LEVEL II

ARI TECHNICAL REPORT
TR-78-A18

AD A056054

Research on Training for Brigade Command Groups: Factors Contributing to Unit Combat Readiness

by

Joseph A. Olmstead
Michael J. Baranick
B. Leon Elder

HUMAN RESOURCES RESEARCH ORGANIZATION
300 North Washington Street
Alexandria, Virginia 22314

DDC
RECEIVED
JUL 10 1978
F

JUNE 1978

Contract DAHC 19-77-C-0018

Steven R. Stewart, Technical Monitor
ARI Field Unit, Fort Leavenworth, Kansas

Prepared under subcontract from
System Development Corporation
Santa Monica, California

Prepared for

U.S. ARMY RESEARCH INSTITUTE
for the BEHAVIORAL and SOCIAL SCIENCES
5001 Eisenhower Avenue
Alexandria, Virginia 22333

AU NO. _____
DDC FILE COPY

Approved for public release; distribution unlimited

U. S. ARMY RESEARCH INSTITUTE
FOR THE BEHAVIORAL AND SOCIAL SCIENCES

A Field Operating Agency under the Jurisdiction of the
Deputy Chief of Staff for Personnel

JOSEPH ZEIDNER
Acting Technical Director

W. C. MAUS
COL, GS
Commander

Research accomplished
under contract to the Department of the Army

System Development Corporation

NOTICES

DISTRIBUTION Primary distribution of this 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: PERI-P, 5001 Eisenhower Avenue, Alexandria, Virginia 22333

FINAL DISPOSITION This 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 report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: TR-78-A18 (18) ARI	2. GOVT ACCESSION NO. / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle): RESEARCH ON TRAINING FOR BRIGADE COMMAND GROUPS: FACTORS CONTRIBUTING TO UNIT COMBAT READINESS	5. TYPE OF REPORT & PERIOD COVERED: Final Report, 8 Feb 77 - 7 Feb 78
	6. PERFORMING ORG. REPORT NUMBER: TM-6008/000/00
7. AUTHOR(S): Joseph A. Olmstead, Michael J. Baranick, B. Leon Elder (Human Resources Research Organization)	8. CONTRACT OR GRANT NUMBER(S): DAHC 19-77-C-0018
9. PERFORMING ORGANIZATION NAME AND ADDRESS: System Development Corporation, 2500 Colorado Avenue, Santa Monica, CA 90406	10. PROGRAM ELEMENT PROJECT TASK AREA & WORK UNIT NUMBERS: 2Q762722A765, 2Q263743A773
11. CONTROLLING OFFICE NAME AND ADDRESS: U.S. Army Research Institute for the Behavioral and Social Sciences (PERI-OL), 5001 Eisenhower Ave., Alexandria, VA 22333	12. REPORT DATE: June 78; NUMBER OF PAGES: 44
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report): UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE: N/A

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release, distribution unlimited. (12) 42 p.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

(14) SDC-TM-6008/000/00

18. SUPPLEMENTARY NOTES: Prepared by Human Resources Research Organization, 300 N. Washington St., Alexandria, VA 22314, for System Development Corporation under Subcontract H6-3277 to Prime Contract DAHC 19-77-C-0018. HumRRO Final Report FR-ED(C)-78-1. Monitored technically by S. R. Stewart, ARI Field Unit at Fort Leavenworth.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Brigade Command Groups	Leadership Climate
Supervision and Control	Organizational Competence
Organizational Processes	CAMMS

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This research examined the relationships between (1) brigade command group effectiveness in performance of Army Training and Evaluation Program (ARTEP) during Computer Assisted Map Maneuver System (CAMMS) exercises and (2) the quality of performance within the brigade of certain organizational processes found in previous research to be related to combat effectiveness. Data were collected on 11 brigades. Seven of nine process dimensions were found to be highly correlated with Brigade Command

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

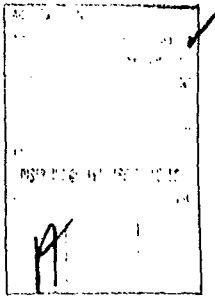
Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

339 900

20. ABSTRACT (Contin.ed)

Group Effectiveness as evaluated by exercise controllers. Furthermore, large significant correlations were found between the organizational process dimensions and a number of dimensions subsumed under the rubric Supervision and Control, which were also highly correlated with Brigade Command Group Effectiveness. Implications of the findings are discussed.



FOREWORD

System Development Corporation submits this document to the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) in conformance to contract number DAHC 19-77-C-0018, "Application of Human Factors Research to (1) Develop Training Objectives for Brigade Commanders and Brigade Command Groups and, (2) Optimize the Effectiveness of Command Posts at Division Level." Mr. Steven R. Stewart, ARI Field Unit - Leavenworth, was the Contracting Officer's Technical Representative.

This document was produced for System Development Corporation by Human Resources Research Organization (HumRRO) in conformance to subcontract number H6-3277 of prime contract number DAHC 19-77-C-0018. The results for Subtask 1B are described in detail.

The work was performed during the period 8 February 1977 - 7 February 1978 by staff members of the Columbus Research Office of HumRRO. Dr. Joseph A. Olmstead was HumRRO Project Director. Mr. Michael J. Baranick and Mr. B. Leon Elder were project members.

Mr. B.R. Modisette was System Development Corporation Project Director.

Dr. T. O. Jacobs was ARI Contracting Officer's Technical Representative for this part of the project initially and the work was completed with Mr. Steven R. Stewart in that role.

The documentation produced for this project is:

TM-5958/000/00, "A Description of an Army Division Manual Tactical Operations Center Organization and Tasks," 12 September 1977.

TM-5958/001/00, "Tactical Organization and Tasks of the Intelligence (S2) and Operations (S3) Elements Within the Tactical Operations Centers of a Brigade and a Battalion," 21 October 1977.

TM-6008/000/00, "Research on Training for Brigade Command Groups: Factors Contributing to Unit Combat Readiness." Final Report, 7 February 1978.

TM-6008/001/00, "Training for Brigade Command Groups: Training Objectives and Strategies," 7 February 1978.

TM-6008/002/00, "A Training Feedback System for Brigade Command Groups," 7 February 1978.

TM-6009/000/00, "Initial Strategies for the Tactical Operations System (TOS) Support of the Command and Control Process. Final Report, Volume I, Overview of TOS Operations," 7 February 1978.

TM-6009/001/00, "Initial Strategies for the Tactical Operations System (TOS) Support of the Command and Control Process. Final Report, Volume 2, Description of TOS Functions for Division Elements," 7 February 1978.

TM-6609/002/00, "Initial Strategies for the Tactical Operations System (TOS) Support of the Command and Control Process. Final Report, Volume 3, Description of TOS Functions at Brigade and Battalion," 7 February 1978.

SUMMARY

This report documents research on training for brigade command groups and describes the results of one subtask of that research. As part of a larger project, the subtask objective was to identify factors or patterns of organizational behavior within brigade command groups which contribute to effective unit performance.

The research was designed to examine the contribution of organizational processes to brigade effectiveness in Computer Assisted Map Maneuver System (CAMMS) exercises and the effects of brigade command group supervision and control upon brigade performance of the processes.

METHOD

Data were collected on 11 brigades located in the continental United States and Hawaii. Eight were Active Army units, two were Reserve brigades, and one was a National Guard unit. HumRRO personnel collected data on the units' participation in CAMMS exercises. The following types of data were collected: (1) combat results of CAMMS exercises, which produced a Brigade Combat Effectiveness score, (2) ratings by Division-level controllers of overall brigade command group effectiveness, based upon controller observations of command group performance of tasks specified in draft ARTEP 100-1 for brigade command groups, and (3) ratings by three levels of players (brigade, battalion, and company) of the quality of organizational processes within the brigades and of a number of dimensions subsumed under the rubric Supervision and Control. The following process dimensions were measured: (1) Information Acquisition, (2) Providing Information and Intelligence, (3) Anticipating Contingencies, (4) Timeliness of Adjustments in Plans and Operations, (5) Effectiveness of Adjustments in Plans and Operations, (6) Planning, (7) Decision Making, (8) Coordination, and (9) Communication. The following Supervision and Control dimensions were measured: (1) Clarity of Mission Objectives, (2) Clarity of Roles, (3) Responsiveness to Subordinate Unit Requirements, (4) Quality of Supervision, (5) Amount of Supervision and Control, and (6) Delegation.

