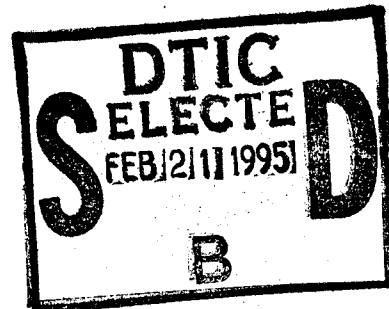


CR
U
417
.T1
M26

CLASS 80

STUDENT NO. 156

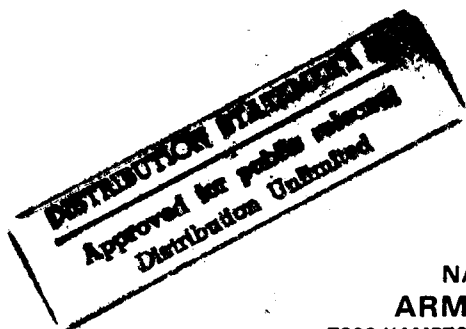


KEEPING WWMCCS UP--
HOW LONG WILL THE BAND-AID HOLD?

MAJ THOMAS C. MAIELLO, JR., USA

12 NOVEMBER 1986

FOR INSTRUCTIONAL PURPOSES ONLY



NATIONAL DEFENSE UNIVERSITY
ARMED FORCES STAFF COLLEGE
7800 HAMPTON BOULEVARD • NORFOLK, VIRGINIA 23511-6097

19950209 000

DISCLAIMER

This paper represents the views of the author and does not necessarily reflect the official opinion of the Armed Forces Staff College. For official use by personnel of the Armed Forces only. Property of the United States Government. Not to be reproduced in whole or in part without permission of the Commandant, Armed Forces Staff College, Norfolk, Virginia 23511.

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/ _____	
Availability Codes	
Dist	Avail and/or Special
A-1	

DTIC QUALITY INSPECTED 4

TITLE OF PAPER
 KEEPING WWMCCS UP - HOW LONG WILL THE BAND-AID HOLD?

TYPE OF PAPER (RR, ME, CS)
 RESEARCH REPORT

ABSTRACT

The Defense Reorganization Act of 1958 laid the ground-work in the formulation of initial requirements for the development of a Worldwide Military Command and Control System (WWMCCS). It was intended to be the most responsive, reliable, and survivable system ever built, contributing to the nation's defense posture. In the 1960's the Joint Chiefs of Staff were charged with its maintenance and development responsibilities. However, it has been crippled with one major failure after another, leading people to question its usefulness and reliability in crisis, transition to war, or wartime situations. Our evolutionary strategy for making this system a usable tool has been flawed by the lack of two key ingredients: ~~*~~ clear requirements and a fluid product acquisition process. The Joint Program Manager (JPM), in the form of the WWMCCS Information System (WIS), has the capability to bring this modernization program to reality, if we are willing to learn from our past mistakes and follow a strategy of utilizing ^{using} these key ingredients.

NAME THOMAS C. MAIELLO, JR.		RANK, SERVICE Major, USA	STUDENT NO. 156
CLASS 80	SEMINAR NO. 8	DATE SUBMITTED 12 November 1986	CLASSIFICATION OF PAPER UNCLASSIFIED

ABOUT THE AUTHOR

^{Thomas C.}
Major ¹ Maiello, USA (M.B.A., Syracuse University), became involved with ADP systems design and software development while serving as a computer systems manager/analyst and project officer with the Worldwide Military Command and Control System Data Processing Center, Headquarters, United States Army, Europe (USAREUR). As Chief of the Customer Support Division, he was responsible for assisting users with application software enhancements and maintenance of the Joint Chiefs of Staffs reporting systems, i.e., Joint Operation Planning System (JOPS), Unit Reporting (UNITREP), and the Joint Deployment System (JDS). His work also included Contracting Officer Representative (COR) responsibilities for the analysis, design, development, testing, and implementation of two critical ADP systems: the USAREUR Command and Control Information System (UCCIS) and the Force Modernization Command and Control System (FMCCS). His previous assignments included tours as assistant professor of military science at Syracuse University and as an Atomic Demolitions Munitions platoon leader in Germany. Major Maiello is a graduate of the NATO Army Officer Prefix 5 Nuclear Weapons Course and the Armed Forces Staff College (Class 80).

