

**COLLABORATION TOOLS FOR CRISIS ACTION
PLANNERS: AN EVALUATION OF MICROSOFT OFFICE
2000**

**A MONOGRAPH
BY
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Second Term AY 98-99

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DTIC QUALITY INSPECTED 4

19991109 054

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE <i>27 May 99</i>	3. REPORT TYPE AND DATES COVERED MONOGRAPH	
4. TITLE AND SUBTITLE <i>Collaboration Tools for Crisis Action Planners: An Evaluation of Microsoft Office 2000</i>			5. FUNDING NUMBERS	
6. AUTHOR(S) <i>LCDR Stuart Carter</i>				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) School of Advanced Military Studies Command and General Staff College Fort Leavenworth, Kansas 66027			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Command and General Staff College Fort Leavenworth, Kansas 66027			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION / AVAILABILITY STATEMENT APPROVED FOR PUBLIC RELEASE DISTRIBUTION UNLIMITED.			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) <i>SEE attached</i>				
14. SUBJECT TERMS			15. NUMBER OF PAGES <i>59</i>	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UNLIMITED	

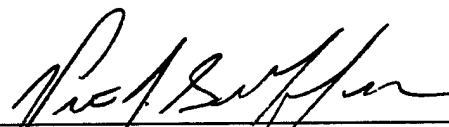
SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

Lieutenant Commander Stuart Carter

Title of Monograph: *Collaboration Tools for Crisis Action Planners: An Evaluation
of Microsoft Office 2000*

Approved by:



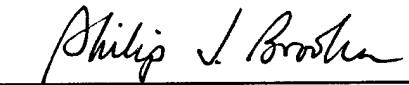
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ABSTRACT

Collaboration Tools for Crisis Action Planners: an Evaluation of Microsoft Office 2000 by Lieutenant Commander Stuart Carter, USN, 55 pages.

Detailed planning of complicated and multifaceted operations, often in crisis situations, is a way of life for the military. During crisis action planning, diverse staff elements must agree on a number of details for a successful plan to come together. As part of that process, staff elements must work together to assess the mission, evaluate the threat, review the forces available, and provide reasonable courses of action for the commander. Staff elements must complete several reports and briefs as a team. They collaborate together to produce mission orders, decision briefs, and several other written and graphical tools used to conduct crisis action planning under the Joint Operation Planning and Execution System (JOPES).

Computer software has been developed in recent years aimed at the collaborative planning market. Most have been very expensive, and their complexity is probably beyond the average military staff officer, who usually serve positions for only one to three years before moving on to other jobs. Additionally, such unique, special purpose software may not be widely accepted throughout the military, will require additional training for users, and dedicated management by systems personnel.

The software maker Microsoft has announced the pending release of the latest version of their "Office Suite". Known as Microsoft Office 2000, the product promises to bring several collaborative planning tools to users. This monograph examines the data sharing needs of crisis action planners, and considers the ability of the commercial software product Microsoft Office 2000 to meet those needs.

Microsoft Office 2000 does offer significant collaboration tools for military planners. Most useful to the military will be the ability of average users to post and update web pages without specialized training. This will enable planning teams to use the web to share their documents with a wide audience.

The application suite is best suited for small planning teams that want to exploit Web technology, already have Microsoft NT servers, and are ready to train their crisis action planners to use the software. Large commands that are not willing to adopt Microsoft technology across the board or whose planning teams are required to communicate with Windows 3.x users will not be satisfied with the product. Systems professional assistance will be needed to set-up directory structures, and a webmaster will have to create homepages and link newly published documents.

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I. INTRODUCTION

"None of us is as smart as all of us"¹

Detailed planning of complicated and multifaceted operations, often in crisis situations, is a way of life for the military. During crisis action planning, diverse staff elements must agree on a number of details for a successful plan to come together. As part of that process, staff elements must work together to assess the mission, evaluate the threat, review the forces available, and provide reasonable courses of action for the commander. Staff elements must complete several reports and briefs as a team. They collaborate together to produce mission orders, decision briefs, and several other written and graphical tools used to conduct crisis action planning under the Joint Operation Planning and Execution System (JOPES).

Computer software has been developed in recent years aimed at the collaborative planning market. Most have been very expensive, and their complexity is probably beyond the average military staff officer, who usually serve positions for only one to three years before moving on to other jobs. With such a short time in their positions, even if there was an interest in using collaborative tools, there is not time to learn them. Overworked staff systems managers, as helpful as they may want to be, are unlikely to adopt special purpose tools. Additionally, such unique, special purpose software has not been widely accepted through the military, will require additional training for users, and dedicated management by systems personnel.

Despite, or perhaps because of the lack of general acceptance DoD-wide of collaborative tools, there are efforts within the military to develop special-purpose tools to assist with military collaborative planning. All of the services and the Joint Staff have

invested years of time and thousands of dollars to develop special-use products that for the most part have not been seen by operational staffs. Having separate workstations and networks for tactical and non-tactical uses is unreliable, burdensome, unnecessary, and costly.

The software maker Microsoft has announced the pending release (summer of 1999) of the latest version of their "Office Suite". Known as Microsoft Office 2000, the product promises to bring several collaborative planning tools to users. If the advance reports bear out, the product should have a lot to recommend to the military. Using commercial products like Office 2000 gives the military a leg up on technology with virtually no R&D costs.

This monograph will examine the data sharing needs of crisis action planners, and consider the ability of the commercial software product Microsoft Office 2000 to meet those needs. In Chapter II I will review doctrine on joint crisis action planning. Chapter III will be a review of the automated data processing tools currently available to staff planners and used in crisis action planning. A criteria for evaluating Microsoft Office 2000 will be developed in chapter IV. The software package will be analyzed in chapter V and applied to the criteria in Chapter VI. Chapter VII will have conclusions and recommendations.

Even though collaborative planning tools have not been widely adopted in the DoD, the military is probably the biggest potential customer for their use. Considering the amount of crisis action, deliberate, and exercise planning that occurs at nearly all levels and in all services, there cannot be any other single organization that conducts

more planning, with more tempo, and with such disparate and widely separated autonomous units.

II. REVIEW OF THEORY AND DOCTRINE

The military is required to respond to emerging crises throughout the world. Staff planners are tasked to conduct crisis action planning to formulate responses to crises. In doing so they move through a sequence of planning steps, assembling facts, reviewing previous plans, assessing options, and finally--recommending a course of action. Since the process involves the collective efforts of a variety of personnel, it can be termed a collaborative planning process.

The Random House Unabridged Dictionary, Second Edition, 1993, defines collaboration "to work, one with another; cooperate." Cooperate is "to work or act together or jointly for a common purpose or benefit." Collaboration always involves some form of interaction between two or more people and it can occur at any time or at any place. People who need to collaborate can be in the same team or unit, different parts of an organization, and in different organizations. They can be located anywhere on the globe and in any time zone, but still require the ability to communicate with each other, share information with each other, and coordinate their activities.