RESULTS

The validity of CAMMS combat results depends upon a number of conditions that must be met if the data are to accurately reflect the actual combat effectiveness of units participating in the exercise. In most of the exercises covered by this research, all of the conditions were not met and, in several exercises, few of the conditions were met. Accordingly, the validity of the Brigade Combat Effectiveness scores is questionable and this fact was recognized and taken into account throughout the analysis of data. Little confidence can be placed in findings related to Combat Effectiveness.

Organizational Processes and Effectiveness. No significant correlations were found between Brigade Combat Effectiveness and the various Organizational Process dimensions. On the other hand, seven of the nine process dimensions were highly correlated with Brigade Command Group Effectiveness. Planning and

Coordination were not correlated with command group effectiveness. Furthermore, comparisons between the five brigades with the highest Brigade Command Group Effectiveness scores and the six with the lowest scores showed superior performance by the "most effective" brigades on eight of the nine organizational processes, with four of the differences statistically significant.

Supervision and Control. No relationships were found between any Supervision and Control dimensions and Brigade Combat Effectiveness. However, large significant correlations were found between Brigade Command Group Effectiveness and five of the six Supervision and Control dimensions. No relationship was found for Clarity of Roles. For all six dimensions, scores were higher for the five brigades with the most effective command groups, and the differences were significant for five of the dimensions.

Finally, correlations were computed between all process and Supervision and Control dimensions. High correlations were found between each process dimension and several Supervision and Control dimensions, indicating strong relationships between the type of supervision and control that is exercised within a brigade and the quality of organizational processes that occur.

CONCLUSIONS

1. Brigades whose command groups perform ARTEP tasks more effectively are also characterized by supervision and control activities which are related to the performance of a number of critical organizational processes which have previously been found to be contributors to unit combat effectiveness.

2. When linked with the findings of previous studies, the data reported here suggest that well-designed training of command groups in the performance of the supervision and control activities and the organizational processes examined in this research can result in improved combat effectiveness.

3. From observations made during the conduct of those CAMMS exercises that constituted the source of data upon which this report is based, it was concluded that CAMMS is an effective vehicle for training and evaluating brigade command groups when it is conducted under systematic and well-controlled conditions. It can be especially valuable for investigating and training in organizational process performance.

CONTENTS

	Page
INTRODUCTION	1
Project Objectives	1
Source of Project Data	2
Content of This Report	2
CONCEPTUAL FRAMEWORK	2
METHOD	4
Computer Assisted Map Maneuver System (CAMMS)	5
Data Collection	5
Data Reduction	7
Quality of Data	10
RESULTS	11
Organizational Processes and Effectiveness	12
Supervision and Control	15
Supervision and Control and Organizational Processes	18
DISCUSSION	21
Climate and Organizational Competence	22
Command Group Effectiveness, Supervision and Control, and Competence	23
Relation to Combat Effectiveness	23

TABLES

	Page
Table 1 - SUMMARY DATA FOR ORGANIZATIONAL PROCESS DIMENSIONS, COMBAT EFFECTIVENESS, AND COMMAND GROUP EFFECTIVENESS	13
Table 2 - CORRELATION OF PROCESS DIMENSIONS WITH BRIGADE COMBAT EFFECTIVENESS	14
Table 3 - CORRELATIONS OF PROCESS DIMENSIONS WITH COMMAND GROUP EFFECTIVENESS	14
Table 4 - PROCESS PERFORMANCE OF BRIGADES WITH MOST AND LEAST EFFECTIVE COMMAND GROUPS	15
Table 5 - SUMMARY DATA FOR SUPERVISION AND CONTROL DIMENSIONS	16
Table 6 - CORRELATIONS OF SUPERVISION AND CONTROL DIMENSIONS WITH BRIGADE AND COMMAND GROUP EFFECTIVENESS	17
Table 7 - SUPERVISION AND CONTROL IN BRIGADES WITH MOST AND LEAST EFFECTIVE COMMAND GROUPS	17
Table 8 - CORRELATIONS OF SUPERVISION AND CONTROL DIMENSIONS WITH ORGANIZATIONAL PROCESS DIMENSIONS	19
Table 9 - ANALYSIS OF VARIANCE FOR UNIT RATING FORM ITEMS AND ORGANIZATIONAL LEVELS	20
Table 10 - RESULTS OF SIMPLE EFFECTS TESTS FOR ORGANIZATIONAL LEVELS	21

APPENDICES

	Page
Appendix A - SELECTED CONTROLLER RATING FORM ITEMS	25
Appendix B - UNIT RATING FORM - CAMMS EXERCISE	31

RESEARCH ON TRAINING FOR BRIGADE COMMAND GROUPS: FACTORS CONTRIBUTING TO UNIT COMBAT READINESS

INTRODUCTION

This final report documents research on training for brigade command groups and describes the results of one subtask of that research. The work described in the report was part of a larger Army Research Institute (ARI) program which will contribute to the development of a family of games and simulations to be used for training commanders and staffs of battalions, brigades, and divisions. Emphasis in that program is upon research which will contribute to development of strategies for training command groups--commanders and principal staff officers--to meet or exceed Army Training and Evaluation Program (ARTEP) standards. As a part of that larger program, the project documented by this final report was designed to contribute to strategies for training brigade command groups.

PROJECT OBJECTIVES

The successful implementation of command and control simulations for training brigade command groups to achieve ARTEP standards required training objectives which should act as guideposts for tailoring appropriate games and simulations and associated courseware to train select sets of critical performances. In turn, the development of training objectives based upon the brigade command group ARTEP required refinement or validation of existing draft ARTEP tasks and subtasks to determine those critical to overall command performance. In addition, a training feedback system suitable for use with the Computer Assisted Map Maneuver System (CAMMS), the battle simulation selected for use in training brigade command groups, was required. The feedback system was to include guidance for providing performance feedback to command groups who participate in CAMMS and quantitative data concerning average brigade command group performance for the various ARTEP tasks or subtasks for potential use of command groups participating in CAMMS for feedback purposes. Finally, it was desirable to identify patterns of organizational behavior which result from brigade command group activity and which contribute to more or less effective unit performance.

Accordingly, the project objectives were:

1. Using CAMMS performance as the source of data, determine the relative criticality of brigade command group ARTEP tasks and relationships among the various ARTEP subtasks.

2. Develop recommendations for ARTEP modification.

3. Develop training objectives for brigade command groups functioning as a whole.

4. Develop average ARTEP performance data for brigade command group participation in CAMMS.

5. Develop a CAMMS training feedback system for use with brigade command groups.

6. Study and identify factors or patterns of organizational behavior within brigade command groups which contribute to more or less effective unit performance.

SOURCE OF PROJECT DATA

Data pertinent to all of the above objectives were collected during participation of 11 brigades in CAMMS exercises during the period of April, 1977 to October, 1977. Then, analysis and developmental methods appropriate to the respective objectives were applied. During any single exercise several different types of data were collected and the data types contributed to accomplishment of different objectives.

CONTENT OF THIS REPORT

Results for Objectives 1 through 5 were presented in a separate technical report.[1] The remainder of this final report describes the conceptual framework, method, and results, for Objective 6, which was concerned with identification of factors or patterns of organizational behavior within brigade command groups and the effects of such behavior upon unit performance.

CONCEPTUAL FRAMEWORK

The conceptual framework derives from the view that one of the most critical factors in the effectiveness of any organization is its ability to accurately sense the states of its critical environments, i.e., to acquire information about its environments and changes in them; to process the information that has been sensed; and to adapt its operations to cope with the sensed changes.[2] The ability of an organization to perform these functions has been termed "Organizational Competence" and the validity of certain

---

[1] Olmstead, Joseph A., Baranick, Michael J., and Elder, B. Leon. Training for Brigade Command Groups: Training Objectives and Strategies. Human Resources Research Organization, Special Technical Report SR-ED(C)-78-3, February, 1978.

