NAVAL WAR COLLEGE
Newport, R.I.

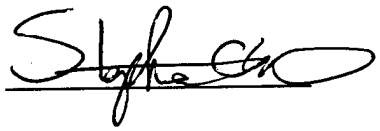
INFORMATION MANAGEMENT: THE KEY TO OPERATIONAL SUCCESS

By

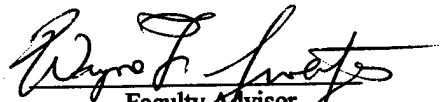
Stephen C. Evans
LCDR U.S. Navy

A paper submitted to the faculty of the Naval War College in partial satisfaction of the requirements of the Department Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy

Signature: 

11 February, 1998



Faculty Advisor
CDR Wayne F. Sweitzer, USN
Raymond A. Spruance Military
Chair of Command, Control, Communications
Computers, and Intelligence (C4I)

REPORT DOCUMENTATION PAGE

1. Report Security Classification: UNCLASSIFIED	
2. Security Classification Authority: N/A	
3. Declassification/Downgrading Schedule: N/A	
4. Distribution/Availability of Report: DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.	
5. Name of Performing Organization: JOINT MILITARY OPERATIONS DEPARTMENT	
6. Office Symbol: C	7. Address: NAVAL WAR COLLEGE 686 CUSHING ROAD NEWPORT, RI 02841-1207
8. Title (Include Security Classification): INFORMATION MANAGEMENT: THE KEY TO OPERATIONAL SUCCESS (U)	
9. Personal Authors: Stephen Carl Evans; Lieutenant Commander, USN	
10. Type of Report: FINAL	11. Date of Report: 11 February, 1998
12. Page Count: 30 pages	
13. Supplementary Notation: A paper submitted to the Faculty of the NWC in partial satisfaction of the requirements of the JMO Department. The contents of this paper reflect my own personal views and are not necessarily endorsed by the NWC or the Department of the Navy.	
14. Ten key words that relate to your paper: Information Management, C4I, Operational Commander, Decision-Maker, Organization, Information Specialist, Processing, Dissemination, Organizing	

15. Abstract: Information management is critical to all future joint operations. Today's technologies provide increased connectivity. High speed computers and digital satellite connectivity can tie sensors, platform and command centers together to share a common picture of the battlefield. Emphasis is rapidly shifting from the operational commander not having enough information to the perception that he is getting too much information.

The key to the success of future operations will be harnessing the gains made in technologies. At the operational level this means being able to sift through mountains of information and pull out the nuggets of essential data. Once the data is in hand, it must be presented to the commander in a manner and format that allows him to rapidly orient himself with the data and act upon what he sees. To accomplish this task, three elements must be in place: (1) An understanding of C4 systems and their applications. (2) A well organized and tailored supporting staff. (3) Doctrine and procedures detailing the management and use of information in joint operations.

16. Distribution / Availability of Abstract:	Unclassified: X	Same As Rpt	DTIC Users
17. Abstract Security Classification: UNCLASSIFIED			
18. Name of Responsible Individual: CHAIRMAN, JOINT MILITARY OPERATIONS DEPARTMENT			
19. Telephone: 841-6461		20. Office Symbol: C	

Abstract

Information management is critical to all future joint operations. Today's technologies provide increased connectivity. High speed computers and digital satellite connectivity can tie sensors, platform and command centers together to share a common picture of the battlefield. Emphasis is rapidly shifting from the operational commander not having enough information to the perception that he is getting too much information.

The key to the success of future operations will be harnessing the gains made in technologies. At the operational level this means being able to sift through mountains of information and pull out the nuggets of essential data. Once the data is in hand, it must be presented to the commander in a manner and format that allows him to rapidly orient himself with the data and act upon what he sees. To accomplish this task, three elements must be in place: (1) An understanding of C4 systems and their applications. (2) A well organized and tailored supporting staff. (3) Doctrine and procedures detailing the management and use of information in joint operations.