Cooperation and collaboration grow more important every day. A shrinking world in which technological and political complexity increase at an accelerating rate offers fewer and fewer arenas in which individual action suffices. In our globally deployed military, in which timely information is the most important commodity, collaboration is not simply desirable--it is unavoidable.²

Collaborative software began to emerge in the early 1990's when faster PCs,

increased network and communications bandwidth, and more-capable digital video components brought such capabilities into the realm of possibility and affordability. Since then, the DoD has made several efforts to integrate collaborative planning software into Joint Operational Planning.³

The Joint Staff/J6 published the Command, Control, Communications, Computers and Intelligence (C4I) for the Warrior architecture strategy in June 1992. C4I for the Warrior recognized that the warrior needs a fused, real time, true picture of the battlespace and the ability to exchange information horizontally (across the CINCs, Services, and Defense Agencies), and vertically (from the foxhole to the President), in order to execute the full spectrum of post-cold war missions.⁴

C4I for the Warrior would bring the much-needed vision of jointness, interoperability, and integration to the entire Defense community. The key elements of the concept are as follows. First, the warrior's computer terminal provides the capability to access fused information, planning tools, and decision aids along with the required data, communications, and collaboration. Second, the warrior's battlespace is any three dimensional area over which they have control or interests. Third, is the infosphere, which represents global connections and accessibility to databases and information centers.⁵

A key to integrating the kind of multiple computer systems envisioned by C4I for the Warrior is the use of Open Systems Architectures. Open systems are those that comply with universally accepted standards (government, international or industry-wide) for programming, operation and communications. In many cases, open systems architecture allows interoperability, portability, and increased quality due to competition

in a multi-vendor environment. Using client-server architecture over a network open systems applications can usually interact with other open systems applications in the desired way. This is one of the advantages of using the Internet and the TCP/IP family of protocols.⁶

Proprietary equipment purchased by DoD is not always built with open systems architecture. For example Hewlett Packard workstations and Sun Microsystems workstations cannot run the same software despite both being UNIX-based. Even Internet browsers differ on which extensions and executable applets they will run. Using PCs (with Intel microprocessors) and the Microsoft Windows operating system may seem like an open system because of its popularity, but it is not. Both are proprietary systems and only open to paid licensees. Some say that introducing standards has the potential to inhibit innovation and freeze technology. However, the fact that new technologies emerge from the labs every day and become quasi-standardized through popular use would seem to counter that argument.⁷

Planning for the employment of military forces is an inherent responsibility of command. Planning is performed at every echelon of command, and it is conducted across the range of military operations. Joint Operation planning is directed toward the employment of military forces within the context of a military strategy to attain specific objectives for possible contingencies. Joint operation planning is conducted within the chain of command that runs from the National Command Authorities (NCA) to the combatant commanders. Joint operational planning includes the preparation of plans (e.g., operation plans (OPLANs) and campaign plans) and orders (e.g., operation orders (OPORDs)) by the combatant commanders as well as those joint planning activities that

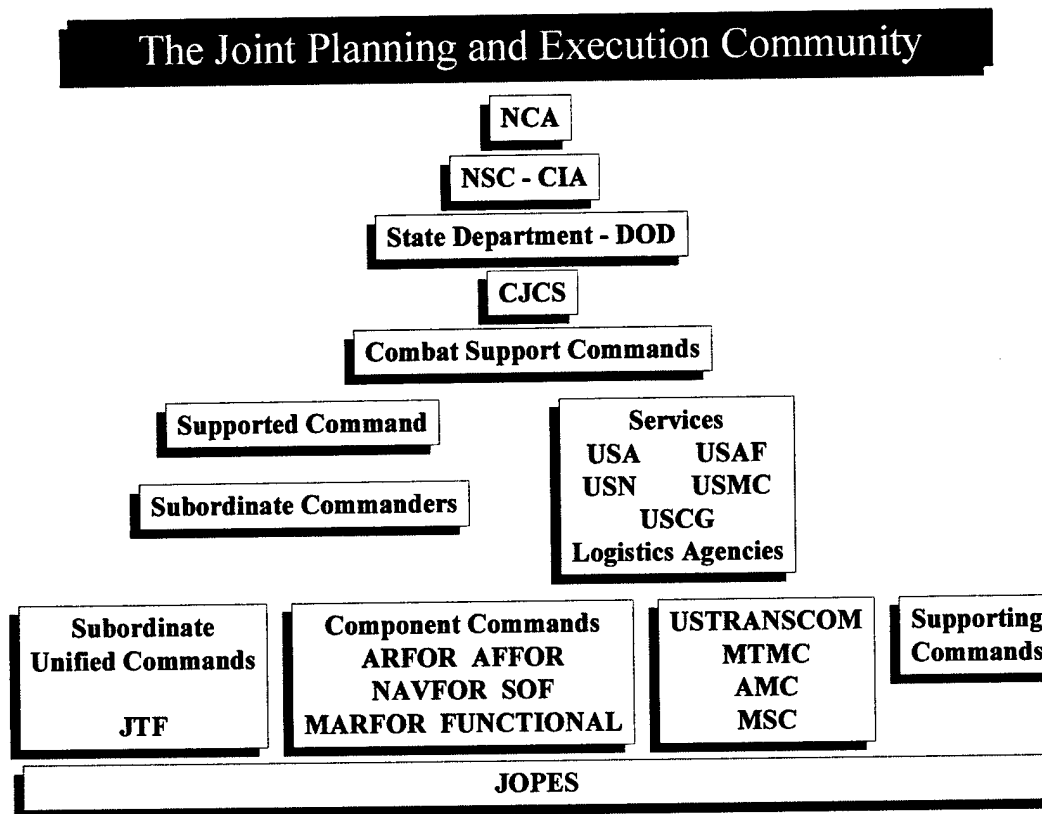
support the development of these operation plans or orders. Joint operational planning is a sequential process performed simultaneously at the strategic, operational, and tactical levels of war.⁸

Planning for joint operations is continuous throughout the range of military operations. As such, joint operation planning employs an integrated process entailing similar policies and procedures during war and military operations other than war, providing for orderly and coordinated problem solving and decision making. In its peacetime application, the process is highly structured to support the thorough and fully coordinated development of deliberate plans. In crisis, the process is shortened, as necessary, to support the dynamic requirements of changing events. In wartime, the process adapts to accommodate greater decentralization of joint operation planning activities. In all its applications, the basic process remains fundamentally unchanged and provides a consistent and logical approach for integrating the activities of the NCA, Chairman of the Joint Chiefs of Staff, other members of the Joint Chiefs of Staff, combatant commanders, and all other members of the Joint Planning and Execution Community (JPEC) in a coherent planning and execution process to attain military objectives.⁹

Interoperable planning and execution systems are essential to effective planning for joint operations. The activities of the entire planning community must be integrated through an interoperable joint system that provides for uniform policies, procedures, and reporting structures supported by modern communications and computer systems. The system designed to provide interoperability is the Joint Operation Planning and Execution System (JOPES). JOPES encompasses the entire JPEC. The essential components of

JOPES are the policies and procedures that guide joint operation planning efforts. JOPES Automated Data Processing (ADP) provides computer support, primarily for transportation planning associated with deployment operations.¹⁰

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Combatant commanders are expected to plan military responses to crises in their area or responsibility. The Joint Strategic Capabilities Plan (JSCP) tasks the combatant commanders to prepare joint operation plans. They may be OPLANs, OPLANs in concept format (CONPLANs) with or without time-phased force and deployment data (TPFDD), or functional plans.¹²

During crisis situations for which an approved OPLAN does not exist, the combatant commanders, in concert with members of the JPEC as appropriate, develop courses of action (COAs) in response to specific situations or tasking and prepare campaign plans and joint OPORDs to execute COAs approved by the NCA.¹³

Crisis action planning is based on current events and conducted in time-sensitive situations and emergencies using assigned, attached, and allocated forces and resources. Crisis action planners base their plan on the actual circumstances that exist at the time planning occurs. They follow prescribed crisis action procedures that parallel deliberate planning, but are more flexible and responsive to changing events. The procedures provide for the timely flow of information and intelligence, rapid execution planning, and the communications of the decisions of the NCA to combatant commanders.¹⁴

In crisis situations, the JPEC follows formally established crisis action planning procedures to adjust and implement previously prepared joint operation plans or to develop and execute OPORDs where no useful joint operation plan exists for the evolving crisis. A campaign plan may be developed if warranted by the scope of contemplated operations. Crisis action planning procedures provide for the rapid and effective exchange of information and analysis, the timely preparation of military courses of action for consideration by the NCA, and the prompt transmission of NCA decisions to supported commanders.¹⁵

Crisis action planning and execution are accomplished within a flexible framework of six phases (see table II-1). These six phases integrate the workings of the NCA and the JPAC into a single unified process that sequentially provides for the identification of a potential requirement for military response; the assessment of the requirement and formulation of strategy; the development of feasible COAs by the supported commander; the selection of a COA by the NCA; and, when directed by the NCA, implementation of the approved COA by the supported commander. The last row of table II-1 lists sample collaborative products of the crisis action planning process.

