# NAVAL POSTGRADUATE SCHOOL
## Monterey, California




# THESIS

**IMPACT OF THE IMPLEMENTATION OF INFORMATION TECHNOLOGY ON THE CENTER FOR ARMY LESSONS LEARNED**

by

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March 2001

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As today's Army moves further into the Information Age and its mission evolves into a CONUS-based, Force Projection Army with diverse mission requirements, the ability to collect and disseminate lessons learned never has been more important. Units must be able to use the lessons of those soldiers who have preceded them in order to maximize force multipliers, execute missions right the first time, and save lives.

This research evaluates the impact that the implementation of an Information Technology infrastructure has had on the efficiency of Army's Lessons Learned Process and the overall effectiveness of the Center for Army Lesson Learned to conduct its primary mission. The objective is to determine how Information Technology has changed the organizational structure, culture, reward systems, processes, and personnel skill requirements within CALL.

Research includes an in-depth review of CALL as the Army's mechanism for creating organizational learning, a description of the Lessons Learned Process, an efficiency comparison between the current and previous collection, an analysis of dissemination processes using Extend Simulation Software, and an explanation of the organization's current IT architecture.

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# IMPACT OF THE IMPLEMENTATION OF INFORMATION TECHNOLOGY ON THE CENTER FOR ARMY LESSONS LEARNED

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# ABSTRACT

As today's Army moves further into the Information Age and its mission evolves into a CONUS-based, Force Projection Army with diverse mission requirements, the ability to collect and disseminate lessons learned never has been more important. Units must be able to use the lessons of those soldiers who have preceded them in order to maximize force multipliers, execute missions right the first time, and save lives.

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# TABLE OF CONTENTS


I. INTRODUCTION....1
A. BACKGROUND. ....1
B. RESEARCH QUESTIONS....3
C. SCOPE AND METHODOLOGY ....4
D. ORGANIZATION OF THE STUDY....5
E. BENEFITS OF THE STUDY ....6

II. BACKGROUND OF THE ARMY LESSONS LEARNED PROCESS....7
A. ORIGINS OF LESSONS LEARNED PROCESS....7
B. ADOPTION OF THE AFTER ACTION REVIEW....8
C. ESTABLISHMENT OF A NATIONAL TRAINING CENTER....10
D. THE CREATION OF CALL....12
E. CALLS INCORPORATION OF INFORMATION TECHNOLOGY ....16
F. SUMMARY ....18

III. CALL's ORGANIZATIONAL STRUCTURE ....21
A. CALL'S MISSION AND KEY FUNCTIONS....21
B. ORGANIZATIONAL ENVIRONMENT ....22
1. United States Army Forces Command (FORSCOM). ....22
2. United States Army Training And Doctrine Command (TRADOC)....23
3. United States Army Combined Arms Center (CAC). ....24
4. The Department of the Army (DA). ....25
5. U.S. Congress/General Accounting Office (GAO). ....25
C. ORGANIZATIONAL STRUCTURE ....27
1. 1990 Functional Configuration. ....27
2. 1993 Reorganization To Divisional/Product Configuration. ...28
3. 1996 Reorganization to Support the Information Age. ....30
D. SUMMARY ....35

IV. LESSONS LEARNED METHODOLOGY....37
A. ROLE OF A LEARNING ORGANIZATION....37
B. THE ARMY AS A LEARNING ORGANIZATION....38
C. WHAT ARE ARMY LESSONS LEARNED? ....42
D. CALL'S LESSONS LEARNED SYSTEM....43
1. Mission Analysis and Planning. ....43
2. Deployment and Linkup....45
3. Collection Operations. ....46
4. Analysis. ....48
5. Distribution and Archiving....50
E. SUMMARY ....53

V. INFORMATION TECHNOLOGY AT CALL ..... 55
A. IT ARCHITECTURE ..... 55
B. CALL'S 3-TIER ARCHITECTURE ..... 56
1. Tier One. ..... 57
2. Tier Two ..... 58
3. Tier Three. ..... 59
C. CALLCOMS SOFTWARE ..... 61
D. CALL GATEWAY WEBSITE AND LAN ..... 63
E. SUMMARY ..... 64

VI. ANALYSIS OF CALL'S ORGANIZATIONAL DESIGN ..... 65
A. GALBRAITH'S STAR MODEL ..... 65
B. KEY ENVIRONMENTAL FACTORS ..... 66
C. STRATEGY, TASKS, AND TECHNOLOGY ..... 67
D. STRUCTURE ..... 72
E. PEOPLE ..... 76
F. REWARD SYSTEM ..... 78
G. CULTURE ..... 81
H. INFORMATION AND DECISION PROCESSES ..... 84
I. SUMMARY ..... 89

VII. CONCLUSIONS AND RECOMMENDATIONS ..... 91
A. CONCLUSIONS ..... 91
B. RECOMMENDATIONS ..... 95

APPENDIX A. SIMULATION MODELS OF CALL'S COLLECTION PROCESS AND USER ACCESS TO THE CALL DB ..... 99
A. EXTEND SIMULATION SOFTWARE ..... 99
B. GENERAL MODEL ASSUMPTIONS ..... 100
1. Collection Process Models. ..... 100
2. Database Access Models. ..... 100
C. CALL OBSERVATION COLLECTION PROCESS MODEL USING INFORMATION TECHNOLOGY ..... 101
1. Purpose ..... 101
2. Key Tasks Depicted in the Model. ..... 101
3. Explanation of Key Task Blocks and the Data Used for Each Task. ..... 102
*a. Observation Collection ..... 102*
*b. Draft CALLCOMS Form ..... 102*
*c. Review Observations by CAAT Team Chief ..... 102*
*d. Returned to CAAT SME for Refinement. ..... 103*
*e. Analyst Review. ..... 103*
*f. Analyst Input into CALLCOM DB ..... 104*
D. CALL OBSERVATION COLLECTION PROCESS BEFORE USING INFORMATION TECHNOLOGY ..... 104
1. Purpose ..... 104
2. Key Tasks Depicted in the Model. ..... 104

3. Explanation of Key Task Blocks and Data Used for Each Task. ....105
*a. Observation Collection....105*
*b. Draft Observation Manual Form. ....105*
*c. Review Observations by CAAT Team Chief....106*
*d. Returned to CAAT SME for Refinement. ....106*
*e. Analyst Review Observation. ....107*
*f. Observation Typed by CALL....107*
E. USER ACCESS TO LESSONS IN CALL DB USING CURRENT INFORMATION TECHNOLOGY....108
1. Purpose....108
2. Key Tasks Depicted in the Model. ....108
3. Explanation of Key Task Blocks and Data Used for Each Task. ....109
*a. CALL Web Page Receives a Request. ....109*
*b. User has Access. ....109*
*c. Requests Password Be Issued. ....109*
*d. Search Database....110*
*e. Download Product....110*
F. USER ACCESS TO LESSONS PRIOR TO CURRENT INFORMATION TECHNOLOGY ARCHITECTURE110
1. Purpose....110
2. Key Tasks Depicted in the Model. ....111
3. Explanation of Key Task Blocks and Data Used for Each Task. ....111
*a. CALL Receives a Request from a Client. ....111*
*b. Analyst Searches for Information. ....112*
*c. Information Sent to User via US Mail. ....112*
G. SIMULATION RESULTS....112
APPENDIX B. SURVEY OF CALL CLIENTS ....115
A. SURVEY DESIGN....115
B. SELECTION OF RESPONDENTS ....115
C. SURVEY INSTRUMENT....116
1. Section One....117
2. Section Two....117
3. Section Three....118
D. SURVEY RESPONSE STATISTICS. ....118
LIST OF REFERENCES....121
INITIAL DISTRIBUTION LIST ....125

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# LIST OF FIGURES


Figure 1. Army Lesson Learned Structure. ..... 22
Figure 2. CALL Organizational Chart 1993-1996 ..... 29
Figure 3. Present CALL Organizational Chart ..... 32
Figure 4. Boyd's OODA Loop ..... 38
Figure 5. CALL's IT Architecture ..... 56
Figure 6. Galbriath's Star Model ..... 65
Figure 7. CAAT Observation Collection Process w/ IT ..... 101
Figure 8. CAAT Observation Collection Process w/o IT ..... 105
Figure 9. User Access to CALL DB w/ IT ..... 108
Figure 10. User Access to CALL Lesson Learned w/o IT ..... 111
Figure 11. Section Two of User Servey ..... 117
Figure 12. Section Three of User Survey ..... 118

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# LIST OF TABLES


Table 1. Extend Collection Process Model Data ..... 70
Table 2. Extend User Access Model Data ..... 71
Table 3. CALL's Organizational Form ..... 72
Table 4 Extend Collection Process Model Data ..... 112
Table 5. Extend User Access Model Data ..... 113
Table 6. Survey Section Two Results For Questions 1-6 ..... 119
Table 7. Survey Section Two Results For Questions 7-9 ..... 119

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# I. INTRODUCTION

## A. BACKGROUND

During the later stages of the Cold War, Army Chief of Staff, General Gordon R. Sullivan, concluded that the National Training Center (NTC) at Fort Irwin was not achieving its full potential in preparing its forces for combat. While NTC was effective at generating learning at the individual, team, or platoon level through the use of After Action Reviews, the real value of the process would be turning those lessons into organizational learning. To make the transition from individual learning to organizational learning required a structured mechanism for sharing this information. That mechanism would be the lessons learned process.

To oversee this new mechanism, the Army created the Center for Army Lessons Learned (CALL) at Fort Leavenworth, Kansas in 1985. CALL was tasked with capturing the learning taking place at the national training centers and disseminating it throughout the Army. CALL's initial focus was to document successful tactics, techniques, and procedures (TTP). NTC's success at developing combat prepared, CONUS-based heavy forces, led to the expansion of the training center concept. The Army created the Joint Readiness Center (JRTC) at Fort Chaffee for light forces, the Combat Maneuver Training Center (CMTC) at Hohenfels for OCONUS heavy forces, and the Battle Command Training Program (BCTP) at Fort Leavenworth for division and corps staff officers. As the Combat Training Center (CTC) base expanded so did CALL to provide the same repository of lessons learned for all of these centers.

As a result of Operation Just Cause, CALL expanded its charter to include capturing lessons for actual operations. From the early 1990's CALL provided collection teams for all major Operations, including Desert Shield/Desert Storm and Operation Restore Hope. Although the system for collecting data from the field was judged effective from the earliest moments, General Sullivan noted that, "CALL produced little of enduring value during it first several years because the data from the training centers overwhelmed the paper-and pencil system to analyze and distribute the information."[1] Although CALL confirmed that units often repeated the same mistakes, because of the long time delay in compiling and distributing the valuable lessons, most units fell victim to the same pitfalls. In response to this deficiency CALL sought to incorporate the emerging information technology as a solution.

In 1993, the CALL Database (CALL DB) was created. The CALL DB allows soldiers, trainers, and unit leaders to consult the Army's "corporate memory" with previously unprecedented speed, accuracy, and thoroughness. Members of the organization can now either submit valuable pieces of information to CALL for analysis and input into the "corporate memory" or search the database for information to help train or prepare their units for combat. The capabilities of this information technology infrastructure include: scanning documents directly into the database, establishing a communication link between deployed Combined Arms Assessment Teams and analysts

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[1] Gordon R. Sullivan and Michael V. Harper, *Hope is Not A Method,* Random House, 1996, pg. 208.

at Fort Leavenworth, and distributing lessons learned via e-mail, CD-ROM, and web page links.

As today's Army moves further into the Information Age and its mission evolves into a CONUS-based, Force Projection Army with diverse mission requirements, the ability to collect and disseminate lessons learned has never been more important. Units must be able to use the lessons of those soldiers that have preceded them to maximize force multipliers, execute missions right the first time, and save lives. The objective of this research is to analyze the efficiency of the IT infrastructure to collect and disseminate lessons learned to the force and the impact that it has had on CALL effectiveness as an organization. It will address not only possible improvements to the infrastructure, but also to the organization as a whole.

## B. RESEARCH QUESTIONS

The primary research question of this thesis is: How has the implementation of Information Technology increased the organizational effectiveness of CALL in collecting and distributing lessons learned to the total army? The subsidiary research questions are as follows:

1. What changes in the lessons learned collection process have come about as a result of the implementation of Information Technology?
2. How effective is the information categorized within the CALL DB for access by users throughout the service?
3. What impact did the implementation of IT have on the organizational size and structure?

4. What changes in skills qualifications of personnel have resulted from the changes?
5. Does the organization have an existing culture that must be overturned to successfully implement change?
6. What changes within the organization would further improve the organization's effectiveness to capture and disseminate lessons?

## C. SCOPE AND METHODOLOGY

The scope of this case study is limited to the period from the inception of the Center For Army Lessons Learned (CALL) in 1985 through the present day. Utilizing this historical time reference, the study analyzes the significant events affecting CALL and the actions and decisions taken by the organizational director and deputy director to enable the transformation of the lessons learned process from a paper and pencil system to one reliant on information technology.

The methodology used in this thesis is a historical case analysis of the Center for Army Lessons Learned. To conduct this case analysis the author conducted personnel interviews with the organization's deputy director, branch chiefs, senior analysts, and Combined Arms Assessment Team members to record their impressions on the organization and its processes He also conducted a search of the CALL Database to gather information of previous lessons learned collection processes, organizational structures, and other data relating to the transformation of CALL. The modeling software Extend was used to construct a simulation of the organization's lesson learned collection process and how a typical user might gain access to information from the organization.

The data from both the pre- and post-implementation simulations were then used as a comparison of the efficiency of the organization. A survey of mid career company grade officers is conducted to determine the depth and breath of their knowledge of the various services that CALL provides. This survey is used to establish CALL's effectiveness in disseminating lessons learned to this key customer group.

## D. ORGANIZATION OF THE STUDY

Chapter I. Introduction: Identifies the focus and purpose of the thesis as well as the primary and subsidiary research questions.

Chapter II. Background of the Army Lessons Learned Process: Provides the reader with the history of the Army's Lesson Learned Process from its initial use during World War II through the formation of CALL and its subsequent transformation to support the Information Age Army of today.

Chapter III. CALL Organizational Structure: Provides the reader with a detailed explanation of the organization's stakeholders, pre-IT organizational structure, and current organizational structure of CALL

Chapter IV. CALL Lesson Learned Methodology: Provides a detailed explanation of the process, which CALL uses to capture and disseminate lessons learned to the total army.

Chapter V. Information Technology at CALL: Identifies the information technology that is in place to assist CALL in the lesson learned process.

Chapter VI. Analysis of CALL's Organizational Design: Provides an abridged explanation of major components of the Galbraith Star Model for Organizational Design and analyzes the significant changes to the organization that occurred as a result of the implementation of information technology using the Galbraith Star Model.

Chapter VII. Conclusions and Recommendations: Summarizes the findings of the research and answers the research questions.

## E. BENEFITS OF THE STUDY

This study provides the necessary information to evaluate the effect the incorporation of technology is likely to have on an organization. It serves as an example for other DoD organizations seeking to implement an IT infrastructure to improve their organization's effectiveness.

# II. BACKGROUND OF THE ARMY LESSONS LEARNED PROCESS

> "I am tempted to say that whatever doctrine the armed forces are working on now, they have it wrong. I am also tempted to declare that it does not matter. What does matter is their ability to get it right quickly when the need to use it arrives."[2]
>
> British Historian Sir Michael Howard

## A. ORIGINS OF LESSONS LEARNED PROCESS

As early as World War II, the Army attempted to increase its organizational learning by creating mechanisms for sharing and adopting lessons from the battlefield in an effort to save lives. In World War II, General Marshall directed his chief of military history to collect what was being learned by soldiers in the Pacific and European Theater and to provide these lessons to the training base of new recruits back in the United States. Although the process that General Marshall adopted did not survive the war, the idea of using "lessons learned" would subsequently be revived during both the Korean and Vietnam Wars.[3] Because of the informality of the collection, analysis, and dissemination process of the era, the impact and significance of the lessons learned process could not be measured, but the idea behind it would remain a valuable part of the Army's institutional background.

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[2] Ibid. pg. 190.

[3] Ibid. pg. 204.

## B. ADOPTION OF THE AFTER ACTION REVIEW

Based on the value added by the previous wartime lessons learned collection processes, the Army sought a new system to improve its performance and organizational learning during times of relative peace. By the mid 1970's, the Army's mechanism for collecting and disseminating lessons consisted of the After Action Review (AAR). The AAR was developed under the guidance of Training and Doctrine (TRADOC) Commander General William E. DuPuy. It was designed to be a structured method to facilitate learning by individuals or small units from the complex experiences that result from their tactical operations or training.[4] The AAR had three fundamental purposes: learning, improving, and doing it better the next time. The AAR process was to take place after every training event and would follow a standard structured format. The AAR would address three questions:

- What happened?
- Why did it happen?
- What should we do about it?

The structure of the AAR was formally outlined in the Army Training Circular 25-20, *A Leader's Guide to After Action Reviews.* Fifty percent of the total available time was allocated to answering the first two questions and the remaining time to answer the final question.

The participants of the exercise would sit down with an Observer Controller (OC) who monitored the unit's performance throughout the exercise and lead a

[4] Ibid. pg. 190.

discussion on the events that had transpired. Using the unit's intended plan and doctrine as the base of reference, the group would talk about the events that unfolded in an effort to improve unit proficiency. They were not to focus on individual performance, position, or rank of the participants. The OC was designated to foster a non-threatening environment in which all members of the organization were highly encouraged to participate no matter what their rank or experience level. The AAR was not intended to fix blame, but to truthfully discover why things happened the way they did and to identify areas for sustainment or improvement. This structured, open discussion process not only promoted learning, but facilitates honest feedback, organizational member buy-in, and trust in the unit. At the tactical level, the AAR provided a dynamic link between executing a task to standard and developing TTPs. Soldiers quickly understood when they did not perform a task to standard and what actions should be modified to improve proficiency. Leaders could then use the information to assess performance and retrain units as necessary.

Within 10 years of its intimation, the AAR process had become embedded into the Army's culture because of its focus on improvement without fixing or allaying blame.[5] Its value had been accepted, and its use spread to activities other than training. Over time the Army became increasingly reliant on the use of the AAR to assess its combat unit capabilities and preparedness for combat.

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[5] Ibid. pg. 192.

## C. ESTABLISHMENT OF A NATIONAL TRAINING CENTER

Since 1979, the Army had repeatedly petitioned the U.S. Congress to permit the creation of a training center that would allow it to "isolate and resolve recurring problems that have an Army-wide impact."[6] In April of 1979 TRADOC published the NTC Development Plan, which stated that a key aspect would be its impact on developing lessons learned for the force and assessing training, doctrine, and equipment requirements for the Army. In 1981, the Army established the NTC at Fort Irwin, California. The NTC was to offer individual soldiers and units a training environment that closely paralleled that of actual combat; this provided an opportunity that was not currently available at home stations.[7] The training would consist of force-on-force engagements against an Opposing Force (OPFOR).[8] The training center used objective data recorders such as audio from radio transmissions, video from cameras located throughout the battle space, and digital input from the Multiple Integrated Laser Engagement System for real time assessment of personnel and vehicle casualties to provide feedback to units. In

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[6] Army Training: National Training Center's Potential Has Not Been Realized, GAO/NSIAD 86-130, 23 July 1986, pg. 14.

[7] Ibid. pg 8.