Table of Contents

ABSTRACT.....ii

TABLE OF CONTENTS.....iii

INTRODUCTION.....1

BACKGROUND.....3

INFORMATION MANAGEMENT 5

THE COMMANDER'S IMPACT ON INFORMATION MANAGEMENT 7

INFORMATION MANAGEMENT IMPROVEMENTS 10

Speeding the decision process 10

Procedure improvements 12

CONCLUSIONS 15

BIBLOGRAPHY.....17

Introduction

The time is 0530. Commander Joint Task Force (CJTF) 966 enters his command center. He sits in his chair beside the Battle Watch Officer. As he looks at the large screen display monitors: to the right he scans the positions of ground units as they maneuver across the battlefield. He looks in the center and observes ship and submarine positions of the naval battlegroup formation. The commander scans to the left and sees the air picture with associated assigned targets and aircraft status. The Battle Watch Officer is busy sorting out conflicting reports on troop positions. He invites the commander's attention to an army platoon sent to conduct surveillance on one of the day's objectives. The platoon is late getting into position, but that should have little impact on the planned operations.

The Commander leans back in his chair. He looks at the two computer monitors on the desk in front of him. On the monitor he views the morning message traffic and secure e-mail transmitted through the Defense Message System (DMS). He notices a lot of messages were forwarded from his staff, and many had the same subject line. A bit irritated, he looks at his watch. Only one hour before the morning meeting with his Deputy Commander and two hours until the 0730 video teleconference (VTC) with the theater Commander-in Chief (CINC). The commander presses the enter key on the keyboard and begins to read; thinking to himself that, later, he'll have a word with his deputy about the message traffic problem.

This scenario illustrates that today's operational commanders have access to more information than ever before. High-speed computers and digital satellite connectivity can tie sensors, platforms and command centers together to share a common picture of the battlefield. This multidimensional view is available across the entire spectrum of command (tactical, operational and strategic) and brings a new dimension to joint operations. But do

these advancements improve the ability to conduct joint operations? The ability to rapidly handle and display information is designed to have a synergistic effect on how operations are being conducted. Synergy enables greater unity of effort and allows for massing effects against the enemy. The doomsayers believe that providing vast amounts of tactical information to operational commanders will only serve to slowdown operations. They believe tactical commanders will be continually questioned and second-guessed by superiors. To the contrary, the Operational Commander will be far too busy to micromanage tactics. He and his staff will be spend the majority of their time managing information (i.e. processing and disseminating information) in order to make the operational decisions needed to bring about the desired end goals of the mission. The question is then, how will the operational commander optimize his command and control (C2) structure to take advantage of technology? What role does he play in information use or non-use? And, how can he leverage his battlespace awareness to maintain the broad focus providing centralized direction for decentralized execution?

To answer these questions, first we must have a firm understanding of the issues brought forward by the latest technological advancements. Second, we must comprehend the importance of managing information in the decision making process. Then come to appreciate the role operational commander plays in managing the flow of information. With this foundation, we can begin to examine possible ways to improve information management at the operational level for future joint forces. What is clear from the outset is that if the commander and his staff are not well organized, they will be bogged down in data. If this happens, the operation will surely suffer.

Background

"What the Warrior Needs: a fused, real time, true representation of the battlespace – an ability to order, respond and coordinate horizontally and vertically to the degree necessary to prosecute his mission in that battlespace."[1]

Today, leaders are faced with new challenges as they learn to operate in a rapidly changing information age. Leaders at every level are flooded with a massive and continuous flow of information made available by digital systems. Information is provided through command, control, communications and computer (C4) systems. C4 systems link computers, telecommunications equipment, and command centers worldwide through a global network sharing near real-time and real-time information. At the operational level these systems support Command and Control (C2) by providing the JFC with information connectivity with all assigned forces, the theater commander and a host of governmental and non-governmental agencies. It is not, however, an all-knowing magic box system.

One major downfall faced by the military planners today is the assumption that more information is better. "The advent of increasingly capable collection technologies in the U.S. inventory has prompted many visionaries to reason that operational commanders will soon have so much information available that *Battlespace fog* will be all but lifted. The fallacious assumption underlying this reasoning can be expressed as the equivalence relation:

(More Information) = (Improved Situational Awareness)"[2]

This assumption has not proven true during real world operations. When the flow of

---

[1] Joint Chiefs of Staff, Joint Pub 6-0, Doctrine for Command, Control, Communications, and Computer (C4) Systems Support to Joint Operations, (Washington: GPO, 1995) I-1.

