a list of 17 conceptual "skills" that have been deemed important for commanders at the battalion level or higher. Conceptual skills include competence handling ideas, thoughts, and concepts.

1) Please look over each "skill" and read its accompanying description.

2) After examining the "skill" and its description please make as many alterations as you see fit to help clarify the description.

3) Next, please provide an importance rating of each "skill" that is based on the necessity that a future leader possesses this skill.

4) In the space below the rating, please provide your personal interpretation of the skill. In other words, if you were involved in a discussion where you wanted to illustrate the important "skills" that a future battle commander should possess, explain how **YOU** would describe the "skill".

5) Next, consider the various leaders that you know, or have known, throughout your professional career. Please provide a personal example of a commander who possessed or did **not** possess a certain "skill" (that is, provide an example of what not to do). If you are unable to come up with an example from your personal experience then please try to use a historical example that would describe a commander who exhibits (or fails to exhibit) the described "skill".

6) After deriving an example, please suggest some possible ways that younger officers might develop such a "skill". Rather than simply stating that the "skill" can develop through basic experience, try and pinpoint what **exact** experiences would most effectively lead to better development of the skill.

7) Finally, on the last page please provide a list and description of key conceptual "skills" that do not appear among those listed for you.

Appendix C2. Conceptual Skills and Descriptions for Stage 2- Fort Bragg Data Collection

1) Concentration of thought

This "skill" describes a tendency to find ways to enforce plans despite threats from the opponent or other friction from war or operational missions. Instead of simply responding to the threats, one strives to overcome the threats and to continue with their conception. One has the ability to bring a seemingly chaotic situation into focus through mental concentration.

2) Self understanding

This "skill" refers to ones ability to look at one's performance and examine how it could have been improved. Thinkers need to remain open and flexible to create new frames of reference to aid understanding, see problems from differing perspectives, and determine what improvements to make.

3) Situation understanding

This "skill" refers to ones ability to form an accurate, coherent understanding of the current situation. Situation understanding is basic for understanding constraints, problems, and goals

4) Awareness of implications from actions

This "skill" suggests that better thinkers are more conscious of how their plans and actions support and impact on the mission of higher and friendly units. One should have the ability to envision concepts within the structure of the commander's intent and the framework of the larger organization. Less skilled planners focus on the actions of their own units in greater isolation.

5) Battlefield Visualization/Prediction

This "skill" is based largely on applying specific content knowledge of METT-T factors to envision future situations within the operational environment. High accuracy of the prediction is a crucial aspect of this "skill".

6) Attending to Enemy Thought

This "skill" involves the development of an active model of a thinking enemy. Often the thinker's model of the enemy or belligerent parties is based on an opponent who is too cooperative. During a consideration of mission execution enemy intents and plans are not sufficiently regarded. One needs to have the ability to think about such difficulties and develop thought patterns that represent a dynamic, unwilling adversary.

7) Information Assimilation

This "skill" refers to the brevity in which a thinker can take in and retain information essential to the problem at hand. The information may consist of a large amount or diverse, apparently unrelated data. As a thinker develops and gains experience, knowledge structures will become better organized and he or she will be able to assimilate information at a greater rate and understand its implications.

8) Dynamic Thinking

This "skill" involves the process of making decisions with serious consequences under conditions of stress, uncertainty, and immediate time deadlines. It involves the ability to improvise an action in fluid conditions, in reaction to unanticipated events, or in circumstances where a plan is evidently failing. This also involves one's ability to think of options outside the bounds of conventional doctrine to effectively meet the desired endstate.

9) Positive Attitude about Change

This "skill" includes having an open attitude towards one's tactical or strategic concepts. Once thinkers have developed an opinion of a current operational situation or developed a plan of action, they should be ready and willing to make adjustments to their intellectual commitment if circumstances change sufficiently or better opportunities arise. Planners should remain mentally prepared to change and adapt as often as necessary.

10) Communicating a summarized situation

This "skill" consists of one being able to absorb and understand a current situation and then condense this knowledge so that it can be transferred to someone else. Components of this "skill" include accuracy, comprehension, concise communication, and understanding whether others received the information and comprehended it.

11) Situation Monitoring

This "skill" involves continual monitoring when pursuing a particular goal or starting a new plan. This "skill" allows for the revision or replacement of faltering plans as well as helping to define goals more sharply. Monitoring lets one use feedback as a way to control progress.