[2] Bennis, Warren G. Changing Organizations: Essays on the Development and Evolution of Human Organizations. New York: McGraw-Hill Book Co., 1966.

processes of which competence is comprised has been verified for military tactical units in an earlier study by the current HumRRO project director and associates.[1]

It is apparent that Competence is mainly dependent upon the performance of personnel. Some technological assists can be provided, such as data processing systems and highly sophisticated communications systems; however, the payoff in Competence ultimately reduces to the judgements and actions of key personnel, both individually and collectively. It depends upon the quality and quantity of information that is acquired; choices concerning to whom acquired information is to be communicated, as well as the accuracy and completeness of the communications; decisions concerning ways to cope with unusual or unanticipated situations; and the execution of actions resulting from such decisions--all performed at a high level of sensitivity and coordination. These are uniquely human qualities that can only be assisted by technology. Thus, the competence of a unit is mainly dependent upon the performance of certain critical processes by its key personnel--commanders and staff members--at all levels. In turn, effective performance of the processes appears to be dependent, at least in part, upon the quality of supervision and control provided to each level by successively higher organizational levels.

Effective performance of the processes involved in competence is one of the principal ways that a command group influences the effectiveness of subordinate units and, hence, the outcomes of military operations. The effects exerted upon a combat operation by the command group of a large unit such as a brigade are the results of the acquisition, processing, and interpretation of information; the development of operational concepts and plans; the diffusion of plans, orders, and instructions through successively lower level units; and supervision of implementation of the plans by lower level units. Thus, the fundamental military function, known as "command and control," involves mainly the execution of competence processes and supervision and control of their execution by subordinate units. It would be predicted that, when brigade command groups perform the processes effectively and provide high-quality supervision and control to subordinate levels, equally high-quality process performance would result at lower levels. Similarly, it would be expected that performance of the organizational processes and the provision of supervision and control would be related to combat effectiveness. Thus, where process performance together with supervision and control are better, unit effectiveness should also be better.

The present study was designed to study the contribution of organizational processes and brigade effectiveness on CAMMS and the effects of brigade command group supervision and control upon Organizational Competence (process performance) in CAMMS. To accomplish the study, the following organizational

---

[1] Olmstead, Joseph A., Christensen, Harold E., and Lackey, Larry L. Components of Organizational Competence: Test of a Conceptual Framework. Alexandria, VA., Human Resources Research Organization, Technical Report 73-19, August, 1973.

processes and associated dimensions were conceived to serve as the basic framework for analysis:

Process	Dimension
Information Acquisition and Processing	Information Acquisition Providing Information and Intelligence
Adaptability	Anticipating Contingencies Timeliness of Adjustments in Plans and Operations Effectiveness of Adjustments in Plans and Operations
Implementation	Planning Decision Making Coordination
Communication	Communication

In addition, the following dimensions were devised to evaluate supervision and control:

Responsiveness to Subordinate Unit Requirements
Amount of Control and Supervision
Quality of Supervision
Delegation
Clarity of Objectives
Clarity of Roles

The main thrusts of the study were to examine the relationships between the various organizational processes and unit effectiveness, and to evaluate the effects of supervision and control upon performance of the processes.

METHOD

All the data were collected in association with CAMMS exercises conducted by eight Active Army units, two Reserve units, and one National Guard unit. All Active Army exercises were conducted and controlled by the local units or their parent divisions. In the cases of the two Reserve units, the exercises were conducted and controlled by training personnel of Active Army divisions. The National Guard unit exercise was conducted and controlled by personnel of a Maneuver Area Command (MAC). In all exercises, HumRRO research personnel were guests of the units and all data collection activities were secondary to conduct of the exercises. Neither HumRRO nor the Army Research Institute exerted any control or influence upon the manner in which the exercises were conducted. Thus, all exercises were conducted by the local units for training purposes and the data collection was incidental to the primary purposes.

COMPUTER ASSISTED MAP MANEUVER SYSTEM (CAMMS)

CAMMS is a two-sided battle simulation which makes possible a training situation in which a brigade command group (players) interacts with controllers playing superior unit levels and, through subordinate unit players, with "table controllers" playing lower-level friendly units. The exercise is planned and directed by an Exercise Director. Activities of controllers are supervised by a Chief Controller. Table controllers are supervised by a Chief Table Controller. Using a control map to depict disposition and movement of forces, friendly table controllers maneuver their units according to player instructions so as to engage in combat with enemy units maneuvered by "threat table controllers." Combat outcomes are determined by a computer which provides rapid calculation and feedback of results of engagements between friendly and threat forces and can provide end-of-exercise summaries of the status of friendly and threat resources. Thus, CAMMS is a flexible, two-sided, free-play simulation which, when properly conducted, provides dynamic and realistic opportunities for brigade command groups to experience and practice required command and control activities.

CAMMS play is activated by an operations order issued by Division. In the order, a mission is assigned and typical intelligence and other information is provided. The CAMMS program permits initial friendly and threat unit strengths to be varied according to the training plan and, therefore, differing force ratios may be played. In the exercises covered by this research, initial force ratios varied considerably among the brigades.

Depending upon the training design, the number of organizational levels included in an exercise may vary. However, for all exercises included in the present research, "players" included brigade and battalion command groups. Superior-unit controllers performed the roles of division-level personnel. Friendly "board controllers" played company commander roles and were personnel, usually company commanders, of the brigades participating in the exercises. Thus, three levels of each brigade participated in the exercises and, for data purposes, were classed as "players."

DATA COLLECTION

Data were collected on 11 brigades located in the continental United States and Hawaii. Eight were Active Army units, two were Reserve brigades, and one was a National Guard unit. The Active Army units consisted of two Infantry, three Airborne Infantry, and three Mechanized Infantry brigades. The Reserve units were two Infantry brigades and the National Guard unit was Armored Cavalry.

HumRRO personnel traveled to the training sites one day prior to the beginning of the exercises. Coordination was established with the Exercise Director and copies of the Operations Order were obtained. Controllers and playing personnel were briefed on the purpose of the study and the data requirements. Assurances were given that no evaluation of the units was involved. Initial friendly and threat personnel, weapons, and equipment strengths and the numbers and types of units to be played were obtained.

Most exercises lasted two days with a break during the intervening night. One exercise was conducted for 48 continuous hours. During the exercises, one HumRRO staff member remained in the control room, where the control board was located, and observed controller activities. Notes of any significant events and combat results were recorded. The second HumRRO staff member, who was experienced in military operations and procedures, was stationed in the Brigade Tactical Operations Center (TOC) and made observations of the functioning of Brigade Command Groups.

After completion of each exercise, computer printouts of remaining unit resources (personnel, weapons, equipment) were obtained and retained for later data analysis. Also final board locations of threat and friendly units were recorded.

Controller Evaluations. After completion of each exercise, four division-level controllers (G1, G2, G3, G4), the Chief Controller, and the HumRRO TOC observer completed a 52 item Controller Rating Form devoted to evaluations of Brigade Command Group activities. Forty-seven items contained descriptions of single activities and standards for judging performance of the activities. Forty-two of the activities were subtasks of draft Brigade Command Group ARTEP 100-1 and five were generalized activities representing organizational processes. An additional five items required evaluation of overall performance of the command group and the principal staff sections.

For all items, respondents rated command group performance on a seven-point scale ranging from "Totally Ineffective" to "Superior." Opportunity was also provided for a "0" rating to indicate "no personal knowledge of command group performance of this activity."

Only selected items of the Controller Rating Form were used to provide data for the research reported here. Rater instructions and the Controller Rating Form items used in this research are shown in Appendix A. The complete Controller Rating Form may be found in the HumRRO technical report covering the remaining elements of the overall project.[1] Although slightly different forms were developed for exercises depicting attack and defense operations, all units in the study used defense scenarios only. Therefore, only the defense form is shown in Appendix A.

Player Evaluations. After completion of each exercise, all players (brigade, battalion, and company levels) were requested to complete a Unit Rating Form. The questionnaire contained 15 items upon which players rated the various dimensions of organizational processes, supervision, and control within the brigade. Raters used seven-point scales with descriptors specific to the items. The Unit Rating Form is shown in Appendix B.

Combat Results. One criterion of brigade effectiveness is the outcome

[1] Olmstead, Joseph A., Baranick, Michael J., and Elder, B. Leon. Training for Brigade Command Groups: Training Objectives and Strategies. Human Resources Research Organization, Special Technical Report SR-ED(C)-78-3, February, 1978.

of the combat engagement depicted by a CAMMS exercise. To evaluate effectiveness, the following data were collected.