[8] The OPFOR, consisting of about 1500 personnel, is designed to replicate a Soviet motorized rifle regiment. Soviet style tactics and U.S. vehicles modified to look like soviet vehicles are used during force-on-forces simulated engagements. The NTC requires units to conduct training in eight different battle scenarios, which include offensive and defensive operations in day and night. The scenarios are changed for each training rotation so that NTC presents a different challenge to soldiers who have been to NTC previously.

addition, a qualitative assessment of unit performance was provided by 126 OCs who watched and recorded events and provided feedback to small units in the form of AARs.

By the mid 1980's, the Army extended the success they had at the NTC by developing three additional major combat training centers. The CMTC at Hohenfels, Germany is where United States Army Europe (USAREUR) units train heavy mechanized infantry and armored brigades in a fashion similar to the NTC. JRTC at Fort Polk, Louisiana is used by light forces for Low/Mid-Intensity Conflict, and BCTP at Fort Leavenworth, Kansas is designed to provide command and control training for division and higher battle staffs.[9] As the Army's forces trained at these centers and were evaluated on their ability to conduct their wartime missions, senior leadership began to receive feedback that units were repeating many of the same mistakes during maneuver exercises.

A Government Accounting Office study of the effectiveness of the NTC in 1986 discovered that lists of training trends compiled in March 1982 and in 1985 "showed many of the same problem areas."[10] Some of these recurring mistakes could have had serious consequences on a real battlefield; these included fratricide incidents and operational inabilities in a Nuclear, Biological, Chemical (NBC) environment. Most of the mistakes were identified and corrected using the current AAR system in specific units, and these would not be repeated during the ongoing rotation. However, the same corrections had to be made when the next unit arrived at the training center. This pattern

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[9] Army Training: Prioritizing and Follow up on Lessons Learned Should Minimize Recurring Weaknesses, GAO/NSIAD 93-231, 16 September 1993, pg. 1.

[10] Ibid. Pg. 21.

depicted a system that promoted individual learning but little organizational or institutional learning.

GAO concluded that the fundamental reason behind the failure to develop Army-wide lessons learned was that the primary emphasis was directed towards the training aspects of the NTC and providing units with immediate feedback. In addition, according to Army officials, the service still had not determined what analysis or data were required to develop lessons learned. The Army schools that were responsible for training and doctrine development had not been required to define the data necessary to fully evaluate training or doctrine effectiveness.[11] Overall, the GAO concluded that the lack of a systematic method to collect, process, and distribute lessons learned was causing the NTC not to fulfill a major portion of its intent.

To make the transition from an individual learning process to an organizational learning process, the Army Chief of Staff directed TRADOC to develop a systematic way to obtain information from the NTC exercises. In December 1985, TRADOC assigned this mission to the U.S. Army Combined Arms Center (CAC) at Fort Leavenworth.

## D. THE CREATION OF CALL

Although the use of the AAR and the NTC had become the cornerstones for the Army's effort to improve its ability to collect lessons learned, it had a fundamental flaw. Their design was to create learning at the small unit level; they could not, on their own, transfer these lessons across the entire organization. The realization of this shortcoming

[11] GAO/NSIAD 86-130, pg. 15.

by senior Army leaders, especially in the aftermath of Operation Urgent Fury, resulted in the desire to develop a mechanism to permit sharing lessons across the entire Army. This new mechanism would be achieved through the creation of the Center For Army Lessons Learned (CALL) in late 1985. CALL would be tasked with collecting and consolidating the subjective assessments from the NTC and major exercises into one central location. They would analyze them to identify trends, identify training problems and their causes, prioritize recurring problems, develop or assign proponents to develop solutions to them.[12]

CALL developed the Lesson Learned Process to achieve these tasks. The process included data collection using a variety of sources, including AARs, audio and video transmissions, and the evaluations of observers at the training centers. This process relied heavily on creating a standardized data/observation collection format that was used during an NTC rotation or major training exercises. CALL required any observation to follow a new standard trip report format. They also focused the attention of observers on selective issues that CALL was attempting to analyze. Before this standardization, the Army schools had been sending Subject Matter Experts (SMEs) to the NTC to observe exercises and evaluate the training rather than requiring them to document specific observations. In addition, the evaluation reports had been so general and unstructured that they provided little value or usefulness. Once data was collected, CALL consolidated them and conducted analyses for trends and deficiencies. It then published the results of its analyses in quarterly bulletins and newsletters that were sent to each of

[12] Ibid. pg. 22.

the TRADOC schools and tactical organizations throughout the Army. The TRADOC schools and tactical organizations were ultimately responsible for using CALL's input to modify training or doctrine.[13]

By 1989, the Army had quickly recognized the need to expand the lessons learned process to function in the event of combat operations. To meet this expanded role, CALL developed the Wartime Lessons Learned Program (WALLP). WALLP was later synthesized with the NTC and major exercise collection process in AR 11-33, *Army Lessons Learned Program: System Development and Application,* to establish a system for collecting and analyzing all field data and disseminating and archiving lessons from actual Army operations and training events. CALL conducted its first combat operation collection effort in December 1989, when Operation Just Cause began in Panama.[14] The system outlined by AR 11-33 consisted of a 6 phase process: Plan, Collect, Analyze, Publish, Distribute, and Archive with a stated goal of "getting the information into the hands of soldiers and units to help them perform their mission right the first time."[15]

When the GAO conducted a follow-up assessment of the effectiveness of CALL in 1993, they found that "Despite the lessons learned program, Army units are still repeating the same mistakes during maneuver exercises at the combat training centers."[16] The underlying problem of recurring mistakes was found to be two fold. First, TRADOC

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[13] GAO/NSIAD 93-231, pg. 2.

[14] CALL Handbook 97-13, pg. 1.

[15] Ibid.

[16] GAO/NSIAD 93-231, pg. 2.

and CALL, in particular, did not assign priorities to the lessons learned when it provided them to the schools. The lessons were provided to the school as information to use as they wished. By not tracking the extent to which the schools modified their training or doctrine to incorporate the lessons learned, TRADOC was not enforcing one of the key components of organizational learning.

Underscoring the importance that TRADOC's emphasis had on fostering organizational learning, the GAO highlighted a case where CALL had continued to identify fratricide-related problems recurring at the NTC. In 1989, CALL issued a plan to correct these deficiencies in six key areas; they assigned specific actions and responsibilities to be taken by the various schools and tactical organizations. By the onset of Operation Desert Shield, most of the responsible organizations either did not carry out the specified actions or could not document what actions they had taken. As a result of the numerous incidents of fratricide that resulted during Operation Desert Storm, renewed interest in these areas arose, and the Combined Arms Command issued a new plan to incorporate all of the key areas addressed in the original 1989 plan, plus two additional areas. This time, with TRADOC's pressure, the Army more aggressively implemented the plan. As a result, data from the mid 1990's shows a vast decrease in fratricide-related problems at the NTC.

The second key problem that contributed to CALL's ineffectiveness was, as General Sullivan noted, "the data from the training centers and actual operations overwhelmed our pencil-and-paper system." [17] CALL's analysts were trying to take

[17] Sullivan, pg. 208.

thousands of AARs, audio and video data, and trip reports and condense them into its bulletins. In the process, although they were providing insights into how to overcome deficiencies, they also were aggregating data to such a high level that it tended not to be useful.[18] Aside from this problem, the slowness of the manual lessons learned process often prevented timely information flow to the schools or field, and it limited the ability of units to request information on specific problems outside of those addressed by the standard CALL bulletins. In an effort to overcome the shortfalls in meeting the original goal of getting the information into the hands of soldiers in a timely manner, CALL sought to leverage the use of information technology.

## E. CALL'S INCORPORATION OF INFORMATION TECHNOLOGY

From the earliest moments of the information technology revolution, CALL has sought ways to increase its ability to meet its primary goal. Shortly after Operation Desert Shield, CALL undertook a test bed program to automate the archiving phase of the lessons learned process. With the support of the TRADOC Commander, CALL established the Automated Historical Archives System (AHAS) to electronically archive lessons learned into a vast database. This system not only would increase the ability to access information, but also assist in the Army-wide dissemination of numerous historical and new lessons learned documents from the Gulf War. By early 1993, this system was in operation and provided a valuable asset to the Army.

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[18] Ibid.

The success of this system was evident during the 10th Mountain Division's (10th MD) deployment to Haiti in September 1994. Once the unit was alerted to prepare to deploy, CALL was able to search its database and create a tailored soldier's handbook for operating in that environment. Information included preventive medicine for the tropics, crowd control techniques, tips for dealing with local officials, and tactics and small unit procedures for Urban Operations. These handbooks were produced quickly and sent to the units use during pre-deployment training at home station. This effort enabled the Army to significantly increase the effectiveness of the division once in theater. As a comparison, when this same unit deployed to Somalia just two years earlier, CALL was unable to provide any real value added prior to the deployment.

CALL also sent collection teams to Haiti to capture the knowledge being gained everyday by soldiers of the 10th MD while deployed. This knowledge was then transferred to troops from the 2nd Cavalry Regiment (Light) and 25th Infantry Division (25th ID) through updated handbooks based on the current situation in Haiti, feedback from the 10th Mountain Divisions soldiers, and updated Rules of Engagement. CALL's lessons also were incorporated into the creation of a training environment that simulated Haiti-like conditions at the JRTC to prepare follow on forces prior to their rotation into the country. [19] In fact of the 26 scenarios CALL developed for the 25th ID to use during their pre-deployment training, 23 were actually faced by units of the command during their 6 months in Haiti. One soldier from the 25th ID responded to a reporter from CNN

[19] Sullivan, pg. 204-205.

that a mission had been so successful and smooth, "Because I have already executed this mission 20 times before [actually getting here]."[20]

CALL's success in assisting the improved operational performance of units deployed to Haiti resulted in the CAC Commander's expansion of the test program to incorporate the integration of Information Technology throughout the lessons learned process. The expansion of automation included the use of databases, computers, servers, e-mail, FTP, and other on-line technologies to assist in the reporting and dissemination of lessons learned to the total Army. The goal of CALL was to refocus to "ensure the Army receives timely and relevant feedback required to achieve victory in the Information Age." [21]

## F. SUMMARY

Since the late 1940's, the Army has realized the importance of having a mechanism to facilitate the transfer of lessons learned on the battlefield to its training base in an effort to save lives. In 1985, the Army created the Center for Army Lessons Learned to oversee this function. CALL was tasked as the organization responsible for collecting observations, transferring them into relevant lessons, and then disseminating them to the force. By the mid 1990's, CALL's existing lessons learned process had been overwhelmed with the amount of data that it was collecting; it therefore sought to

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[20] Lloyd Baird and John C. Henderson. "Learning From Action: An Analysis of the Center for Army Lessons Learned", Human Resource Management, Winter 1997, Volume 36, pg. 387.

[21] call.army.mil/call/homepage/history.htm pg 1.

leverage Information Technology as a possible solution. The automation of the collection process proved invaluable in preparing forces for Operation Restore Hope and soon was developed as a means to support all of the organization's key functions.

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# III. CALL'S ORGANIZATIONAL STRUCTURE

"The Army has perfected a remarkably efficient process for correcting its mistakes and sustaining its successes."[22]

## A. CALL'S MISSION AND KEY FUNCTIONS

Almost since CALL's inception in 1985, it has maintained the same primary mission: to collect, analyze, and disseminate timely and relevant lessons learned, tactics, techniques and procedures (TTPs), research material and security assessments to Army units around the world.[23] To satisfy this mission it must conduct the following key functions: collect relevant observations, analyze observations and develop lessons learned, disseminate lessons in a timely manner, act as an agent for change, maintain a historical file of all lessons learned and AARs, and recommend changes to doctrine, training, organization, material, and leadership (DTOML).[24] By fulfilling these core functions, CALL not only could improve individual learning and performance, but more importantly serve as the mechanism for developing organizational learning in the Army.

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[22] Thomas E. Ricks, "Lessons Learned: Army Devises System To Decide What Does and Does Not Work", The Wall Street Journal, 23 May 1997, pg. A1.

[23] Center for Army Lessons Learned, http://www.call.army.mil/call/homepage.

[24] 1990 CAC Annual Command Histories, Center For Army Lesson Learned, pg. 94.

## B. ORGANIZATIONAL ENVIRONMENT

One of the key aspects that effect the performance of an organization is the environment in which it operates. The environment comprises elements outside the organization, including stakeholders, that may influence the ability to accomplish key goals. These elements can affect the organization by making demands or placing constraints on it.[25] The CALL's environment includes the following key stakeholders: FORSCOM, TRADOC, CAC, and the United States Congress/GAO. (Figure 1)

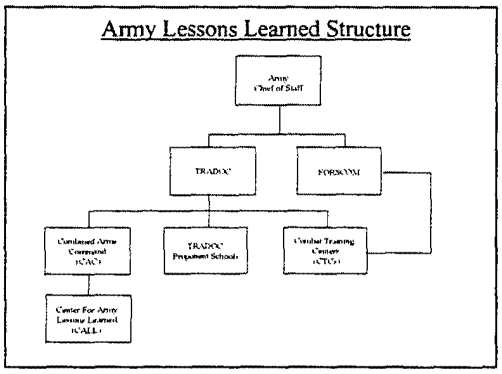



Figure 1. Army Lessons Learned Structure

### 1. United States Army Forces Command (FORSCOM)

FORSCOM, whose mission is to train, mobilize, deploy, and sustain combat ready forces capable of operating in a joint and combined environment, is the warfighting arm of the Army. Through its responsibility to train over 760,000 active and reserve soldiers for combat, FORSCOM is the main user of the services that CALL provides. Not only is it CALL's biggest client, but it also is the source of its data.

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[25] David A. Nadler and Michael Tushman. "Organization, Congruence, and Effectiveness", Organizational Dynamics, Autumn 1980, pg. 96.

FORSCOM is also responsible for the operational control of the Combat Training Centers. It is through the observation of FORSCOM units at the Combat Training Centers, major training exercises, and during actual operations that CALL is able to gather lesson learned. FORSCOM's influence on CALL is its ability to identify which exercises or operations require Combined Arms Assessment Teams (CAAT) and specify collection requirements on an issue. This shapes the scope of CALL's collection effort, which in turn effects the products that are produced for the Army.[26]

**2. United States Army Training And Doctrine Command (TRADOC)**

TRADOC is charged with the major Army missions of individual training and combat development. This vast task places "the development of the Army's tactical organizations, weapons, equipment, doctrine, and the training of soldiers in that doctrine, in one command."[27] Individual training, for both officers and enlisted soldiers, is conducted through the military education system, which consist of 18 TRADOC monitored military specialty schools located throughout the United States. The responsibility for doctrine development is divided between the levels of TRADOC's hierarchy. TRADOC headquarters, located at Fort Meyer, Virginia, writes strategic level doctrine; Combined Arms Center, located at Fort Leavenworth, writes Corps and Division level doctrine; proponent school headquarters write branch specific Field Manuals.

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[26] Center for Army Lessons Learned Handbook 97-13, United States Army Combined Arms Center, Fort Leavenworth, Kansas, pg. 10.

[27] Chapman, Anne W., Carol J. Lilly, John L. Romjue and Susan Canedy, Prepare The Army For War: A Historical Overview of the Army Training and Doctrine Command 1973-1998, Military History Office, United States Army Training and Doctrine Command, Fort Monroe, Virginia 1998, pg. 14.

TRADOC's requirement to develop doctrine has a significant impact on CALL's ability to conduct their mission. When CALL identifies lessons learned that are linked to problems in individual training or doctrine, it provides that input to TRADOC for action by the proponent organization. TRADOC then holds the school accountable for correcting these deficiencies by incorporating them into training or doctrine modifications. As TRADOC prepares the Army for the future, through the development of new doctrine, such as Force XXI or the Army After Next, they use the collection and analysis functions of CALL to provide feedback about the feasibility of the doctrine.

### 3. United States Army Combined Arms Center (CAC)

The mission of the Combined Arms Center (CAC) is to educate officers in the art of command and staff functions of the combined arms at the tactical level and to educate officers in the operational art of war.[28] CAC has a training development function for battle command staff and experimenting with concepts, methods, procedures and means of battle command. CAC is one of the proponent organizations under the control of TRADOC and has the tasks of writing the doctrine for war fighting at the division and corps levels. CAC is also the higher headquarters for CALL within the TRADOC organizational hierarchy.

When CALL identifies lessons learned that are linked to problems at the tactical doctrine level, it provides that input to CAC for correcting these deficiencies by incorporating them into training or doctrine modifications. Since CAC also is responsible for providing the training exercise scenarios for BCTP, they can effect the

[28] www.army.mil.cac/mission/mission.html

scope of CALL's lessons learned process by dictating what issues require collection and analysis.

### 4. The Department of the Army (DA)

Through its tasking authority, the Department of the Army provides the impetus for CALL to initiate its active collection operations in support of actual operations or major training exercises. This key power grants CALL two important items: authorization and funding. First, the Department of the Army will generate a support tasking to furnish CALL with not only the CAAT Team Chief, but official authorization to request CAAT team members from the relevant TRADOC proponent schools. This formal tasking is a binding requirement to TRADOC to temporarily assign qualified personnel to CALL to assist the upcoming collection mission. Secondly, and most importantly, once a formal tasking comes from DA, it also appropriates the budgetary funds that will be used by CALL in support of the collection effort. Without the granting of these additional funds, CALL does not have an operating budget to actively collect data. Because of the DA's power to control CALL's ability to generate and fund its collection efforts, it has enormous impact on what events and issues CALL undertakes. This allows the DA to shape the corporate learning mechanism to focus on issues that it sees most important.

### 5. U.S. Congress/General Accounting Office (GAO)

Since the U.S. Congress is responsible for appropriating funds to all DoD programs, it has a significant impact on CALL's personnel, equipment, and collection effort. Congress employs the GAO to: examine the use of public funds, evaluate federal programs and activities, and provide assistance with oversight, policy, and funding

decisions.[29] As a result, GAO works to continuously improve the efficiency and effectiveness of the Department of the Army through program reviews.

It is in this context that the GAO has sought to assess the overall impact that the CALL Lessons Learned Process has had on the Army. Once an evaluation is made, the GAO furnishes a report to the Executive or Legislative Branch member that has requested the service. They can then use this report to justify funding, expand CALL's mission, or make other determinations as appropriate.

The geopolitical realities that now face the United States Army also are critical to understanding CALL's environment. When CALL was founded in the mid 80's, the Army was structured both organizationally and doctrinally to counter the threat posed by the Soviet Union. The Army was expected to be prepared to fight a high intensity conflict in the European or Korean theaters against a known enemy using understood and well documented tactics. The task of CALL was finding trends in training deficiencies and creating tactical level solutions. Time was not a factor in the development and dissemination of these solutions.

After the collapse of the Soviet Union; new geopolitical realities exist. The Army has to counter many different threats along the conflict continuum including peacekeeping operations, mid-intensity conflicts, humanitarian relief, terrorism and cyberterrorism. Speed in the collection and dissemination of lessons learned to the total Army is now paramount. In addition to rapidly collecting and disseminating lessons learned, CALL must tailor training packages to FORSCOM prior to the deployment of

[29] www.gao.gov

forces and to TRADOC for necessary adjustments to strategic and tactical level doctrine to counter this extensive expansion of threats.