[2] CDR Wayne F. Sweitzer, Battlespace Information, Command and Control (C2), Operational Intelligence, and Systems Integration, An unpublished paper, (Naval War College, September, 1997), p. 3.

information exceeds a certain level, it makes battlespace fog denser, rather than clearer. The Operational environment in which joint forces must operate has brought about a change in emphasis for the management of information. The emphasis has switched from collecting sufficient amounts of pertinent information, to being able to sort and sift through the mountains of information available gleaning out what is pertinent. Therefore warfighters are forced to expend valuable energy and resources to pull out what is relevant.[3]

Additionally, the harmful tendency to believe that all information received through computer-based mediums is correct or relevant has developed. Nothing could be further from the truth. The old adage of *Garbage in = Garbage out* is still applicable. So a sanity check must always be conducted on all information received to ensure that the information is accurate and germane to ongoing operations. The issue of quality assurance (QA) remains a significant and problematic factor that must be continually worked.[4]

In command and control, both quality and quantity of information are essential issues.[5] C4 systems play a critical role in the processing, flow, and quality of data supporting information requirements throughout the joint force.[6]

---

[3] Ibid.
[4] Ibid.
[5] David J. Aland, C4I for the Warrior: Avoiding "Nose-in-the Cockpit" Syndrome, An unpublished Research Paper, (Naval War College, May, 1995), p. 2.
[6] Joint Pub 6-0, p. vii.

Information Management

In a speech given in June of 1992, Chairman of the Joint Chiefs General Colin Powell spoke on information technology. He stated:

> "At the height of the Persian Gulf conflict, the automated message information network passed nearly 2 million packets of information per day through gateways in the Southwest Asia Theater of operations. Efficient management of information increased the pace of combat operation, improved the decision making process, and synchronized various combat capabilities. The technology developed to support these networks proved to be a vital margin that saved lives and helped achieve victory."[7]

Just as it is critical in joint operations that information pathways be established to carry information, it is equally critical that information be quickly processed and disseminated so that timely decisions can be made. Making a decision involves assessing a situation, deciding what to do and then acting on that decision. In military circles, this decision making process can be discussed using the decision cycle of Observation, Orientation, Decision, and Action (OODA).[8] The OODA cycle, often referred to as loop, is a continuous rather than a step-by-step process that takes place at all levels of command. A Decision-maker must gather information (*Observation*) on the situation. He must then make an assessment or orient (*Orientation*) himself with the information. Then he must decide (Decision) on a course of action and lastly implement (Action) the course of action. The process is then repeated as many times as necessary to reach the operation's desired end state. At the same time, the enemy must apply the same process to plan and conduct his operations. Therefore in a conflict between adversaries, whoever completes the ODDA loop the quickest has the greater speed of command. That side will control the battlespace and

---

[7] Joint Pub 6-0, p. II-1.
[8] Joint Pub 3-13.1, p. A-1.

likely ensure victory.

Completing the OODA cycle faster and more efficiently involves being able to gather information and present it to the right decision-maker so that he/she can assimilate it in order to make an informed decision. This is no small feat in today's operational environment. The days are gone when information was stovepiped through record message traffic and routed to everyone who needed to take action. Today, in addition to record traffic, information is transmitted and received via secured telephone, secured e-mail, satellite voice circuits, and Video Teleconference (VTC). With so many methods of information exchange, there is a real danger that information could be received by the wrong persons, misinterpreted and then become misrouted or fall through the cracks. Or, the other extreme could become the case. One individual could be inundated with the same information sent repeatedly from others. The repetition is the result of no established routing system. No one wants to see the ball get dropped so they route it to the person(s) they believe would most need to take some type of action.[9]

The operational commander is the primary decision-maker in a joint operation. Directly supporting him in the conduct of operations are the personnel who make up the commander's staff. It is the job of the staff to ensure the JFC has all the information needed to make decisions during joint operations. The JFC will organize his staff according to his needs. And since staffs with diverse structures, scopes of responsibilities and supporting infrastructures support JFC's, there is no single correct way to organize personnel on a staff

[9] Captain Dennis Hopkins, Assistant Director of War Gaming, Naval War College. Interviewed by author, 15 January 1998, Simms Hall, Newport, RI. E-mail.

to plan and execute operations.[10] However, how the commander organizes his staff will directly impact the flow of information. The JFC's leadership style and what he personally needs to attain his awareness of the battlespace to make key decisions will mainly drive the staff structure.