KEEPING WWMCCS UP:† HOW LONG WILL THE BAND-AID HOLD ?

INTRODUCTION

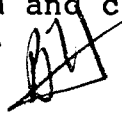
Since its inception in 1971 as the National Command Authority's (NCA) communication network, the Worldwide Military Command and Control System (WWMCCS) has struggled to exist as a survivable backbone for fast, reliable, responsive, and secure military communications. In recent years, however, many users have been alarmed that the system is deteriorating, thereby losing its key capabilities of being a survivable, responsive, and timely disseminator of decisions. Loss of these capabilities could easily result in a breakdown of communications in a crisis ~~situation~~, which, in turn, could potentially affect strategy and future national policy development~~x~~ and result in the loss of lives, materiel, or the battle itself. As a previous user of the system, I feel that these fears of failure and continued reduced capabilities are justifiable and represent a valid cause for concern. WWMCCS must succeed in performing an ~~ever~~ increasingly critical and time-sensitive mission. It can do this, however, only if two conditions exist: namely, if ^Aclear definition of requirements is obtained through the involvement of high-level functional managers, and if the acquisition process is improved to allow for quicker procurement of hardware for use in the system's

upgrade.

For as long as it has existed, WWMCCS as a whole has been criticized for not being able to support the mission which it was designed to perform. People blamed the system as if the hardware and software existed independently from the designers, developers, and users. At times the criticism has been justified, but what is being done to correct this plague of problems? Rather than defend what WWMCCS has been unable to do, I intend to point out that fundamental changes in defining requirements and acquiring hardware are necessary if the system is to become a finished success and not another disappointment.

WWMCCS -- IN THE BEGINNING

With the passage of the Defense Reorganization Act of 1958, ^{AWK} along came the initial requirements for WWMCCS. It ^{was not} wasn't until 2 December 1971, however, that WWMCCS was established under DOD Directive 5100.30. It was expected to be "the most responsive, reliable, and survivable system that can be provided within the resources available" (4:18). More specifically,

JCS Pub 2, UNAAF, defines WWMCCS as "the system that provides the means for operational direction and technical administrative support involved in the function of command and control of U.S. military forces" (10:5-18). 

When one speaks of WWMCCS as a total automatic data processing (ADP) system, he/she is referring generically not only to the equipment, software, communications, and facilities, but also to the personnel who implement specified procedures in planning, directing, coordinating, and controlling the operational activities of the U.S. military forces. ^{sub?} It exists to provide the NCA with the following capabilities:

- To receive early warning and intelligence information, ✓
- To apply the resources of the military departments, ✓
- To assign military missions, and ✓
- To provide direction to the Unified and Specified Commands (6:1).

The system supports the primary requirements of the NCA through the National Military Command System (NMCS), which is the primary component of WWMCCS. Emphasis is on the capability to exchange information in a direct or indirect manner with other DOD agencies and those outside the DOD structure, e.g., the White House Situation Room, the State Department Operations Room, the Central Intelligence Agency Indications Office, the U.S Intelligence Board National Indications Center, the Office of the Emergency Preparedness National Warning Center, and the North Atlantic Treaty Organization, to mention but a few. The rapid and accurate exchange of information between the NCA,

DOD, and non-DOD agencies is critical to ensure that decisive responses are made to potential or real threats to the United States' national security.

