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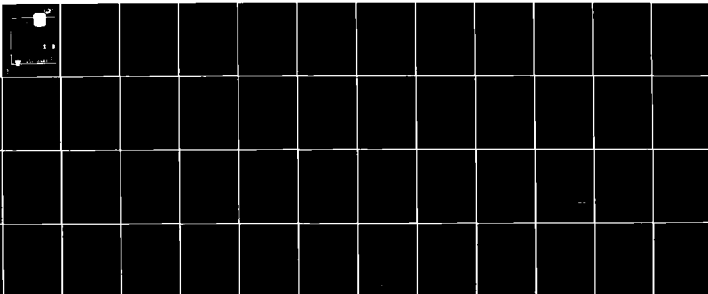
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CONCEPTUAL DESIGN AND DEVELOPMENT OF A JOINT SERVICE WARGAME. P--ETC(U)
JUN 82 J A MADDEN, J W MCDONALD

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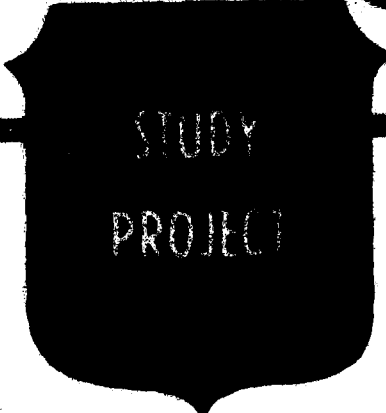
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JUNE 1982

CONCEPTUAL DESIGN AND DEVELOPMENT OF JOINT SERVICE WARGAME

PART I

by

LIEUTENANT COLONEL JOHN A. MADDEN

PART II

by

COLONEL JOHN W. MCDONALD

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SEP 3 1982
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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD A118916	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Conceptual Design and Development of a Joint Service War Game		5. TYPE OF REPORT & PERIOD COVERED Study Project
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) John A. Madden, Lieutenant Colonel John W. McDonald, Colonel		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS US Army War College Carlisle Barracks, PA 17013		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Same		12. REPORT DATE 8 June 1982
		13. NUMBER OF PAGES 44
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This study addresses the concept and design of a single Joint Service Simulations Model that can be used to develop theater level decision and communications prodedures. It specifically proposes continued expansion of the initial model to integrate common features from all Senior Service Colleges into the exercise play in TY 84 and TY 85. Part I looks at the conceptual design and development of joint war gaming between these colleges - specifically Army and Air Force. It is based on data obtained during the September through December 1981 time frame.		

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Item 20. (Continued)

Part II conducted January - May 1982, in the form of a concept paper, focuses on the development of a standardized joint service war game simulation. It uses Part I for background, but is focused on Spring 1982 data. Both parts examine the US Army War College, McClintic Theater Model (MTM) and the Air War College, Theater War Exercise Model (TWX).

> The study reveals that: (1) there would be many educational benefits resulting from joint war gaming; (2) senior military leaders support the concept; (3) all the senior colleges are interested in joint war gaming; and (4) the Army and Air War Colleges will conduct a Joint War Game in academic year 1983.

Part I highlights the action necessary to joint war game between the Army and Air War Colleges. Part II provides even more timely recommendations for linking the two schools and specifically mentions satellite linkage and sub-contractor involvement.

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US ARMY WAR COLLEGE

MILITARY STUDIES PROGRAM PAPER



CONCEPTUAL DESIGN AND DEVELOPMENT OF
JOINT SERVICE WARGAME

PART I

BY

LIEUTENANT COLONEL JOHN A. MADDEN

PART II

BY

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8 JUNE 1982

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ABSTRACT

AUTHORS: John W. McDonald, COL, FA
John A. Madden, LTC, USAF
Fred F. McClintic, Advisor

TITLE: Conceptual Design and Development of A
Joint Service War Game

FORMAT: Two Part, Joint Study Project

DATE: 8 June 1982 **PAGES:** 44 **CLASSIFICATION:** Unclassified

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Part I looks at the conceptual design and development of joint war gaming between these colleges - specifically Army and Air Force. It is based on data obtained during the September through December 1981 time frame. Part II conducted January - May 1982, in the form of a concept paper, focuses on the development of a standardized joint service war game simulation. It uses Part I for background, but is focused on Spring 1982 data. Both parts examine the US Army War College, McClintic Theater Model (MTM) and the Air War College, Theater War Exercise Model (TWX).

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PART I

SEPTEMBER - DECEMBER 1981

CHAPTER I

INTRODUCTION

Capabilities, Forces, Missions, Commands

As of early 1981, the United States has 3,330 missiles and artillery pieces with a nuclear delivery capability in addition to 1,024 strike aircraft.¹ We have 2,049,100 members in the armed forces and conventional weapons that are too varied and numerous to mention here.² This capability is all organized into land, sea and air forces committed to three specified and five unified commands. Many of these forces are tasked to serve with the 13 other NATO nations. Beyond the NATO central European region there are at least two other areas in the world where major conflicts could erupt.

Against the US there is a foe that is equally capable from a nuclear standpoint and has superiority in manpower and conventional weaponry. To maintain the peace or win the war will require very capable leaders and managers. A real crisis or conflict is not the time for our senior officers to get "up to speed" through "on-the-job-training."

War Gaming

The most practical way for senior officers to gain "combat" expe-

rience in high level decision making is to simulate employing/war game the resources that will be at their command.³ The educational benefits accrued from war gaming are heightened when potential conflict scenarios and theaters are used in the play. It should be noted here though that gaming does not provide "the" strategy or tactic . . . it trains the commander or staff officer to ask the right questions, to make complete assessments, to address short and long term implications and to ask the "what ifs."⁴

Presently war gaming is receiving considerable emphasis in the military. The Senior Service Schools are some of the primary vehicles used to train our senior military leaders. (Author's Note: For the purpose of this paper, senior officers are those LT Colonels and Colonels in SSS's and officers of higher grade and position.)