Their use is discussed later in this chapter.¹⁶

Crisis Action Planning Phases					
Phase I Situation Development	Phase II Crisis Assessment	Phase III Course of Action Development	Phase IV Course of Action Selection	Phase V Execution Planning	Phase VI Execution
Event					
Event occurs with possible national security implications	CINC's report/assessment received	CJCS sends warning order	CJCS presents refined and prioritized COA's to NCA	CINC receives alert order or planning order	NCA decide to execute OPORD
Action					
Submit CINC's assessment	JS assess situation	Develop COA's Evaluate COA's	CJCS advice to NCA	CINC develops OPORD	CINC executes OPORD
Sample Collaborative Products (see text)					
----- Document Sharing (all phases) -----					
Staff Planner Roster	Mission Analysis Brief	COA Statements Sketches	Synchronization Matrix	OPORDS	
Production Responsibility List		Task Organizations	COA Brief	OPLANS	
				Annexes	

Table II-1 Summary of Crisis Action Planning Phases¹⁷

Situation development is the initial phase of crisis action planning. Here events that have potential national security implications are detected, reported, and assessed to determine whether a military response may be required. The focus of this phase of crisis action planning is on the combatant commander in whose area the event occurs and who will be responsible for the execution of any military response. If not included in initial reports, the supported commander prepared and submits an assessment of the event to the NCA and the Charmin of the Joint Chiefs of Staff. If there are significant time constraints, this report may also include a recommended course of action. The situation

development phase ends when the supported commander submits an assessment.¹⁸

During the crisis assessment phase of crisis action planning the NCA, the Chairman, and the other members of the Joint Chiefs of Staff analyze the situation through available intelligence and determine whether a military option should be prepared. This phase is characterized by increasing information and intelligence gathering, NCA review of options, and preparatory action by the JPEC. The crisis assessment phase ends with a strategic decision by the NCA to return to the precrisis situation, or to have military options developed for consideration and possible use.¹⁹

The COA development phase of crisis action planning implements an NCA decision of CJCS planning directive to develop military options. In response to that decision, the Chairman of the Joint Chiefs of Staff issues a planning guidance directive to the supported commander directing the preparation of COAs. Normally, the directive will be a CJCS WARNING ORDER. In response to the directive, the supported commander, with the support of subordinate and supporting commanders, develops and analyzes COAs. Joint operation plans are reviewed for applicability and used when needed. Based on the combatant commander's guidance, supporting commanders, subordinate joint force commanders, and component commanders begin TPFDD development. USTRANSCOM reviews the proposed COAs and prepares deployment estimates. The services monitor the development of COAs and begin planning for support forces, sustainment, and mobilization. The supported commander analyzes the COAs and submits recommendations to the NCA and the Chairman of the Joint Chiefs of Staff. The COA development phase ends with the submission of the supported commander's estimate.²⁰

The focus of the COA selection phase is on the selection of a COA by the NCA and the initiation of execution planning. The NCA select a COA and direct that execution planning be accomplished. The Chairman of the Joint Chiefs of Staff issues a CJCS ALERT ORDER implementing the NCA decision. The CJCS ALERT ORDER describes the selected COA in sufficient detail to allow the supported commander, in coordination with other members of the JPEC, to conduct the detailed planning required to deploy forces. In some cases, a PLANNING ORDER is used to initiate execution planning activities before a course of action is formally selected by the NCA. Issuance of either the PLANNING ORDER or the ALERT ORDER marks the beginning of execution planning.²¹

An NCA-approved COA is transformed into an OPORD during the execution planning phase of crisis action planning. In this phase, the JPEC performs the detailed planning necessary to execute the approved COA when directed by the NCA. Actual forces, sustainment, and strategic mobility resources are identified and the concept of operations is described in OPORD format. Supporting commanders providing augmentation forces identify and task specific units and provide movement requirements. Component commanders identify and update sustainment requirements in coordination with the Services. USTRANSCOM develops transportation schedules to support the requirements identified by the supported commander. The execution planning phase terminates with an NCA decision to implement the OPORD.²²

The execution phase begins when the NCA decide to execute a military option in response to the crisis. During this phase, a military response is implemented and operations are conducted by the supported commander until the crisis is resolved. A

CJCS EXECUTE ORDER directs the deployment and employment of forces, defines the timing for the initiation of operations, and conveys guidance not provided in earlier CAP orders and instructions. The supported commander, in turn, issues an EXECUTE ORDER to subordinate and supporting commanders that directs the execution of their OPORDs. Subordinate and supporting commanders execute their OPORDs and conduct operations to accomplish objectives. The supported commander monitors movements, assesses and reports the achievement of objectives, and continues planning as necessary. The execution phase of crisis action planning continues until the crisis is terminated or the mission is terminated and force redeployment has been completed.²³

Timely, accurate communications are essential in exchanging information and transmitting directions during a crisis. USCINCPAC identified information management as one of the five most frequently identified training needs of Joint Task Force staffs. These are the activities associated with the staff's ability to process information from internal and external sources. It is concerned not only with identifying sources and making connections, but also with determining what the staff needs to know, who needs the information, and how it is provided to users.²⁴

Recognizing the need for joint staffs to effectively communicate, the CJCS has mandated communications within Joint Task Force Headquarters. With the establishment of the Joint Planning Group (JPG) within a Joint Task Force Headquarters, there is a requirement that the JPG leadership coordinate between JTF staff, components, higher headquarters, government and non-government organizations, allies, and coalition partners, as required, in order to facilitate simultaneous, multilevel planning. Owing to time constraints, planning may be conducted simultaneously for each phase between the

JTF and components. In any case, the requirement for continuous coordination is paramount.²⁵

Although the Joint Task Force Master Training Guide (March 1999 draft) does not prescribe products to facilitate staff coordination, several come to mind and are commonly found in these situations. Perhaps foremost among these is the Planning Staff Roster. Seemingly mundane documents like these have been dubbed the "killer apps" of collaborative planning. In a JTF Headquarters Joint Planning Group (JPG) this could identify the members of the core-JPG and full-JPG by function (see Table II-1).

Early in the planning process, the JPG will assign responsibilities for the preparation of the OPORD/OPLAN annexes and appendices. The JTF Master Training Guide suggests a responsibility list be published which includes a timeline for product submissions. A cell is designated as responsible for collating and final editing of these documents.²⁶

During the Crisis Assessment phase of Crisis Action Planning, the JPG is focused on collecting information. A product of this phase is the Mission Analysis Briefing. The JTF Master Training Guide reminds planners that for many in the newly-formed full-JPG, this will be the first time they will have been exposed to the crisis action planning methodology. A logical informal product would be briefing materials on the process and end products of crisis action planning and mission analysis.²⁷

Products produced at the end of the Course of Action Development phase of Crisis Action Planning include COA concept of operations statements (or tasks), COA sketches, and final task organizations. During COA development, staff sections develop their staff estimates concurrently to be prepared for COA analysis. Later they will fold

their staff estimates into the OPORD.²⁸

Before a COA can be selected, several are analyzed through the war gaming process. The draft JTF Master Training Guide suggests some tools that can be used during this phase to record and display war game results. Termed synchronization matrixes, these tools are spreadsheets that allow the staff to record the results of war gaming and to synchronize the COA over a number of different parameters. A sample is provided in figure III-1. Finally, a COA decision briefing is prepared for the JTF Commander (see table II-1).²⁹

Following COA selection, the staff prepares OPORDS and OPLANS for the execution planning phase. The main parts of the order are contained in the first five paragraphs. Additionally, there can be as many as eighteen annexes, most with multiple appendices each. All must be prepared under severe time constraints by dozens of staff officers. Although the staff estimates form the basis for these annexes, the task of physically producing and synchronizing the document will consume a significant amount of time.³⁰

In summary, the crisis action planning process requires the coordination of a number of planners towards the aim of providing the best guidance possible to the commander. The time-critical aspect of the process, and the need to prepare and communicate a number of products demands that production be smooth and coordinated with the ability to rapidly disseminate results outside the command. Many of the coordination tools and products of the planning process are good candidates for collaborative computing applications. Three of these products, the staff planner roster,

the timeline synchronization matrix, and the COA decision brief, have been chosen to test the applicability of the software program Microsoft Office 2000 to crisis action planning.