12) Discriminating Relevant Cues

This "skill" involves the ability of a commander to consider all environmental cues (i.e., information) and partial out those which are relevant to the task. One is able to discriminate the most important cues in information rich environments.

13) Finding Hidden Assumptions

The "skill" involves the ability to determine when information is really just an assumption or an assertion rather than a fact. One who possesses such a "skill" will actively remain alert to identifying assumptions that are unknowingly considered to be facts.

14) Maintaining Emotional Control

This "skill" refers to ones ability to remain calm while encountering a stressful situation. Possession of such a quality can lead to effective operation during time constrained or other stress related situations.

15) Decentering

This "skill" involves the ability to shift out of one's typical way of viewing and understanding a situation and to take on a perspective that may be uncommon to them. Decentering allows one to understand how others are likely to see a problem or situation. Being able to take multiple perspectives provides one the advantage of broadly envisioning possibilities and testing plans according to how others see them.

16) Mental wargaming and simulation

This "skill" refers to ones ability to envision how proposed goals and actions will play out and what their result will be. Mental simulation involves imagining how events will interact and evolve into prospective results. It is the process for prediction and explanation of prospective actions. It is also a means to do "what if" thinking, to explore alternatives and contingencies. Progressive deepening can be a way to do mental simulation whereby events are simulated in finer and finer detail until success or a difficulty is envisioned.

17) Proactive Planning

This "skill" represents an attempt to achieve a desired result by designing plans that have anticipated how and how well plans will play out. Proactive planning involves envisioning both the intended and unintended consequences of actions and including steps to shape the result toward the end desired. Against an enemy proactive planning will influence enemy behavior by using one's knowledge of enemy doctrine and tactics to shape actions rather than predict them. This "skill" includes situations where you take the offensive and force the enemy to react to you.

Appendix C3. Example of the Data Collection Form for Stage 2- Fort Bragg.

1) Concentration of thought

This "skill" describes a tendency to find ways to enforce plans despite threats from the opponent or other friction from war or operational missions. Instead of simply responding to the threats, one strives to overcome the threats and to continue with their conception. One has the ability to bring a seemingly chaotic situation into focus through mental concentration.

If you feel that the description of this "skill" is incomplete, vague, and/or awkward please make revisions either in the above text or the area below.

How important do you find it that a future Army commander possesses this "skill"? (circle the number)

Not Important	Somewhat Important	Moderately Important	Extremely Important	Critical	Unsure
1	2	3	4	5	0

*How would **YOU** describe this "skill" to a developing officer?*

In order to pass this knowledge to a younger officer, please provide at least one personal or historical example where it was obvious that a leader possessed or did **not** possess this "skill".

How would you suggest that someone could go about developing such a "skill"?

Appendix D1. Conceptual Skills and Descriptions for Stage 3- Fort Hood Data Collection

1) Self understanding

This "skill" refers to ones ability to look at one's performance and examine how it could have been improved. Thinkers need to remain open and flexible to create new frames of reference to aid understanding, see problems from differing perspectives, and determine what improvements to make.

2) Battlefield Visualization/Prediction

This "skill" is based largely on applying specific content knowledge of METT-T factors to envision future situations within the operational environment. High accuracy of the prediction is a crucial aspect of this "skill".

3) Information Assimilation

This "skill" refers to the brevity in which a thinker can take in and retain information essential to the problem at hand. The information may consist of a large amount or diverse, apparently unrelated data. As a thinker develops and gains experience, knowledge structures will become better organized and he or she will be able to assimilate information at a greater rate and understand its implications.

4) Question Asking

This "skill" involves asking a question or multiple questions to gain a relevant interpretation of the setting. Question asking leads to a re-evaluation of the current situation that may produce a reshaping of the initial goal.

5) Discriminating Relevant Cues

This "skill" involves the ability of a commander to consider all environmental cues (i.e., information) and partial out those which are relevant to the task. One is able to discriminate the most important cues in information rich environments.

6) Finding Hidden Assumptions

The "skill" involves the ability to determine when information is really just an assumption or an assertion rather than a fact. One who possesses such a "skill" will actively remain alert to identifying assumptions that are unknowingly considered to be facts.

7) Situation understanding

This "skill" refers to ones ability to form an accurate, coherent understanding of the current situation. Situation understanding is basic for understanding constraints, problems, and goals