CHAPTER 1

ENDNOTES

1. "The Military Balance 1981/82," Air Force Magazine, December 1981, pp. 122-123.
2. Ibid., p. 125.
3. Francis B. Kapper, "The Simulation of Crisis," Defense 81, May, 1981, p. 14.
4. Ibid.

CHAPTER 2

THE PROBLEM

New Focus

The good news is that the services are war gaming and the bad news is that the services focus primarily on their own roles. Mastery of one's own job is primary of course, but as was shown in the introduction, there are many forces, services, commands and scenarios. No one service can do the job alone. To maintain the peace or win if called on to fight will require the utmost in teamwork -- a coordinated joint effort.

General Dwight Eisenhower had a similar problem during the war years of the late 1930's and early 1940's. The senior command colleges had been the exclusive property of the individual services and each focused heavily on service -- not joint -- military doctrine. The results were numerous problems on joint and allied operations during World War II. The creation of a joint school, the National War College, the ward of the Joint Chiefs of Staff, was General Eisenhower's recommendation.¹ The recommendation was carried out, but in the areas of joint conflict management, the military has not gone far enough in war gaming.

It would be an omission to say that the various services do not address the other service branches' roles and missions. They do, but in

virtually all cases, it is in a canned and sterile way — much like fixed scenery on a stage.

Initiatives

There are, however, initiatives to solve the problem of lack of dynamic inter-service war gaming. In a 1 February 1978 note to the Army War College Commandant, General Edward C. Meyer, Army DCS Ops & Plans, asked, "... how the Army might interface with the Air War College (AWC) on the computer assisted war game" He was not satisfied with air/land interface.² Since then General Meyer has become the Army Chief of Staff. His 1979 charge to the US Army War College (USAWC) was to include the Integrated Battlefield in the joint war games and increase Army and Air Force interface.

In an interview with the Washington Post, Air Force Lt General John S. Pustay, President of the National Defense University (NDU), stated that courses for senior officers should,

... focus on ... joint military strategy, doctrine and tactics . . . Heavy stress should be placed on operational questions stemming from joint capabilities, limitations, procedures and problems³

During an 8 December 1981 briefing at the USAWC, Lt General Pustay further remarked that it is,

... essential that War College centers work together on annual global and theater war games. It would help the entire nation. It is important to build in linkage so we can work together.⁴

The Challenge

It is clear then that our challenge is to take the next logical step forward in war gaming and do it on a joint basis involving not only the Army and Air Force, but the Navy and National Defense University as well.

CHAPTER 2

ENDNOTES

1. Douglas B. Feaver, "A Course for Brass to Polish Their Skills?" Washington Post, December 7, 1981, p. A13, col. 5-6.
2. Memo from Gen Edward C. Meyer, Army DCS Ops & Plans, to MG D. C. Smith, Commandant, USAWC, February 1, 1978.
3. Kapper, loc. cit.
4. Remarks by Lt Gen John S. Pustay, President of the National Defense University, at the USAWC, Carlisle Barracks, 8 Dec 1981.

CHAPTER 3

DEFINITIONS

Computer-assisted Game

A manual game utilizing digital computer assistance for bookkeeping and damage assessment. Also called a manual-computer game.

Educational Game

A game conducted to provide military commanders or executives with decision-making experience, and to familiarize them with the operations and problems involved.

Level

The range of the echelons of military command which are represented by the players in a war game. Also, the lowest echelon of command which is represented by players.

Model

A representation of an object or structure, or an explanation or description of a system, a process, or a series of related events.

Scenario

A chronological listing of pre-planned situations, events, messages, etc., to be generated by the control group in order to confront the players with situations requiring decisions during the play of a one-sided game. (Author's note: Also applies to two-sided game.)

Simulation

An operating representation of events and processes.

Subroutine

A program which can be stored in the main or auxiliary program of a digital computer and used as part of other programs to perform a specific operation; e.g., a square root subroutine.

Two-sided Game

A game in which there are two opposing players or teams of players.

War Game

A simulation, in accordance with predetermined rules, data and procedures, of selected aspects of a conflict situation.¹

Joint War Game (Author's definition)

A war game played by two or more service schools using common scenarios and compatible goals, decision levels and training time frames. Land, sea and air elements are joined into united forces via appropriate communications and data links.

CHAPTER 3

ENDNOTES

1. Francis J. McHugh, "Definitions," Fundamentals of War Gaming (Newport: Naval War College, 1966) pp. C-2-10, 3d ed.

CHAPTER 4

WAR GAMING REQUIREMENTS OF THE USAWC, AWC & BEYOND

Logical First Step

Focusing on joint war gaming, the USAWC and the AWC are the combination that provides a logical first step. Preliminary contact has been made between the schools and they have compatible hardware. An examination of their educational requirements is now in order.

USAWC

The USAWC Advanced Courses Directive for Academic Year 1982 gives the following description for the Simulation and Gaming Course.

1. Objective: Conduct and interpret the results of operational simulations involving models ranging from sand tables to elaborate computer games.
2. Scope.
 - a. The course is designed for the decision maker.
 - b. Uses war games and politico-military simulations.
 - c. Addresses the theory and practice of war gaming.
3. Methodology.
 - a. Examines problems involving land warfare, force capabilities and requirements and strategic mobility using
 - (1) Politico-military simulation, a
 - (2) Strategic mobility model, and a

(3) War game, theater level.

b. A class of 16 students will play two-sided war games requiring the decision making process in AY 82. All students will play in AY 83.

4. Requirements: The practical application of political, economic and military knowledge obtained in previous classes through simulations and war gaming.