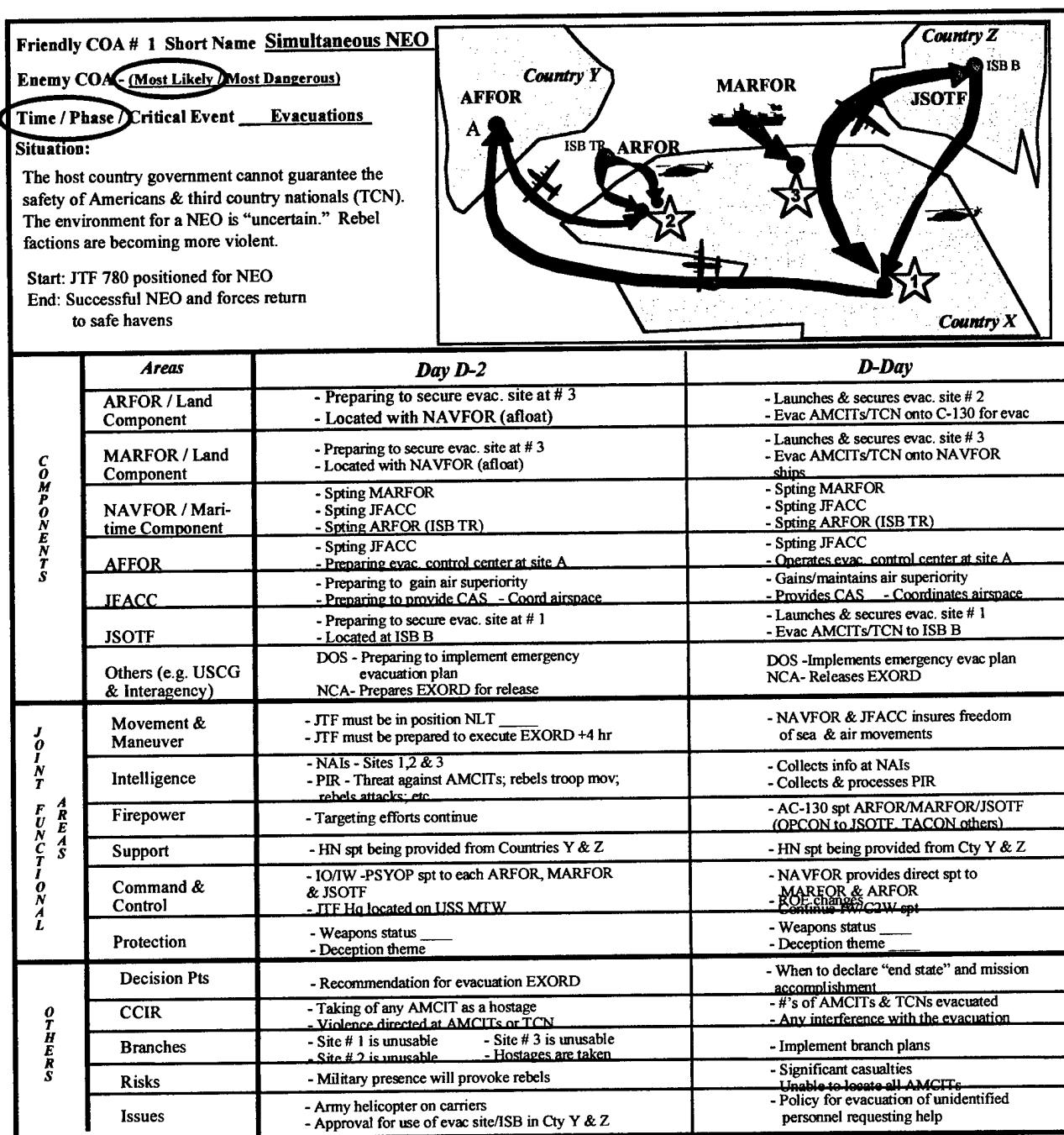


Figure VI-1 Sample of a "Timeline" Synchronization Matrix³¹

III. MILITARY COLLABORATIVE PLANNING TOOLS

DoD has developed several systems to meet the needs of the military for computer-assisted collaborative planning. As a counterpoint to the commercial software that will be examined later, this chapter will highlight the most common military systems used in the Joint environment. All of these systems have the means for same-time, different-place interactions such as file sharing, text chat, audio conferencing, whiteboard, and desktop video conferencing. Short descriptions of each tool, applicable standards, and general limitations will be presented.

The Global Command and Control System (GCCS) is a Joint C4I system. It also encompasses a strategy for moving older communications systems into a common operating environment. The objective of GCCS is to become the single C4I system supporting the warfighter. It will do that by replacing and modernizing legacy systems by applying the most capable and current software.³²

GCCS replaced the WorldWide Military Command and Control System (WWMCCS) as the National Command Authority's link to the CINCs and as the host for JOPES-related strategic planning tools. As the answer to C4I for the Warrior, GCCS is also becoming the primary joint command and control system from the President down to the JTF component forces. CGGS is a superset of software contributed by the Services and Agencies. The GCCS Common Operational Environment (COE) has applications modules in nineteen functional areas which provide the ability to maintain the near-real time common operational picture of the battlespace, tailorable to satisfy the needs of commanders at all echelons. Eventually the software and functionality will be completely hardware independent.³³

The Common Operational Modeling, Planning, and Simulation Strategy (COMPASS) provides services using government funded software to C4I and M&S systems so that live, virtual, and constructive simulations can be accessible for planning, evaluation, and to facilitate collaborative exchanges. It runs in client-server architecture and provides the following services: shared overlays, audio, and video teleconferencing, shared whiteboards, composite mission preview, and simulated mission rehearsal.³⁴

COMPASS improves joint interoperability among mission planning systems, mission deconfliction, and collaborative planning. The system provides review, rehearsal, commander feedback and approval. The system has been installed on some aircraft carriers and flagships as well as with CINCs.³⁵

JIVA is both a concept and an umbrella program for many new technology programs. The core of the concept is that intelligence analysis can be done better and with less duplication of effort if the entire Intelligence Community (DoD and other government agencies) applies new collaborative analytic and data base tools to the intelligence process. JIVA requires evaluating and selecting the best analytic tools from many different developmental programs and making broad infrastructure enhancements to allow multimedia collaboration between organizations and worldwide locations. The tools will include VTC to the desktop, white boarding, chatter, e-mail, and other means to share information.³⁶

IV. EVALUATION CRITERIA

In evaluating the potential for Office 2000 to assist in crisis action planning, the following criteria will be used. To evaluate how well the software functions in a collaborative environment we will evaluate its level of document sharing, and to

determine its appropriateness to military users the tenants of Information Technology for the Twenty-First Century (IT-21) will be applied.

Document sharing reflects on the ability of the product to share documents outside the command over a Web, and within the local area network. Particular attention will be paid to adherence to HTML standards and file compatibility.