## C. ORGANIZATIONAL STRUCTURE

### 1. 1990 Functional Configuration

From its inception in the mid-1980's, CALL has undergone many organizational changes. Initially CALL was developed to capture lessons learned from the Combat Training Centers. By 1989 senior Army leadership realized that CALL also should support on going combat operations to identify lessons being learned by deployed fighting forces. As a result of this expansion of its mission, CALL was reorganized by functionality, in 1990. CALL's basic organizational structure consisted of four major divisions: Collections, Analysis, Processing, and Dissemination.[30] Additionally, an Operations cell at Fort Leavenworth ran the day to day operations of CALL, while small observation divisions at each of the CTCs supported units conducting training.

The Operations cell consisted of the director, deputy director, and two secretaries. They were responsible for distribution, budgeting, tasking and tracking ongoing collection efforts, as well as administrative and logistical support of the organization. The Collections division consisted of two sections. The Combined Arms Assessment Teams collected observations from on going major exercises and actual operations, and the Wartime Lessons Learned Program (WALLP) collected after-the-fact interviews on Operation Desert Shield/Desert Storm. Because of senior Army leaderships desire to

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[30] 1989 CAC Annual Command Histories, Center For Army Lesson Learned, pg. 191-192.

document all aspects of the conflict in the Persian Gulf, CALL's WALLUP section's authorization was increased an additional 40 personnel to assist in this effort. The Analyst division consisted of 9 civilian analysts who were charged with transforming the observations from the Collection division into lessons learned. Those observations that were deemed relevant by the analyst were identified and grouped under a particular Battlefield Operating System (BOS) and were provided as input to future products and publications. The Processing division was accountable for the production of all initial impression reports, final reports, newsletters, articles, training vignettes, handbooks, and exportable training packages. The Dissemination division had the primary responsibility to provide all CALL products to evaluated units, the organizational stakeholders, and the historical archives.

**2. 1993 Reorganization To Divisional/Product Configuration**

In 1993, responding to the increasing demand on the Army, CALL underwent another reorganization. The reasons for this were threefold. Firstly, to increase effectiveness through analysis. Secondly, to adjust the organization to meet the steadily increasing missions without an increase in personnel. Lastly, to focus on the development and implementation of automated data systems. CALL was separated into three major divisions: Collection, Analysis, and Information Systems (Figure 2). This would transform the organization from a functional organization to a product organization. The reorganization upgraded each division chief to Lieutenant Colonel and allowed each a certain independence in collecting, analyzing, processing, and publishing materials in their respective orientation to a product orientation. This type of

departmentalization creates self-contained divisions, each of which is responsible for every aspect of a certain product.[31]

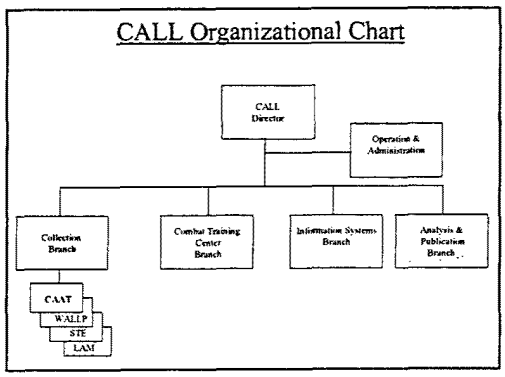



Figure 2. CALL Organizational Chart 1993-1996

The functions of the Operations and Administration cell remained relatively unchanged, and its personnel manning remained at four. The Collection division maintained its focus on supporting CAATs, WALLP, and Support to Exercise (STE) requirements to include: Operation Restore Hope in Somalia, Operation Support Hope in Uganda, Operation Uphold Democracy in Haiti, and 3rd Army's Bright Star exercise. In addition to these roles, the Collection division also assumed a pivotal role in the Louisiana Maneuvers (LAM), a series of simulations and exercises by the Army to anticipate and adapt its our changing environment. Force XXI doctrine resulted from these exercises and was used to replace the outdate Air Land Battle Doctrine. Although it expanded its collection effort and would also conduct some preliminary analysis, the Collection division was reduced as a result of the completion of the Desert Shield/Desert Storm collection effort to a manning of 10 to 12 officers and enlisted soldiers.

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[31] Jerald Greenburg. *Managing Behavior In Organizations*, Prentice Hall, 1999, pg. 286-287.

The Analysis and Publication division's four civilians were to serve as researchers and archivist for the organization. The newly created Information Systems division was tasked with the development, testing, and implementation of automated data systems. This function was seen as paramount to ensuring CALL's future success and resulted in "the recruitment of 25% of CALL's officer strength to upgrade and test information systems." [32] They were charged with developing and maintaining the CALL database (CALL DB), providing the automation equipment infrastructure to include computers for CAATs, and implementing the Army Lessons Learned Management Information System (ALLMIS). After the initial surge of personnel to assist CALL leverage the emergence of information systems, the division's manning was reduced to three officers to maintain the equipment and continue to seek advances in information technology.

The last significant change in this reorganization came in the latter half of 1994 when the CTC Division was added. Its mission was to supervise the Focused Rotation Program at the CTCs, collect lessons from the BCTP Warfighter exercises, and publish take home packets and trend newsletters for the units of FORSCOM. This effort was manned with 8-12 officers, enlisted soldiers and civilians, located at Fort Leavenworth and at each CTC.

### 3. 1996 Reorganization to Support the Information Age

In March 1996, CAC fused the Army Knowledge Network (AKN) and CALL in an integrated effort to provide timely and relevant lessons learned to the entire force.

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[32] Center For Army Lessons Learned, Memorandum for Record, 27 February 1995, Subject: ADCST Input to Annual Command History Report 1994.

AKN had been developed in the early 1990s as a system of linked and cross-referenced databases constituting a complete collection of military, political, social, and economic information pertinent to military operations.[33] Each activity was expected to complement and strengthen the other. CALL had long achieved excellence in analyzing and providing relevant lessons learned, and AKN had a strong reputation for its electronic archiving and rapid distribution of documents. Along with the combination of AKN and CALL, the implementation of web enabled solutions was expected to facilitate CALL's communications with units across the Army. This merger would solve a longstanding CALL problem of disseminating vital information throughout the Army. The reorganization initially reduced the number of divisions to three: Lessons Learned, Information Systems, and Research. Each division focused on the specific services that CALL provided. However, in 1998, CALL was expanded to also incorporate the Army's University After Next (UAN) (Figure 3).

The Lessons Learned Division (LLD) consists of two sections: Actual Operations (AO) and the Combat Training Center (CTC) Branch. The LLD's mission is to gather and analyze observations and produce a variety of lessons learned literature for the entire Army. They have a total of 28 military and civilian personnel to assist in this function. The AO Branch is assigned the task of collecting observations from contingency operations and training exercises through the use of CAAT teams. CAATs are task-organized teams of Subject Matter Experts (SMEs) representing each BOS normally from TRADOC Schools and Centers. These teams are lead by a TRADOC-provided Team

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[33] L. D. Holder and Edward Fitzgerald. "The Center for Army Lessons Learned: Winning in the Information Age", Military Review, July-August 1997, pg. 2.

Chief external to CALL. If sufficient time is available, they also host a Collection Workshop for CAAT personnel on the collection plan and lessons learned methodology. The AO Branch also furnishes an operation officer and non-commissioned officer (NCO) to assist the CAAT Team Chief with operation support issues and the CALL collection methodology. The AO Branch has nine officers and NCOs to assist in this function as required.[34] Along with the OPSO/OPSNCO, CALL also assigns a civilian analyst to support each CAAT collection effort. The three civilian analysts not only provide feedback on the quality of the observations, but also insure that the collection effort is addressing its stated targets.

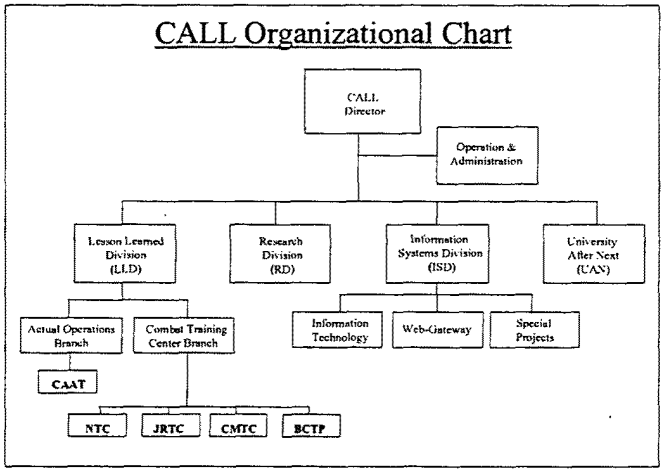



Figure 3. Present CALL Organizational Chart

The CTC Branch's mission is to capture lessons learned and TTP derived from observation at the CTCs for dissemination to the Total Army. Unlike the AO Branch, members of this section conduct both active and passive collection while units are training at the four CTCs. They also are responsible for conducting analysis of

[34] Center for Army Lessons Learned Handbook 97-13, United States Army Combined Arms Center, Fort Leavenworth, Kansas, pg. 4.

performance trends to assist units in focusing their training at home stations. CTC Branch has a total of 12 military and civilian analyst located at each of the training centers and Fort Leavenworth, and the CTC also prepares products to assess units' abilities to execute their wartime missions.[35]

The Research Division (RD) is composed of 7-14 archivists, historians, record managers, librarians, and security specialists. RD is responsible for not only the lessons learned that are produced by the LLD, but also for archiving all Operations Orders (OPORDs), AARs, and army tactical level related articles from professional magazines. They provide the records of all information stored by CALL that are available to authorized personnel throughout the Army. It is this division that is responsible for inputting all classified and unclassified data into the CALL DB for use via the World Wide Web using the CALL Gateway or the Secure Internet Protocol Router Network (SIPRNet). The RD processes data in two ways. Paper data is scanned into computers in a digital format and then uploaded to the CALL DB. Electronic documents are directly uploaded by archive technicians. All documents are stored by appropriate classification in electronic filerooms based on archival standards.

The Information System Division (ISD) is the automation equipment support infrastructure branch. They facilitate the collection effort by the effective use of emerging telecommunication and computer technologies. ISD renders support to the collection and analysis process as well as the publication and dissemination process. The primary tool for collection and analysis is the software program CALL Collection and

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[35] Ibid.

Observation Management System (CALLCOMS). This software allows the CAAT to formulate a collection plan and categorize observations. CALLCOMS robust search, sort, and filter capabilities assist analysts and trend identifications. The key to CAAT's success is the use of the Internet. CAATs now have the ability to use File Transfer Protocol (FTP) to transmit observations stored in CALLCOMS back to CALL for storage or analysis by the LLD Branch while still deployed. They can also use this communication link to send messages back to CALL twenty-four hours a day when assistance is needed. They no longer have to worry about waiting for business hours to pass information because messages are forwarded to the intended recipient and waiting for them once they arrive at work.

Automation also aids the production and distribution of products by CALL. CALL's ISD supports four main methods for the electronic distribution of products: E-Mail, postings of current products on the CALL Web homepage, storage in the CALL DB, and storage in the CALLCOMS DB. This division is currently manned with six civilians located at CALL and six civilians assigned to the Fort Leavenworth Department of Information Management (DOIM).

The newest division of CALL, UAN is a distributed organization designed to meet the emerging knowledge needs of the Army After Next. It consists of three components: Distributed Laboratory, Distributed Library, and Distributed University. These components provide the capability for enterprise-wide knowledge and learning management by integrating and synchronizing best practices and technologies from public, academic, private, and military sectors. The UAN integrates new technologies and methods to create a common learning environment to meet the future requirements of

soldiers, leaders, and units. It is tasked with developing technologies that will serve as the cornerstone of the theory of "Reachback". Reachback allows soldiers and leaders to gain real-time tailored knowledge from SME located throughout the world for contingency or information needs that may arise.[36]

The Distributed Laboratory will identify methods for transferring knowledge and information between deployed units and resource centers located throughout the world. The Distributed Library will serve as a single point of access for soldiers and leaders to a vast knowledge repository. Not only Army and DoD information systems will be linked, but also physical and virtual public libraries. It will address general questions that may arise using multiple integrated formats to include video, audio, imagery, or text. The Distributed University will provide mentorship to the user to answer very specific issues.[37] This will be done using a virtual staff or SMEs distributed at TRADOC schools or other knowledge centers. UAN's nine civilians will identify information technology solutions for training, learning, and educating the Army in the future to leverage knowledge into a combat multiplier.

## D. SUMMARY

Although its mission to collect, analyze, and disseminate timely and relevant lessons learned, tactics, techniques and procedures (TTPs), remains virtually unchanged

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[36] University After Next Pamphlet, TRADOC Program Office for University After Next, U.S. Army TRADOC, 1999.

[37] Interview with Antonio Monaco, Program Manager-University After Next, on 17 January 2001.

since its inception CALL has undergone numerous structural changes. The changes from a Functional to a Product Orientation have been in an effort to increase the organization efficiency and to assist the assimilation of smaller organization into CALL. The present focus of CALL remains to continue to provide its services to its existing clients, while using the UAN to identify emerging technologies that can be used to support the knowledge requirements of the future force.

# IV. LESSONS LEARNED METHODOLOGY

"The only thing harder than getting a new idea into the military mind is to get an old one out."[38]

## A. ROLE OF A LEARNING ORGANIZATION

The Army's drive towards transforming itself to meet its mission has become increasingly important as the geopolitical instability of the post Cold War era continues. With a myriad of new threats and commitments that have emerged in the 1990's, the force has had to become more deployable, flexible, and responsive while simultaneously undergoing a reduction in personnel strength of nearly one third on its current manning. The challenge that faced the Army was how to take a highly bureaucratic organization that was very good at accepting gradual changes and make it operate effectively in an environment that could dictate an avalanche of required changes.[39] To meet this challenge the Army, initially under General Sullivan's stewardship, sought to become what it defined as a learning organization.

A learning organization is an "organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect this new knowledge or insight."[40] The key is not the idea that triggers the desired organizational improvement,

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[38] Col Michael Starry, "It's Not The Same Old Army," Armed Forces Journal, October 1995, pg. 42.

[39] Sullivan, pg. 5.

[40] David A. Garvin, "Building A Learning Organization," Harvard Business Review, July-August 1993, pg. 80.

but rather the accompanying change in the way that the tasks get done. [41] Learning organizations must be skilled at five main activities that serve as the foundation for their success: systematic problem solving, experimentation with new approaches, learning from past experiences, learning from the experiences of others, and transferring knowledge quickly and efficiently throughout the organization. [42]

## B. THE ARMY AS A LEARNING ORGANIZATION

The Army has emplaced methods to enable it to perform each of the five activities necessary for it to qualify as a learning organization. Systematic problem solving is accomplished using various formal methods. The Army's most prevalent method for tactical decision making is based on the Boyd's OODA Loop. This process follows four distinct phases: Observe-Orient-Decide-Act. (Figure 4)

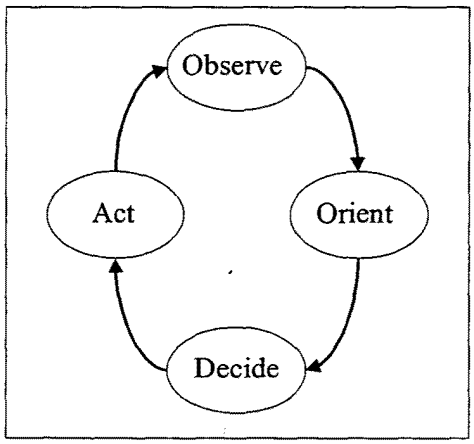



Figure 4. Boyd's OODA Loop

The output for each phase of the cycle serves as the input for the next phase and forms a continuous loop. The Observe phase is an effort to determine exactly what is

[41] Ibid. pg. 81.

[42] Ibid.

taking place in the decision makers environment and under what circumstances they must function. The Orient phase interprets the information gathered from the Observe phase, uses it identifies the overall objective, and formulates possible courses of actions. In the Decide phase, the decision-maker will determine how best to use all available resources to reach the stated objective. In the Act phase the decision-maker will execute the decision.[43]

The Experimentation with New Approaches activity is broken down by the Army into two subgroups: ongoing and one-of-a-kind experimentation. The ongoing experiments are conducted at the service's battle labs that are located at each of the TRADOC proponent schools. These labs run extensive virtual and live tests/simulations to measure the impact of what changes to Doctrine, Training and Leader Development, Organization, Materiel, and Soldier (DTLOMS) will have on the force. One-of-a-kind experiments, such as the Advanced Warfighting Exercises (AWEs) are used to test the maturity of cutting edge technology and its impact on the effectiveness of current units. The results of both types of experiments provide a means to understand future warfighting requirements or current deficiencies.

CALL serves as the focal point in helping the Army become a learning organization by responding to the last three activities. It addresses the Learning from Past Experiences activity in its effort to systematically collect, analyze, record and disseminate information throughout the organization. The open access to this information by all members of the organization prevents them from being "condemned to

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[43] Daniel H. Kim, "The Link between Individual and Organizational Learning," Sloan Management Review, Fall 1993, pg. 37-38.

repeating past mistakes."[44] Since not all learning comes from self-analysis, CALL also gains valuable insight from the fourth activity, Learning from Others. As a member of such cooperative organizations as the ABCA Coalition Operations Lessons Learned Database, the Joint Services Lessons Learned program, and NATO Lessons Learned Program, it shares observations with the members of other military strategic alliances. These two-way exchanges are valuable because they allow the organization to gain either a new perspective on an issue or implement TTPs successfully used by Allies when the U.S. Army is operating in an environment which previously it has not been exposed.

The last activity is the Transfer of Knowledge throughout the organization. For learning to have the maximum possible impact it must be transmitted not only as broadly as possible, but also quickly and efficiently. CALL spreads this knowledge thorugh a continuous series of pamphlets, bulletins, newsletters, briefings, and special after-action reports. These reports serve many purposes, to include: providing a checklist of do's and don'ts, summarizing trends, and furnishing input to modify training and doctrine. The effect of these reports is to develop shared mental models throughout all of the members of the organization. It is through individuals sharing and improving their mental models that true organizational learning occurs.[45] The distribution channel of CALL's publications include all Army FORSCOM units down to the battalion level, TRADOC schools, the CTCs, major Reserve Component headquarters, other military services, and Allied nations through liaisons and attaché offices. CALL's use of emerging

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[44] Ibid. pg. 43.

[45] Garvin, pg. 85.

information technology solutions, such as web based access to its current publications and electronic copies sent via the Internet, assists in expediting the information out to its users.

It is important to also track the efficiency of the spread of knowledge. This can be done by evaluating three overlapping stages of learning: cognitive, behavioral and performance improvements. Cognitive learning occurs when members are exposed to new ideas and begin to think differently. Behavioral learning is when members begin to internalize new ideas and alter their behavior. Performance improvement is when changes in behavior lead to measurable improvement in results.[46] Because CALL does not have the authority to mandate implementation of its lessons, they are acted upon based on CALL's reputation and their quality alone.

The semi-regular products that result from CALL, such as the CTC Quarterly Bulletin, CTC Trends Bulletin, or Topic Newsletters generate cognitive learning. These products have near-term impact because they are focused on getting individual or unit level leaders to use these lessons prior to their incorporation into formal materials, for example field manuals. The Army uses its proponent schools and military education system to implement behavioral learning. The proponent schools use CALL's products to identify those lessons that will provide an added value to Army operations. These lessons then are incorporated into the long-term organizational memory through the modification of formal training programs and field manuals. As new ideas or TTPs are accepted, they are incorporated into the military education that all soldiers receive as they

[46] Ibid. pg. 90

periodically advance in rank. This education then serves as the basis for how they lead their units or perform missions in a tactical environment. Finally, the Army can track the progress as units rotate through the CTCs every 18 months. While at the CTC, each unit is evaluated using the latest doctrine, TTPs, and trend analysis to provide feedback to CALL showing whether the same mistakes are being repeated or the new ideas are being used to maximize unit performance.