5. Timing

a. 22 March - 28 May 1982

b. Thursdays, A.M. (0830-1200)

ANC

The Theater War Exercise (TWX) is the ANC's simulation that is compatible for senior level joint war gaming with the USAWC. The Air University Educational Simulations and Exercises Pamphlet dated 13 June 1979 describes TWX as follows:

1. Objectives: Allow the players to gain insights into decision processes relative to the principles of war, war fighting systems, and force employment decisions to military objectives of war.

2. Scope

a. The course is designed for the decision maker.

b. Uses war games.

c. Particular emphasis is placed on resource allocation and force employment decisions (beddown, logistics, and dispersal).

3. Methodology

a. The use of a two-sided theater-level war gaming exercise.

b. Computerized air and land battle simulations.

c. Up to 22 Blue teams. Opposition is by Red team(s) or a

predetermined Red air campaign plan.

4. Requirements: The practical application of air power through appropriate logistics, beddown, dispersal and operations apportionment and allocation. The principles of war are to act as guiding tenants.

5. Timing

a. A 3-5 day exercise

(1) Planning/build-up phase: 8-15 hours.

(2) Execution: 5-9 hours per day.

b. March of each academic year.²

Comparison of Requirements

A comparison then of the two schools' requirements reveals that:

1. They are educationally oriented.
2. Focus on theater level decision making.
3. Use computer assisted war games.
4. Each school primarily addresses its service's role using the other service's forces as a backdrop.
5. Training times are distinctly different.

NWC

The Naval War College (NWC) and National Defense University requirements provide a final note in this chapter.

The NWC with a long and extensive history in war gaming,³ has compatible educational objectives involving single iteration gaming.⁴ A scenario involves theater level decision making in sea scenarios (NATO resupply, Mediterranean, Indian Ocean, North Atlantic), up to Marine air and beach assaults. Decision making is at the following levels:

1. Task force commander. Task force being one to two aircraft

carriers, 12 support ships and amphibious vessels.

2. Air assets commander.
3. Screen assets commander.
4. Maritime Patrol Aircraft (MPA) assets commander.
5. Submarine force and area commanders.
6. Amphibious forces commanders.⁵

Preferred rate of game play is one training hour equals one hour of combat. A new facility and the installation of a Honeywell Level 68 Multex mainframe computer in April of 1982 will enhance the school's war gaming capability.⁶ The integration of the facility and computer into the school's curriculum will however delay joint war gaming play for the near term.

NDU

The NDU with two senior service schools, the National War College and the Industrial College of the Armed Forces, has educational objectives for war gaming. Their focus is on joint decision making at the National Command Authority, Joint Chiefs of Staff, Unified/Specified Command and Theater levels. The NDU will meet its objectives this spring for its 14-16 war gaming students through classes taught in part by the Joint Chiefs of Staff (JCS) Studies and Analysis Gaming Agency (SAGA). A manual game is planned. NDU has 75 portable terminals (Texas Instruments Silent 700). As they have no dedicated computer themselves, they time-share using other agency main frames. Expanded capabilities are planned such that a joint exercise Globex can be played in academic year 1984.⁷

CHAPTER 4

ENDNOTES

1. "Simulation and Gaming," USAWC Advanced Course Directive, (Carlisle Barracks: USAWC, 1981), p. 80.
2. "Theater War Exercise," Air University Educational Simulations and Exercises, (Maxwell: AU, 1979), pp. 2-52-55.
3. Francis J. McHugh, "History of War Games," Fundamentals of War Gaming, (Newport, Naval War College, 1966) pp. 2-20-58. 3d ed.
4. Letter from LCDR M. C. Thomas, NWC Center for War Gaming, December 1981.
5. Statement by CMDR Ray Heinz, NWC Center for War Gaming, telephone interview, Newport, RI, December 7, 1981.
6. Ibid.
7. Statement by COL Jim Bambery, NDU Center for War Gaming, telephone interview, Ft. McNair, Washington, DC, December 2, 1981.

CHAPTER 5

APPLICATION OF EXISTING WAR GAMING MODELS AND SIMULATION TO MEET USAWC AND AWC REQUIREMENTS

In this chapter the author will describe the USAWC's McClintic Theater Model (MTM) and the AWC's Theater War exercise Model (TWX). Linkage alternatives will then be proposed.

McClintic Theater Model

The MTM is a closed, two-sided, interactive computer model. It allows simultaneous input of orders from both sides. A knowledge of computer programming is not required. Input orders are entered in a natural, spoken manner in which spacing, order and extraneous words do not matter. The model is time driven at rates varying from 0 up to 72:1. Normal ranges are from 5:1 to 24:1. It is a four service model that can address such features as: airlifts, sealifts, naval gunfire, suppression of enemy air defenses, close air support, and interdiction. Factors considered include weather, time of day, trafficability of terrain and road networks, electronic warfare, intelligence, local population, ten classes of supplies, units carrying capabilities, and others.

Pregame inputs consist of terrain and road network data and orders of battle (25 data items on each unit). Of particular significance is the fact that it takes one day to input data to change from a scenario say in Central Europe to Southwest Asia. Inputs during the game consist

of orders to units in free-form style by means of typewriter keyboard or voice command.

During the game the following are some of the outputs which are provided:

- Estimated times of arrival
- Logistics warnings
- Logistical reports
- Situation reports
- Intercepted enemy radio traffic
- Indirect fire damage reports
- Airstrike damage reports
- Nuclear/chemical weapons usage
- Intelligence reports (5 types)
- Combat/battle reports

After action analysis can be provided in the form of graphical outputs such as graphs, bar charts, maps, or a printout of specified variables.

The model is constrained by a maximum number of units -- 300. Maximum map dimensions are 6 ft by 8 ft. Both units and dimensions can be expanded if additional computer memory is available.