(1) Area - the area or geographical objectives controlled by the brigade upon completion of the exercise. Obtained from the Controller Map Board.

(2) Resources - the quantity of resources (personnel, weapons, equipment) possessed by the unit at the beginning of the exercise and remaining to the unit upon completion of the exercise. Obtained from computer printouts of battle summaries and update reports.

(3) Time - time required to accomplish the mission or in achieving some intermediate status.

DATA REDUCTION

Data consisted of controller ratings of Brigade Command Group performance on selected Controller Rating Form items (Apperdix A), ratings of three levels of players on Unit Rating Form items (Appendix B), and the combat results information described above.

Controller Ratings. For each brigade, a Brigade Command Group (BCG) score was computed for each Controller Rating Form item. A BCG score is the mean rating of controllers for the item. "0" (no opportunity to observe) ratings were excluded from computation of BCG scores. Thus, a BCG score was available for each participating unit for each Controller Rating Form item.

Player Ratings. For each Unit Rating Form item, unit mean player ratings were computed for each organizational level (brigade, battalion, company) and for all levels combined. Thus, a brigade mean score and means for three levels within each brigade were available for analysis.

Combat Effectiveness. CAMMS combat results provided data for development of one measure of brigade effectiveness. To use the data, it was necessary to devise a procedure for ordering the participating brigades according to relative effectiveness. The procedure and rationale for arriving at indicators of relative brigade effectiveness follow.

The problem was to develop a procedure which would make it possible to order participating brigades in terms of overall effectiveness. An extension of earlier work by the Research Analysis Corporation (RAC) provided the basis for the ordering procedure.[1]

Following the earlier work by RAC, there were identified three dimensions which define the mission space of a unit. The three dimensions are:

[1] Tiede, Roland V., and Leake, Lewis A. "A Method for Evaluating the Combat Effectiveness of a Tactical Information System in a Field Army." Operations Research, 1971, 19(3), pp. 587-604.

(1) Area - the area or geographical objectives controlled in accomplishing the mission, or during the engagement.

(2) Resources - the quantity of resources (personnel, weapons, equipment) expended, or remaining at the end of the engagement.

(3) Time - time required to accomplish the mission, or in achieving some intermediate status.

Appropriate combinations of indicators of these three dimensions made it possible to order participating units in terms of outcomes. The principal dimensions are area and resources, with time carrying much less weight and used only to break ties.

Briefly, the procedure consisted of operationally defining, according to the type of operation depicted by the scenario, (1) three levels of effectiveness in terms of area controlled at the end of the CAMMS exercise and (2) three levels of resources remaining at the end of the CAMMS exercise.

In CAMMS, the battle summaries and update reports are the measurable criteria of the combat being simulated--the area gained or lost, resources expended, and time spent. These outcomes can be classified in accordance with the degree to which the assigned mission was accomplished. Using three levels each of area and resources, there results a 3 X 3 matrix of possible battle outcomes. The matrix follows:

		Area		
		A1	A2	A3
Resources	R1	R1A1	R1A2	R1A3
	R2	R2A1	R2A2	R2A3
	R3	R3A1	R3A2	R3A3

In the above matrix, one cell, R1A1, represents the most effective outcome and one cell, R3A3, represents the least effective. The remaining cells must be ordered according to a rationale that is militarily meaningful.

Operational definitions of the cells differ according to the mission of the brigade, i.e., attack, defense, division covering force, retrograde, etc. Since all brigades observed in this research p'ayed defense scenarios, only definitions covering brigade defense will be presented.

The definitions presented below apply when the brigade was given the mission of defending in place. They also apply whether the brigade used a covering force or did not use one. They do not apply for the situation where an entire brigade serves as a covering force for a division.

Area:

Area 1 - The brigade holds the enemy on or forward of the FEBA.

Area 2 - The brigade holds the enemy behind the FEBA but on or forward of the planned secondary defense line.

Area 3 - The brigade fails to hold the secondary defense line and the enemy is advancing at completion of the exercise.

Resources:

The resource definitions shown below follow guidance for assessing casualties in defending units during maneuvers and war games.[1]

Resource 1 - At termination of exercise, the brigade strength is such that the defense can be continued without interruption. Resources remaining are not less than 75 percent of the unit's resources at beginning of the exercise (losses not more than 25 percent).

Resource 2 - The remaining brigade resources are not more than 74 percent nor less than 60 percent (losses more than 25 percent but less than 40 percent).

Resource 3 - The remaining brigade resources are such that the unit is totally ineffective and should be replaced. Resources remaining are less than 60 percent (losses more than 40 percent).

Following is the ranking for brigade defense, with or without use of covering force:

Rank	Cell	Rationale
I	R1A1	Most preferred outcome. All criteria for mission accomplishment satisfied. Brigade holds the enemy on or forward of the FEBA with minimal loss of resources (25 percent or less).
II	R2A1	Brigade holds the enemy on or forward of the FEBA with moderate loss of resources (more than 25 percent but less than 40 percent).
III	R1A2	Brigade holds the enemy behind the FEBA but on or forward of the planned secondary defense line with minimal expenditure of resources (25 percent or less).

[1] FM 105-5. Maneuver Control. Headquarters, Department of the Army, December, 1973, pp. D-18 and D-19.

IV	R2A2	Brigade holds the enemy behind the FEBA but on or forward of the planned secondary defense line with moderate expenditure of resources (more than 25 percent but less than 40 percent).
V	R3A1	Brigade holds the enemy on or forward of the FEBA but with critical level of resource expenditure (40 percent or more). The unit should be replaced/reinforced immediately or risk being overrun.
VI	R1A3	Although resources were expended minimally (25 percent or less losses), the brigade failed to hold the secondary defense line and the enemy is advancing.
VII	R3A2	The brigade holds the enemy behind the FEBA but on or forward of the planned secondary defense line, however, resource expenditure was such that the unit should be replaced/reinforced immediately (40 percent or more losses).
VIII	R2A3	Moderate expenditure of resources (more than 25 but less than 40 percent) but brigade failed to hold secondary defense line and enemy is advancing.
IX	R3A3	Least preferred outcome. Unit failed to hold planned secondary line of defense and the enemy is advancing. Because of high expenditure of resources, unit should be replaced/reinforced immediately or risk being overrun (losses of 40 percent or more).

Brigades were assigned to cells according to the above scheme. Units falling within the same cells were assigned the same cell ranks. For assignment to resource classifications, only personnel losses were used. A satisfactory formula for aggregating different types of resources (personnel, weapons, equipment) could not be devised and, accordingly, personnel losses, or personnel remaining at conclusion of the exercise, were used to assign brigades to resource classifications.

After assignment to appropriate cells, rank values of the cells were reversed so that cell R1A1 received the highest value (9) and R3A3 received the lowest value (1). Under this procedure, there was, in effect, a nine-point rating scale upon which the brigades were evaluated; however, the "ratings" would be based upon clear-cut "behavioral" results.

QUALITY OF DATA

The above-described procedures are feasible and potentially valid means for generating meaningful data. However, the quality of the data produced by

the procedures is dependent upon several factors which, in the present research, were not under the control of the research staff nor the Army Research Institute.

The validity of ratings made on the Controller Rating Form requires that controllers be motivated military personnel who are experienced, or at least knowledgeable, about the requirements of command and staff activities at brigade or battalion levels. When the study was designed, it was assumed that all division-level controllers would be such knowledgeable and motivated individuals. However, in several instances, superior-unit controllers occupying G1 and G4 roles were junior company-grade officers levied from within the brigade, with no experience in staff activities and, accordingly, with little background or inclination to evaluate the performance of the brigade command groups.

Similarly, the validity of CAMMS combat results data depends upon at least the following factors: (1) continuation of the exercise to completion without interruption or artificial readjustment of force dispositions, weapons, or equipment, (2) only resupply which would be normal and feasible under the circumstances dictated by the scenario, (3) threat board controllers who are knowledgeable of threat doctrine and who adhere to such doctrine at all times during the exercise, and (4) uncontrolled, two-sided free play on the control board so that the decisions, orders, and tactical skills of brigade personnel can realistically influence outcomes of the engagements. In only a very few exercises were all of the above conditions fully met. In several exercises, none of the conditions were met to any degree. The most common problem was indiscriminate and uncontrolled resupply and replacement of personnel which, of course, prevented valid and realistic estimates of losses and the conditions of units at the close of the exercises. Early in the data collection phase, it became apparent that Combat Results data would be questionable. However, it was the joint conclusion of the ARI COTR, the SDC Project Director, and the HumRRO Project Director that other useful data could be developed and, therefore, the data collection should continue.