## C. WHAT ARE ARMY LESSONS LEARNED?

Before discussing the method that CALL uses to transform observations into lessons learned, it is important to understand the definition of a lesson learned. The Army defines a lesson learned as "validated knowledge and experience derived from observations and the historical study of military training, exercises, and combat operations."[47] It is CALL's responsibility to identify observations or data that will have a significant impact on/or require changes to one of the DTLOMS. Once this data is validated and bundled as new insight through use of the Lessons Learned System, it is codified as a lesson. These lessons are considered in term of focus, relevant, timely, and useful to affecting behavioral changes. CALL does not consider a lesson "learned" until it has resulted in behavioral change. Its ultimate purpose is not to build a knowledge base of data, but rather to actively engage in the process of changing a specified behavior that exists in the force.

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[47] Center for Army Lessons Learned, CALL Handbook 97-13, United States Army Combined Arms Center, Fort Leavenworth, Kansas, pg. 2.

## D. CALL'S LESSONS LEARNED SYSTEM

The system employed by CALL to develop lessons learned is outlined in AR 11-33, *Army Lessons Learned Program.* This system establishes a methodology for collecting and analyzing field data and distributing, integrating, and archiving lessons from Army combat operations and training events. CALL breaks its various methods of gathering data into three classifications: Active, Passive, and Active-Passive.

Active collection is done by the AO and CTC Branches when they send out CAAT Teams to observe and record data from ongoing training or operations. Passive collection is done via the website when members of the force either send observations or unit AARs into CALL for inclusion in the CALL DB. Active-Passive collection is done when CALL contacts a unit after the fact and conducts a formal interview or AAR with key members of the organization. It also will contact units that are redeploying from major training events and ask them to send a copy of all OPORDs, AARs, and ROEs to CALL for input into the database. No matter what the source of input of data, CALL will follow the same methodology to glean lessons learned from the data it is provided. This methodology consists of several basic components or stages: Mission Analysis and Planning, Deployment and Link-Up, Collection Operations, Analysis, Distribution and Archive. Only by the exercising of each of these components in a systematic process can CALL provide results in the form of lessons that assist soldiers and units to perform their missions right the first time.

### 1. Mission Analysis and Planning

As with most military operations, effective and detailed planning appears to be central to CALL's success in capturing lessons. When CALL receives a request for

assistance or tasking to gather information and observations, mission analysis is initiated. Mission analysis is an attempt by key members of CALL and the requesting organization to determine what specific issues need to be address by the collection plan once it is formed. In the past, the data collection plans have taken a "vacuum cleaner approach." Observation teams were widely deployed and little attempt was made to define explicit learning objectives.[48] The result, as earlier noted by General Sullivan, was the collection of a mass amount of data that overloaded the organization's capacity to turn it into useful information or lessons. Senior Army leaders at DA currently select what events have the highest potential for generating valuable lessons and outline the specific issues to be observed by the CAAT. This specific guidance to CALL and the CAATs has created a "telescope" of learning. This change, during mission analysis, in focusing the collection effort early has allowed the human analysts at CALL to no longer be the chokepoint of the Lessons Learned System.

Once mission analysis is completed it serves as the basis for the composition of the collection team and the development of a detailed collection plan. The Combined Arms Assessment Team (CAAT) is composed of 8-12 subject matter experts tasked from the TRADOC proponent school. The CAAT members' specialties are directly related to the issues that are identified during mission analysis. A team chief, external to CALL, also is designated by the Department of the Army and becomes responsible for the development of the actual collection plan and all CAAT collection activities. Team

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[48] John C. Henderson, Stephanie Watts Sussman, and James B. Thomas, "Creating and Exploiting Knowledge For Fast Cycle Organizational Response: The Center for Army Lessons Learned", Advances In Applied Business Strategy, Volume 5, 1998, pg 106-107.

Chiefs are generally Lieutenant Colonels or higher depending on the size and difficulty of the collection effort. In addition, CALL assigns an Operations Officer and Operations NCO (OPSO/OPSNCO) to serve as advisors to the team chief on the collection process and as a subject matter experts on the use of CALL's collection software CALLCOMS and IT architecture. Furthermore, CALL appoints an analyst to support the CAAT via a communication link from Fort Leavenworth. A Combat Camera Crewman can be employed by CALL if needed.

Once the CAAT has been formed and there is sufficient time available, team members travel to CALL for a 3-5 day Collection Workshop. During this workshop the team members refine the collection plan, train team members on the lessons learned process and CALL's methodology. Assisting the CAATs is the software application CALLCOMS. CALLCOMS can be used to formulate the detailed collection plan, delineate collection responsibilities among CAAT members by Battlefield Operating System (BOS), and determine the collection methodology for each task. Once the CAAT is formed, the collection plan completed, and the CAAT members are trained, this phase of the process is complete.

**2. Deployment and Linkup**

This phase begins with the deployment of the CAAT to the collection site or aerial/seaport of embarkation. The CAAT attempts to link-up with the host unit as soon as possible to begin collecting data and, more importantly, to build rapport. During this phase the OPSO/OPSNCO plays a significant role because they are responsible for arranging the counterpart link-up between the CAAT subject matter experts and observed

unit personnel. This link-up can be at the staff, unit, or individual level based on the mission analysis conducted during Phase I.

Once the CAAT team has linked-up with the host unit, they begin their collection effort. Host units must supply a CAAT team access to communication links that allows transmittal of e-mail. This communication link allows the CAAT to promptly relay data to CALL analysts via CALCOMS. Since the CAAT personnel are observers and not evaluators, their mission is to support and assist the unit as much as possible, along with collecting data for CALL. Because of this relationship, CAAT should be seen as an asset by the unit leadership and become an integral part of the operation. This phase is complete once the CAAT members linked-up with their host unit counterparts and establish a communication link to CALL.

**3. Collection Operations**

Once on site, CAAT members begin to observe events and collect data in real-time. Collection team members join in on field missions to look for factual, observable events to document. They also perform in their area of expertise, for example carrying and operating communication equipment or even replacing a rifle infantryman.[49] No retrospective accounts are taken and only data of a tactical or operational nature are collected. CAAT members are taught to look for systemic-induced problems rather than those due to soldier/leader error or anomalies.

[49] Ibid. pg. 109.

Once an issue is recognized, they examine the events that transpired, try to find the cause and look ahead to identify the potential consequences. This process is called "threading the needle", tracing the path of a problem back to its source in order to gain a better understanding of what happened and why.[50] As this process nears completion, team members document their observations and discussion of the events into CALLCOMS using its pre-formatted input form.

While the collection team members work with the unit to gather data, the CAAT team chief consolidates their observations on a recurring basis. This information can be transmitted using the File Transfer Protocol (FTP) by way of the Internet, if team members are at a remote location, or downloaded onto the team chief's computer via standard computer disk. The team chief, with the assistance of the OPSO/OPSNCO, then conducts a review of the subjective observations. The purpose of this review is to screen for content, edit grammar, ensure the observations are addressing the collection plan requirements, and identify problems that are potential warstoppers.[51] Since the team chief is reviewing the actual file on CALLCOMS that the team member submitted, any cosmetic changes to the file can be completed without requiring further communication with the team member. If the team chief believes the team member has identified an area outside the scope of the collection plan or needs further clarification, he can discuss these issues with the observing team member and correct the CALLCOMS form as necessary.

Once the team chief has completed his review of the CALLCOMS observations, they are forwarded electronically by the CALL OPSO/OPNCO to the CALL analyst at

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[50] Ibid. pg. 108.

[51] CALL Handbook 97-13, pg. 14.

Fort Leavenworth. During past operations, such as Operation Restore Hope, five to ten observations a day were transmitted to CALL. CALLCOMS also provides the team chief with the ability to track the current status of any observation and develop an ongoing issue tracking worksheet. A compilation of observations is provided to the supported unit commander during a briefing prior to the CAAT departing the theater.

Moreover, CALL is able to support the collection of passive observations from members of the force. At this time, soldiers throughout the Army can input observations directly to CALL using the CALLCOMS software located on the CALL web site. Once an observation is presented, an analyst is assigned to assist in processing the observation and maintains close contact with the submitter until the procedure is complete. As an observation is forwarded to CALL, it moves into the next phase of the lessons learned process.

**4. Analysis**

During the analysis phase, the raw data of observations gets processed into lessons through an expanded interpretation method that includes feedback from experts around the Army. Even while the CAAT is still deployed and gaining additional observations to support the collection plan, the analyst at CALL is working on taking the CALLCOMS observation previously forwarded to him electronically via FTP and converting it into a lesson. As these observations are received, the analyst transfers them into the CALLCOMS Database (CALLCOMS DB). Supporting documents, such as video, also are received via the Internet and converted so they can be added to the database.

Observations then are categorized in accordance with the BOS as outlined in TRADOC Pamphlet 11-9. Once the observations are indexed, they are scanned for formatting and grammatical errors, and checked to insure they maintain individual or unit anonymity. As the analyst works on observations, he or she relays questions back to the team, as necessary, to resolve conflicts and refine the collection effort. Observations then are posted on electronic bulletin boards on the Secret Internet Protocol Router Network (SIPRNet) and sent electronically to the appropriate specialists at TRADOC agencies to solicit feedback.[52]

The analyst also validates the data coming in from the field. Validation occurs when the current observation is compared with past information contained in the CALL DB to determine frequency and impact. Feedback from the TRADOC experts is used to determine if the current observation is new knowledge or an expansion of existing organizational knowledge. Correspondingly, it can render additional new questions or issues that TRADOC experts would like to see the CAAT team address. This three-way communication between TRADOC experts, the CALL analyst, and the CAAT Team Chief occurs almost daily.

Upon completion of the screening by the analyst, the observation can be released to commands that are rotating into the theater to support their training initiatives. The CALL Director, working in conjunction with the deployed units and the follow-on unit's chain of commands, seeks to gain release authority of lessons. [53] However, "nothing is

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[52] Ibid.

[53] CALL Handbook 97-13, pg. 14.

released by CALL until the observed Task Force Commander allows it."[54] It is at this point that the observations are codified as lessons.

**5. Distribution and Archiving**

When the CAAT returns from its deployment, the team members and the assigned CALL analyst are responsible for insuring that all lessons are categorized by BOS and compiled into an initial impressions product. A draft of the coordinating initial impressions report is produced by the CAAT, and it is staffed-out to all interested commands and agencies for comment. Normally, agencies receive an initial product within two to three weeks. Once the coordinating initial impressions report is sent out, the CAAT departs CALL, which officially ends their tasking. At this point the OPSO is responsible for finalizing the collection product. Any appropriate comments from the staffing process are added to the final product by the OPSO. Copies of the final impressions report are forwarded to the numerous Army Commands as a guide for future contingencies.

Simultaneously with this distribution, the product is placed in the CALL Database (CALL DB). The CALL DB is a 5-Petabyte storage site of both classified and unclassified data. It serves as the Army's electronic archives of all operations orders, situation reports, and key briefings on post-1973 Army contingency operations. It also contains CTC take home packages, all final exercise reports, all training lessons learned and user feedback on articles from previous CALL publications.[55] This automation tool

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[54] Interview with Lon Seglie, Senior Actual Operations Analyst-Lessons Learned Division, on 16 January 2001.

[55] Holder, L.D. and Edward Fitzgerald. "The Center for Army Lessons Learned: Winning in the Information Age", Military Review, July-August 1997, pg 55.

allows lessons that are stored to be accessed using various methods. CALL DB can be browsed using several methods: the Library of Congress subject coding system, attributes of the event (i.e. time, location, date, or operation), according to the task, conditions, and standards applied by the CAAT team, or a simple word search.[56]

After the final impressions report is completed, the CALL Director, in coordination with the Lessons Learned Division, determines whether other CALL products should be developed to further disseminate the information. CALL uses Push and Pull strategies to distribute its lessons. Push distribution is accomplished when information is sent from CALL out to its client base. This can be done through customized or mass market products. CALL also can use pull distribution which is keeping information in a central, accessible area for uses by its clients. Pull distribution is done through self-service from the CALL website and Internet access to the CALLDB.

The customized products are in the form of training vignettes, handbooks or exportable training packages. They are made in response to request from FORSCOM units to prepare for operating in a particular environment. Examples are the handbooks that were created for elements of the 10th MD before deploying to Haiti and the training scenarios that were developed for units in Europe to utilize at the CMTC preceding deployment to Bosnia or Kosovo. Mass-market products are in the form of the CALL newsletters, the bi-monthly *News From The Front* bulletin, Training Quarterly publication, CTC Quarterly bulletins, and special editions. These products are aimed at reaching the widest possible audience and are published on paper, CD-ROM, or sent via e-mail.

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[56] Henderson, pg. 111.

The last channel is self-service from the CALL web page. The goal of this service is to be a "one-stop shop where military users can find the information they need to improve training, prepare for a contingency operation, or gather research information."[57] All of CALL's latest publications are available on the web page. A user can go to the web site and download or read the current products. If the customer desires to gain access to back issues of products or the CALL DB, they can fill out a registration form on the web site and submit it electronically. Once the CALL Executive Officer reviews the application, verifies the customer and their need for access, a password and user identification is sent to the customer through the postal system. Once a customer has access to the CALL DB they can use software tools to access 2.5 million pages of data related by subgroups. While the user enters key search words or terms, the software using artificial intelligence graphically displays information by themes of related subgroups that allows the user to rapidly sort and retrieve whatever information is needed.[58]

Whatever the method of dissemination, push or pull, that is deemed to be appropriate, the most important function of this last phase of the Lesson Learned Process it to make sure that they have the widest possible impact on the total Army. Because budget constraints do not permit CALL to print all of its products down to the Company/Team Level, they authorize and encourage local reproduction to get access to the lowest levels of the organization. CALL also sees the website as a means to search and download tailored information, lessons, and TTP as needed.

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[57] CALL Handbook 97-13, pg. 21.

[58] Holder, pg. 56.

## E. SUMMARY

To meet the challenge of operating in an environment that has become increasingly complex and unstable, the Army has sought to become a learning organization. As a learning organization, the force could rapidly collect and transfer knowledge to make the necessary modifications in its TTPs to increase effectiveness. CALL performs several key functions to enable the Army to operate as a learning organization. These functions are outlined in AR 11-33, *Army Lessons Learned Program*. This manual establishes the CALL methodology for collecting and analyzing field data and distributing, integrating, and archiving lessons from combat operations and training events. The use of information technology has augmented the methodology by providing standardized planning, collecting, and analyzing tools and an alternative dissemination platform.

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# V. INFORMATION TECHNOLOGY AT CALL

"The power of the microprocessor [is] the fact that shared information can compress time and increase effectiveness, not by a little, but by a lot."[59]

## A. IT ARCHITECTURE

IT architecture can be defined as the underlying framework that determines and describes the IT resources required by an organization to meet its goals and achieve its vision. The fundamental components of any Information System architecture are its hardware, software, policies, and network.[60] When CALL decided to adopt information technology solutions to aid in overcoming the deficiencies that its old "paper and pencil" system had encountered, they sought to find a unifying framework for all aspects of the lessons learned process. This framework would have to support not only the collection teams in the field, the analyst and archivist at Fort Leavenworth, but also units located throughout the world. It was with this in mind that CALL sought to develop an Information Technology architecture to meet all of the diverse demands on its resources. This required identifying the functions that the IT infrastructure must support. CALL determined that the key functions were: for collection teams to be able to input data and electronically send this data to an analyst for processing, the capacity to store data for future retrieval, the capability to search data by various methods, and the ability of CALL's clients to gain access to the data via the Internet. These key functions have

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[59] Sullivan, pg. 16.

[60] Rex Buddenburg, "What's Wrong with DoD Information Architectures," http://web1.nps.navy.mil/~budden, March 2000, pg. 3.

served as design parameters for the development of the information system that CALL has put into place.

## B. CALL'S 3-TIER ARCHITECTURE

To support the key functions CALL identified as being paramount to successfully transferring its lessons learned process to a fully integrated IT process, it developed a 3-Tier Architecture: Client, Application-Web Server, and Data Server. (Figure 5)

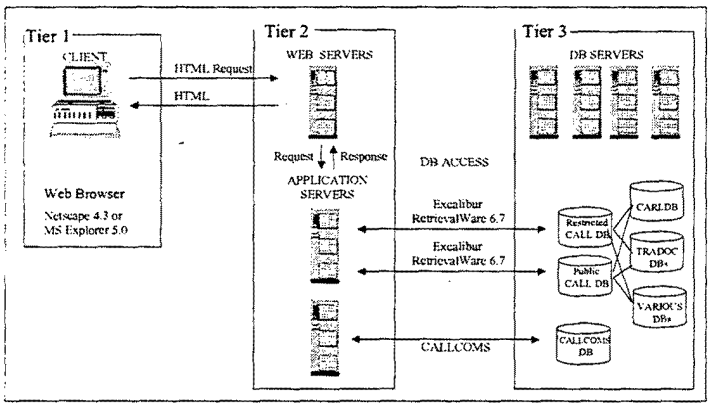



Figure 5. CALL's IT Architecture

The 3-Tier architecture was an attempt to overcome the limitations of older legacy systems. By separating presentation, processing, and data into distinct entities CALL's system permits the parallel development of future hardware, application, or database upgrades without requiring a complete overhaul of the existing system. This design not only decreases upgrade development time, but also has a significant cost savings since only one tier needs replacing at a time, not the entire system.[61]

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[61] Andrew Combs, "N-Tier Client Server Architectures," www.ilt.com/AEDIS/Ntier, pg. 2-3.

### 1. Tier One

Tier One of this architecture also is classified as the Client Tier. It is responsible for the presentation of the data, receiving user request in HTML, and controlling the user interface. The client can be any member of CALL, DoD government employees, or U.S. Military personnel who have been approved access to the CALL DB by the Operations Cell at Fort Leavenworth.[62]

To request access to the CALL DB, a client must complete the Access Request Form located on the CALL web site. This standardized request form is converted into an e-mail text message that is forwarded to the Operations Cell. The Operation Cell assesses the individual's need to use the database and determines whether to grant access to the FOUO or classified information database. Once approval is granted, the client is issued a USERID and password to gain access to the specified database.

If the client has been granted FOUO access, they can use a PC with an Internet connection and Web Browser to enter the database. Once connected to the CALL web page, clients can enter the assigned USERID and password to issue an HTML request to gain access to information within the CALL DB. When this request has been passed, they move into Tier Two of the architecture. If the client is attempting to access the classified database, they must gain access through computers that are attached to the SIPRNet. Members of CALL must gain access through the 4 PC linked to the SIPRNet located in the classified materiel room of CALL.

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[62] CALL Handbook 97-13, pg. 22.

Once the client's request returns from processing by Tier Two and Tier Three, it will be formatted as either a text or image file. For the client to view or read these files, they must have Adobe Acrobat and TIFF image viewer applications loaded onto their PCs. The CALL web site has both of these applications available for downloading by the client.

**2. Tier Two**

The second tier of the architecture is called the Application-Web Server Tier. This tier protects the data from direct access by the client. It uses middleware located on an application server to conduct interactions with the database translating client calls into database queries and then translating the data from the database into a formatted presentation for the client. This important function is performed by Excalibur's RetrievalWare 6.7 software application.