THE PROBLEMS BEGIN

During the '60's, the Defense Department's data processing system continually grew but was still not able to perform the job for which it was intended. From its very beginning, WWMCCS had a difficult time orchestrating its act. It existed as a conglomeration of more than 150 different computer systems, running with 30 software systems in over 80 different sites. Needless to say, problems began to arise. Three key international events during the late '60's prompted the JCS to look seriously at ways to standardize these computer systems as well as improve their capabilities. These disastrous events were the U.S.S. Liberty being fired on by Israeli gunboats in 1967, a U.S. spy plane ^{being} shot down over North Korea, and the capture of the U.S.S. Pueblo in 1968. Each of these embarrassing events occurred as a direct result of a computer message or warning not being passed or being misrouted (4:15).

A General Accounting Office report to Congress in 1981 described the WWMCCS problems as an inability of the total system to meet national-level requirements. It further pinpointed problems with hardware, software, data base interface with other systems, and the inefficient transfer of

data (6:2). Army Lt. Gen. Hillman Dickinson, who headed the JCS's C3 (Command/Control/Communications) System Directorate upon its inception in 1979, summarized the problem as follows: "C3 capability has not exploded during the last ten years." In fact, he added, some portions of military C3 systems "have shown little improvement and, in some cases, have deteriorated in capability" (22:12).

THE PROBLEMS GO ON

Throughout the '70's, reports to Congress and DOD contended that WWMCCS had not accomplished its original mission. It was clear that shortfalls in such a system would directly affect the combat readiness of our forces and their ability to respond in a crisis ~~situation~~. For example, when the Mayaguez incident occurred in 1975, the President was unable to get the information he needed because of a system crash. ^{Jargon ✓} During the Jonestown crisis in late 1978, rescue efforts coordinated by the JCS were initially halted by a power outage and later thwarted because one computer did not allow the other to sign on to the network. Within a one-year period (1979-1980), the North American Air Defense Command's (NORAD) WWMCCS system registered five false nuclear alerts generated by the computer, which pressed NORAD to the second stage of readiness. These false alerts were the result of the computer's identifying a wargaming tape as the real thing (4:17).

What are the explanations for lack of reliable communications in critical situations? Some, such as power outages, are related to natural disasters; nevertheless, our system should and must be survivable even in such situations.

ARE WE FACING A CAPABILITY OVERLOAD?

The performance figures of the WWMCCS Intercomputer Network (WIN), which is the communications network that links all computers together so that they can ^{now} talk and share information, have been impressive. Given the massive amounts of data to be processed and the critical time sensitivity of that data, the system's performance is essential. "WIN has sustained real life traffic loads as high as 509 million characters a day with average network transfer rates of more than 46 million characters per hour" (8:52). This data load translates to a system reliability rate greater than 97%. But even with constant improvement efforts to keep the rate high, there is speculation as to whether any future improvements can alleviate the data jam that currently exists. This jam translates into outdated data, i.e., figures regarding the status of forces around the world necessary for crisis action planning.

The question that still remains is this: was WWMCCS ~~conceived~~ with full understanding of what it was meant to do? Most *awd* probably the answer is no. With the establishment of the WWMCCS Information System (WIS) and Joint Program Managers

What will it take to fulfill that commander's needs? My years of software and system design tell me that the commander must dedicate his time and his people to work in an interactive process of requirement definition which includes numerous refinements. Only in this manner will we begin to achieve the design objectives of both accuracy and timeliness of information flow in any command and control system, let alone in one which our leaders count on for world-wide dissemination of policy-directed information.

Mr. Dave Solomon, the Deputy for Telecommunications, Directorate/Telecommunications Command and Control Systems (DTACCS), said, "Outside of available dollars and time, the limitations on what we [communicators] can do are rarely technical. The basic problems are political, philosophic" (1:24). Any ADP job would be easier, require less effort, and be more effective if a detailed front-end analysis was done.