The Commander's Impact on Information Management

As the architect of missions assigned to him, the JFC must act as the shaper of the battlefield on which his forces will operate. His role in operational and sometimes strategic decision-making and in conducting campaign planning and execution make him one-quarter operator and three-quarters strategist.[11] The success or failure of his operation depends heavily on his ability to manage information in order to balance his role up and down the chain-of-command.

Improved technology in mobility weapons, sensors, and C4 systems continue to reduce time and space, increase tempo of operations, and generate large amounts of information.[12] The need for the commander to have quick access to pertinent information in order to make the decisions that only he can make is greater than ever before. The commander possessing such timely information may feel that the element of uncertainty is largely erased, giving him Dominant Battlespace Awareness (DBA). The traditional fog of battle, while not absent, is not as dense as before allowing the commander a clearer view of ongoing operations.

---

[10] Joint Chiefs of Staff, Joint Pub 3-13.1, Joint Doctrine for Command and Control Warfare (C2W), (Washington: GPO, 1996), p. IV-1.

[11] General Crosbie E. Saint, USA, A CINC's View of Operational Art, (U.S. Army Command and General Staff College, 1990), p. 166.

To take advantage of the information available, the operational commander must understand the architecture that supports him. He must understand C4 architectures and the interfaces that connect forces. He must understand the data networks that provide his force with shared tactical picture. The commander must also have a strong knowledge of computers and how to glean data and information. The confidence that comes from this kind of knowledge will allow him to pull or push information requirements as appropriate to the given situation. Thus, he is able to conduct centralized control, while allowing decentralized execution.

The much-touted counter argument to allowing the operational commander complete access to the tactical picture is it will lead to a more centralized control of tactical forces by the operational commander. Opponents ask: with an architecture that can nearly provide "NCA to foxhole" connectivity, how can the operational commander detach himself from providing tactical orders to a subordinate if he is able to view that subordinate's actions as they transpire? [13]

The answer is simple. Having a detailed view of the battle does not necessarily cause the operational commander to take on what the Army typically refers to as the "squad leader" mentality. For example, During Operation Just Cause, the US Southern Command commander, General Maxwell R. Thurman, successfully avoided the pitfalls of the squad leader mentality, allowing the commander on the ground, Lieutenant General Carl W. Stiner, to conduct the operation, resulting in a quick U.S. win at relatively small cost. Although General Thruman did not have the kind of connectivity we are talking about today, he did understand the importance of decentralized execution. Thinking and acting as a shaper, he

---

[12] Joint Pub 6-0, p. I-1.

provided prudent, hands-on control when necessary, while avoiding too much interference with their subordinates.[14]

Another operation commander, VADM Metcalf as commander Joint Task Force (JTF) 120 during the Grenada Rescue Operation, maintained control of his operation by influencing decisions at the strategic level. VADM Metcalf and his staff were busy pushing information to CINCLANTFLT and the NCA, leaving tactical commander free to do their jobs. In addition to the continuous information flow up the chain, VADM Metcalf established a policy that by five o'clock each day the operational plans for the next day were to be completed. This information was relayed to higher authority, and it enabled them to review it, in context of the operational commander's ongoing needs and estimates. The concept was not only to inform seniors but also to keep their staffs busy. VADM Metcalf was aware that the staffs of both the JCS and USCINCLANT were filled with people who wanted to know what was going on so he sought to keep them occupied reading his messages, not telling him what to do.[15]

Commanders are not the only ones who can be lured into the tactical realm by information. An operational staff may suffer the same fate if a conscious effort is not made to remain on the operational level. Author Roger Beaumont attributes this to the fact that the career patterns of operational staff officers provide them with more tactical than operational experience. This experience often makes them more comfortable with tactical matters than with operational matters.[16]

---

[13] David F. Bean, Advanced Technology and the Future of Command and Control, Unpublished Research paper, (Naval War College, November, 1997), p. 4.
[14] Saint, p. 67.
[15] VADM Joseph Metcalf III, Decision Making and the Grenada Rescue Operation, pp. 284-285.
[16] Roger Beaumont, The Nevers of War: Emerging Issues in and References to Command and Control (Washington: AFCEA International Press, 1986), p. 55.