Hardware consists of a Honeywell 6060 (belonging to the World Wide Military Command and Control System) or Altos 8000 series microcomputer. FORTRAN and PASCAL are the respective programming languages. The minimum storage requirement is 69K for the Honeywell and 208K for the Altos. Optional peripheral equipment is the Tektronix graphics terminal.¹

Theater War Exercise Model: The TWX is a two-sided theater-level war gaming exercise using computerized air and land battle simulations. The

goal is to assess the players' impact on resource allocation decisions in a NATO Central Region conflict scenario. The air battle is dynamic and represents decisions made by the Allied Air Forces Central Europe (AAFCE) and Second and Fourth Allied Tactical Air Forces (ATAF) commanders. Warsaw Pact Frontal Aviation and appropriate tactical Air Army "commanders" represent the opposing force. The land battle is preprogrammed over an initial 5-day conventional battle sequence representing a pact thrust into Western Europe. The major variable influencing the land battle is tactical air power. The full range of tactical air missions are available. Further, Strategic Air Command contingency forces and Strategic Reserve tactical air units may be time-phased into play.

The introductory phase requires 4-10 training hours and represents 72 hours of warning time. Appropriate buildup actions are then taken. After the planning phase, which takes 8-15 training hours, a team is ready for war and has completed Air Operation Orders consistent with posture and objectives. After these orders, which specify types of aircraft and numbers of sorties for each air mission, are entered into the TWX computer system, the first day of the war is executed. Computer assessment of the air battle is done "off line" and the results are returned to the players at the start of each game day during the execution phase. The cycle thus then becomes a loosely structured analysis-planning-implementation cycle taking 5-9 hours per day. The functional responsibilities during planning and execution are apportionment, allocation, force posturing and logistical support. Three to a maximum of five days constitute the exercise duration.

The TWX can support up to 22 teams playing simultaneously. The model is currently configured for NATO's Central Region. It would take

2-6 months to gather data and build a new base. Basic limitations which cannot be exceeded are as follows:

Airbases per side	80
Aircraft types per side	50
Air munition types per side	10
Cycles per day	2
Land units per side	300
Types of air missions	9
Weather states	3
Exercise days	5

Two computer programs are available. The AAFCE Planning Executive (APE) and Mission Input (MI). APE allows manipulation of the air force data base during the planning and execution phases. The MI program provides the ability to build an ATAF air mission file.

The air and land battle simulations may be executed independently; however, interfaces between the air and land simulations permit transfer of data elements essential to assessment of the impact of tactical air power on the ground war.

In the form of a limitation, TWX does not, by design, explicitly address command and control or the procedures required to execute the air missions planned by the players.

SYSTEM SPECIFICATIONS: Machine: Honeywell 6060

		Language:	FORTRAN	
		Execution	Number	
<u>Program(s)</u>	<u>No.</u>	<u>Core</u>	<u>Instructions</u>	<u>Mode</u>
Input	4	16-17K**	12K	Time-sharing
Simulation	2	58-80K*	10K	Batch
Utility	26	7-50K	15K	Time-sharing/Batch
*overlayed				

DISK REQUIREMENTS: Programs 3408 blocks**

Files	<u>No.</u>	<u>Size (blocks**)</u> ²
Reference	25	1014 total
Team	24	2548 each

**1 block=320 words

Linkage Alternatives

The MTM and TWX models and simulations have much in common but as one might imagine, linking the two together for joint play will involve some work. Four alternatives are presented here which would tie the USAWC and the AWC models together for joint war gaming.

Alternative 1: Modify the MTM. This would involve the AWC rewriting, modifying or approving the following routines in MTM:

AIR
AIRORD
AIRLIFT
DCA
ASSIGN
RECON
AIRAIR
AIRGND
AIRROAD

The advantage would be a smaller (6,000 statement), newer, faster and more flexible joint model. Possible failure to satisfy AWC educational objectives is a disadvantage.

Alternative 2: Modify the TWX. This would involve the USAWC rewriting, modifying or approving the following routines in TWX:

Ground Maneuver
Air Defense
Ground Based Radar
Ground Combat

The disadvantages would be lack of flexibility, just a NATO scenario, batch processing (1 run/day), 100,000 statement size program. Additionally, this would not satisfy USAWC educational objectives.

Alternative 3: Interface MTM and TWX. MTM would send to TWX the ground order of battle and TWX would send to MTM the number of sorties of each aircraft type available on target after air to air and air to ground attrition. This would occur for each 24-hour period.

This option satisfies the educational objectives of both insti-

tutions with a minimum amount of reprogramming. The disadvantage is the total program size -- 106,000 statements.

Alternative 4: A joint effort with people from both schools participating in the development of an entirely new joint model acceptable to both schools. While a goal to aim for, in the future, this alternative would require the most effort of those proposed. It would not be possible to complete this project by 1984 with existing manpower.

Associated with the linkage problem is the subject of when to play, for how long and at what model speed. Given the existing models and curricula with two and three year lead times, a four day period with speed of play where one training day equals 24 hours of combat, is compatible. Within the day, the USAWC can play four two-hour periods (mornings) to represent four days of battle and the AWC can play four eight-hour periods (days) to represent four days of battle.³

CHAPTER 5

ENDNOTES

1. Fred McClintic, McClintic Theater Model (Carlisle Barracks, USAWC, 1981), Vol I-III.
2. "Theater War Exercise," Air University Educational Simulations and Exercises, (Maxwell: AU, 1979), pp. 2-52-55.
3. J. Madden, F. McClintic, J. McDonald, B. Moss, "Trip Report, Joint Service/College War Game Coordination Meeting, Maxwell AFB, Ala., November 16-18, 1981," December 11, 1981.