ANOTHER PROBLEM INTERWOVEN

Advances in commercial technology are, for the most part, everyday occurrences. Like any other user, the military views new technological breakthroughs as beneficial. The present situation surrounding the acquisition of C2 systems has made this desirable technology a far distant reality. In the competition for dollars, command and control acquisitions tend to be thrust into a category of undeterminable impact compared

to high-fire-power weapon systems, i.e., tanks, ships, and planes (21:85). Mr. Norman Waks, Chief Management Scientist at the Mitre Corporation, commented that "until quite recent times at least, it [the C2 system] has too often been thrown into the 'nice-to-have-but-not-really-needed' category of budget requirements which are handled on a level-of-effort basis each year at DOD's margin of affordability" (21:85). ~~AW~~

The feasibility of procuring new high-tech equipment while developing and fielding a state-of-the-art system is hampered enormously by the DOD Planning, Programming, and Budgeting System (PPBS). [?] This is especially true when little or no importance is placed on the system and the role it must play.

In the final report of the President's Blue Ribbon Commission on Defense Management, an analysis of the current acquisition system revealed that

Problems are deeply entrenched and have developed over several decades from an increasingly bureaucratic and overregulated process. As a result, all too many of our weapon systems cost too much, take too long to develop, and, by the time they are fielded, incorporate obsolete technology (12:44).

The commission ^{ed} points out that there has been "chronic instability in top-line funding and, even worse, in programs." It also indicates that "project managers have in effect been deprived of control over programs" (12:xxii). The defense

programs "lose more from inefficient procedures than to fraud and dishonesty." The commission went on to say that "the truly costly problems are those of overcomplicated organization and rigid procedure, not avarice or connivance" (l2:xxiii-xxiv).

WHAT WILL IT TAKE TO FIX IT?

The efforts to modernize WWMCCS to WIS have taken new and energetic approaches that will propel ADP capabilities of this system into the twenty-first century. A 1981 House hearing on military posture described the WIS effort as follows:

A major modernization and enhancement of the current WWMCCS ADP and the entire WIS, including the basic information reporting system and its procedures, will be required over the next ten years to meet the national priorities for situation assessment, crisis operation and rapid deployment and support of military forces worldwide. Modernization of the ADP hardware alone will not be sufficient to provide the capabilities required for the wide range of WWMCCS functions. Redesign and modernization of the major applications software which supports a broad range of functions and users are essential.

Key modernization objectives are summarized as follows:

ESSENTIAL:

- * improve WIS performance in time-sensitive operations,
- * improve reliability and availability of support equipment (power, air conditioning),
- * facilitate WIS evolution and growth to meet future requirements, particularly in the light of changing enemy threats, US policy, and technological opportunities,

* modernize and enhance the current capabilities of WIS hardware, software, and related reporting systems, and

* improve ADP security controls and, if possible achieve multi-level security or an equivalent thereto (14:1100-1101).

Development of this joint-Service upgrade effort is projected into the early 1990's. The difficulty of the task will require a robust interactive network which will interface world-wide central computers with distributed processing networks. "The critical nature of WWMCCS's mission adds to the complexity of the project by demanding that the WIS installation be performed while the existing ADP system remains fully operational at all times" (3:85).

STATUS OF THE FIX

The responsibility for implementing WIS as a high-speed, more dependable system ^{has been} ~~was~~ given to Maj. Gen. D. L. Evans, who was appointed as WIS Joint Program Manager (JPM). Maj. Gen. Evans's grand strategy to accomplish this task is to first seek out the requirements to be converted to usable application software and then make the hardware selections (2:18). He stated, "Our fault in the past has been we've always tackled the hardware first. That's folly, if for no other reason than because of exponential [computer-communications] technology growth. I plan to tackle the software first; and, in parallel, make the network more robust" (2:12).