RetrievalWare 6.7 is a framework for information retrieval on an enterprise wide network. It combines two online search capabilities, adaptive pattern recognition and semantic network analysis, into a method for searching disparate databases for text, scanned images, video, and audio documents.[63] Adaptive pattern recognition is a search technique that analyzes and matches binary patterns to locate errors such as misspellings or bitmaps which otherwise would not be presented to the client. This fuzzy logic technique allows for an expanded search of documents that would be excluded because of user-input error or optical scanning character recognition errors. The Semantic Network Analysis searches for words in context by recognizing word meanings and relationships.

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[63] Geoffrey E. Brock, "Information Retrieval Tools for Knowledge Management," Patricia Seybold's Workgroup Computing Report, January 1998, pg. 4.

This allows the client to drill down into the database using very specific queries. Although RetrievalWare does not permit SQL searches, the quality of the results and document rankings are much higher based on the search techniques it does permit.

As soon as the client inputs his search parameters, RetrievalWare accesses the CALL DB searching from its various libraries. This is the transition point from Tier Two to Tier Three. When the search is complete it presents the client with a list of files that match the search parameters. The client can then select a file for viewing. RetrievalWare displays the information in a format that is supported by Adobe Acrobat or TIFF Image Viewer. This display of information is the transition from Tier Two back to Tier One and completes the client's service request.

The application server that supports RetrievalWare is run on one of the four ProLiant Compaq network servers administered by the ISD Branch. These servers have up to two processors operating at between 667 MHZ to 1 GHZ each, 125GB external disk arrays, and 90GB expandable storage capacity. Although the application server is physically located with servers that support the CALL DB, it is logically separated to allow for a three-tier architecture. Tape backups of the data contained in the CALL DB are located at the Fort Leavenworth DOIM and maintained by the Special Projects section of the ISD.

**3. Tier Three**

The last tier of the architecture is the Data-Server Tier. This tier is responsible for all data storage. CALL's data storage of all classified and unclassified TTPs, lessons learned, OPORDs, AARs, ROEs, and military relevant professional articles, is located in the CALL DB. The CALL DB is also linked to the Combat Arms Research Library

Database (CARL DB), TRADOC DB, and various other databases throughout the Army. The CALL DB is a relational database that currently has 5 Petabytes of storage and is expandable, as future storage needs increase. The database is run on the same supermini computers that support the application server and uses the Excalibur Electronic Filing System (EFS) as the Database Document Management System (DBMS).

EFS allows documents to be stored in accordance with international archival standards and displayed in a format following what the RD branch classifies as a "File Drawer." The "File Drawer" analogy is an attempt to structure the records in a method that is easily accessible and user friendly to members of the DoD. Since military records previously have been kept in large multi-drawer file cabinets, the RD Branch sought to use this common military storage arrangement within the CALL DB. When a user accesses the database, he is presented with a "Cabinet" that contains historical files from a particular storage library. Once a cabinet is selected, a list of "Drawers" is displayed. In each of these drawers are numerous "Folders" and each folder, in turn, contains numerous "documents".[64] Documents can be text, slide presentations, audio, video, or imagery files.

Another important aspect of the Data Storage Tier is the method in which the RD processes records for input into the CALL DB. Processing of records is done in two basic ways based on whether it is in paper or electronic format. Records received in a paper format are converted to digitized form using PowerScan or StageWorks scanning software.

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[64] Interview with Dr. Scott Lackey, RD Brief Chief, on 16 January 2001.

These software solutions allow for full page Optical Character Recognition while conducting batch oriented processing. This provides the RD branch with the capability to scan up to a thousand pages a day of older paper files into digitized text and images if required. RD Archivist organize and prepare the documents for input and then load them into the scanner. All documents are scanned as single page files although the software allows for multi-page scanning. Although this decision increases the amount of space required to store a document and increases the complexity of the File Management System, it is based on improving user access by decreasing the wait time to download a file via the Internet.[65] Once the scanning is complete, the digitized documents are then classified and uploaded into the appropriate CALL DB by the Special Projects section located at DOIM. Documents that are received in electronic format are classified and uploaded by the RD branch directly into to CALL DB.

## C. CALLCOMS SOFTWARE

Equally important to the current network architecture that CALL has established to assist in the storage and dissemination of lessons learned is the software application it developed to aid the collection process. As CALL sought a way to increase the efficiency of the collection process, they conducted an in-house development of a software tool that would support all of the requirements of the CAAT. This software, CALLCOMS, assists the CAAT in five key functions: Collection Plan Building, Issue Tracking, Observation Entry, Administration and Trend Analysis are the five modules of this CALLCOMS. Although it is currently not part of the three-tier architecture, CALL

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[65] Ibid.

expects to migrate this application to Tier Two and the CALLCOMS DB to Tier Three during the next fiscal year.[66]

During the Mission Analysis phase of the collection operations, the Collection Plan Building module is used by the CAAT to identify the parent issues and sub-issues for which the data will be collected. It also permits the CAAT to delineate responsibilities to the identified questions among the CAAT members. The Issue Tracking module allows the CAAT Team Chief to keep abreast of the status of each issue. It depicts where in the collection process that issue is and when events are scheduled that will likely initiate data for an issue. Once a CAAT begins active collection, the Observation Entry module entitles team members to enter data directly into the pre-formatted form. This data is then automatically entered into the CALLCOMS DB. The Administration module equips the CAAT with the ability to transmit files and data from his deployed location to the analyst located at CALL Headquarters.

Once an analyst approves an observation, it is added to the CALLCOMS DB. Currently, there are approximately 15,000-18,000 observations located in this database.[67] The Trend Analysis permits users to conduct searches of the database for past observations. Limitations to CALLCOMS are that it can only conduct pre-defined queries and does not support SQL-style queries that are typical of a system like Microsoft Access.

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[66] Interview conducted with James Walley, LLD Actual Operations Analyst, on 17 January 2001.

[67] Ibid.

## D. CALL GATEWAY WEBSITE AND LAN

The last key piece of technology that is designed to assist CALL in completing its mission is the CALL Gateway web site and internal CALL LAN. The CALL gateway is an Internet web site designed to assist CALL in the passive collection of lessons learned and as a mechanism for the dissemination of TTP and lessons learned to its customers. To goal of the Gateway is to be "a one-stop shop where military users can quickly find information to improve training, prepare for a contingency operation, or gather research information."[68] To meet this challenge, the ISD develops and maintains a homepage that has links to current CALL products, the CALL DB, Training Resources, U.S and International News agencies, and the Army homepage.

The CALL LAN is in place to increase office productivity and communication within the organization and with its customers. The network uses Novell Netware 4.11 Operating System to link its 125 PC's to each other and the Internet. The LAN allows members of the organization to tap into the CALL DB, CALLCOM DB, and share files with a download speed of 1.54 MBS via a T-1 Ethernet connection. To run these services, ISD has established a server farm of 30 servers of different makes and models. These servers run the Gateway as well as provide file storage and print services for the LAN, E-mail for members of CALL, and FTP services for deployed CAAT team members.

Although this robust IT infrastructure is currently in place, CALL, as part of the Defense Information Technology Testbed (DITT), is constantly looking for new

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[68] CALL Handbook 97-13, pg. 21.

technologies to assist in fulfilling its core mission of collecting, analyzing, archiving, and disseminating of lessons learned to the total Army. The goal of these future technology enhancements is to enable CALL to furnish tactical commanders with the right information at the right time in the right format.[69]

## E. SUMMARY

When CALL adopted an information technology solution to overcoming the deficiencies that its old "paper and pencil" system had encountered, they developed a 3-Tier Architecture to support all aspects of the lessons learned process. Users can now access and search CALL's vast data repositories via an Internet connection. By establishing Client, Application, and Data tiers, CALL has the ability to separate the presentation, processing, and database functions into distinct entities. This permits the parallel development of future hardware, application, or database upgrades without requiring a complete overhaul of the existing system. In addition to the architecture, the development of the CALLCOMS software application provides CAAT teams with a planning, collection, and analysis tool designed to improve their efficiency

[69] Holder, pg. 55.

# VI. ANALYSIS OF CALL'S ORGANIZATIONAL DESIGN

"The different parts of an organization can fit well together and function effectively, or fit poorly leading to problems."[70]

## A. GALBRAITH'S STAR MODEL

Understanding the dynamics of organizational design, either explicitly or tacitly, is essential for leaders to effectively organize the work of their individuals toward achieving the organization's stated goal or mission. Jay Galbraith identified the policy domains or subsystems of an organization's design that could be altered to bring about the desired state of effectiveness. These policy variables are Task, Structure, Information and Decision Process, People, and Reward Systems.[71] In addition to the five

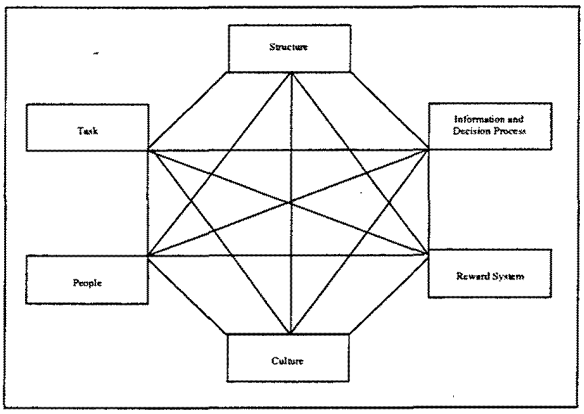



Figure 6. Galbraith's Modified Star Model

policy variables identified by Galbraith, a sixth domain of Culture should be added to the model. (Figure 6) Culture a powerful force of shaping the behavior of individuals and groups and can have profound impacts on all of the other domains.

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[70] Nadler, pg. 94.

[71] Jay R. Galbraith, *Organizational Design*, Addison Wesley Publishing Company, 1976, pg. 12.

For an organization to operate effectively, all of its branches, components, or subparts must be consistently structured and managed by its leadership. For management to improve existing task performance, policy and system variables can be changed to bring about the new desired state. However, because the variables are interdependent, a change in one variable can result in a change in any of the others for better or worse. Therefore, organizational design changes must be comprehensive in nature and will require coordination, compensation, or reinforcement of all the variables.[72]

## B. KEY ENVIRONMENTAL FACTORS

Every organization exists within the context of the other groups, organizations, governments and regulations that impact its ability to perform in its market.[73] This interaction of elements is considered the organizational environment. For CALL, two key environmental factors have had a profound impact in its ability to perform its primary mission within the Army.

First, since the end of the Gulf War, the number and spectrum of Operations Other Than War (OOTW) missions conducted by the Army has increased exponentially. This has resulted in a transformation of the focus of FORSCOM units to prepare for an OOTW mission, as opposed to conventional warfare as in the past. Because OOTW missions are different in scope and task composition then conventional warfare units have found that current Field Manuals do not adequately address the best methods to perform

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[72] Ibid. pg. 27.

[73] Nadler, pg. 95.

and train to be successful in this environment. The deficiencies of the Army publication and training system have been offset by CALL's ability to provide relevant and timely TTPs for training units before they deploy.

Secondly, The Department of the Army maintains strict budgetary control over the activities of CALL. The operational budget that CALL receives each fiscal year as part of the Combined Arms Center is approximately $67,000.[74] These funds are used to continually run the day to day operations at CALL headquarters, upgrade its IT architecture, and publish and disseminate its current line of products to clients. In order to initiate new collection operations or create a CAAT, CALL must first get the approval of DA. Once approval is granted, CALL can request that CAAT members be tasked from the various TRADOC Proponent Schools. Additional funds to support the collection operation will be appropriated to CALL for this mission. This strict control over what missions CALL can support, by use of its funding and tasking authority, gives DA the ability to dictate exactly what types of missions CALL should focus its collection and lessons learned process on.

## C. STRATEGY, TASKS, AND TECHNOLOGY

An organization's strategy is the set of concepts that relate its means to its ends. The strategy defines how an organization's task procedures and technology will be employed to produce the end product.[75] For CALL, the end product is defined as

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[74] Interview with Dr. Lon Seglie, AO Branch Senior Analyst, 16 January 2001.

[75] Ibid.

relevant lessons learned that are accessible for use by the total force. All of CALL's divisions, except the UAN, are focused on helping the organization reach its end product. As the Army has moved into a period of greater uncertainty, caused by the requirement to accomplish any of a diverse spectrum of missions, the speed at which validated TTPs and lessons are provided has become crucial. To achieve this end product, CALL has redesigned the means it must use to reach its desired endstate. The redesigned means is the automation of the key planning, collection, and dissemination tasks to decrease the time required to take an observation and transform it into a valid relevant lesson learned or TTP.

At the operating core level, the information system software CALLCOMS is designed to increase the efficiency of CAAT team members during the planning and collection tasks. The CALLCOMS Collection Plan Building module is used by the CAAT to identify the parent issues and sub-issues that the data are collected for. It also permits the CAAT to delineate responsibilities of collecting data for the identified questions among the CAAT members. This functionality prevents redundancy of effort, since no two CAAT members are assigned to collect data addressing the same parent issue. It also should prevent members from wasting valuable time collecting observation data for issues that are outside the scope of the CAAT mission.

For the middle line level, CALLCOMS Issue Tracking module allows the CAAT Team Chief to keep abreast of the status of each issue. It depicts where in the collection process that issue is and when events are scheduled that will initiate data for an issue. This information allows the CAAT Team Chief to ensure that no issue goes unobserved or to surge resources to more rapidly gather observation data for critical issues. Once

observations are ready to be sent to the CALL analyst at Fort Leavenworth, the use of FTP or E-mail provides an Information Technology framework that permits the seamless transfer of information between the operating core and the strategic apex.

For the last task, dissemination, CALL has sought to leverage the use of an Internet Portal as a mechanism for providing TTPs and lessons learned to its customers. The Internet Portal is intended to increase the efficiency and effectiveness of the distribution process in several key ways.

First, it permits interested users 24-hour access to the latest CALL products in electronic form from any PC with an Internet connection. This should not only decrease the dissemination time, because the information does not have to be sent through the U.S. Postal system, but also increases the number of recipients of the information. The dissemination of CALL products is no longer limited to Brigade and larger size organizations, but now any interested soldier can gain access. Secondly, the CALL DB containing products, TTPs, and lessons learned are also available to users with approved access via a Web Browser. This functionality, to access the CALL DB through the Internet, reduces the amount of time it takes for an interested user to search for specific information contained in CALL's vast repositories. Instead of requesting information for CALL, via the telephone as in the past, and waiting for an analyst to search, package, and send the information to the user, they now can search the DB themselves using the RetrievalWare software.

As with any IT solution, if the fundamental process is good prior to implementing the IT then productivity and efficiency should result. However, if the process is flawed,

IT will not solve the problem, but rather further exacerbate it. CALL's strategy to improve the collection process tasks by incorporating the use of Information Technology has seen remarkable results. It was able to take a paperwork intensive task and simplify and speed up the procedure. With the use of CALLCOMS, the mechanism to transform an observation into a lesson learned has been reduced from a mean time of 4.21 days to 2.64 days. [76]

| | Collection Process w/ IT | Collection Process w/o IT |
|---|---|---|
| MeanTime (Days) | 2.64 | 4.21 |
| Standard Deviation (Days) | 1.35 | 1.77 |

Table 1. Extend Collection Process Model Data

This reduction of 1.57 days reflects an increase in efficiency of 38% over the previous process. This increased productiveness enables CALL to quickly pass knowledge from deployed troops and embed them in the training program for follow-on troops. This permits units to use others' lessons to change their behavior prior to entering an environment where the mistake could be fatal. The importance of this was evident during Operation Restore Hope when lessons from the 10th Mountain Division were used to create training scenarios for the 25th Infantry Division's rotation to JRTC. The ability to practice likely situations and test TTPs proved invaluable and gave the soldiers the "feeling that I have already been there before."[77]

[76] See Appendix A for an explanation of the Extend Model used to determine the collection process time.

[77] Baird, pg. 387.

CALL's use of the Internet Portal to assist in the dissemination of products and provide access to its information repositories also has shown an increase in efficiency of that task. It has reduced the mean time to search for information from CALL's data repositories from 6.54 days to .902 days.[78]

| | Document Access w/ IT | Document Access w/o IT |
|---|---|---|
| Mean Time (Days) | .902 | 6.54 |
| Standard Deviation (Days) | 2.03 | 1.49 |

Table 2. Extend User Access Model Data

This 86% reduction in time can be directly linked to replacing human procedure with an automated one consisting of a database containing Internet connectivity. This reduction, however, can be misleading because it is based on all users already having assigned userids. If the requester does not currently have an assigned userid and password from CALL, then the actual time savings is minimal at best. This is due to the primitive process for setting up an account to gain access to the CALL DB, which involves sending your userid and password through the U.S. Mail. Very few members of the Army are presently experiencing the actual benefit of this IT solution, because only 3000 accounts are currently established.

Information Technology's ability to provide solutions to key tasks within CALL is important. CALL's divisions use IT to facilitate the achievement of the organization's mission. It increases the efficiency of the collection and dissemination process and has a profound impact on the Structure and People variables of the Star Model.

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[78] See Appendix A for an explanation of the Extend Model used to determine the data access process time.

## D. STRUCTURE

The organizational structure of CALL can best be described, using the Mintzberg Framework for Organizational Form, as a Machine Bureaucracy.[79] Machine Bureaucracies generally have highly routine operating tasks, very formalized rules and procedures, and a distinct chain of command. Although military organizations traditionally have been seen as a prototypical machine bureaucracies, CALL has some important modifications to these traditional attributes. (Table 3)

| Attribute | Machine Bureaucracy | CALL |
|---|---|---|
| Coordination Mechanism | Standardized Work | Standardized Work |
| Key Part of Organization | Technostructure | Technostructure |
| Specialization of Jobs | Horizontal/Vertical | Horizontal/Vertical |
| Training | Little | Much |
| Indoctrination | Low | High |
| Departmentalization | Functional | Product |
| Unit Size | Wide bottom, Narrow Top | Wide bottom, Narrow Top |
| Control | High Level | Low Level |
| Liaison Devices | Few | Few |
| Decentralization | Limited | Horizontal Decentralization |
| Tech Systems | Routine | Routine |
| Environment | Simple and Stable | Complex and Changing |
| Power Resides | Technocratic | Technocratic |

Table 3. CALL's Organizational Form

One of the key aspects of CALL's structure is the coordinating mechanism used throughout the organization. Coordinating Mechanisms are the methods used to synchronize activities within an organization.[80] For CALL, the Lessons Learned Process is used to transfer knowledge and as coordinating mechanism within the Army. The "checklist" of Standard Operating Procedures outlined in AR 11-33 and the collection software CALLCOMS are used to enforce the rules and procedures of the collection

[79] Greenberg, Pg. 297.

[80] Richard Burton and Borge Obel, *Strategic Organizational Diagnosis and Design*, Kluwer Academic Publishers, 1998, pg. 4.

process. For CALL, standardization of work is important because the operating core composition is different for each CAAT. By maintaining a rigid collection framework and standardized observation format, CALL can achieve symmetry between the collection efforts of various CAATs. Because the standardization of work is paramount for its success, the actual power within CALL resides in what Mintzberg calls the "Technostructure". For CALL, the Technostructure consists of the Military and Civilian Analysts who developed the checklist style SOP that CAAT teams are required to follow.