In the final analysis, what seems to determine whether an operational commander has adopted the squad leader mentality or maintains a decentralized command and control structure is how knowledgeable the commander is on the technologies available to provide him information. If his staff is pushing all of the pertinent information available to him, he probably has a good view of operations and a sense of how well they are being executed. However, efforts must be continued to explore new approaches, devices and procedures that can help the operational commander in the decision process.

Information Management Improvements

Speeding the decision process

On the battlefield of tomorrow, the key to victory will be achieving an information edge and converting that edge into a decisive competitive advantage. We will still need highly capable platforms, but we will be able to dramatically increase their aggregate combat power by massing effects through the synergy of networking.[17] In what is being called "network-centric warfare", sensor information will be fused with command information to provide a never before realized capability for dynamic prioritization and allocation of sensors and weapons. This information enables increased "speed of command."[18] This increase will allow U.S. commanders to complete the previously mentioned OODA loop faster and more effectively. The Navy is at the forefront of developing this concept of Network-Centric Warfare. The speed of information and decision support will help Joint Forces maintain DBA and the edge over potential adversaries.

---

[17] Vice Admiral Arthur K. Cebrowski, "Nework Centric Warfare," Surface Warfare, Nov/Dec 1997, 5.
[18] Ibid.

To make network-centric warfare a reality requires the development of a compatible methodology for command and control. The network-centric battlespace could easily provide enough information to overwhelm decision-makers. It will do no good to accelerate bad decisions. To meet this need, the Navy is working on a new concept of command and control --- *Command 21* --- to help decision-makers cope with the flood tide of information.[19]

The Command 21 concept is based on a decision-making process called Naturalistic Decision-Making (NDM) and a decision-support system called Decision-Centered Design Process (DCDP). The premise for NDM is that decisions made under stress are not normally made using a rational choice process. Without stress, a decision- maker will often come up with several alternatives, evaluate the current situation and select the alternative most appropriate to the situation. Under stress, however, what information is recognized is then mentally "fitted" into experienced situations in which the decisions to be made are known to the decision-maker. This often results in either the decision-maker basing the decision on what he has experienced in the past or on little understanding of the situation.[20] There will remain times when "gut feeling" decisions will have to be made, but the more thoroughly a situation is understood the wiser the decision made.

DCDP involves a careful evaluation of the information actually used by a decision-maker under stress to reach a decision and then using this to design a more efficient decision-making environment by altering such things as information access, processing or presentation, command center staffing or procedures, and decision-making training. "More

[19] Ibid.
[20] Ibid.

efficient" means that the decision-maker is able to recognize the best decision more quickly and accurately than before DCDP improvements were implemented.[21]

The Command 21 concept will allow future decision-makers faster access to information. The information will be displayed in a manner that will allow the decision-maker to quickly recognize pertinent data and come to the correct decision for the particular situation.

In a separate program dealing with modeling and simulation of decision-making at the JTF-level, the Navy is participating in the development of the Joint Simulation System (JSIMS), which will provide the architecture to support large-scale multiservice simulations for commanders and battle staffs. JSIMS will facilitate the training of joint forces in all phases of military operations, including operations other than war.[22] JSIMS is the simulated battlefield of the future. Future joint force will practice network-centric warfare and establish new procedures and doctrine using this capability.

Procedure Improvements

Hand in hand with technological development must come the institution of doctrine and procedures that seek to smooth its integration.[23] There are three recommended procedures, involving staff organization and practices, that would streamline the flow of information and assist commanders in the operation of their joint staffs. The first is the assignment of an Information Specialist on joint staffs. The Information Specialist would be someone who has a systems background. Individual having Information Warfare, Information Technology Management or Computer Science sub-subspecialty designation

---

[21] Ibid.
[22] Cebrowski. P. 6.

would qualify. The Information Specialist would manage the flow of information to all nodes. Working for the J6, this individual would be an expert in communications routing, video teleconferencing and network-centric warfare. The Specialist would have a thorough knowledge of computer programs used by the staff, such as power point, MS excel, MS mail and all Global Command and Control System (GCCS) applications. Additionally, the individual would have an in-depth knowledge of relevant oplans, oporders, joint doctrine and crisis action planning.