CHAPTER 6

RECOMMENDATIONS FOR A NEAR TERM JOINT WAR GAMING CAPABILITY (1984)

Interfacing MTM and TWX

Alternative 3, *interfacing MTM and TWX*, is the alternative recommended by this author to initiate joint war gaming between the USAWC and AWC. It would satisfy the educational requirements of both schools, is possible to accomplish with resources available and offers the earliest opportunity for joint gaming. It does, however, tie the USAWC to the NATO scenario only for near term joint war gaming. A joint curriculum conference is needed to identify gaming periods for AY 83 and AY 84.

Concept Definition

This research project will continue throughout the academic year. Numerous visits to the other service colleges and agencies involved may be required. Current curriculum programs must be addressed to develop common learning objectives. The multi-lateral coordination and communication proposed by this study procedure will best demonstrate the effectiveness of our concept.

CHAPTER 7

RECOMMENDATIONS FOR LONG TERM JOINT WAR GAMING CAPABILITY

A checklist of items to consider when planning for the future:

1. Build on short term "lessons learned."
2. Long term solutions will probably not be the same as for the short term. Existing capabilities are not necessarily optimum, e.g., 106,000 FORTRAN statements, one scenario.
3. Expand MIM to satisfy AWC educational objectives or develop a new model.
4. Plan for inter school communications links . . . unclassified and classified.
5. Think three years ahead when addressing curriculum alignment.
6. Design in data base compatibility.
7. Initiate war gaming conferences on an annual basis. Consider meeting before the academic year begins.
8. Identify requirements for an "ideal" model: Scenario flexibility, "user friendly" (easy for the student to use), nuclear and chemical capabilities, variable speed, independence from specific hardware (useable on any computer).

CHAPTER 8

METHODOLOGY AND RESOURCE REQUIREMENTS

USAWC and AWC

To join the USAWC and the AWC together in joint war gaming using MIM and TWX models, the following is required:

1. Agree on identical air orders of battle, ground orders of battle, terrain and scenario.
2. On the MIM - turn off the following subroutines:
 - DCA
 - AIRAIR
 - ASSIGN
 - AIRDEF
3. On the MIM - modify the following subroutines:
 - AIR
 - AIRORD
 - AIRGND
4. TWX - Turn off or ignore these subroutines:
 - Ground Maneuver
 - Ground Combat
5. MIM - Send to TWX a file containing unit #'s, unit % strengths and unit locations.
6. MIM - Translate MIM coordinates into TWX coordinates.
7. Acquire three data quality and one voice quality dedicated telephone lines between USAWC and AWC.
8. MIM - Send data file (#6 above) over communications lines.
9. TWX - Write file to send to MIM containing type of aircraft, # of sorties, ATAF assignments.

10. TWX - Send data file (#9 above) over communications lines.

A proposed sequence of play between groups at the two schools:

1. Day One

- a. TWX play eight-hours to arrive at available # of sorties.
- b. Send sortie data to MIM.

2. Day Two

- a. MIM play three-hours, A.M.
- b. P.M. - MIM send unit locations and strength data to TWX.
- c. Voice coordination over voice lines, with the Air

commander giving the Army the air resources available for the next day. The Army commander would then give the Air commander his offensive Air support requests.¹

NWC, NDU

Resource requirements for the NWC and NDU are necessarily vague at this point. They should however, embody the capabilities identified in Chapter 7. Recognizing that each school may have a different type of computer, special emphasis should be given to software compatibility with a variety of computer hardware.

CHAPTER 8

ENDNOTES

1. Statements by Fred McClintic, GS-14, Director of USAWC War Gaming Systems Support, Col Dean Pappas, Dir AWC War Gaming, personal interview, Maxwell AFB, Ala, November 17, 1981.

CHAPTER 9

CONCLUSIONS

The armed forces possessed by the United States are vast and powerful, as are the forces of the Soviet Union. In pursuit of peace or victory, managing these forces will not be easy. War gaming is a far better approach than relying on OJT. But, gaming must not be limited to single service roles and missions. General Eisenhower very clearly pointed out the need for joint training. Currently, many of our key senior leaders are supporting this joint training in the form of joint war gaming.

It is encouraging to find that the senior service schools have basically compatible educational war gaming goals. In addition, each of the schools displayed considerable interest and enthusiasm for joint war gaming. The NWC is taking delivery of a new gaming computer and both the AWC and NDU expect to purchase computers in the near future. Another encouraging note is that technical problems are not insurmountable . . . computers can talk to each other and software changes, while taking time, do not pose a real stumbling block.

Perhaps the most difficult administrative problem is that of aligning school curricula to provide a common time window for joint gaming. Cooperation, flexibility and lead time are the solutions.

The bottom line — joint war gaming between the senior service schools is desirable and achievable.

CHAPTER 10

FINAL RECOMMENDATIONS

A workable roadmap to joint war gaming is contained herein. At the working level the enthusiasm is there. Many of our key military leaders are also in complete support of this goal. To the end that this joint effort is achieved in the next few years, it is appropriate to suggest very generally, that what is needed now is:

1. A leader who will be continuously supportive.
2. A prestigious person, under the top leader, who will devote most of his energies to the effort.
3. Participation of those officials who will be affected in the change effort.
4. Experimentation in those problem areas where a significantly useful progress can be demonstrated -- and advertisement of that progress.
5. A few participants in the change effort who command prestige among the groups of officials where support is mandatory.¹
6. PERSERVERANCE!