Some of the significant attributes in which CALL departs from the traditional Machine Bureaucracy structure are Training, Control, and Departmentalization. Training is important to CALL because to be successful in its mission it must provide a vast amount of training to the OPSO/OPSNCO as well as the CAAT team members. Unlike most traditional organizations, CALL's operating core is drawn from other organizations within its environment (TRADOC proponent schools). Because the operating core is untrained prior to each collection effort, it is paramount that they receive adequate training in order for them to provide any relevant data to the organization.

CALL ensures that CAAT is trained to conduct its collection effort in two ways. First, they provide a seven day course on the Lessons Learned Process for each team prior to their deployment. This training teaches them the CALL Methodology and how to interact with the observed unit, writing skills, and collection planning. Secondly, an OPSO/OPSNCO from CALL is assigned to assist each CAAT while deployed. OPSO/OPSNCO are military officers and senior non-commissioned officers who have received detailed training on the collection methodology by members of the technostructure.

Control is another attribute in which CALL's structure is different from that of a traditional Machine Bureaucracy. Typically, in a Machine Bureaucracy, decision-making authority is centralized. Because the environment is stable, the chain of command dictates exactly what's expected to employees and anything other than that must receive special permission.[81] In contrast, the environment CAAT members operate in is complex and changing. Because CAAT members are widely dispersed and may have only infrequent e-mail contact with the team chief, they are given wide latitude on their collection efforts. Although they have specific assigned collection requirements, which can be tasked in person or transmitted via an Internet connection, they also have the flexibility to capture observations outside the scope of their responsibility if the situation arises. This loose control allows for the rapid collection of "target of opportunity" type observations, without having to wait for approval from high echelons which may result in missing the collection opportunity altogether.

The last attribute that is a significant departure from a traditional Machine Bureaucracy structure is departmentalization. Departmentalization is the general principle for dividing work and coordinating activities. It is generally revealed by an organizational chart.[82] CALL can be classified as departmentalized by Divisional or Product. An organization with a divisional structure aims to minimize the interdependencies between its units, especially when the Information Technology in use

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[81] Greenberg, pg. 297.

[82] Burton, pg. 43.

is a database.[83] It is common for organizations that are customer or product oriented to adopt this configuration.[84] The reasons for this classification are two-fold. First, CALL is separated into four major divisions: Lessons Learned, Information Systems, Research, and University After Next. Each division maintains a certain independence in developing, testing, processing, and distributing materials in their respective area. This type of departmentalization creates self contained divisions, each of which are responsible for everything to do with a product.[85] Lastly, the only interdependencies among CALL's four branches are linked to the development and implementation of the CALL DB, which serves as a repository of lessons learned and all the organization's work products.

CALL's coupling of traditional attributes of a Machine Bureaucracy, with a substantial training program, product configuration, and low level of control have created an organization that maintains high efficiency while overcoming the dehumanizing and boring nature of standardized tasks. Information Technology has permitted CALL to standardize work within the operating core using CALLCOMS and to adopt a product configuration.

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[83] Ibid, pg. 54.

[84] Ibid, pg. 55.

[85] Greenberg, pg. 287.

## E. PEOPLE

The People component deals with changes to the skills, training, and development required of individuals that are part of the workforce. As with most organizations that have such a wide range of missions and responsibilities, CALL requires a myriad of individual skill sets.

CALLs military personnel must have substantial tactical experience in both command and staff positions and a strong knowledge of current doctrine. The Lessons Learned Division's civilian analysts require not only an understanding of current doctrine and its historical context, but also strong analytical and writing skills. Members of the UAN Division must possess strong theoretical and analytical skills that will allow them to envision the emerging knowledge needs of the future force and design systems to meet those needs. The Research Division's archivists, historians, record managers, librarians, and security specialist all require an in-depth understanding of record management and storage processes.

With the introduction of Information Technology into CALL's architecture, the existing skill set was expanded to meet the challenges that these systems introduce. All members of the organization require basic computing skills. Members of the LLD are now required to learn to use the CALLCOMS software and basic TCP/IP skills to successfully accomplish their work. The biggest change in required skills occurs in the ISD and RD Branches. Because of the implementation of IT solutions to the collection process, the RD branch converts from standard file management system to one that is completely reliant on computer hardware and software. Since the ISD is responsible for

maintaining the integrity of the data in CALL DB and the conversion of paper documents to electronic form, it has had to hire eleven people that have strong technical backgrounds and show a lot of computer savvy.[86] These are different people than were required in the past.

The ISD branch was expanded to not only provide local technical support to the various divisions within CALL, but to maintain the IT architecture itself. This expanded responsibility included the installation and monitoring of the LAN, Internet Portal, Server Farm, and in house development of application software. As a result, ISD workers now require extensive knowledge about TCP/IP, Website management, PC repairs, software engineering, and coding.

Initially, CALL's automation was seen as a method to remove vertical layers of the organization hierarchy. Computer Information Systems, Databases, and E-mail increase the average user's information capacity and eliminate the need for a large middle management.[87] Within CALL, the LLD was able to reduce the number of analysts from a high of 40, after Operation Desert Storm, to the 10-12 currently used. Even with the reduction of manning, the use of IT systems has diminished overall time to transform observations into lessons or TTPs. A by-product of the incorporation of IT, however, has been a significant increase in the number of personnel required to support the current architecture. In recent years, the LLD branch has seen a reduction in the number of analysts, while the ISD and RD Branches personnel requirements have increased by 25%.

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[86] Interview with Dr. Scott Lackey, Chief ISD Branch, 16 January 2001.

[87] Burton, pg. 214.

The skill level and capacity of the People variable helps define the tasks and processes that an organization can adopt and the structure that will best facilitate an increase in efficiency.[88] Even so, an organization's Reward System direct impacts its ability to attract and retain qualified personnel.

## F. REWARD SYSTEM

Closely tied to the People component is the organization's Reward System. This component includes organizational incentives to motivate and inspire the operating core to achieve its tasks. Rewards generally are classified as intrinsic (psychological rewards from membership) or extrinsic (rewards received from others).[89] In the Army, a number of rather intangible concepts such as duty, honor, selfless service, esprit de corps, reputation, and inclusion in the tradition of the institution are important factors in the force's intrinsic non-task reward system. These values are important to motivating the civilian and military analysts who are responsible for the collection and dissemination portion of CALL missions.

In addition to the values that serve as the foundation of the Army, CALL has an additional factor that helps it to motivate its members. This important factor is task significance. Task significance is the impact the work is believed to have on others.[90] Because soldiers' lives may be at stake, members of CALL know the importance of not

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[88] Ibid. pg. 212.

[89] Kenneth Thomas and Erik Jansen, "Intrinsic Motivation In The Military," Eight Quadrennial Review of Military Compensation, September 1996, pg. 6.

[90] Greenberg, pg. 71.

only doing a thorough job, but also ensuring it is completed in a timely manner. Failure to do so could result in the loss of lives, while success can assist units in achieving their mission. Task significance leads to members of CALL experiencing a sense of meaningfulness in their work, internal work motivation, and a high level of job satisfaction.

However, these intangible factors only can be expected to do so much to improve efficiency within CALL. CALL must build a valuable extrinsic reward package on top of these core values to help sustain its work force. Because of the diverse interests of the members of CALL, the Branch chiefs tailor a reward package to meet their work forces particular needs. In most cases this package includes a very limited combination of education, promotion, monetary, and family incentives.

The first incentive is to increase the educational opportunities within the organization. As with any organization that has a high reliance on Information Technology to conduct its mission, CALL uses technology training and certification as a reward for superior job performance. This allows the individual to gain additional proficiency sets, which can then be used to achieve skill variety within their respective division. Skill variety adds to the meaningfulness of the work experience and generally increases job satisfaction. Increasing the workers IT skills, however, can have unintended results. As CALL has increased the training and certification opportunities of its members, it has raised individuals' marketability to outside organizations and resulted in a significant turnover in the ISD and RD Branches.

The financial incentives that CALL can implement are limited within the framework of existing Federal statues. Managers have the ability to grant their civilian

employees with step increases as a bonus for superior job performance. Military members are not authorized to pay bonuses for performance. Because of the lack of availability of financial incentives, CALL finds it difficult to compete with civilian organizations to retain some of its critical technological skill workers. Another incentive is to reward superior job performance with time off. This generally is very effective with the military members of the organization. Increasing the amount of time that a service member is home with their family reduces the traditional strains found in many military families. Thus promotion becomes the primary means of unnecessary compensation.

Promotion is another traditional incentive that has limited application within CALL. Because a significant amount of the organization are active duty military members, they are subject to centralized promotion boards. Although their performance while assigned to CALL is evaluated on an OER or NCOER, it does little to influence their actual promotion. This is due to the nature of centralized promotion boards putting increased weight on job performance in key leadership positions such as command and primary staff. Since the positions at CALL do not fall into this category, they are generally weighted less when the board convenes. However, the civilian members of CALL can be selected for promotion within the organization based on job performance.

The current Reward System used by CALL has some significant deficiencies. It currently is structured to rely heavily on the intrinsic motivating factors and not the extrinsic rewards. As CALL continues to exploit cutting edge technological solutions to solve its collection and dissemination missions, CALL struggles to maintain its technical support personnel. The more training and educational opportunities it provides the higher the likelihood workers with these new skill sets will seek a civilian job opportunity with

greater pay. Without comparable promotion and financial incentives, CALL will not be able to compete with the civilian workforce and face qualified personnel shortages.

## G. CULTURE

A key to the success or failure of any organization to attain productivity is the influence that culture has on its operation. Culture comprises the "values, norms, and expectations shared by the organization's members."[91] The culture provides members with a sense of identity, enhances commitment to the organization's mission, and reinforces standards of behavior.[92] At the root of the organization's culture is a set of core characteristics that are valued by its members. For the Army, a core characteristic that has emerged is an openness of communication.

The openness of communication comes from the fact that "good ideas have a high currency when lives are at stake."[93] Leaders and the led conduct an open dialogue to reflect on why actions occur and finding appropriate solutions. The idea is that "information is not a source of power but an objective commodity that belongs to the organization, not to individuals."[94] This leads to the rewarding of individuals who share information, as being team players, not necessarily those who come up with the idea. It

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[91] Charles O'Reilly, "Managing Organizational Culture", California Management Review, 1989, pg. 289.

[92] Greenberg, pg. 258.

[93] Henderson, pg. 106.

[94] Ibid.

is this openness that provides input to the lessons learned process and allows CALL to successfully conduct its mission.

To support the Army's culture, CALL sees itself as the fundamental mechanism for sharing information across its parent organization. Its focus on "what units are doing, not who is doing it"[95] also supports the values of teamwork and not seeking personal credit for ideas. By establishing a method that supports the unanimity of sources for lessons, CALL is reinforcing the idea that members of the Army can be creative in their use of TTPs. Leaders are allowed to be innovative and take reasonable risks. If they are successful, their new methods are spread through the entire force; if they fail, they are free to learn from their mistakes without reprisal.

Another important function of CALL's culture is its ability to stress the importance of the organization's mission to members of the CAAT team that are temporarily assigned to the organization. During their methodology training, members of the LLD Branch reinforce the idea that sharing of information in critical by reminding the CAAT members "everything boils down to making sure the soldier in harms way has the knowledge needed to prevail and survive."[96] By transmitting information through stories about how CALL products have successfully impacted units in the past, it is able to introduce its core value to these members.

Within CALL, as most large diverse organizations, multiple subcultures exist. Two distinct subcultures have emerged along functional lines. One supports the core

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[95] Interview with DR. Lon Seglie, AO Branch Senior Analyst, 16 January 2001.

[96] Ibid.

characteristic of the Army to promote openness of communication through the sharing of information; the other values the promotion of innovation. Although both subcultures accept the role of CALL, conflict exists when the organization's budget is allocated.[97]

The first subgroup is composed of the elements that were part of CALL when it was founded in 1985. It includes elements of the LLD, ISD, and RD. This group feels that the most important core value of the organization is the facilitation of sharing information within the Army. They have accepted the use of Information Technology as a means to achieving this value, but feel that the core function of CALL should remain providing support to soldier. If funds are to be allocated, this group feels that they should be used to support the production of more frequent products, assist collection operations, or on the IT architecture to augment the support to the user.[98]

The other subculture is composed of former pieces of the Army Knowledge Network. It includes the elements of UAN and RD. This group feels the most important core value is the promotion of innovation. This group sees IT as a method for providing enterprise-wide knowledge and learning management for the Army After Next. They value the innovation above everything else. If funds are to be allocated, this subculture feels it should be used to find solutions to tomorrow's challenges even if they diminish CALL effectiveness today. They are exploring cutting edge technology solutions for knowledge tools, knowledge applications, and learning applications.

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[97] Interview with Ken Vanderpool, Chief ISD Branch, 17 January 2001.

[98] Ibid.

CALL's use of IT has created two distinct subcultures within the organization. One sees the technology as a method to support the Task policy variable. The other sees CALL's primary role as serving as testbed for future innovations for the force. The close relationship between the Culture and People policy variables is evident by which individuals support each subculture. Those individuals who use IT to assist them complete their work, such as analysts, OPSO/OPNCOS, and historians feel it is a means to an end. The members of the organization with strong technical backgrounds and responsible for maintaining the IT architecture, want to see it continue to maintain a cutting edge level.

## H. INFORMATION AND DECISION PROCESSES

This component of the model includes the organization's decision mechanisms, the information the organization requires, and controls to make sure information is disseminated to its client base. As with most organizations that adopt IT solutions, CALL believed it could exploit the information processing power of the computer to improve service to its customers.[99] IT provides CALL with a method for decision-making, formalized data, and data transmission.[100]

CALL's mechanism for decision making is contained within the various modules of the CALLCOMS software. During the Mission Analysis phase of the collection operations, the Collection Plan Building module is used by the CAAT to identify the parent issues and sub-issues for which the data will be collected. This serves as the

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[99] Galbraith, pg. 25.

[100] Ibid. pg. 27.

blueprint for the entire collection operation. As issues are identified, the CAAT Team Chief can assign collection assets (team members) to each area to ensure comprehensive coverage of the problem areas.

Once the Collection Phase of the operation begins, the CALLCOMS Issue Tracking module allows the CAAT Team Chief to keep abreast of the collection effort. It depicts the current collection status of each issue, when the next event is scheduled that will likely initiate data, and what resources have been allocated to the issue. This provides the decision-maker with a greater understanding of the problem and real-time information to permit the surging of resources to an issue, if necessary.

Finally, during the Analysis Phase of the operation, the CALLCOMS Trend Analysis module allows CALL to use mathematical models to identify existing trends in the observation data that it receives from the CAAT. This data can be used to modify the CAAT's current collection plan. Modification may result in additional resources or time being given to an issue that has shown to be a troublesome trend during analysis or needs further development. The Trend Analysis also can identify issues that may need coverage in a topical CALL newsletter or other publication. This supports the rapid transmittal of information to the force to correct a deficiency or problem area.

IT supports the formalization of data by creating categories and storage schemes.[101] CALL uses two methods to formalize data. The first is the use of a standardized observation collection form. As part of the active collection process, the form is part of the CALLCOMS software and is used by CAAT members to annotate the

[101] Ibid, pg. 25.

task, condition, and information of each observation. For passive collection, a shell form is located on the CALL Web Site and allows users to enter the required information, which is then transmitted, to an analyst for review. Presently, CALL's active collection process has provided a valuable means to formalize data, however since the passive input method has not experienced high user volume it has cause the adaptation of Active-Passive collection.

The second method of formalization is found in storage of data. Whether the observation is active or passive, once it has been entered into the CALLCOMS DB it is categorized for storage by the relevant BOS that it supports. Users can then search CALLCOMS by BOS to identify various observations. The Trend Analysis module's models scour the stored data for recurring trends also use the BOS tags. This allows the formalized data to be fed back into the decision process.[102]

The CALL DB contains operations orders, situation reports, CTC take home packages, all final exercise reports, all training lessons learned and user feedback on articles from previous CALL publications. These documents are tagged using several methods: the Library of Congress subject coding system, attributes of the event (i.e. time, location, date, or operation), according to the task, conditions, and standards applied by the CAAT team, or a simple word search. The RetrievalWare software that CALL utilizes to support user access into the DB supports searching for documents using any of the tagging methods or a simple word search.

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[102] Ibid.

The last important aspect of this component is the methods that data are transmitted to the organization clients. For CALL, it has sought to augment, and later replace, its paper product mailing with an Internet web page that provides access to all of its products and services. CALL sees the use of the web page and IT as "the way to do a better job getting our products to the Army."[103] For CALL to be an effective organization, it must be able to facilitate the transfer of knowledge among its clients and change its behavior when required. Providing a valued service that is widely used by the Army can only do this.

Although 75% of the respondents believe that information and products from CALL were of great value to the Army, most felt that the products were underutilized.[104] This is due to two prevalent problems. The first is that the current paper products are in limited distribution down to the Brigade level. This leaves most of the individuals who derive the greatest benefit from the TTPs that CALL produces without direct access to the paper copies. CALL has identified this as a large problem and has hoped the Internet would provide it with an easy solution. As a fix to this dissemination problem, the CALL Web Page provides access to all of it products and controlled access to its databases. This has not occurred due to a lack of access to computer systems, a lack of knowledge in the userbase about this service, and the bureaucratic method used to gain access to the databases.

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[103] Interview with Dr. Lon Seglie, AO Senior Analyst, 17 January 2001.

[104] See Appendix B for information on survey questions, scope, and methodology.

Currently most soldiers in the Army do not have direct access to computer systems or Internet connection in there work place. In most units, automation tools and e-mail accounts are limited to commanders and primary staff officers. This prevents the average soldier or leader from logging on to CALL's webpage while on duty to download current CALL products. If they do have access to a computer at home, they must also use a much slower connection to download or search for data than would be available from a T-1 LAN connection at the workplace.

Another problem is CALL's new dissemination process. It faces a lack of user knowledge about its existence. 41.9% of company grade officers who had just come from serving in key leadership positions as company commanders or platoon leaders did not even know that CALL had a website or provided its products via the Internet. Of those who knew about the web site, only 33% even used the service.[105] If CALL wants to use the Internet as its primary dissemination method, it needs to increase users' awareness of its existence. As one respondent claimed "CALL is a misnomer, it should be called Center for Lessons Storage, because information does not make it to the actual user."

The last issue is access to CALL databases. Because of the sensitivity of some of the information it possesses, CALL maintains tight control over access to its data. However, the bureaucratic process for setting up an account to gain access to the CALL DB, which involves sending a userid and password through the U.S. Mail, takes too long to be of any service. Only 3000 registered users currently have access to the

[105] See Appendix B for survey results.

CALLDB.[106] If a soldier tries to use CALL to find a quick answer to a training issue or a TTP and has to wait days for a response, they are not likely use the resource again in the future. To be a more effective resource and provide a mechanism to change behavior and impact training, access must be more widely disseminated.

## I. SUMMARY

Understanding the dynamics of CALL's design is essential to analyze the efficiency of its process and how effectively it achieves the organization's stated goal or mission. By looking at the organization through the six policy variables, one can see that many aspects of the organization are in congruence. The incorporation of IT has had an impact on all of the variables, however the Structure, Information and Decision Process, and Tasks variables need to be modified if CALL is to increase its process efficiency. One must remember, though, because the variables are interdependent, that a change in one variable can result in a change in any of the others for better or worse.

[106] January 2001 CALL DB Usage Statistics.