IT-21 is used as a measure of appropriateness of the software package for military users. IT-21 has seven tenants that include endorsement by the commander, integration of tactical and support information sharing, commonality with industry standards, operating on a personal computer, commercially available, facilitating a seamless transition from garrison to deployment, and not a single-use (stovepiped) system.

In reviewing the after action reports of JTF commanders and the joint universal lessons learned database, U.S. Pacific Command isolated the five most frequently identified JTF training needs. They are crisis action planning, management of information, development of staff battle rhythm, formation of the JTF, and development of the Time Phased Force Deployment Data (TPFDD).³⁷

All five of these needs of Joint Task Force staffs are interrelated and could be assisted through the proper use of information systems. Collaborative computing systems may have the greatest potential impact assisting in crisis action planning in and of itself, and as it relates to management of information and formation of the JTF.³⁸

As planners conduct crisis action planning, they must be able to process information from both internal and external sources. Staff planners need to review existing plans, updating them and incorporating new information that arrives from a variety of sources. A number of planners will work on products at the same time,

producing a common set of documents. The example we chose from Chapter III was a timeline synchronization matrix. It is a single document that requires input from all staff planners.

The information management problem for JTF staffs works two ways. Staff planners must not only review new information from internal and external sources, they must communicate externally as well. An example shown in Chapter III was the Course of Action Brief. It is a presentation for the commander (and many others) of what the planners believe are the best alternatives to accomplishing the mission.

Additionally, as JTF staffs form they increase exponentially in size, CINCPAC has noted some staffs growing from fewer than 100 to over 600 personnel. As new members join a JTF planning staff, to work effectively they need to be brought up to speed on what has transpired before their arrival: messages, existing plans, assignments, changes to plans. An example document we chose from Chapter III to facilitate this organizational step is the Planning Roster, a simple list of staff planning augmentees, with assignments and contact numbers.³⁹

If computer tools are to assist in crisis action planning, what should they be able to do? A definition for collaborative computing is the capacity for one or more people (and/or applications) to share information in actual time. Examples of collaborative computing include file sharing, electronic mail, simultaneous editing (whiteboard), desktop audio and video conferencing, and data conferencing. Technology now provides the capability to share all types of information in real-time.⁴⁰

Michael Schrage, collaborative design consultant for MIT, points out that the quality and quantity of collaboration normally depend upon the tools that are used to

provide it. According to Schrage, the issue is not automating the process of collaboration, but rather using the technological tools that are available to build and enhance the collaborative relationship.⁴¹

Current deficiencies in collaborative technology provide limitations. These deficiencies center on limited interoperability between different types of tools and various operating systems. Limited interoperability is evident, for example, among the available audio and video conferencing tools. Competing and incompatible formatting standards have frustrated attempts of editors to share documents across local area networks (LANs), and even in e-mail.⁴²

An answer was found in the use of Internet technology. As organizations build teams to solve problems, they are making increasing use of Internet technology to connect the people to make the teams work. No other medium exists that allows so much free sharing of information. On the World Wide Web (Web for short) common document format standards, as determined by the World Wide Web Consortium (W3C), have created a true single standard for document publishing. In general (and there are some exceptions) any document that can be published on a Web, and viewed by a Web browser, can also be viewed by any other browser, anywhere there is connectivity to the Internet, and as long as developers adhere to mutually agreed upon standards. Those standards are currently expressed within a set of codes that include Hypertext Markup Language (HTML). In examining software, if a product is going to provide for publication on the Web, it will need to produce documents in HTML (Adobe Acrobat is a noteworthy exception to this).⁴³

HTML is a significant way to publish data and make it more easily accessible and

universally viewable. A recent industry update report shows that HTML is emerging as a standard portable content format for the creation, consumption and exchange of information in business. According to the study, the growth of HTML is attributed to the fact that business products are routinely viewed in different formats, i.e., formats differ in word processors, spreadsheets, and database applications.⁴⁴

Many users are extending the capabilities of HTML to convert existing documents for distribution on Intranets, which are Internet-like Webs contained within a local area network (LAN). Even though files may be easily shared over a LAN, businesses find Intranets a logical way to present information in a structured way. As such, Intranets are rapidly becoming the repositories for critical information.⁴⁵

These developments have not been lost on the military. USCINCPAC has emphasized the importance of Internet technology in easing the burden of JTF staffs. They envision use of Internet browser technology to deliver information from a wide variety of sources, regardless of database location. The defense intelligence community delivers a significant amount of information through an Internet-like classified network called SIPRNET.⁴⁶

Here is a good and simple example of Internet use in teamwork from the civilian world. David Siegel, a noted web designer, uses a small web termed a "project site" to coordinate his design teams. His project sites also function as client-contractor communication centers. In web jargon, the project site is an Extranet--a password-protected Internet site designed for only those involved in a project. His project site could just as easily work on an Intranet (within one company's local area network). It is a primitive but useful version of groupware.⁴⁷

Candidates for items to post on a project site include calendars, schedules, a running chronology, meeting agendas, meeting minutes, contacts page, and a resources page. Siegel also uses his project sites to assist new team members. A few hours at the project site will thoroughly brief a new team member. Essentially, Siegel's project site functions as a scheduler, running log, organizer, and repository of draft material. It is simple and quickly set-up.⁴⁸

With the growth of Intranets, users are seeking easier, more effective ways to publish to the Web. One of the hardest parts of creating pages for an Intranet is to get them actually posted to the Web. It is very common for users to create Word documents and then hand them off to systems professionals for HTML conversion and posting. Those that need to be posted to the Web immediately are often delayed significantly due to limited resources. "Dead Web" scenarios have become a reality when Web content is not updated or the systems department becomes a bottleneck for updating the content.⁴⁹

To increase the amount of useful material available over their Intranets, companies are trying to integrate Web publishing with their everyday workflow. Where before dedicated, autonomous Web teams were responsible for publishing, now they are shifting publishing to individual departments. If over-reliance on the Webmaster once slowed the content publishing process, the goal now is to shift control of the content to various internal departments. Web page designers will create templates into which these departments can pour content.⁵⁰

If collaborative planning software tools are going to facilitate the crisis action planning process, they must be able to incorporate information derived from the Internet. It must also be able to use the Internet, both as a way to disseminate information out, and

as a method to achieve a common document standard.

In evaluating software for military use, should particular consideration must be given to the needs of the military? It was once felt that commercial computer systems would not be robust enough to withstand the rigors of combat. While that may not be entirely true today, there are many examples in the DoD of systems designed exclusively for military use such as JIVA, COMPASS, and JOPES. An alternative viewpoint for incorporation of new technology into the military is the Navy's plan to use personal computers and other commercial off-the-shelf (COTS) standard hardware and software for integrating tactical and non-tactical applications. It is a simple plan, and it suggests that the needs of the military are in fact much like those of a very large corporation.

Information Technology for the Twenty-First Century (IT-21) is the brainchild of Admiral Archie Clemins, former Commander-in-Chief, Pacific Fleet. He sees leveraging the power of technology, especially the personal computer, as an efficient way to do more with less. Clemins directed the use of commercial off-the-shelf (COTS) personal computers (PCs), software, and networking technologies to replace the more expensive stand-alone systems being used throughout the Navy. The benefits, in addition to lower cost, include better documentation, less need for training, cheaper maintenance, more intuitive operation and user friendly features, and commercial standards that are inherently interoperable. The goal of the IT-21 concept is to have access to all necessary tactical and non-tactical data and services at the click of a computer keyboard or mouse button. Since most military processes are just relational databases, shared data available from every PC can be used to fight the ship or handle administrative matters.⁵¹

Admiral Clemins envisioned using the best technology to share information, and

suggests seven precepts to achieve the goals of IT-21. The technology must be endorsed, and actually used by the commander. Tactical and support functions must be integrated. It should use common industry standards, operate on the personal computer, and be commercially procurable. The technology should foster a seamless transition from garrison to deployment and not constitute a stovepiped C4I system.⁵²

In evaluating the potential for Office 2000 to assist in crisis action planning, the following criteria will be used. How well does the product facilitate document sharing? This will be reflected in the ability of the product to share documents over a web, and within the local area network. Does the program enable simultaneous editing of products? Does it incorporate e-mail? Does it facilitate publication of products to the Web? Particular attention must be paid then to adherence to HTML Web standards and file compatibility.