For the above reasons, the quality and validity of Controller Rating Form and Combat Results data collected in this research are questionable. On the other hand, there is no reason to question the validity of data generated by the Unit Rating Form. This instrument was designed to reflect the perceptions of actual players in the exercises. Players completed the forms without problems and numbers of respondents were sufficient to provide for reasonable reliability of data. Therefore, data produced by the Unit Rating Form can be interpreted with more confidence than is true for the combat results data for reasons discussed above.

RESULTS

Data were available from several sources. First CAMMS combat results, classified according to the scheme described in an earlier section, were available as a measure of the effectiveness of the several brigade command levels functioning as a unit. This measure was labeled "Brigade Combat Effectiveness." As discussed in the preceding section the validity of data concerned with Brigade Combat Effectiveness is doubtful because the combat results were frequently influenced by interventions and manipulations not

under the control of the research staff.

A second source of data for this research included a number of items on the Controller Rating Form (Appendix A). This form was completed by division-level controllers and a HumRRO observer all of whom were in a position to evaluate the performance of the brigade command groups. Data from the Controller Rating Form are conceived to be measures of Brigade Command Group performance. For reasons discussed in the preceding section, Controller Rating Form ratings produced by many G1 and G4 controllers were questionable. Accordingly, during the data reductions, all G1 and G4 data were discarded. Controller Rating Form data in the following results include only ratings of the G2 and G3 controllers, chief controllers, and the HumRRO TOC observer. Controller Rating Form Item 48 will be of special significance in the results to follow. This item required a rating of overall brigade command group effectiveness and can be taken as a criterion of the effectiveness of command group performance. For analysis and discussion purposes, mean ratings resulting from Item 48 have been labeled "Brigade Command Group Effectiveness." Conceptually, these data are to be distinguished from Brigade Combat Effectiveness as measured by combat results. Item 48 was conceived to measure effectiveness of brigade command groups, whereas Brigade Combat Effectiveness refers to the combined effectiveness of entire units consisting of three command levels.

Finally, data were available from the Unit Rating Form (Appendix B). These data were player ratings of (1) several organizational process dimensions and (2) a number of dimensions of Supervision and Control. For each item, unit mean ratings were computed. Means were used as unit scores in the computation of other statistics.

Table 1 shows summary data for organizational process dimensions, Brigade Combat Effectiveness, and Brigade Command Group Effectiveness.

ORGANIZATIONAL PROCESSES AND EFFECTIVENESS

Product-moment correlations were computed between unit mean ratings for the various process dimensions and both Brigade Combat Effectiveness and Brigade Command Group Effectiveness scores. These statistics provide indices of the relationships between the process dimensions and the two effectiveness measures.

Brigade Combat Effectiveness. In view of the questionable validity of the CAMMS combat results, data concerning relationships between organizational processes and Brigade Combat Effectiveness are presented primarily for informational purposes and little confidence can be placed in the results. Table 2 shows indices of correlation between the process dimensions and Brigade Combat Effectiveness. No significant correlations were found.

Brigade Command Group Effectiveness. Table 3 shows correlations of process dimensions with Brigade Command Group Effectiveness. Seven of the nine dimensions show significant relationships to command group effectiveness. Only Planning and Coordination were found not to be related to command group effectiveness. Furthermore, for those dimensions which show significance, the size of correlational indices is substantial.

Table 1

SUMMARY DATA FOR ORGANIZATIONAL PROCESS DIMENSIONS, COMBAT EFFECTIVENESS, AND COMMAND GROUP EFFECTIVENESS

Data Item	Data Source[a]	Mean	SD
Organizational Process Dimensions:			
Information Acquisition	URF Item 5	4.31	.46
Providing Information and Intelligence	URF Item 6	4.38	.43
Anticipating Contingencies	URF Item 8	5.02	.36
Timeliness of Adjustments in Plans and Operations	URF Item 9	5.09	.46
Effectiveness of Adjustments in Plans and Operations	URF Item 10	5.28	.45
Planning	URF Item 1	4.70	.42
Decision Making	URF Item 2	5.18	.33
Coordination	URF Item 7	4.49	.39
Communication	URF Item 3	4.79	.59
Brigade Combat Effectiveness	CAMMS	3.73	1.95
Brigade Command Group Effectiveness	CRF Item 48	5.07	.49

[a]URF - Unit Rating Form (7 pt. scales).
CRF - Controller Rating Form (7 pt. scales).
CAMMS - CAMMS Combat Results (9 pt. scale).
N = 11.

Thus, when the overall performance of command groups was judged to be more effective by controllers, players found acquisition of information, provision of information and intelligence, anticipation of contingencies, timeliness of adjustments in planned operations, effectiveness of adjustments in planned operations, decision making, and communication within the brigades to be more effective also. When overall performance of command groups was less effective, processes within the units were less effective also.

The distribution of Brigade Command Group Effectiveness scores was split at the median and mean process scores were computed for the five brigades having the highest Command Group Effectiveness scores and the six brigades with the lowest scores. Table 4 compares organizational process performance of brigades with the most effective command groups against that of brigades with the least effective command groups. For eight of the nine processes,

Table 2

CORRELATION OF PROCESS DIMENSIONS WITH
BRIGADE COMBAT EFFECTIVENESS

Dimension	r	p[a]
Information Acquisition	.24	NS
Providing Information and Intelligence	.44	NS
Anticipating Contingencies	.03	NS
Timeliness of Adjustments in Planned Operations	.06	NS
Effectiveness of Adjustments in Planned Operations	.02	NS
Planning	-.54	NS
Decision Making	.04	NS
Coordination	.33	NS
Communication	.35	NS

[a]Degrees of freedom = 9.

Table 3

CORRELATIONS OF PROCESS DIMENSIONS WITH
COMMAND GROUP EFFECTIVENESS

Dimension	r	p[a]
Information Acquisition	.81	<.002
Providing Information and Intelligence	.79	<.004
Anticipating Contingencies	.67	<.02
Timeliness of Adjustments in Planned Operations	.82	<.002
Effectiveness of Adjustments in Planned Operations	.74	<.01
Planning	.16	NS
Decision Making	.83	<.002
Coordination	.02	NS
Communication	.72	<.01

[a]Degrees of freedom = 9.

performance within the brigades with the most effective command groups was superior to performance in brigades with the least effective command groups, and, for four of these processes, the differences were significant. For the one process (Coordination) for which the mean of "least effective" brigades was higher, the difference between the means was trivial (.15) and not significant.

These results concerned with process performance and overall brigade command group effectiveness show that Organizational Competence (process performance) is better throughout brigades in which command groups perform their recognized functions well.

Table 4

PROCESS PERFORMANCE OF BRIGADES WITH MOST AND LEAST EFFECTIVE COMMAND GROUPS

Process Dimension	Process Performance[a]				t	p
	Most Effective		Least Effective			
	Mean	SD	Mean	SD		
Information Acquisition	4.51	.15	4.13	.51	1.60	NS
Providing Information and Intelligence	4.52	.14	4.20	.57	1.22	NS
Anticipating Contingencies	5.25	.24	4.76	.34	2.73	<.05
Timeliness of Adjustments in Planned Operations	5.40	.18	4.77	.40	3.25	<.01
Effectiveness of Adjustments in Planned Operations	5.59	.16	5.03	.45	2.66	<.05
Planning	4.90	.27	4.48	.45	1.81	NS
Decision Making	5.39	.27	5.01	.27	2.33	<.05
Coordination	4.40	.47	4.55	.25	.68	NS
Communication	5.10	.26	4.60	.66	1.59	NS

[a]Most Effective N = 5; Least Effective N = 6; Degrees of freedom = 9. p based on one-tailed test.