A second procedure change would streamline inflow to the decision-makers by assigning specific information management tasks to specific staff elements. This would prevent duplication of effort and the decision-makers from being overwhelmed with information by sifting through volumes of superfluous information. The different elements of the staff would be responsible for the collection and analysis of different types or components of information. They would then pass all that is relevant to the decision-makers. Implementing this procedure would require strict discipline on the part of the staff elements to remain within their own tasked guidelines.

Third, the establishment of Information Management (IM) teams. The IM team would be organized under the control of the J6. As depicted in figure 1, team members would be administratively assigned to the major staff elements, but would report to a coordinator [perhaps the Information Specialist mentioned earlier] for training and IM related matters. The IM team's function would be to familiarize themselves with the key issues that will be pertinent during exercise or real world operations. Then these individuals would immerse themselves in the incoming flow of information filtering out the wheat from the

[23] Bean, p. 5.

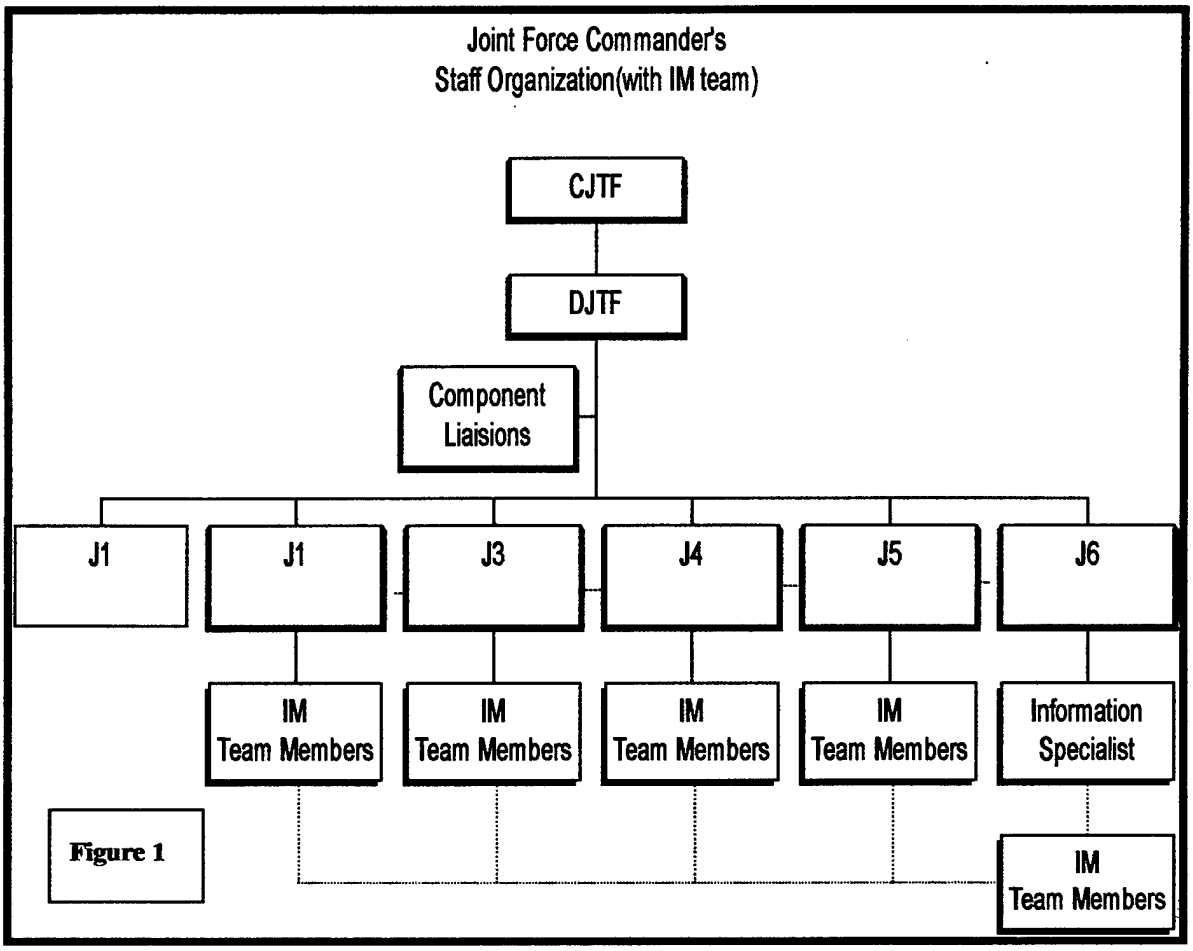


Figure 1

chaff and disseminating the information quickly to the right persons. This is particularly important when time critical decisions are needed. The IM team would be tied together through a network guaranteeing that information be routed to where it is needed most.

Doctrine must be continually developed and practiced to implement these procedures. If there is going to be a seamless flow of information, procedures must be standardized throughout our joint forces. Once doctrine is developed, we need to continually exercise it with future forces. By providing the operational leader a training environment in which they

can practice operational decision-making, we improve the chances of success for real-world operations.[24]

Conclusions

Information management is the key to all future joint operations. A well organized, well executed C2 structure could expeditiously speed essential information to where it is needed. For example, a joint task force operating in the pacific area of operations could establish an information grid that would allow for the rapid exchange of detailed information. Commanders at every level would be able to reach into the grid and pull out only the information they needed to execute their missions. Or, if desired, monitor a broad scale view of the entire operation.