To evaluate the appropriateness of the software package for military users, the seven tenants of IT-21 will be applied. Specifically, is the software something likely to be endorsed and used by the commander? Does it facilitate the integration of tactical and support information sharing? Does it stay common with industry standards? Will it run on a personal computer? Is it true COTS? Does it facilitate a seamless transition from garrison to deployment? And finally, is it a stovepiped system, the only one of these seven tenants that is not desired?

V. AN ANALYSIS OF O2K FOR STAFF PLANNERS

The Microsoft Office family of products are already widely known to DoD. Most staff planners are at least familiar with the popular Word word-processing program, and the PowerPoint presentation graphics program. Many are also familiar with the

spreadsheet program Excel, which is also part of the Office 2000 package. According to Microsoft, there are 75 million users of Office, 45 million of whom use Office 97.⁵³

A full-featured word processor, Word 2000 was used to create a sample Timeline Synchronization Matrix. The matrix was drawn up as a table, a graphic was inserted and data was added to simulate input from various staff planning elements. Since the table became crowded very quickly, a nice new feature was the ability to rotate text ninety degrees. Applying this to row headers saved space.

Word 2000 provides support for HTML, the standard for publishing to the Web, as a companion file format. Users have access to the formatting capabilities of Word whether they are working in the Word file format or in HTML. This means that Word 2000 allows users to create documents in Word, save them on the Web as HTML, open the Web page again in Word and still have all the editing features of Word available for use. The HTML output will be created in full fidelity so it looks just like the content created in Word.⁵⁴

Web pages published through Word look virtually identical to the original document in versions 4.0 and higher of the browsers Internet Explorer and Netscape Navigator. Pages open in older browsers may lose some formatting, and multi-column Word documents appear as single-column Web pages in all browsers.⁵⁵

Word 2000, like each of the Office 2000 applications, makes publishing documents to a Web server as simple as saving a file to a hard drive. Opening, browsing and saving files on Web servers is done within the same file Open/Save dialog box used for regular files. Posting pages to a Web server in .doc or HTML (Web) format is as simple a matter as saving files to the appropriate directory on a hard disk. With

appropriate access then, a military member who has augmented a JTF staff could use the network to access files saved to the Web server at the home command.⁵⁶

PowerPoint is the de facto standard for briefings to the military community. PowerPoint 2000 was designed to allow users to author and share presentations on the Internet. PowerPoint will allow users to collaborate in the creation of a large presentation over the Internet, and to broadcast presentations to a large Internet audience. PowerPoint 2000 was used to create a sample course of action briefing. The file was saved, published to the Internet, and viewed in the browser Internet Explorer.⁵⁷

The PowerPoint "Save as Web page" feature creates Web pages that are nearly identical to shows saved in PowerPoint's native file format. But PowerPoint 2000's default Web pages are not universally compatible with all Web browsers. Users must view the presentation using Internet Explorer 4.0 or above, they are not at all compatible with Netscape Navigator. PowerPoint 2000 allows two alternatives, one saves the presentations in a less-faithful HTML format that works with other browsers, the other is a hybrid form that displays a fancy show in Internet Explorer 4.0 and a more basic one in other browsers. But using these two optional formats is less desirable, since PowerPoint itself cannot open files saved in the first of these two alternatives, and neither format can be set as the default.⁵⁸

PowerPoint 2000 integrated two Microsoft technologies, NetShow and NetMeeting, to enable users to collaborate over the network in real-time. The NetShow technology enables broadcasting of presentations to a wide audience over an Intranet. NetShow uses streaming multicast technology to distribute a live or recorded audio and/or video broadcast over an Intranet. PowerPoint 2000 allows broadcasting of

presentations directly from within PowerPoint.⁵⁹

In tests, presentation broadcasting did allow the briefer to conduct a presentation over the Web, allowing users to view the show live, or pre-recorded over the browser. However, viewing the presentation requires Internet Explorer 4.0 or above. Although Microsoft provides several wizards to ease the setup of NetMeeting and broadcasting, the features are difficult to use. First-time users will need the assistance of systems personnel to identify appropriate file directories.⁶⁰

Whiteboarding is the term used to describe the use of a network to collaborate on a document simultaneously. Early versions of the software consisted of a simple "whiteboard" that participants drew on. Microsoft's version of whiteboarding is called NetMeeting. PowerPoint 2000 integrated NetMeeting into presentations. PowerPoint 2000 provides an "Online Collaboration: Meet Now" command on the Tools menu, enabling users to automatically start NetMeeting in the background and share the current document with one or more people. It automatically provides round-trip verification for commands that are communicated to remote users.⁶¹

Excel 2000 is a continuation of Microsoft's popular spreadsheet program. It is the most web-integrated of the Office 2000 programs, offering the possibility of interactive spreadsheets that are viewable through a browser. Our sample Staff Planning Roster spreadsheet was worked up much like previous versions of Excel. Like Word and PowerPoint, the file could be saved to the Web, and using the interactive feature, the spreadsheet could be edited using the browser. Excel also allowed simultaneous editing of the document by multiple users.

Users choosing Web-ready HTML as the Excel default file format will experience

similar functionality to that of the Excel .XLS format, with the added capability of viewing the spreadsheet in a web browser. After converting files to HTML, Excel 2000 allows users to "round-trip," re-open the HTML Web page in Excel, and receive the same functionality, formatting and edit state as when originally created. This ability to round-trip features and formatting provides a way to make Excel spreadsheets accessible through a browser, while maintaining the original edit state of the documents.⁶²

There are two options for saving Web pages with Excel. They can be saved for viewing only or saved for interactivity. The first option creates a document that is viewable in recent versions of Internet Explorer and Netscape. The second creates an interactive Web page viewable only with Internet Explorer 4.01 or later and Office 2000.⁶³

Interactive Web pages are created using Microsoft Office Web Components, which are "server-side" software programs that enable additional functions in programs not normally available through the HTML language. When an Excel spreadsheet is saved to the web with these components active, it enables users to enter text and numbers, create formulas, recalculate, sort, filter, and perform basic formatting.⁶⁴

When an Excel chart is saved as HTML, for example, Excel saves all the data with it, so while it is viewed in the browser, values can be changed and the chart updated. There are some limitations however, the interactivity only works in Internet Explorer 4.0 or later, and to view the interactive charts, Office 2000 must be installed, as well as Internet Explorer.⁶⁵

Although this technology is promising, compatibility problems will limit its use in large organizations. Users must have Office 2000 installed in order to browse an

interactive web page interactively. When users browse an interactive Excel spreadsheet with Microsoft Internet Explorer—if Office 2000 is installed on their computers—the page will allow them to edit cells in the spreadsheet. If Office 2000 is not installed, they will see a hyperlink pointing to the Web Components installation program. Users who view the interactive web pages with Netscape Navigator will see a static HTML representation of the page as the author last saved it. The user can see the information, but cannot interact with it.⁶⁶

Document sharing is one of the criteria used to evaluate this product. At its most basic, the product at least must be compatible with earlier versions of the same product. When Microsoft introduced all-new file formats in Office 97, the change created compatibility problems for early adopters who shared documents with Office 95 users. This time around, the company has done much more to keep file formats consistent, documents created in the new suite can be viewed, edited and saved in earlier versions of the suite. There may still be problems, however, for those users who will work with Office 2000's pervasive HTML Web page support.⁶⁷