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# VII. CONCLUSIONS AND RECOMMENDATIONS

## A. CONCLUSIONS

During the early 1990's an information technology architecture was introduced at CALL as means to improve the existing lessons learned process. Up until this time CALL had produced "little of enduring value because data overwhelmed our pencil-and-paper system."[107] The goal of senior Army leadership was to use the capabilities of the technology to increase the efficiency of both the collection and dissemination of lessons throughout the Army. CALL's improved rapid process would result in a significant increase to the effectiveness of all combat units.[108] After six years, the information technology architecture and organizational design that CALL established has mixed results. Although it has shown a significant increase in its collection process efficiency, the dissemination of information has not provided either the efficiency or effectiveness that initially was sought.

The incorporation of information technology on the collection process has increased efficiency because of a congruence between the policy variables of the Star Model, especially the Task, Structure, Information and Decision Processes variables. The key technologies that have helped achieve this congruence is the CALLCOMS software application and the FTP functionality of the Internet. CALLCOMS has provided the planning tools to assist the CAAT develop and manage its collection effort

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[107] Sullivan, pg. 208.

[108] Ibid. pg. 204.

(Task Variable). It supports the standardization of the collection process tasks so that the quality of data remains relatively consistent between CAATs (Structure Variable). It also provides a means to formalize the data so that it can be categorized and stored for later use by CALL analysts or clients (Information and Decision Process Variable) . The use of FTP protocol facilitates the need to accomplish more with fewer personnel because it allows a flattening of the organizational hierarchy through a internetted information process (Structure and People Variables).

This congruence of variables has resulted in the reduction in time required to produce new and validated lessons to the force. In Somalia, CALL had an average 4-5 days turn around from observation to validated lesson;[109] this was reduced to 2-3 day during Operations in Bosnia and Kosovo.[110] This analytical data is supported by the empirical data gather from the Extend models that found the reduction in time to be from 4.21 to 2.64, or a 38% improvement in efficiency of the collection process.

While the effect of information technology on the dissemination process has not produced the intended improvements its has had significant positive impact. CALL's dissemination process seems to be better suited to aid units that are preparing for large scale deployments. This is because they follow a product "push" dissemination strategy. This strategy identifies lessons or knowledge that would be useful to the force and sends it directly to the force. During preparations for operations in Haiti, CALL tapped into its existing database and developed tailored soldier handbooks to cover customs, TTPs, and

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[109] Henderson, pg. 105

[110] Interview with CPT Leo Nascimento, 16 January 2001.

small unit procedures for conducting peacekeeping missions. These products were "pushed" to member of the 10th Mountain Division before they deployed as part of the train-up. They also were able to use the efficiency of the collection process to develop "push" scenario packages for units to rehearse operational tasks while at the CTCs before they deployed.[111] The success of these type "push" products is evident in the 25th Infantry Division's experience in Haiti where they faced 23 of 26 JRTC scenarios that CALL developed for their pre-deployment train-up.[112]

The incongruence of the dissemination process is due to a disconnect between the Task, Structure, and Information Variables associated with the "pull" distribution strategy. This incongruence has created a dissemination process that is not efficient and reduces the overall effectiveness of the organization. The intent of the CALL Webpage is to allow users to gain quick access to information when they need something (Task Variable) .[113] However, the existing bureaucratic process for setting up an account to gain access to the CALL DB, which involves sending a userid and password through the U.S. Mail, takes too long to be of any service (Task Variable). If a soldier tries to use CALL to find a quick answer to a training issue or a TTP and has to wait days for a response, they will not likely use the resource again in the future. Using empirical data from the Extend model, if a user does not already possess access to the CALLDB then it takes 22% longer to get information then simply contacting CALL via the telephone and

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[111] Henderson, pg. 105.

[112] Baird, pg. 387.

[113] Sullivan, pg. 209.

asking an analyst to find the information for them. Since, the incorporation of information technology has flattened the organizational hierarchy, few analysts are available to provide this service (Structure Variable).

The intended "pull" of information has not occurred on a wide scale due to a lack of access to computer systems, a lack of knowledge in the user-base about this service, and the bureaucratic method used to gain access to the databases (Information Variable). Because the degree to which CALL achieves it goals depends on the quality of the work it publishes and its usefulness, if its customer-base does not know of its services or use it products, then it is not effective.[114] My study found that 41.9% of company grade officers who had just come from serving in key leadership positions as company commanders or platoon leaders did not even know that CALL had a website or provided its products via the Internet. Of those who knew about the web site, only 33% used the service.[115] One respondent to the survey stated, "CALL produces good observations, but they are not widely used because they are not widely disseminated."[116] In fact the top organizations outside of CALL and DOIM to access the CALLDB are CAS3, DoD Contractors, CGSC, and Fort McClellan.[117] This indicates that most of the requests came from members of the service not currently in key leadership positions but are currently obtaining military education. To be a more effective resource and provide a

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[114] Henderson, pg. 112.

[115] See Appendix B for survey results.

[116] CALL User Survey Conducted on 1-5 Feb 01 at Fort Knox, Kentucky.

[117] January 2001 CALL DB Usage Statistics.

mechanism to change behavior and impact training, access must be more widely disseminated to members of FORSCOM.

## B. RECOMMENDATIONS

Although CALL has shown a significant increase in its collection process efficiency, the dissemination of information has not provided the efficiency or effectiveness that was initially sought. The following changes to the existing process would improve CALL's performance in these key areas:

- Increase user-base knowledge by going to TRADOC proponent schools and informing soldiers of CALL's products and services.
- Use push distribution strategy of products down to company/platoon level e-mail accounts.
- Assign userids and passwords to all key leader positions down to platoon leader and require unit S-3 to manage passwords. S-3 shops can contact CALL to update passwords as new platoon leaders assume the position.

The first change will increase potential clients' knowledge of the services that CALL can provide. By going to the TRADOC schools and conducting a one to two hour briefing as part of the Officer Basic, Officer Advance, and CAS3 courses, they will teach young officers about CALL and its services and reinforce the importance of information sharing. Officers exposed to this information early in their careers, will be more likely to realize the benefit of CALL and seek out their products or assistance. This should greatly improve the number of users and increase CALL's impact as the Army's learning mechanism.

As more Army units become linked via post LANs or use of the Internet, CALL can exploit this medium to further increase it reach. They can use the no-cost electronic

distribution of its products via E-mail to extend its dispersion from Brigade to company/platoon level. This will put CALL products in the hands of key leaders all the way down to the lowest levels of the organization. This type of deep penetration into the organization hierarchy will provide another substantial positive impact on CALL effectiveness to create shared learning across the organization. The challenge in this "push" distribution is to get and update E-mail addresses of all potential clients. This can be done by maintaining close contact with the MACOM Chief Information Officers or through a standardization of unit E-mail addresses that are linked to position not individual names.

The last recommendation is to assign userids and passwords to all key leader positions down to and including platoon leader positions. This will allow any officer serving in a leadership position to gain access to the restricted CALL database. Soldiers then will be able, through their first line leader, to get information, TTPs, and documents to assist training without incurring a substantial time lag. This will reinforce the use of CALL, its TTPs and lessons because of its responsiveness as an asset that is widely available. The difficulty in this method of creating widespread access to the CALL DB is in maintaining control of the userids and passwords. This function can be done at the Battalion level, by the S-3 Training Office. The S-3 can request the necessary userids and passwords and assign them to their current leaders. Once a leader transfers out of that position, the S-3 will contact CALL and request that a new password be issued for that position account. Again the key is not to link the userid to a person, but rather a position. Centralizing the management of the accounts at the Battalion Operations and Training Office level, ensures that the individual responsible for the overall training plan

of the organization also is responsible for providing and encouraging access to CALL's products and services.

The impact of these changes within the Army would be significant. Not only would CALL show an increase in the efficiency of its dissemination of information, but, more importantly, it would provide a deeper penetration into organizations' client-base. This penetration would improve CALL's effectiveness because its products would be better known, easily accessed, and widely used.

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# APPENDIX A. SIMULATION MODELS OF CALL'S COLLECTION PROCESS AND USER ACCESS TO THE CALL DB

## A. EXTEND SIMULATION SOFTWARE

The purpose of using the Extend model software is to develop a logical description of how a system performs a real world activity. This model can be used for carrying out experiments on the system over time to determine inefficiencies of design and identify chokepoints or problem areas before actual implementation.[118]

The Extend software creates a representation of the key tasks that CALL must perform in order to accomplish their mission. These results serve as a way to measure the impact that the incorporation of IT has had on the collection process and the ability of CALL's customers to rapidly gain access to the products and lessons that the organization produces and manages.

To determine the impact that IT has had on the efficiency of the process, four models were developed to replicate the previous and current CALL process for collecting and analyzing observations and user access to information contained in CALL's data storage repositories. The data used as a basis for the input variables for the models are derived from interviews with members of CALL, historical data provided by the ISD and AO Branch, or from personnel observations of the execution of specific tasks by either members or clients of CALL.

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[118] Extend User Manual, Imagine That Inc, 1997, pg. 4.

## B. GENERAL MODEL ASSUMPTIONS

The following assumptions were used in the development of the basic models:

### 1. Collection Process Models.

- CAAT Team Members' general writing and processing of observations does not improve significantly over the 30-60 days that they are deployed.
- Since CAAT SMEs have similar military experience, service time, and skills, they do not have significantly different observation processing success rates.
- Work day is 18 hours, 7 days a week.
- Each simulation represents 30 days of collection effort.
- Communication link to CALL is established before collection operations begin.
- All Internet connections are made using a 56K modem, while all faxes use a 14.4K modem.

### 2. Database Access Models.

- Access to information is available 24 hours, 7 days a week.
- Users requiring access are members of the United States Armed Forces only.
- All requests via Internet will be made using a 56K modem.
- All requests without IT will be via telephone.
- The Internet portal does not experience any significant down time that prevents user access.
- Users know exactly what information they want to search for and the topics are located in CALL's database.

## C. CALL OBSERVATION COLLECTION PROCESS MODEL USING INFORMATION TECHNOLOGY

### 1. Purpose.

The purpose of this model is to depict the current CALL observation collection process that includes various types of Information Technology. (Figure 7) This process incorporates the use of the CALLCOMS software to assist CAAT members in the planning, collection, and processing of observations in the field. It also depicts the use

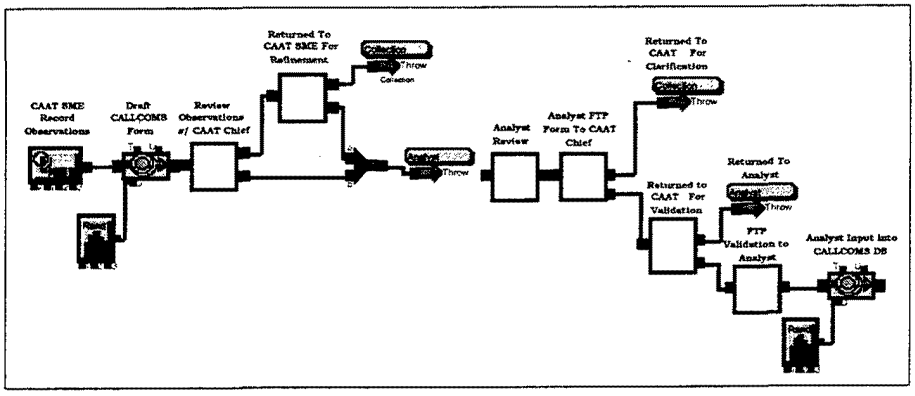



Figure 7. CAAT Observation Collection Process w/IT

of FTP, to transmit CALLCOMS forms from forward deployed locations to CALL at Fort Leavenworth via established communication links.

### 2. Key Tasks Depicted in the Model.

The following tasks are pivotal in the accurate depiction of this process:

- Observation Collection.
- Draft CALLCOMS Form.
- Review Observations by CAAT Team Chief.
- Returned to CAAT SME for Refinement.
- Analyst Review.

- Analyst Input into CALLCOM DB.

**3. Explanation of Key Task Blocks and the Data Used for Each Task.**

***a. Observation Collection.***

This block of the model simulates the CAAT SMEs' daily collection of observations throughout their deployment in the theater of actual operations. There are usually 3-5 observations a day that arrive to the system in a Poisson distribution with a mean value of 6 hours per observation.

***b. Draft CALLCOMS Form.***

This block depicts the time that it takes a CAAT member to record their observations in the correct format using the CALLCOMS application software on their assigned PC. This value is calculated by a random number generator following a normal distribution with a mean of 2 hours and a standard deviation of 1.

***c. Review Observations by CAAT Team Chief.***

This hierarchical block depicts the series of tasks that a CAAT Team Chief must complete to evaluate a CAAT member's CALLCOMS observation for relevance, completeness, accuracy, and grammatical errors. The team chief receives the file by either uploading the CAAT member's electronic file from a floppy disk onto his PC or receiving it via FTP. It begins with a review by the team chief that takes a time-value based on a random number generator following a normal distribution with a mean of 1.5 hours and a standard deviation of 1. Once it has been reviewed, the CALLCOMS observation is passed to a decision block that simulates the success rate that observation will have in being approved on the first attempt. Since the observation is in electronic form, minor adjustments can be made by the team chief to speed the process up. The

historical rate of success on first drafts is 30%. If the observation is approved, it is sent to the Analyst Review task via FTP. If the observation fails, it is sent to the Returned to CAAT SME for Refinement task.

***d. Returned to CAAT SME for Refinement.***

This hierarchical block depicts the series of tasks that occur when a CAAT Team Member gets a CALLCOMS observation returned by the CAAT Team Chief for corrections. The team member makes the necessary adjustments and forwards the CALLCOMS observation back to the team chief for another review. The time that the rewrite requires is based on a random number generator following a normal distribution with a mean of 2 hours and a standard deviation of 1. The team chief review time is based on a random number generator following a normal distribution with a mean of 1.5 hours and a standard deviation of 1. Once it has been reviewed, the CALLCOMS observation is passed to a decision block which simulates the success rate that observation will have in being approved on the second attempt. The historical rate of success on second drafts is 70%. If the observation is approved, it is sent to the Analyst Review task via FTP. If the observation fails, it is passed to the Returned to CAAT SME for major rework.

***e. Analyst Review.***

This block depicts the tasks that occur when CALLCOMS observation is FTPed to the civilian analyst at Fort Leavenworth. The analyst receives the observation and then reviews it for content relevance, and grammatical errors. This value is calculated by a random number generator following a normal distribution with a mean of 2 hours and a standard deviation of 1. Once it has been evaluated, the observation is

passed to a decision block that to determine if it is sent back to the CAAT for content refinement or validation. The historical rate of validation is 40%.

*f. Analyst Input into CALLCOM DB.*

This block depicts a CALLCOMS observation that has been validated by the CAAT Team Chief and FTPed to the civilian analyst at Fort Leavenworth for input into the CALLCOMS DB. This value is calculated by a random number generator following a normal distribution with a mean of 3 hours and a standard deviation of 1.5. The large standard deviation is based on the priority of the analyst's effort for reviewing observations and providing feedback to the deployed CAAT, not on immediate input to the database.

## D. CALL OBSERVATION COLLECTION PROCESS BEFORE USING INFORMATION TECHNOLOGY

### 1. Purpose.

The purpose of this model is to depict the previous CALL observation collection process that did not include the use of Information Technology solutions. (Figure8) This process incorporates the use of a "Paper and Pencil" system by the CAAT to aid in the collection and processing of observations in the field. It also depicts the use of fax machines or US Mail carriers to transmit CALLCOMS forms from forward deployed locations to CALL at Fort Leavenworth.

### 2. Key Tasks Depicted in the Model.

The following tasks are pivotal in the accurate depiction of this process:

- Observation Collection.

- Draft Observation Manual Form.
- Review Observations by CAAT Team Chief.
- Returned to CAAT SME for Refinement.
- Analyst Review Observations.
- Observations Typed by CALL.

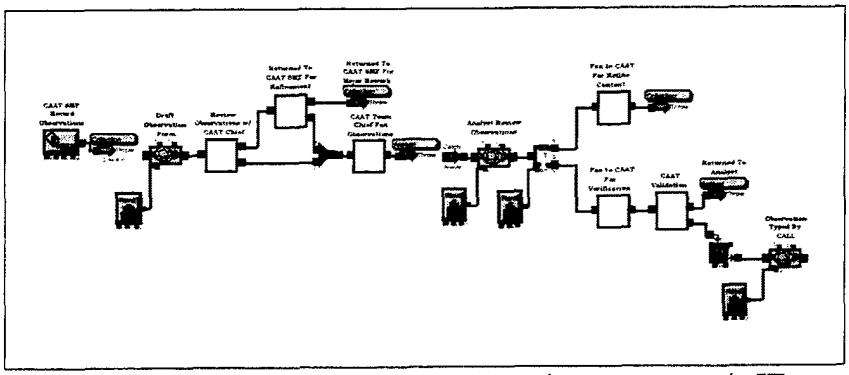


Figure 8. CAAT Observation Collection Process w/o IT

**3. Explanation of Key Task Blocks and Data Used for Each Task.**

***a. Observation Collection.***

This block of the model simulates the CAAT SMEs' daily collection of observations throughout their deployment in the theater of actual operations. There are usually 3-5 observations a day that arrive to the system in a Poisson distribution with a mean value of 6 hours per observation.

***b. Draft Observation Manual Form.***

This block depicts the time that it takes a CAAT member to manually record their observation in the correct format using preprinted paper observation shells. This value is calculated by a random number generator following a normal distribution with a mean of 2 hours and a standard deviation of 1.

### *c. Review Observations by CAAT Team Chief.*

This hierarchical block depicts the series of tasks that a CAAT Team Chief must complete to evaluate a CAAT member's observation for relevance, completeness, accuracy, and grammatical errors. The team chief receives the paper form when it is hand delivered by the CAAT SME. It begins with a review by the team chief that takes a time-value based on a random number generator following a normal distribution with a mean of 2 hours and a standard deviation of 1. Once it has been reviewed the observation is passed to a decision block that simulates the success rate that observation has of being approved on the first attempt. Since the observation is in paper form, corrections can be written on the page to assist the SME. The historical rate of success on first drafts is 30%. If the observation is approved, it is faxed to the Analyst Review task. If the observation fails, it is passed to the Returned to CAAT SME for Refinement task.

### *d. Returned to CAAT SME for Refinement.*

This hierarchical block depicts the series of tasks that occur when a CAAT Team Member gets an observation returned by the CAAT Team Chief for corrections. The team member rewrites the observation, making the necessary adjustments and delivers the corrected observation back to the team chief for another review. The time that the rewrite requires is based on a random number generator following a normal distribution with a mean of 3 hours and a standard deviation of 2. The team chief review time is based on a random number generator following a normal distribution with a mean of 1.5 hours and a standard deviation of 1. Once it has been reviewed, the observation is passed to a decision block which simulates the success rate that observation will have of

being approved on the second attempt. The historical rate of success on second drafts is 70%. If the observation is approved it is faxed to the Analyst Review task. If the observation fails, it is passed to the Returned to CAAT SME for major rework.

*e. Analyst Review Observation.*

This block depicts the tasks that occur when an observation is faxed to the civilian analyst at Fort Leavenworth. The analyst receives the observation and reviews it for content, relevance, and grammatical errors. This value is calculated by a random number generator following a normal distribution with a mean of 2 hours and a standard deviation of 1. Once it has been evaluated, the observation is passed to a decision block that will determine if it is sent back to the CAAT for content refinement or validation. The historical rate of validation is 40%.