SUPERVISION AND CONTROL

In addition to process dimensions, the Unit Rating Form contained items designed to obtain player evaluations of several dimensions of Supervision and Control. Summary data for Supervision and Control dimensions are presented in Table 5.

Table 5

SUMMARY DATA FOR SUPERVISION AND CONTROL DIMENSIONS

Dimension	Data Source[a]	Mean	SD
Clarity of Objectives	URF Item 11	5.74	.56
Clarity of Roles	URF Item 12	5.89	.39
Responsiveness to Subordinate Unit Requirements	URF Item 4	5.07	.57
Amount of Supervision and Control	URF Item 13	5.96	.36
Quality of Supervision	URF Item 15	5.28	.46
Delegation	URF Item 14	6.11	.32

[a]URF - Unit Rating Form (7 pt. scales).
N = 11.

Supervision and Control and Brigade Effectiveness. Table 6 shows correlations of Supervision and Control dimensions with Brigade and Command Group Effectiveness. With respect to Brigade Combat Effectiveness, no relationships were found with any Supervision and Control dimensions. Furthermore, the correlation indices were so small as to suggest no relationship even if the sample size had been much larger.

Supervision and Control and Command Group Effectiveness. Table 6 shows large, significant correlations between Brigade Command Group Effectiveness and four of the six Supervision and Control dimensions. Clarity of Roles was found to have no significant relationship to the effectiveness of command groups. The correlation for Responsiveness to Subordinate Unit Requirements is within .01 of the five percent level of confidence, i.e., $p < .06$.

Thus, when brigade command groups were judged to be more effective by controllers, players rated the following Supervision and Control dimensions as higher: Clarity of Objectives, Responsiveness to Subordinate Unit Requirements, Amount of Supervision and Control, Quality of Supervision, and Delegation. When brigade command groups were less effective, players rated the above climate aspects lower.

A comparison of Supervision and Control performance of brigades with most and least effective command groups appears in Table 7. For all six dimensions, scores were higher in brigades with the most effective command groups and four of these differences were significant. Dimensions with significantly higher ratings were Clarity of Objectives, Responsiveness to Subordinate Unit Requirements, Amount of Supervision and Control, and Quality of Supervision.

Thus, brigades which had more effective command groups also had better Supervision and Control.

Table 6

CORRELATIONS OF SUPERVISION AND CONTROL DIMENSIONS WITH BRIGADE AND COMMAND GROUP EFFECTIVENESS

Dimension	Brigade Effectiveness		Command Group Effectiveness	
	r	p[a]	r	p[a]
Clarity of Objectives	.19	NS	.73	<.01
Clarity of Roles	.13	NS	.42	NS
Responsiveness to Subordinate Unit Requirements	-.03	NS	.59	NS
Amount of Supervision and Control	.02	NS	.70	<.02
Quality of Supervision	-.16	NS	.79	<.01
Delegation	.26	NS	.70	<.02

[a]Degrees of freedom = 9.

Table 7

SUPERVISION AND CONTROL IN BRIGADES WITH MOST AND LEAST EFFECTIVE COMMAND GROUPS

Dimension	Player Ratings[a]					
	Most Effective		Least Effective		t	p
	Mean	SD	Mean	SD		
Clarity of Objectives	6.06	.29	5.42	.62	2.12	<.05
Clarity of Roles	6.08	.35	5.76	.25	1.81	NS
Responsiveness to Subordinate Unit Requirements	5.44	.35	4.76	.60	2.21	<.05
Amount of Supervision and Control	6.22	.20	5.75	.34	2.69	<.025
Quality of Supervision	5.71	.11	4.88	.49	3.64	<.005
Delegation	6.23	.13	5.97	.42	1.31	NS

[a]Most Effective n = 5; Least Effective n = 6; Degrees of freedom = 9. p based on one-tailed test.

SUPERVISION AND CONTROL AND ORGANIZATIONAL PROCESSES

Table 8 shows correlations between dimensions of Supervision and Control and Organizational Process dimensions. Among 54 opportunities, 33 correlations were significant. Following are the process dimensions found to be significantly related to each Supervision and Control dimension:

Supervision and Control Dimension	Correlated Process Dimensions
Clarity of Objectives	Information Acquisition, Providing Information and Intelligence, Anticipating Contingencies, Timeliness of Adjustments in Planned Operations, Effectiveness of Adjustments in Planned Operations, Decision Making.
Clarity of Roles	Anticipating Contingencies, Timeliness of Adjustments in Planned Operations, Effectiveness of Adjustments in Planned Operations
Responsiveness to Subordinate Unit Requirements	Anticipating Contingencies, Timeliness of Adjustments in Planned Operations, Effectiveness of Adjustments in Planned Operations, Decision Making, Communication.
Quality of Supervision	Information Acquisition, Providing Information and Intelligence, Anticipating Contingencies, Timeliness of Adjustments in Planned Operations, Effectiveness of Adjustments in Planned Operations, Planning, Decision Making, Communication.
Amount of Supervision and Control	Information Acquisition, Providing Information and Intelligence, Timeliness of Adjustments in Planned Operations, Effectiveness of Adjustments in Planned Operations, Decision Making, Communication.
Delegation	Providing Information and Intelligence, Timeliness of Adjustments in Planned Operations, Effectiveness of Adjustments in Planned Operations, Decision Making, Communication.

The large variations among the correlations within each column and row of the matrix shown in Table 8 indicate that respondents were discriminating in their ratings, i.e., that response sets were not a major factor in the obtained correlations. This is further confirmed by Table 9 which summarizes a two-way Analysis of Variance for Unit Rating Form items. Main effects were

Table 8

CORRELATIONS OF SUPERVISION AND CONTROL DIMENSIONS WITH ORGANIZATIONAL PROCESS DIMENSIONS

Process Dimension	Climate Dimension					
	Clarity of Objectives	Clarity of Roles	Respon-siveness	Quality of Supervision	Amount of Supervision and Control	Delegation
Information Acquisition	.66*	.29	.45	.62*	.70**	.49
Providing Information and Intelligence	.83**	.53	.39	.64*	.72**	.64*
Anticipating Contingencies	.71*	.83**	.83**	.76**	.58	.54
Timeliness of Adjustments in Planned Operations	.89**	.78**	.72*	.90**	.88**	.67*
Effectiveness of Adjustments in Planned Operations	.87**	.64*	.67*	.70*	.83**	.63*
Planning	.28	.22	.15	.60*	.48	.46
Decision Making	.75**	.62	.75**	.70*	.68*	.66*
Coordination	.40	.39	-.05	.01	.10	.13
Communication	.58	.40	.78**	.60*	.66*	.64*

** $p < .01$; * $p < .05$; Degrees of freedom = 9.

tested for Unit Rating Form items and player levels (brigade, battalion, and company). Both main effects were significant. Thus, responses to the various questionnaire items were different and it can be concluded that respondents discriminated in their ratings of the items.

Table 9

ANALYSIS OF VARIANCE FOR UNIT RATING FORM ITEMS AND ORGANIZATIONAL LEVELS

Source	df	MS	F	p
Items	14	10.85	24.96	<.01
Levels	2	6.61	15.20	<.01
Items x Levels	28	.47	1.09	NS
Error	450	.44		

In the ANOVA summarized in Table 9, main effects were also significant for player levels. To pursue this finding, simple effects tests were conducted for each Unit Rating Form item separately. Table 10 summarizes the results.

From Table 10, it can be seen that, for most items, some differences between levels occurred; although, for most items, the differences were not significant. Furthermore, for most items, means for brigade-level players were somewhat higher than for other levels, with company-levels lowest, and battalion-levels falling between brigade and company. This decrease in scores as organizational level becomes lower is indicative of a trend found in many organizations for organizational performance and climate to be perceived more favorable at higher levels and less favorable at lower levels. However, in the present study, significant differences occurred on only four items, two of which addressed organizational processes and two of which addressed Supervision and Control dimensions. Thus, within the trends discussed above, ratings within items were relatively similar among levels indicating that, for the most part, players at different levels had uniform perceptions of the various dimensions.