CHAPTER 10

ENDNOTES

1. Michael J. White and others, Managing Public Systems (North Scituate: Duxbury Press, 1980), p. 139.

TABLE 2

SENIOR SERVICE SCHOOL LOCATIONS AND WAR GAMING CONTACTS

US ARMY WAR COLLEGE
Carlisle Barracks, PA

COL Ray Macedonia/AV 242-3843
COL Wally Franz
COL Frank McGurk
Mr. Fred McClintic/AV 242-3017

AIR WAR COLLEGE
Maxwell AFB, Ala

COL Dean Pappas/AV 875-7831

NAVAL WAR COLLEGE
Newport, RI

CMR Ray Heinz/AV 948-3746

NATIONAL DEFENSE UNIVERSITY
Washington, DC

COL Jim Bambery/AV 223-8412

PRECEDING PAGE B

NOTE TO THE READER: This concludes Part I of the joint war gaming study. Part II will reflect information gained from scheduled visits and game play between the Army and Air War Colleges in the Spring of 1982.

PART II
JANUARY - MAY 1982

CONCEPT PAPER

DEVELOPMENT OF A STANDARDIZED
JOINT SERVICE WARGAME SIMULATION

Background.

The coordinated interaction of joint military decision making processes can produce increased strength through . . . synergism. The timely combination of this countries' military resources will potentially develop the most efficient military force. These relatively obvious statements are complicated by the proposed modernization and introduction of over one hundred seventy new operational systems into military organizations within this decade.

Exploding technology, design sophistication and the accompanying rise in production costs make reliability, user training and trial application of employment doctrine, increasingly sensitive to the time/value equation. Since actual deployment is very costly and often inefficient in time and dollars, it is therefore impractical for the training of higher level commanders and their staffs.

Hypotheses:

1. Theater level war game simulations will most efficiently

prepare military decision makers for the future uncertainties of increasingly complex and diverse battlefields.

2. Current state of the art computer data bases are representative and practical reflections of reality as well as historical experience.

3. The timely feedback and comparative analysis of alternative decisions, that modern computer technology offers, will direct and reinforce rational player judgments.

4. The computer then can be used as a tool to supplement and expand player knowledge through the apparent compression of time and detail.

Problem.

Numerous models exist today, however, they lack a common thread of interoperability. A recent search through the Defense Technical Information Center at Camron Station (#HJLO9B) revealed more than 370 unclassified computer assisted war games. This list did not address the classified or nonpublished models from private contractors that are being developed daily. In practice, most computer simulations are designed for only one user depending on the money available and vary from extremely simple to sophisticated complexities that strain even today's technology.

There is a distinct requirement for a common military model addressing theater level, interservice decision makers that can:

1. Facilitate the coordination and communications within and between the military services.

2. Be easily adapted to different service learning objectives and doctrinal parameters.

3. Reflect specified disciplines within each service (operations, planning, intelligence, logistics, etc.)

Objective.

The integration of joint service doctrines and procedures into a common model. Joint service model interoperability would be very cost effective for training current and future decision makers in the employment of this country's limited military resources.

In his recent addresses to both the Army War College (USAWC) and the Air War College (AWC), General Vessey, nominated Chairman of the Joint Chiefs of Staff, emphasized the increasing need for synergy between a coordinated C³I and the rapidly expanding operational technologies of today's military systems.

The Joint War Games Agency of the Office of the Joint Chiefs of Staff conducts classified simulations three or four times a year for our nation's senior leaders. Each of the Senior Service Colleges conducts numerous war game simulations for their own constituencies. The combination and coordination of already existing programs would make a significant step towards insuring our proposed objective. This is not to imply that the task will be either simple or easy . . . or inexpensive, but the relative rewards to be achieved in future efficiencies and overall effectiveness of our military power is almost limitless. Surveys and analyses of concepts, models and applications of technology throughout the civilian contractor and military networks should be explored. Training curriculum development at all levels of the military, to include senior officer orientations, should be studied. As the integrated Joint Service decision model concept becomes effective, service peculiar packages also applicable to specific military disci-

plines can then be included to represent the conduct of various intensities of war in diverse geographic locations.

Coordination between the Senior Service Colleges has already begun. (Tab A trip reports.) Military studies groups have visited other schools to determine common learning objectives and review current models and procedures. The milestones agreed upon below between USAWC and AWC project a graduated integration of the evolving Joint Model into their college curriculums.

Milestones

- OCT 81 USAWC Direction and orientation for TY82 military studies project "Joint War Game"
- NOV 81 Visit Maxwell AFB
- FEB 82 Controller participation, MTM exercise
- MAR 82 Visit Maxwell AFB, TWIX exercise
- MAY 82 Air-Land Battle Symposium (ALFA) Demonstration current Joint Model (Tab B)
- AUG 82 Faculty shakedown run of modified Joint Model
- TY 83 Military studies orientation for air-land Joint Model exercise
- TY 84 Joint seminars Joint Model Exercise in core curriculums . . . plus . . . military studies orientation to include Naval War College (NWC) integration into project groups Joint Exercise
- TY 85 Joint seminar groups air/land/sea Joint Exercise in core curriculums
- TY 86 Senior Officer Orientation Course, USMC, and project expansion into all military curriculums

The simplicity of this chronology belies its complex reality. It is by no means an easy task to merge the processes and thinking of large

organizations regardless of their overall common objective. The problem can, however, be approached by segmenting various aspects of the collage for intensified study. Special projects can focus on operational service interface points. Separate studies on standards, technologies and procedures can all segregate agreed upon criteria which can then be woven back into a congruent model. Studies are underway now to examine available technology and its relative cost as well as current and proposed military/civilian contracts -- in the field of modeling.

Discussion and Recommendations.

For more insight into this proposed project I would like to focus on some of the agreements, recommendations, problems for the current phase of the air/land model, TY 82.