*f. Observation Typed by CALL.*

This block depicts an observation that is validated by the CAAT Team Chief and faxed to the civilian analyst at Fort Leavenworth for typing so it can be included in the final product report. This value is calculated by a random number generator following a normal distribution with a mean of 6 hours and a standard deviation of 2. The large standard deviation is based on the typing being done by CALL secretaries as a secondary responsibility.

## E. USER ACCESS TO LESSONS IN CALL DB USING CURRENT INFORMATION TECHNOLOGY

### 1. Purpose.

The purpose of this model is to depict the current process that clients of CALL use to access information, products, and TTP from the CALL DB. (Figure 9) This process incorporates the use of an Internet Portal to gain access to the CALL DB from various installations around the US and the world. It also depicts the use of Excalibur RetrievalWare to search and present files on the Client PC where they can be stored or printed for use.

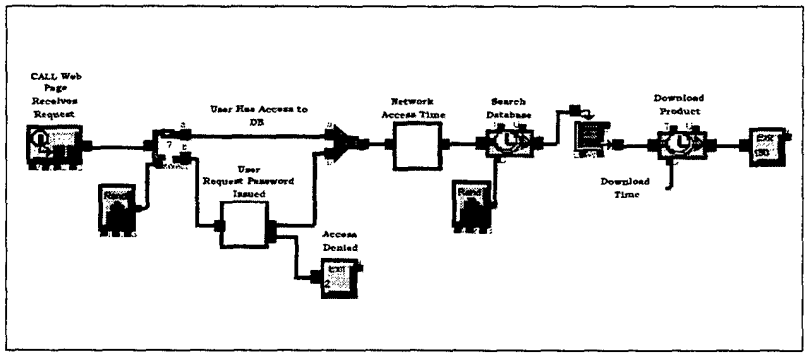



Figure 9. User Access to CALL DB w/IT

### 2. Key Tasks Depicted in the Model.

The following tasks are pivotal in the accurate depiction of this process:

- CALL Web Page Receives a Request.
- User has Access.
- Requests Password Be Issued.
- Search Database.
- Download Product.

### 3. Explanation of Key Task Blocks and Data Used for Each Task.

#### *a. CALL Web Page Receives a Request.*

This block of the model depicts when a client uses the Internet to gain access to the CALL Gateway and signs on to gain access to the CALL DB. There are usually 5-10 attempts a day to gain access to the CALL DB. These attempts arrive in a Poisson distribution with a mean value of 2 hours per observation.

#### *b. User has Access.*

This block is a decision variable. It is used to route the user to the database if they previously have been assigned a userid and password. If they do not have a userid, they are routed to the Request Password Be Issued task. 75% of users who want to gain access will already possess a userid and password.

#### *c. Requests Password Be Issued.*

This hierarchical block depicts the series of tasks that occur when a client needs to request a userid and password from CALL to gain access to the CALL DB. The user fills out a request form on the CALL web page and transmits it to the CALL headquarters section. The time to complete this task is calculated by a random number generator following a normal distribution with a mean of .25 hours and a standard deviation of 1. Once the request has been submitted, CALL confirms the user's need for access by contacting their military chain-of-command. This task has a mean time of 12 hours with a standard deviation of 2. Once confirmation of the user's need for access is ascertained, the request is forwarded to the CALL Director for final approval. This task has a 75% probability of success. If approval is granted, a userid and password is issued and mailed to the requester via US Mail. This task is a uniform distribution with a

maximum time of 6 days and a minimum of 2 days. If the request is denied, a letter informing the client of why the request was turned down is sent via US Mail as well.

*d. Search Database.*

This activity depicts the user searching the CALL DB with Excalibur RetrievalWare to find the information, TTPs, or products they require from CALL. The time of this task is determined by a random number generator using a normal distribution with a mean of 1 hour with a standard deviation of 1.

*e. Download Product.*

This activity simulates the user downloading the required products from the CALL DB using a 56k-modem communication link. The time of this task is determined by a random number generator creating a file size between 10KB and 50MB and then dividing the file size by the connection speed.

## F. USER ACCESS TO LESSONS PRIOR TO CURRENT INFORMATION TECHNOLOGY ARCHITECTURE

### 1. Purpose.

The purpose of this model is to depict the previous process that clients of CALL use to access information, products, and TTP from the CALL DB. (Figure 10) This process illustrates the use of a telephone to call in a request for assistance to CALL. Once CALL receives the request, it is assigned to one of the three civilian analysts. The analyst searches through CALL's information repositories and packages the information for the user. The information is then sent to the user via the US Mail.

## 2. Key Tasks Depicted in the Model.

The following tasks are pivotal in the accurate depiction of this process:

- CALL Receives a Request from a Client.
- Analyst Searches for Information.
- Information Sent to User via US Mail.

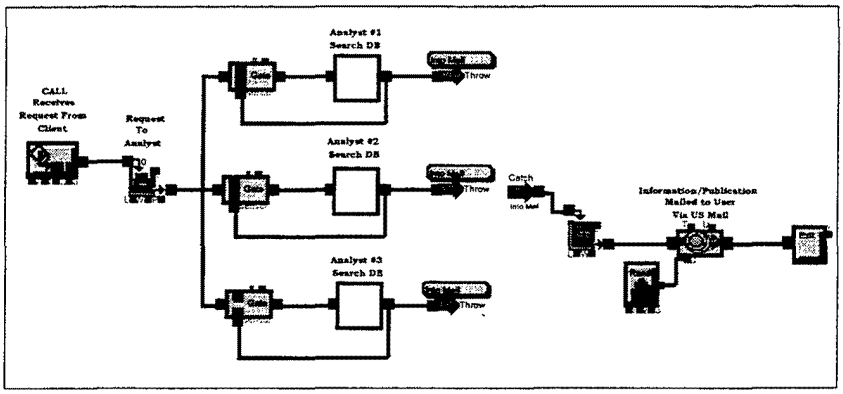



Figure 10. User Access to CALL Lessons Learned w/o IT

## 3. Explanation of Key Task Blocks and Data Used for Each Task.

### *a. CALL Receives a Request from a Client.*

This block of the model depicts when a client contacts CALL via telephone to request assistance on finding information, a particular CALL product, or copies of current TTPs. There are usually 2-3 attempts to gain information from CALL a day that arrive to the system in a Poisson distribution with a mean value of 12 hours per observation.

### *b. Analyst Searches for Information.*

This activity depicts the hierarchical process that the civilian analyst undergoes in searching the CALL repositories and products to find the requested information and then tailor the products to meet the client's specific needs. The time for the task of finding the required information is determined by a random number generator using a normal distribution with a mean of 12 hour with a standard deviation of 2. Once the information has been identified, the next task is tailoring and packaging the information so it can be mailed to the client. The time for this task is determined using a normal distribution with a mean of 12 hours and a standard deviation of 1.

### *c. Information Sent to User via US Mail.*

This task depicts the time it takes for the tailored package of information to be sent via US Mail to the client. This task is a uniform distribution with a maximum time of 6 days and a minimum of 2 days.

## G. SIMULATION RESULTS

To simulate the Observation Collection Process, each of the models was run for a duration of 30 days, which is about the standard amount of time that a CAAT does actual collection operations. Table 1 depicts the results of the simulations.

| | Collection Process w/ IT | Collection Process w/o IT |
|---|---|---|
| # of 30 Day Simulations | 5 | 5 |
| # Observations | 602 | 587 |
| Total Time (Days) | 1589.28 | 2471.27 |
| MeanTime (Days) | 2.64 | 4.21 |
| Standard Deviation (Days) | 1.35 | 1.77 |
| Confidence Level | .18 | .24 |

Table 3. Extend Collection Process Model Data

To measure user accessibility to information from CALL, the two simulations for these process were run multiple times for a duration of 60 days each. The results are listed in Table 4.

| | Database Access w/ IT | Data Access w/o IT |
|---|---|---|
| # of 60 Day Simulations | 3 | 3 |
| # Observations | 492 | 135 |
| Total Time (Days) | 444.12 | 882.53 |
| Mean Time (Days) | .902 | 6.54 |
| Standard Deviation (Days) | 2.03 | 1.49 |

Table 4. Extend User Access Model Data

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# APPENDIX B. SURVEY OF CALL CLIENTS

## A. SURVEY DESIGN

The survey was designed to collect both objective and subjective data. The purpose of the objective survey items is to collect data on the specific level of users knowledge of the services that CALL provides for members of the Army. Subjective items were included to gather the perceptions and opinions of the users on the effectiveness of CALL in providing meaningful lessons, products, or TTPs.

## B. SELECTION OF RESPONDENTS

The focus of the selection of respondents was to identify the group within the Army to whom CALL products are primarily targeted. Since most of CALL's products are oriented on the tactical level of doctrine and focus on Brigade and lower level topics, its key target group is company grade officers.

The reason that company grade officers are a critical target group is two fold. First, they serve in many of the key company and platoon leadership positions throughout the Army. In these positions they are responsible for the planning and supervision of the individual and collective training within their units and deployment during combat. If CALL's products can effect the way training is planned or the method by which it is conducted, through its TTPs and lessons, it will be disseminated down to the individual level resulting in the widest possible impact on the force. Secondly, a key aspect of the Army's Officer Professional Development Program is based on commander's training their subordinates on the latest warfighting Tactics, Techniques, and Procedures. CALL

can identify itself as an invaluable asset earlier in these officers' careers, it is likely that they will use the latest TTPs outlined in CALL products in the development of their subordinates and throughout the remainder of their careers.

Once the key target group was identified, they could be questioned to provide insights on CALL's products, dissemination channels, and overall impact on training. Thirty-Five respondents were identified to participate in the survey from the Combined Arms Officer Advance Course at Fort Knox, Kentucky. All of the respondents were required to have a general knowledge of CALL's mission within the Army. They included representatives from all the major combat arms branches to include Armor, Infantry, Field Artillery, and Aviation. Additionally, each respondent was required to have served as a Platoon Leader or Executive Officer and at least one-third of the respondents had to serve as a Company Commander or a Battalion Staff Officer.

## C. SURVEY INSTRUMENT

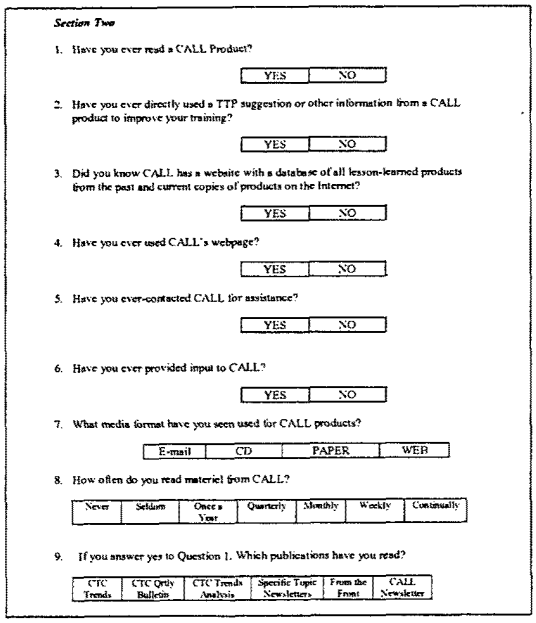
The survey instrument used a combination of yes/no questions reflecting user's knowledge of the services provided by CALL, as well as open ended questions designed to gain subjective perceptions about CALL effectiveness. Respondents were informed that research would be conducted on a non-attribution basis, and that they would remain anonymous. It was believed that anonymous input would result in a more candid disclosure of information. The survey contained three sections.

### 1. Section One.

Section one asked respondents to answer questions concerning aspects of their military career, to include: Current Rank, Duty Status, Branch, Duty Positions Served, Duty Stations, and Number of Years in Service. This information was used to ensure that a wide breadth of experiences throughout the Army would be sampled.

### 2. Section Two.

Section two contained questions to determine the respondents knowledge of CALL, the services that it provides, and the level of their interaction with the organization. Participants were asked to answer a series of objective yes/no questions on CALL, its products, and the Information Technology solutions they currently employ. The answers to these questions will provide data that is an adequate representation of the company grade officer's overall knowledge and usage of CALL products and services. The questions from section two of the survey are shown as Figure 11.



*Section Two*

1. Have you ever read a CALL Product?

| YES | NO |
|---|---|

2. Have you ever directly used a TTP suggestion or other information from a CALL product to improve your training?

| YES | NO |
|---|---|

3. Did you know CALL has a website with a database of all lesson-learned products from the past and current copies of products on the Internet?

| YES | NO |
|---|---|

4. Have you ever used CALL's webpage?

| YES | NO |
|---|---|

5. Have you ever-contacted CALL for assistance?

| YES | NO |
|---|---|

6. Have you ever provided input to CALL?

| YES | NO |
|---|---|

7. What media format have you seen used for CALL products?

| E-mail | CD | PAPER | WEB |
|---|---|---|---|

8. How often do you read materiel from CALL?

| Never | Seldom | Once a Year | Quarterly | Monthly | Weekly | Continually |
|---|---|---|---|---|---|---|

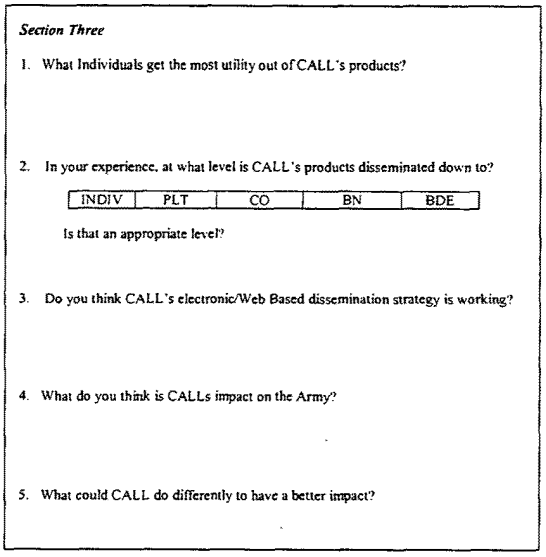
9. If you answer yes to Question 1. Which publications have you read?

| CTC Trends | CTC Qrtly Bulletin | CTC Trends Analysis | Specific Topic Newsletters | From the Front | CALL Newsletter |
|---|---|---|---|---|---|

Figure 11. User Survey Section Two

### 3. Section Three.

Section three gathered respondent's subjective opinions of CALL's impact on the Army, adaptation of Information Technology to disseminate lessons learned, and which clients get the greatest utility from its products. Respondents were given the opportunity to give a brief narrative to explain the factors that influenced their answer. The questions from section three of the survey are shown as Figure 12.



*Section Three*

1. What Individuals get the most utility out of CALL's products?

2. In your experience, at what level is CALL's products disseminated down to?

| INDIV | PLT | CO | BN | BDE |
|---|---|---|---|---|

Is that an appropriate level?

3. Do you think CALL's electronic/Web Based dissemination strategy is working?

4. What do you think is CALLs impact on the Army?

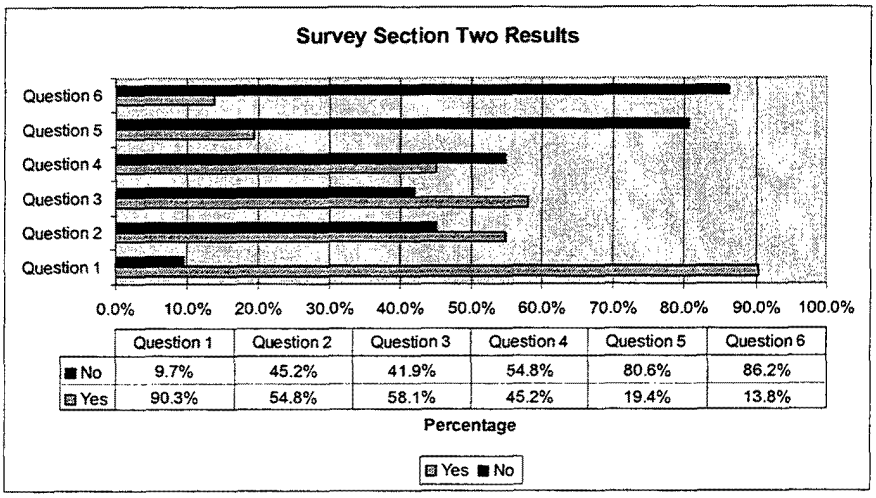
5. What could CALL do differently to have a better impact?

Figure 12. User Survey Section Three

## D. SURVEY RESPONSE STATISTICS

Of the 35 surveys that were sent out to prospective respondents, a total of 31 were returned for a response rate of 88.6%. Responses were received from members of all the combat arms branches. Additionally, 83.9% of the responses had served as both a Platoon Leader and Company Executive Officer, 41.9% had served as Company Commander, and 45.2% as a Battalion Staff Officer. The cumulative experience level of

the response was sufficient in finding that the sample provides adequate data to reach general conclusions on the scope of company grade officer's knowledge of CALL and its products. The collected data is also sufficient to reach findings on the effectiveness of CALL in achieving its mission, at least within this key target group. A summary of survey section two response findings are depicted in Table 6 and Table 7 .




| | Question 1 | Question 2 | Question 3 | Question 4 | Question 5 | Question 6 |
|---|---|---|---|---|---|---|
| No | 9.7% | 45.2% | 41.9% | 54.8% | 80.6% | 86.2% |
| Yes | 90.3% | 54.8% | 58.1% | 45.2% | 19.4% | 13.8% |

Table 6. Survey Section Two Results For Questions 1-6

Survey section three results identified 75% of the respondents feeling that information and products from CALL were of value to the Army and company grade officer in particular, however they felt that the products were under utilized. Their various reasons included: Paper copies not being disseminated by Battalion senior leadership to their units, CALL not "advertising" the usefulness of its products, or lack of access to computer systems that are linked to the Internet or with E-mail capability. Another important finding is the respondents answer to the question concerning which group within the Army gets the most utility from CALLs products. 40% of the subjective

answers identified company grade officers serving in commander or battalion staff positions, an additional 20% of the responses identified small unit leaders at the company

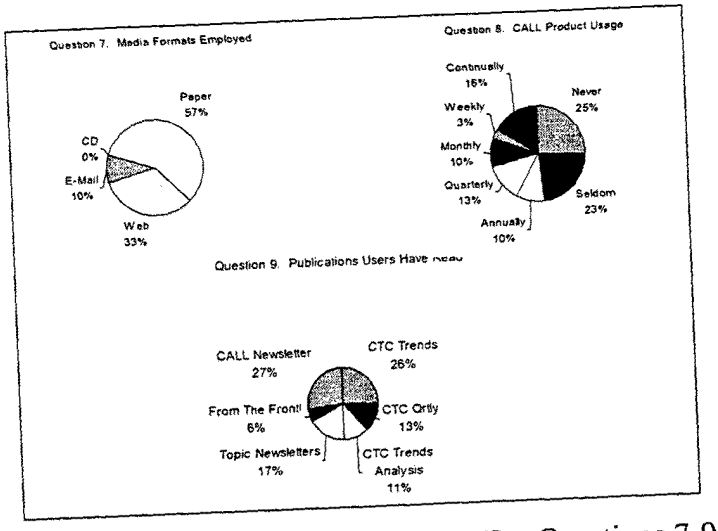



Table 7. Survey Section Two Results For Questions 7-9

or lower level. These indicate that CALL users agree that the key group for CALL to target to improve the use of its services is the company grade officer.

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