On 16 April 1986 Lt. Gen. Winston D. Powers, USAF, Director for the Defense Communications Agency (DCA), appeared before the House of Representatives Subcommittee on Appropriations to describe the DCA's FY 87 C3 budget for the Defense Communication System (DCS) and the National Communications System (NCS). DCA acts as the DOD focal point for strategic C3 missions and programs of which the C3 Architecture, Planning, Engineering and Integration, and the Joint Data Systems Support functional areas have prime impact on WWMCCS and the NMCS. The emphasis on the composition of these systems has generated a large budgetary request. Under the Strategic C3 Programs, the areas which are associated with WWMCCS and NMCS are the following:

FY 87 (\$ in millions)				
	RDT&E	PROC	O&M	TOTAL
NMCS-WIDE SUPPORT	10.5	3.7	6.0	20.2
WWMCCS SYSTEM ENGR	19.3	-	12.3	31.5
				(13:516-517)

↕
Under Defense-Wide C3 Programs, these areas are associated with WWMCCS and support the NMCS:

FY 87 (\$ in millions)				
	RDT&E	PROC	O&M	TOTAL
WWMCCS ADP	-	.4	27.4	27.8
WWMCCS ADP-NMCS	-	2.8	54.8	59.9
WWMCCS Information System (WIS)	-	11.7	13.9	25.6
				(13:519-520)

LIBRARY
ARMED FORCES STAFF COLLEGE
NORFOLK, VA. 2 511-6097

WIS for 1987 is directing its resources toward a broader set of enhanced services designed to expand test and evaluation. This approach will help in the integration of Joint Mission software and hardware as well as the integration of the WIS Common User Subsystems into the operational environment (13:520). Lt. Gen. Powers, in a presentation before the House Subcommittee on Appropriations, said:

New computer hardware for the WIS necessitates funding for hardware and software maintenance, system analyst support, hardware and software security, and computer operations. Funding is also required for development and testing efforts which are under way to support WIS interfaces and new WIS ADP equipment. Increased services will be provided to OJCS and OSD customers in the areas of tactical warning, exercise preparation and evaluation, force status, operational logistical and mobility planning; and the implementation of application software conversions to the new WIS hardware (13:520).

He concluded by stating that these budget requests for FY 87 represent the needed resources for a rapidly evolving C3 environment, resources that would establish C3 as one of our critical top priorities (13:522).

SUMMARY

One would have to be blind not to recognize that command, control, and communications play an ever-increasing role in all aspects of our defense posture. Since a system such as WWMCCS is very much needed, the major initiatives now underway to

totally overhaul it cannot be derailed or allowed to fall prey to the pitfalls of the past. The architecture of the 1960's will not last and in fact has been slowly failing, thus putting our critical command and control requirements in real danger. Any change to the current strategy of gathering requirements and validating them would be a step backward. Top managers must become more involved in the requirements definition process if critical crisis-management systems are to improve in reliability and in operational capabilities. The selection of hardware first has been and will always be the path of least resistance, a path that is sure to doom any system. In addition, a more streamlined acquisition process must be initiated if we expect to stay in stride with the technological advancements and be able to benefit from them. Rapid implementation of the recommendations recently published by the President's Blue Ribbon Commission would be a hopeful sign that the acquisition process, especially regarding C2 items, will gain a new and respectable strength. Our record of ADP development and C2 acquisitions clearly indicates the need for standardization in the design/development and procurement of our ADP systems. Only a continuing insistence on clarity in functional purposes and national information requirements can help us develop the useful military information system that this nation needs.