1. Individual school curriculums must be synchronized to provide interlocking periods for joint school coordination/participation in model development and execution. Military studies programs (USAWC terminology, September-May) can be used for continuity throughout the academic year and advanced course projects (April-May) can be used for less complicated short term projects as well as the Joint Exercise. Various credits/points can be awarded to students based on the amount of work required for their project. This sequenced scenario fits in well with the military studies/advanced course/exercise controller programs of the USAWC and the AWC.

Curriculum content planning for the Joint Exercise sequence should include introduction and background (lead in) classes to show continuation from less complex scenarios earlier in the year (MTM, TWIX) and emphasize the joint nature of the operations in this segment. Consideration should be given to two periods of background (preparatory)

briefings and possibly the following week for the play of the exercise. More about this later when I discuss real-time sequences.

2. The air-land service interface for the theater level is primarily at CINCENT/AAFCE; Army Group/ATAF and Corps/ASSOC. A detailed study and recommendation for the procedures and information requirements at these junctures is being developed in a separate study by LTC Dennis Cole (USAF) USAWC Class 82.

3. The Army Land Module (MTM) and the Air Force Air Module (TWK) can then be combined into the Joint Model. Due to time and personnel constraints current momentum can best be maintained by fragmenting the development and implementation of joint educational and hardware linkage. Close supervision and direction should be maintained by USAWC project managers and work should begin early in TY 83 through assignment of military studies and advanced courses. Whether the Joint Model is operated from one or more computers and how data is transmitted to player terminals should be the objective of still another study, possibly by outside sub-contract also. It appears, however, that the AWC Honeywell computer could best handle the data base for gaming both modules as it has fewer priority constraints than the USAWC computer at this time. It is recommended that the Army module evaluate effectiveness on the ground, firepower ratio, attrition, land movement speeds etc., through its module and the Air (and Navy) module evaluate and assess their capabilities and effectiveness in their areas of expertise.

4. Player element locations should be identified by a common grid on all modules. This will require some modification to subroutines as the hexagonal shaped grid, though not now common to all modules, seems to offer the most flexibility for control and processing of prioritized surface movement in computer programs.

5. An exercise glossary should be developed to insure understanding and common terminology. For example: weather is to the Air Force as terrain is to the Army and apportionment, allotment, allocation, etc. all mean different things to airmen and artillerymen.

6. Who plays Red Forces? The faculty with the aid of computer subprograms could represent Red force tactics and doctrine or special groups of advanced course (elective) students, possibly one half of each Seminar Group could research and demonstrate relative Red force capabilities. Each college could solve this problem internally as to number and technique as the USAWC would represent both the Blue and Red Armies and the AWC would represent both the Blue and Red Air Forces, etc. The Army would represent rotary wing army forces due to their employment missions and the Air Force would control their elements of fixed wing.

7. The most tenuous challenge to the programmed sequences of real-time interschool exercising is the distinction between and representation of the day of planning and the day of battle considerations inherent within each module. The USAWC model execution embraces theater level decisionmaking and focuses on force structure and the metering of time, space, tempo and distance. The AWC also considers theater level decisionmaking, but focuses on the elements of weather, time, space, etc. and the detailed planning of logistics. Current emphasis is not as polemic as it might first appear. It is recommended that the USAWC scenario be expanded to include a start of battle day, CINCENT Staff briefing, complete with AAFCE represented by an Air Force student in the Seminar Group. The AWC scenario should include an Army student in its Seminar Group as LNO from CINCENT for their COMAAFCE staff briefing at the beginning of each battle day. It would be

extremely beneficial to common understanding for all groups in the different schools to observe each other in the actual performance of their briefings. This could be accomplished by satellite transmission relay and distributed locally (throughout each school) by closed-circuit TV hookups. This would reflect the real world interface requirements of joint operations.

A concentrated seven to ten day period of introduction/background and exercise execution is recommended as opposed to one afternoon a week for seven to ten weeks (elective/advance course period). The training value of live video communications vs the leasing cost would have to be evaluated. The multi-week schedule would extend interschool communications lease expense and also lose much of the real-time learning momentum to be gained through concentrated exposure to the scenario sequences.

The variations in length of time for the planning/execution phases of the various modules could be compensated for by the addition of the staff briefing into the USAWC module to slow it down and certain computer subprograms into the AWC module to speed it up. The exercise should cover eight to ten days of battle to fully demonstrate the soundness or errors in guidance and judgments made on Day One. Designated criteria should be aggregated to formulate a meaningful post-exercise critique.

If the actual length of time for a Day of Battle execution cannot be appropriately extended/compressed then another possibility would be to have alternate, or half days of play for the rapid modules with other studies the remainder of the day for effected students.

Conclusion

These recommendations are intended to maximize and perpetuate institutional memory in the extremely fragile arena of military doctrine and force structure development. Our country cannot afford unnecessary cost or expensive mistakes in the use or recommended use of its sources of power. A review of systems and technology now in use throughout the military and civilian sectors will be a major step towards cutting costs. The synchronous thinking by the military's senior officers supporting Joint Operations will be a valuable asset in the command and control of future battlefields.

The USAWC can be a leader in the effectiveness of this evolutionary process.

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EXECUTIVE SUMMARY

Subject: Joint Service/College Wargame Coordination Meeting,
Maxwell AFB, 16-18 Nov 1981

Representatives

Col Robert E. Moss
Dir, Cont. Plan. DMSFO

LTC John Madden
CL 82 Mil. Stdy. Proj.

Col John W. McDonald
CL 82 Mil. Stdy. Proj.

Mr. Fred F. McClintic
Dir. Syst. Supt. DWG

Highlights of meeting

- a. We received a briefing and demonstration of the AWC computer assisted model (Tab B, Agenda)
- b. Joint curriculum educational objectives were discussed as a sequence, exercise times allotted and player input (Tab C, Edu. obj.)
- c. MTM model data was passed from USAWC computer to the AWC computer via AUTOVON line.
- d. Jet Propulsion Laboratory offered to transfer two Slow Scan Transceivers to USAWC for information transmissions.