For Word, Excel, and PowerPoint, the native file formats of these applications has not changed. In tests, Office 97 had no problems opening Office 2000 files, and features that the older version does not support degraded gracefully: Customized bullets in PowerPoint 2000 display as standard bullets when a file is opened in PowerPoint 97. Simple Word 2000 and Excel 2000 documents also open properly in Lotus SmartSuite and Corel WordPerfect Suite, though these applications have some difficulty with richly formatted files.⁶⁸

When military members need to share documents outside of a command, they

usually either e-mail the product, or save it to a disc. Both methods are difficult to do with large files, such as PowerPoint presentations. Office 2000 offers another method to share products through Web Folders. Files can be deleted, renamed, copied, or moved between Web folders and a local disc.⁶⁹

Saving products to the Web using HTML standards is another way to share a document and ensure some level of compatibility. When HTML Web pages are reopened in the Office 2000 applications used to create them, all of the properties remain intact--a feature known as round tripping. If the Web server has FrontPage Server Extensions installed, Word or Excel files can be edited right in Internet Explorer 5.0.⁷⁰

Office 2000 does a good job of hiding some of the differences that occur when moving between native-formatted and HTML-formatted documents, but problems still arise. For example, when saving a Word document as a Web page, formatting such as text-wrapped images and multiple column layouts was lost.⁷¹

There are several other compatibility problems with Office 2000's HTML documents. Most of those problems stem from the suite's use of advanced technologies such as Extensible Markup Language (XML) to preserve formatting. XML is officially supported by the World Wide Web Consortium (W3C), the group that sets standards for the Internet. Microsoft seems to have been faithful to the standard, Internet Explorer 5.0's use of XML has been termed the best native support seen to date. However, this technology is advanced and is not supported by older versions of browsers.⁷²

One major problem is with PowerPoint. Default HTML files display only in Internet Explorer 4.0 and above. Uses of Netscape Navigator and earlier versions of Internet Explorer get an error message. Web pages created with interactive components

available in Excel are more limited, they display only in Internet Explorer 4.0 and above, and the PC must have Office 2000 installed.⁷³

Word and noninteractive Excel pages had fewer problems. Web pages created from these programs work in both major browsers. But the idea of using the Web as a place to share documents, round tripping, as it is called, does have some problems. Web pages created by Word 2000 do not load correctly in Word 97, WordPerfect, or Word Pro. According to the company, compatibility between Microsoft products should be smoother by the time the suite ships. Nevertheless, Microsoft states Office's HTML features are intended primarily for users who will create Web pages solely within the suite's own walls.⁷⁴

The following set of matrixes illustrate file compatibility between the various versions of Microsoft Office programs. Exceptions are noted within each table.⁷⁵

Definitions--Read: Application can read the file format without a viewer or converter. Write: Application can write to the native file format with little or no degradation between versions. Open: Application can open but you cannot save back into the original format. Design & Create: Database can be designed and created in that version. Save to Web: File is viewed via the browser rather than a separate viewer⁷⁶

Word							
This Version of Word	...Can do the Following with these File Formats:						
	Word 2000	Word 97 Mac Word 98	Word 97-2000 & 6.0/95 RTF	Word 95 Word 6.0 (Win/Mac)	Mac Word 5.x	Lotus Smart Suite	Corel WordPerfect Suite
Word 2000	Read, write	Read, write	Read, write	Read, write	Read, write	Read	Read
Mac Word 98	Read, write	Read, write	Read, write	Read, write	Read, write	Unk	Unk
Word 97	Read, write	Read, write	Read, write	Read, write	Read, write	Unk	Unk
Word 95	<u>Open</u>	<u>Open</u>	Read, write (6.0/95)	Read, write	Read, write	Unk	Unk
Word 6.0 (Win/Mac)	<u>Open</u>	<u>Open</u>	Read, write (6.0/95)	Read, write	Read, write	Unk	Unk
Mac Word 5.x	<u>Open</u>	<u>Open</u>	<u>Open & edit</u>	<u>Open & edit</u>	Read, write	Unk	Unk
Word 2.0	-	-	<u>Open & edit</u> (6.0/95)	<u>Open & edit</u>	Read, write	Unk	Unk

Note: Underlined text indicates that the functionality requires the installation of a separate converter.

Table V-1. Microsoft Word File Format Matrix⁷⁷

Excel								
This Version of Excel	...Can do the Following with these File Formats:							
	Excel 2000	Excel 97 Mac Excel 98	Excel 97 & 5.0/95	Excel 95 Excel 5.0 (Win/Mac)	Excel 4.0	Excel 3.0	Lotus Smart Suite	Corel WordPerfect Suite
Excel 2000	Read, write	Read, write	Read, write	Read, write	Read, write	Read, write	Read	Read
Mac Excel 98	Read, write	Read, write	Read, write	Read, write	Read, write	Read, write	Unk	Unk
Excel 97	Read, write	Read, write	Read, write	Read, write	Read, write	Read, write	Unk	Unk
Excel 95	-	-	Read, write (5.0/95)	Read, write	Read, write	Read, write	Unk	Unk
Excel 5.0 (Win/Mac)	-	-	Read, write (5.0/95)	Read, write	Read, write	Read, write	Unk	Unk
Excel 4.0	-	-	-	-	Read, write	Read, write	Unk	Unk
Excel 3.0	-	-	-	-	-	Read, write	Unk	Unk

Table V-2. Microsoft Excel File Format Matrix⁷⁸

PowerPoint					
This Version of PowerPoint	...Can do the Following with these File Formats:				
	PowerPoint 2000	PowerPoint 97 PowerPoint 98 (Mac)	PowerPoint 97-2000 & 95	PowerPoint 95	PowerPoint 4.0 (Win/Mac)
PowerPoint 2000	Read, write	Read, write	Read, write	Read, write	Read, write
Mac PowerPoint 98	Read, write	Read, write	Read, write	Read, write	Read, write
PowerPoint 97	Read, write	Read, write	Read, write	Read, write	Read, write
PowerPoint 95	<u>Open & edit</u>	<u>Open & edit</u>	Read, write (95)	Read, write	Read, write
PowerPoint 4.0 (Win/Mac)	<u>Open & edit</u>	<u>Open & edit</u>	<u>Open & edit</u> (95)	<u>Open & edit</u>	Read, write

Note: Underlined text indicates that the functionality requires the installation of a separate converter.

Table V-3. Microsoft PowerPoint File Format Matrix⁷⁹

Web Pages (HTML)									
Web Pages created by:	...Can be ____ by these programs								
	IE 5.0	IE 4.0	IE 3.0	Netscape Navigator 4.x	Word 2000	PowerPoint 2000	Excel 2000	Word 97	Word-Perfect
Word 2000	Read, write	Read, write	Read, write	Read, write	Read, write	-	-	No	No
PowerPoint 2000: default	Read, write	Read, write	No	No	-	Read, write	-	Unk	Unk
Alternate Save	Read, write	Read, write	Read, write	Read, write	-	No	-	Unk	Unk
Presentation Broadcast	Read	Read	No	No	-	-	-	-	-
Excel 2000: Interactive	Read, edit	Read, edit	No	Read	-	-	Read, write	-	-
Non-interactive	Read	Read	Read	Read	-	-	Read, write	-	-

Table V-4 Web Page (HTML) Compatibility⁸⁰

Adding workgroup tools to the familiar Microsoft Office suite should make it easier for users to collaborate. But though some Office 2000 features can help users

collaborate productively, others are too difficult to promote true teamwork.⁸¹

Excel 2000 is the only program in the package, other than NetMeeting, that allows a document to be edited by multiple users simultaneously. A menu-selectable function allows Excel workbooks to be shared with other LAN users. This allows more than one user at a time to make changes in the workbook, and allows merging of the changes. This should be a popular feature with small teams who need to keep simple lists up to date. Word 2000 does not allow multiple users to open a document at the same time, but will track changes within a document.