BIBLIOGRAPHY

1. Borklund, C. W. "Military Communications: The 'What' is Much Tougher Than the 'How'" Government Executive, Vol. 8 (June 1976), 23-29.
2. -- -- -- -- --. "Upgrading WWMCCS (World-Wide Military Command and Control System) to WIS (WWMCCS Information System): The Problem is in Turfdom, Not Technology." Government Executive, Vol. 15 (June 1983), 12-13.
3. Boutacoff, David A. "WWMCCS (Worldwide Military Command and Control System) Evolves to Meet Expanding Requirements." Defense Electronics, Vol. 16 (November 1984), 79-85.
4. Brown, Rhonda, and Paul Matteucci. "The High Cost of Whistle Blowing." Inquiry, September 1981, pp.15-18.
5. Comptroller General of the United States. LCD-80-22. The WWMCCS -- Major Changes Needed in its Automated Data Processing Management and Direction. Report to the Congress. Washington: GAO, 14 December 1979.
6. -- -- -- -- --. MASAD-82-2. The World Wide Military Command and Control Information System --Problems in Information Resource Management. Report to the Congress. Washington: GAO, 19 October 1981.
7. Crum, Stanley. "WWMCCS (Worldwide Military Command and Control System) ADP (Automated Data Processing): What Went Wrong?" Armed Forces Journal International, Vol. 120 (May 1983), 89,110.
8. Harrison, Robert B., Lt Col, USA, Maj Douglas E. Clemmer, USA, and Maj Larry W. Gold, USAF. "WWMCCS ADP: The Performance Story." Signal, Vol. 40 (January 1985), 47-53.
9. Morgenstern, John C. "C2 Systems Acquisition: The Requirements Problem." Signal, Vol. 37 (May 1983), 117-122.
10. ~~10~~ National Defense University. AFSC Pub 1: Joint Staff Officer's Guide 1986. Washington, 1 July 1986. UNCLASSIFIED.
11. Powers, Winston D. "The Greatest Challenge to DOD Communications is to Maintain a Worldwide System." Defense Systems Review and Military Communications, Vol. 2, no. 5 (June 1984), 6-14.
12. "Quest for Excellence." Final Report to the President by the Blue Ribbon Commission (Packard) on Defense Management. Washington, 30 June 1986. UNCLASSIFIED.

13. U.S. Congress. House. Committee on Appropriations. Department of Defense Appropriations. Hearings. Washington: GPO, 1986, pt3.
14. U.S. Congress. House. Committee on Appropriations. Department of Defense Appropriations. Hearings on Military Posture. Washington: GPO, 1981, pt4.
15. U.S. Congress. House Armed Services Committee. Subcommittee on Investigations. Review of Department of Defense Command, Control and Communications Systems and Facilities. Washington, D.C.: GPO, 1977.
16. U.S. Deputy Secretary of Defense. Memorandum. "WWMCCS Information System Joint Program Management Office (U)" with attachment (Joint Mission Element Need Statement (JMENS), WWMCCS Information System (WIS) Modernization, 9 February 1982. UNCLASSIFIED.
17. U.S. Joint Chiefs of Staff. JCS Pub 2: Unified Action Armed Forces. Washington, October 1974. UNCLASSIFIED.
18. --- WWMCCS ADP Concept of Operations and General Requirements for Post-1985. Washington, 6 February 1981. Updated and published as JCS Pub 19, Vol. II, Annex B, 25 February 1982. UNCLASSIFIED.
19. U.S. Office of the Secretary of Defense. Modernization of the WWMCCS Information System (WIS). Report for the Committee on Armed Services United States House of Representatives. Washington, July 31, 1982. UNCLASSIFIED.
20. U.S. Secretary of Defense. Decision Memorandum on the World-Wide Military Command and Control System (WWMCCS) Information System (WIS), Block A. Washington, 11 September 1985. UNCLASSIFIED.
21. Waks, Norman. "Inherent Conflicts in C2 Systems Acquisition." Signal, Vol. 37, (May 1983), 83-93.
22. "Why the 'ilities' in C3 Are 'Survive' and 'Interoperate.'" Government Executive, Vol. 14 (June 1982), 12-19.
23. "WWMCCS: Why the Goal is to Become More Robust." Government Executive, Vol. 14 (June 1982), 19-22.