Table 10

RESULTS OF SIMPLE EFFECTS TESTS FOR ORGANIZATIONAL LEVELS

Unit Rating Form Item	Level						F	p
	Company		Battalion		Brigade			
	Mean	SD	Mean	SD	Mean	SD		
1.	4.75	.45	4.49	.44	4.87	.69	1.30	NS
2.	4.91	.53	5.22	.30	5.41	.45	3.33	<.05
3.	4.52	.58	4.97	.77	4.88	.83	1.00	NS
4.	5.07	.72	4.95	.70	5.19	.70	.29	NS
5.	4.23	.73	4.18	.52	4.51	.82	.64	NS
6.	4.10	.98	4.35	.58	4.70	.82	1.38	NS
7.	4.76	.64	4.27	.57	4.44	.89	1.22	NS
8.	4.73	.51	4.96	.51	5.35	.65	3.12	NS
9.	4.78	.69	5.04	.42	5.45	.44	4.05	<.05
10.	5.15	.57	5.25	.56	5.45	.49	.80	NS
11.	5.36	.96	5.75	.53	6.13	.47	3.12	NS
12.	5.22	.65	6.20	.28	6.24	.46	14.05	<.01
13.	5.74	.61	6.08	.47	6.06	.35	1.53	NS
14.	5.78	.76	6.17	.33	6.38	.35	3.44	<.05
15.	5.25	.82	5.28	.67	5.29	.89	.007	NS

DISCUSSION

Because of the small number of brigades studied (11) and the questionable validity of certain of the data, the results of this research should be considered as tentative. However, the results provide new leads to understanding some of the more complex factors that may impact upon the effectiveness of large military units and it would appear that further study of the concepts and variables that were examined is warranted.

The results indicate that units in which brigade command groups are effective, especially in the performance of ARTEP tasks, also have more effective supervision and control throughout the units and, in addition, performance of critical organizational processes is more effective throughout the units. It should be emphasized that references here are to the effectiveness of brigade command groups on the one hand and to supervision, control, and process performance throughout brigades on the other. It appears that brigade command groups which are effective in overall performance of ARTEP

tasks are also effective in creating, through supervision and control, climates which, in turn, lead to effective process performance throughout the organizations.

The important point of the results is that a significant determinant of Organizational Competence (Process Performance) may be the type of supervision and control within a unit, which, in turn, is generated by the behavior and actions of command groups at successively higher organizational levels. Organizational Competence has been demonstrated in earlier work to be strongly related to combat effectiveness.

The view that command groups influence climates within lower units and that climates impact upon performance is not a new or startling concept. However, the main contributions of the present research are a demonstration of the relationships within military organizations and specification of some of the factors which impact upon process performance.

CLIMATE AND ORGANIZATIONAL COMPETENCE

Organizational Competence is the ability of an organization to continually and accurately sense the properties of both its external and internal environments, to internally process the information that is sensed, and to flexibly adapt its operations to cope with its constantly changing environments in accordance with its goals or missions. Competence is comprised of a number of organizational processes which convert policies, procedures, doctrine, techniques, and skills into viable organizational responses. The process dimensions examined in the present research are principal components of Organizational Competence.

The results show that certain factors subsumed under the rubric Supervision and Control are strongly related to the processes of Organizational Competence. Thus, Competence, as measured by player ratings of process performance, was higher in brigades where personnel were (1) clear about the mission and objectives of the units (Clarity of Objectives), (2) clear about what was expected of them by their superiors (Role Clarity), and where (3) superior levels were responsive to requirements of subordinate units, (4) the amount of supervision exercised by higher levels was not considered excessive, (5) the quality of supervision exercised by higher levels was excellent, and (6) the freedom to make decisions was optimum.

It is apparent that the dimensions found to be correlated with various dimensions comprising Organizational Competence are all related to the functions of supervision and control. Since the data are correlational in nature, cause and effect relationships can only be proven finally and definitively by experimental manipulation of hypothesized causal variables. However, according to most organizational theories, the quality of process performance within an organization is determined by the climate which derives from the leadership actions provided by key organizational members. Following this reasoning, the quality of process performance, i.e., the degree of Organizational Competence exhibited by a brigade, was determined, in large part, by the quality of supervision and control existing within the brigade.

COMMAND GROUP EFFECTIVENESS, SUPERVISION AND CONTROL, AND COMPETENCE

The strong relationships found between command group effectiveness and both Supervision and Control and Competence dimensions indicate that when command groups are generally effective, supervision and control of subordinate units will also be more effective, and, hence, process performance throughout the units will be more effective. In this regard, an important question concerns the bases for effectiveness ratings of command groups that were made by CAMMS controllers. It will be recalled that controllers rated command groups on an item which asked, "Overall, how effective was this brigade command group?" It will also be recalled that this rating was secondary to the principal rating task of the controllers, which was to evaluate the command group on performance of ARTEP tasks. It seems reasonable that ratings of overall effectiveness would be a reflection of controllers' evaluations of separate ARTEP task performance. In fact, data not presented in this report showed strong correlations between controller ratings of separate ARTEP tasks and the single item covering "overall effectiveness" which was used in the present research. Of course, such a finding would not be unexpected. However, it confirms that ratings of Brigade Command Group Effectiveness are reflections of ARTEP task performance.

Examination of the ARTEP items appearing in the Controller Rating Form showed numerous items which appear to be conceptually related to both the Supervision and Control items and the organizational process items appearing on the Unit Rating Form (examples in Appendix A). Thus, an explanation for the relationships found in this study begins to become clear. When the members of a command group perform all ARTEP tasks effectively, some of their activities, mainly those involving supervision and control, stimulate similar activities at lower levels, all of which results in effective performance of critical organizational processes which have been shown, in other studies, to be related to combat effectiveness of units.

RELATION TO COMBAT EFFECTIVENESS

No relationships were found between Brigade Combat Effectiveness and either Brigade Command Group Effectiveness, any dimension of Supervision and Control, or any dimension of Organizational Competence. As stated in earlier sections of this report, the combat results of the CAMMS exercises included in this research were of highly questionable validity. Because the Combat Effectiveness data are very doubtful, the issue of the relation between any of the variables studied and Combat Effectiveness remains unresolved by this research.

The scheme used for ordering units according to area held or gained and resources expended appears to be conceptually sound and should not be discarded without further tests under conditions that will produce data in which confidence can be placed. If, after further test, the scheme proves to be feasible, a genuine advance in the development of effectiveness criteria for use with simulations will have been made.

APPENDIX A

SELECTED CONTROLLER RATING FORM ITEMS

DEFENSE

- NOTICE -

INFORMATION PROVIDED IN THIS
QUESTIONNAIRE WILL NOT BE USED
IN ANY WAY TO EVALUATE YOUR
UNIT

CONTROLLER RATING FORM

Instructions

The following pages list a number of critical activities performed by Brigade Command Groups during the planning and execution phases of combat operations. For each activity, a standard of performance is also presented. Note that the activities are grouped into two phases-- (1) Planning and Organizaing Prior to the Engagement and (2) Fighting the Battle.

For each activity, please rate the performance of the Brigade Command group according to the standards presented. Note that you should rate the performance of the Brigade Command Group only. The activities of Battalion Command group players should not be a consideration in your ratings.

For each activity, enter in the space provided one of the numbers shown below which best fits your judgment of how well the Brigade Command Group performed relative to the standard. Use the following scale to make your ratings.

Rating	Definition
0 ------	No personal knowledge of command group performance of this activity.
1 ------	Totally Ineffective. Activity was not performed or it included major deficiencies so that it was never completed.
2 ------	The command group's performance included several major deficiencies so that the activity, although completed, was ineffective.
3 ------	The command group's performance included many minor deficiencies so that, overall, the activity was marginal for mission accomplishment.
4 ------	Adequate. Command group performance was minimally adequate for mission accomplishment.
5 ------	Command group performance was better than adequate but included minor deficiencies.
6 ------	The quality of performance somewhat exceeded that required for mission accomplishment.
7 ------	Superior. Command group performance of this activity was complete in all respects and the quality of performance fully exceeded that required for mission accomplishment.