Critical to the success of joint operations is the commander's knowledge of the capabilities of current and future technologies. He must be a student of C4 systems architecture and a scholar of their applications. He must also fully understand what they can and cannot provide. This will allow him to harness their powers to improve his own DBA. Work continues on design and fielding of decision aides. Program like Command 21 and JSIMS will provide commanders a controlled and economical environment to exercise decision-making skills. Only through continual practice and training will we perfect the process.

Also, the operational commander needs a well-organized and structured staff to ensure he is getting all pertinent, available information. The implementation of the

---

[24] Aland. P. 9.

Information Specialist and/or the Information Management Team would greatly improve this effort. By establishing a network within the larger information grid, the commander could be assured that he is optimizing his supporting staff. This in turn would improve the likelihood of the operations success.

Lastly, as technological capabilities change so must the doctrine and procedure under which our forces operate. We must continue to try to keep technology and doctrine as close together as possible. This is a monumental task. But one that we cannot neglect or attempt half hearted.

Bibliography

Aland, David J. C4I for the Warrior: Avoiding "Nose-in-the Cockpit" Syndrome. Unpublished Research Paper, U.S. Naval War College, Newport, RI: 1995.

Bean, David F. Advanced Technology and the Future of Command and Control, Unpublished Research Paper, U.S. Naval War College, Newport, RI: 1997.

Beaumont, Roger. The Nevers of War: Emerging Issues in and References to Command and Control, Washington: 1986.

Cebrowski, Arthur K. "Network Centric Warfare," Surface Warfare, 1997

Hopkins, Dennis, Assistant Director of War Gaming, Naval War College. Interviewed by author, 15 January 1998, Simms Hall, Newport R.I. E-mail.

Joint Chiefs of Staff. Joint Doctrine for Command and Control (C2W), Joint Pub 3-13.1, Washington: GPO: 1996.

Joint Chiefs of Staff. Doctrine for Command, Control, Communications, and Computer (C4) Systems Support to Joint Operations, Joint Pub 6-0, Washington: GPO: 1995.

Metcalf, Joseph III, Decision Making and the Grenada Rescue Operation, Ambiguity and Command: Organizational Perspectives on Military Decision-Making, Harper Business: 1986.

Saint, Crosbie E. A CINC's View of Operational Art, An unpublished paper U.S. Army Command and General Staff College: 1990.

Sweitzer, Wayne F. Battlespace Information, Command and Control (C2), Operational Intelligence, and Systems Integration, An unpublished paper, U.S. Naval War College, Newport, RI: 1997.