Agreements

- a. Common terrain (Fulda), command levels, educational objectives and main frame computers exist.
- b. Common grids, order of battle, exercise sequence and times can be programmed with very little program redesign.
- c. One voice quality and three data quality telephone lines will be required to exercise one group each at USAWC and AWC.

Major area of concern

Rates of input for calculations vary between the models and will require USAWC to play two hours each of four mornings to represent four days battle and that AWC plays four eight hour periods to represent four days of battle.

Recommendations

- a. Technicians at both colleges make necessary program design modifications.
- b. Trial exercise, executed by respective faculties be tested in the Feb/Mar 82 time frame.

EXECUTIVE SUMMARY

Subject: Joint Service/College Wargame Coordination Meeting
Maxwell AFB 15-19 Mar 1982

Representatives (Tab A)

Col John W. McDonald
CL 82 Mil. Stdy. Proj.

LTC Dennie Cole
CL 82 Mil. Stdy. Proj.

Highlights of meeting

- a. We participated in TWIX exercise with seminar groups 11 and 17 over a three day period (Tab B, copy of exercise).
- b. Interface points for communication between proposed seminar groups at different geographic locations were identified.
- c. Maxwell AFB Honeywell could be used during the exercise due to relative freedom from priority conflicts.
- d. Closed circuit TV for joint briefings would be a very effective learning tool for each battle day.
- e. Battle day phasing on alternate days or consecutive weeks would be acceptable to both curriculums.
- f. Damage assessment — times/rates etc.
Air = NWC; Gn = USAWC
- g. Control grid could be modified to hexagonal shape.
- h. Sports Day/Air-Land Symposium would be a good time to review and project milestones.

Major areas of concern

- a. Common definition of intraservice terms.
- b. Use of OAS and OCA planning interface.
- c. Who plays Red air and land forces.

Recommendations

Air-Land Symposium would be great opportunity to run through the modified MTM reflecting as much of the above as possible. Invitation could include NWC and NDU.

EXECUTIVE SUMMARY

Subject: Joint Service Model Development Meeting
Air-Land Symposium 29 Apr - 1 May 82 USAWC (Tab B)

Representatives

Col Ray Macedonia
Dir. DWGS&F

Col John McDonald
CL 82 Mil. Stdy. Proj.

Col W. P. Franz
DWGS&F

LTC John Madden
CL 82 Mil. Stdy. Proj.

Highlights of meeting

- a. AWC computer will (1) carry the data base for both modules due to less priority demands; (2) compute all air related sequences, surface to air, air-to-air, sortie survivability etc.
- b. USAWC module will move, attrit, ground firepower ratios, air-to-ground damage and rotary wing deployment etc.
- c. Template for range of various aircraft should be developed to aid rapid decisions of capabilities.
- d. Hex would be common grid.
- e. CINCENT directive and strategy and COMAAFCE air directive would be product of the joint briefings before the start of each day's battle.
- f. Army would provide EEI and priority tgt. list, ground intelligence, FLOT traces, etc: Maxwell would provide all air intelligence and respond to ground Cntr. request.
- g. AWC would represent Red and Blue Air.
USAWC would represent Red and Blue Ground.
- h. Each college would schedule and give credit for advanced course and elective credit commensurate with work load placed upon students.
- i. Need exists for transmission of live briefings and briefing charts, line traces etc. in addition to normal length-of-exercise voice commo.
- j. Critique should aggregate certain parameters to be used in post analysis.

Recommendations

To be published in final concept paper.

29 April 1982

1. Lecture/Seminar

a. Title. Joint Air-Land Battle Symposium (USAWC-AWC) Carlisle Barracks, 29 Apr-1 May 1982

b. Introduction. Your studies this year have focused on doctrine and operations for conduct of war. This symposium will now give you the opportunity to discuss with members of another college those issues which you think are pertinent to air-land operations. To set the stage, a briefing team from the Air-Land Forces Application Agency (ALFA) will identify the current issues that they are trying to resolve relative to joint operations. Following this briefing a short question and answer period will be held so that you may clear up any questions that may arise during the presentation. Finally you will assemble in seminar rooms to develop your own issues in order of priority that are pertinent to air-land operations based on your studies to date and the briefing by ALFA.

c. Objectives. To be able to:

(1) Identify the key issues which impact upon the execution of the air-land battle.

(2) Assess different approaches to resolve these issues.

(3) Develop a priority listing of issues to be resolved.

d. Scope. This symposium will be devoted to examination of:

(1) Joint Counter-Air-Air Defense (J-CAAD).

(2) Joint Suppression of Enemy Air Defense (J-SEAD).

(3) Joint Attack of the Second Echelon (JSAK).

(4) Air-Land Forces Interface (ALFI).

e. Additional Factors for Consideration.

(1) What will be the impact of joint operations due to electronic countermeasures (NATO and WARSAW Pact).

(2) Airspace Management.

(3) Command Control and Communications Interface.

(4) Problems relative to detection of enemy force movements.

(5) Logistics, mobility and sustainability of forces.

(6) Protection of Air Fields.

30 April 1982

AIR-LAND BATTLE ISSUES

Air superiority first or BAI/CAS first.

Is A-10 survivable in high intensity war?

Joint counter air/air defense.

Joint suppression of enemy air defense.

Joint attack of 2d echelon

- definition of areas of influence/interests

- adequacy of artillery -- range, etc.

Airspace management -- who owns/controls what?

Air-land force interface.

Air to air armament of helicopters to counter Hips and Hinds.

Electronic countermeasures -- impact on battlefield.

All weather capabilities of aircraft and Army weapon systems.

TNF and chemical doctrine, tactics, protective measures.