ARI Document Control
No. 77:5162B

PRECEDING PAGE BLANK-NOT FILMED

ITEM NO.	Rating	Activity	Standard
12.	_____	Gather critical information and intelligence. (2B)	CG determines combat information and intelligence shortfalls and aggressively gathers information from all available/appropriate sources. 1. Were all GSR elements effectively utilized? 2. Were personnel deployed sufficiently to observe the enemy prior to hostilities? 3. Was the TF intelligence collection plan properly prepared, and did it reflect analysis by the Bde S2 of tasking responsibilities?
13.	_____	Analyze enemy. (2C)	CG compares known enemy tactics and doctrine with combat information and intelligence and the result is used to predict enemy intentions. 1. Was an intelligence estimate prepared? 2. Were the probable actions of the enemy discussed?
14.	_____	Disseminate critical combat information and intelligence. (2D)	CG disseminates combat information and intelligence which is event oriented and immediately usable to the recipient. 1. Was relevant information from higher headquarters and adjacent units disseminated to subordinate elements? 2. Were subordinate elements given an estimate of specifically what they would be facing?

ITEM NO.	Rating	Activity	Standard
25.	_____	Gather critical combat information and intelligence. (5B)	CG identifies combat information and intelligence shortfalls and aggressively gathers information from all available/appropriate sources. 1. Request sources to supply event oriented information on a continuing basis.
27.	_____	Disseminate critical combat information and intelligence. (5D)	Combat information and intelligence disseminated by the CG should be event-oriented and be usable by the recipients. Combat information and intelligence should be accurate and disseminated within a time frame which permits the recipient to react. 1. Was critical combat information and intelligence disseminated to the Bde elements? 2. Was information disseminated to the Bde elements within a time frame which permitted the company commander to react?
28.	_____	Modify scheme of maneuver. (6A)	Scheme of maneuver is modified by CG. 1. Was a specific course of action developed? 2. Did the new course of action emphasize cover, concealment, suppression, and teamwork?

ITEM NO.	Rating	Activity	Standard
29.	_____	Coordinate/communicate changes. (6B)	CG immediately makes essential coordination. Changes are communicated to Brigade elements. Changes are communicated orally as a frag. order and include changed objectives, control measures, and scheme of maneuver. 1. Did subordinate elements understand what they were to do without excessive questions? 2. Were all subordinate elements informed of changes? 3. Was adequate coordination made with adjacent units (e.g., for passage of lines?)
43.	_____	Planning. (101)	Overall, planning of the command group is: 1. Complete. 2. Efficient. 3. Covers all contingencies.
44.	_____	Decision Making. (102)	Overall, decision making of the command group is: 1. Timely. 2. Correct in view of the situation.
45.	_____	Implementation. (103)	Overall, implementation of decisions is characterized by: 1. General supervision. 2. Delegation of appropriate responsibilities. 3. Timely and appropriate follow-up.
46.	_____	Communication. (104)	Overall, communication of the command group, both upward and downward, is: 1. Timely. 2. Complete. 3. Accurate. 4. Efficient.

ITEM NO.	Rating	Activity	Standard
47.	_____	Responsiveness to Subordinate Units. (105)	Overall, the command group responds to requests and requirements of subordinate units: 1. Promptly. 2. Helpfully. 3. Accurately.
48.	_____	Overall, how effective was this brigade command group? (106)	
49.	_____	Overall, how effectively were S3 activities performed? (107)	
50.	_____	Overall, how effectively were S2 activities performed? (108)	
51.	_____	Overall, how effectively were S1 activities performed? (109)	
52.	_____	Overall, how effectively were S4 activities performed? (110)	

APPENDIX B

UNIT RATING FORM - CAMMS EXERCISE

- NOTICE -

INFORMATION PROVIDED IN THIS
QUESTIONNAIRE WILL NOT BE USED
IN ANY WAY TO EVALUATE YOUR
UNIT

INSTRUCTIONS

On the following pages appear 15 items on which you are requested to rate several aspects of your just completed CAMMS exercise. Use the rating scales that are provided to indicate your best judgment for each item.

The ratings are not to be used in any way as an evaluation of the unit participating in the exercise. The data that are provided by your ratings will be used to improve the training provided by CAMMS and contribute to better understanding of unit training requirements.

Please place an "X" in the blank that describes your role in the recently completed exercise.

_____ Brigade-level player.

_____ Battalion-level player.

_____ Company-level player.

_____ Subordinate unit controller (friendly).

_____ Other controller.

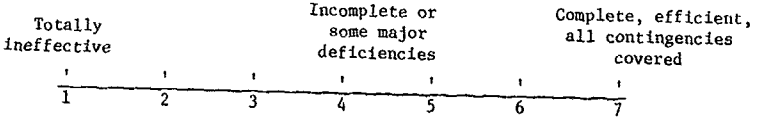
ARI Document Control
No. 77;5162C

PRECEDING PAGE BLANK-NOT FILMED

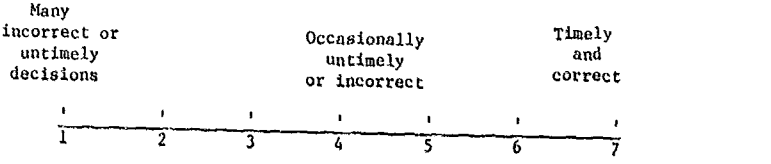
For the following items, use the scale shown below each item to indicate your rating of the item. Enter the number for your rating in the space preceding the item.

Ratings

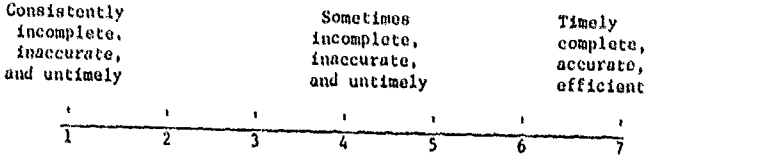
_____ 1. How was the planning during the planning phase in this exercise?



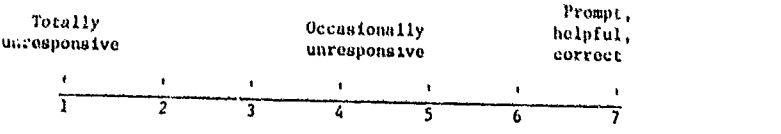
_____ 2. How was the decision making in this exercise?



_____ 3. In general, how was the communication in the exercise?



_____ 4. How was the responsiveness of your superior levels to the requests and requirements of subordinate units?



Ratings

_____ 5. How were the intelligence collection activities in this exercise?

Late, incomplete, and inaccurate			Sometimes aggressive but sometimes passive			Thorough and aggressive
1	2	3	4	5	6	7

_____ 6. How was the provision of intelligence and information to you in this exercise?

Late, incomplete, and inaccurate			Occasionally late, incomplete, or inaccurate			Timely, complete, accurate
1	2	3	4	5	6	7

_____ 7. How was the coordination between adjacent units in this exercise?

No coordination occurred			Occasional breakdowns occurred			Frequent and effective
1	2	3	4	5	6	7

_____ 8. How good a job was done in anticipating contingencies that might occur during the engagement and preventing them from occurring or minimizing their effects?

Many contingencies overlooked			Some contingencies overlooked			Most contingencies anticipated and prevented
1	2	3	4	5	6	7

Ratings

_____ 9. When adjustments or changes in plans or operations were necessary, how timely were they?

Never timely			Sometimes timely, sometimes not timely			Always timely
1	2	3	4	5	6	7

_____ 10. When adjustments or changes in plans or operations were necessary, how effectively were they accomplished?

Consistently ineffective			Sometimes effective, sometimes not effective			Consistently effective
1	2	3	4	5	6	7

_____ 11. How clear were you about the mission objectives of the brigade and battalion?

Never clear at any time			Fairly clear most of the time			Perfectly clear at all times
1	2	3	4	5	6	7

_____ 12. How clear were you about what was expected of you by your commander during the exercise?

Never clear at any time			Fairly clear most of the time			Perfectly clear at all times
1	2	3	4	5	6	7

_____ 13. Rate the amount of supervision exercised over your unit by your next higher level during the exercise.

Highly excessive			Somewhat too much			About the right amount
1	2	3	4	5	6	7

Ratings

_____ 14. Rate the freedom to make decisions permitted to your unit by your next higher level during the exercise.

No freedom at all			Some but not enough to do my job			About right amount
1	2	3	4	5	6	7

_____ 15. Rate the caliber of supervision exercised over your unit by your next higher level during the exercise.

Poor			Adequate			Excellent
1	2	3	4	5	6	7

ARI Document Control
No. 77:5162C