Discussions, a Web-based collaboration tool introduced by Office 2000, are threaded message boards that appear within shared Office documents. They serve as an alternative to revision marking and comments. A user can participate in a document's discussions in either the originating application or a Web browser, but the document must be stored on the network--the message thread disappears if the document is moved to a floppy disc or a non-networked laptop computer or if it is sent by e-mail.⁸²

With the Office Server Extensions installed on a Web server, users can have discussions in both native Word 2000 documents and Web pages. The discussion feature will function in all recent versions of Internet Explorer and Netscape Navigator, but it works best in Internet Explorer 5.0, which has a the discuss button and discuss toolbar for inserting and viewing comments. Other browsers open a separate comments pane. The discussions can be made in-line in the document or as general discussions about the document, which are stored in the discussion pane at the bottom of the page. Using the Discussions toolbar, users can insert new comments; navigate through, edit and reply to

existing comments; subscribe to a particular document; and view or hide the Discussions window.⁸³

Design problems make the discussions tool hard to use. It can be a challenge determining where discussions are happening, since users cannot tell if they are active in a document unless the discussion toolbar is open. Only one user can add a comment to a document at a time, and the document must be closed before the next user can participate in the discussion. Document originators have no direct way to alert appropriate coworkers they have initiated a discussion, users will have to open the document themselves and then subscribe to it. These new and advanced features are probably best left to teams small enough to easily coordinate the document discussions. Additionally, the fast pace of crisis action planning will not be suited to this feature. Those conducting deliberate planning, where reviewing a document can take weeks or months, may find the feature useful.⁸⁴

Subscriptions are Web-based collaboration tools that let users sign on to a document, discussion, or folder on an Office Intranet. Users can be automatically "notified" by e-mail when the status of selected documents changes. Users can choose to be notified when a document changes, or is created or deleted. They can be notified immediately, once per day, or weekly to prevent undue amounts of e-mail when a document is changed several times in a short period. In addition to e-mail notification, users can also add a given document to a Microsoft Internet Explorer subscription channel to receive updates through a browser.⁸⁵

Once opened, notifications refer to most documents not by their file names but by using the entry from Office's little-used Title field. Unless everyone involved enters

Titles scrupulously, Word fills in the field with the first few words of the document, and as a result users could have trouble telling what document is being notified. A benefit of using the Title field is that it will make it easier for documents loaded to the Internet and Intelink easier to be indexed properly by search engines.⁸⁶

Unfortunately, Office 2000 is not compatible with all varieties of personal computers, operating systems, and networks. Upgrading to Office 2000 demands extensive commitment to other Microsoft technologies to fully exploit its features, and a few features are designed to work best with the still-unavailable Windows 2000 operating system.⁸⁷

Office 2000 requires any version of the Microsoft Windows 95, Windows 98, or Windows NT operating system. Listed hardware requirements are at least thirty-two megabytes of RAM and any Intel 486-compatible or Pentium Processor or any DEC Alpha Processor. Typical users will not be happy using the minimum memory requirements. With sixty-four megabytes of RAM on an NT Server, the software performed well, even with multiple windows open. Large PowerPoint briefs did slow the system down.

When a user saves an HTML-formatted document, the application places copies of any images contained in the document in a separate folder. Also placed in the folder is a cascading style sheetfile, which determines the layout of the document, and an XML file list document, which describes the contents of the Web page. Performance suffered when saving those files, however; it usually took twice as long to save a Web page.⁸⁸

If the folder associated with a particular Web page was moved or deleted, the Web page couldn't display properly. Under the as-yet unreleased Windows 2000

operating system, the Web page and its supporting files will be synchronized so that moving or deleting one will also move or delete the other.⁸⁹

Although Office 2000 applications do a fairly good job of retaining a document's layout when saving it as a Web page, IT managers will have to deal with the increase in file space needed. During tests, file size increased from 50 percent to 250 percent, depending on the file's content.⁹⁰

To use Web folders, the server must have FrontPage Extensions, the included Office Server Extensions, or support WebDAV, the distributed Authoring and Versioning protocol. Both Discussions and Subscriptions/Notification require the Office Server Extensions. This server-side software is not compatible with all platforms. Those who use Windows NT Server and Internet Information Server (IIS), Microsoft's Web server, will have the most luck with these features.⁹¹

Broadcasting NetShow to more than fifteen users on a LAN, or using live video requires a NetShow server. Broadcasting NetShow over the Internet requires a NetShow service provider. PCs running NetShows should be 300MHz or faster, with appropriate video and sound cards.⁹²

In summary, those commands that are already running Microsoft servers and Windows 95/98/NT will find this a logical upgrade. Although not all of the collaboration features of the product are easy to use, the ability to push any Office 2000 document to a Web will facilitate planning and collaboration and is within the ability of the average user. Communications is facilitated if the intended audience is also running Windows 95/98/NT and at least Internet Explorer 4.0.

VI. MEETING THE CRITERIA

In Office 2000, Microsoft presents a number of new and significantly upgraded tools aimed at the collaborative computing process. While not all of these tools are either easy to use or significant to military planners, a few do merit attention. Incorporation of the product is eased for those commands operating Microsoft servers and current operating systems.

The ability to transfer files is made easier in Office 2000 through the use of the save to the Web feature. Files can be moved to a Web server as easy as they are moved around on a hard disc. This allows large files to be easily moved outside a command without having to use e-mail. Office 2000 files are backward compatible with older versions of the same software, but less so with WordPerfect and Lotus SmartSuite. A Microsoft or WebDAV-compliant server is required to use Web Folders.

The use of E-mail has been incorporated into all of the Office 2000 products. Any Office 2000 file can be sent by e-mail while the application is open. E-mail is also incorporated into the notifications, allow subscribers to receive a-mail notice when a file or document changes. Use of this feature will probably require a Windows NT Server.

Elements of document sharing, the ability to edit a file simultaneously, is incorporated into Excel 2000 and PowerPoint NetMeeting. Excel allows multiple editors of the same workbook, with some helps to resolve editing conflicts. This is a brilliant feature and something that small teams, who can control production, will want in PowerPoint and perhaps Word as well. NetMeeting incorporates video teleconferencing, a whiteboard and chat window with a PowerPoint presentation that can be edited live while being broadcast. Wizards help with the set up and scheduling of meetings.

Although this feature will probably require systems manager assistance the first time through, the simple fact that NetMeeting is included with the software, with the feature clearly labeled under the tools menu, will result in wider use.

The ability for novice users to publish their document to a Web is the most valuable feature for crisis action planners. All of the Office products can be saved to a Web as either .doc/.ppt/.xls files or as HTML files. Word and Excel files can be edited from within Internet Explorer. Pages published to the Web from Word and PowerPoint look nearly identical to the original documents.

The ability to round-trip HTML files--placing documents on the Web, and later updating the same document--will be a useful feature for crisis action planners. The staff planner will be able to update existing files that have been published previously and linked from a start page. In preparation for a crisis, these source pages may be blank, or nearly so, perhaps containing shells of documents, standing OPLANS, or copies of files from the last crisis.

The value-added in placing documents on a Web is in the ability to use the Web to communicate, both within the organization, and outside. However, pushing files to a server alone does not help them to be found. The contents of files listed on a web folder are no more apparent than corresponding files listed on your PC's hard drive. Making content apparent and accessible will require a webmaster who can list links to files from a starting page, including file titles and perhaps other explanatory information.

Communicating outside the command through the Web page is hampered as Web products created by Office 2000 work best when viewed in Internet Explorer 4 or higher. This problem is mitigated somewhat because Microsoft makes Internet Explorer available

free. Web pages created in Office 2000 do not load correctly in Word 97 or WordPerfect.

Office 2000 is a product likely to be used and endorsed by the commander. The software is a basic step up from the current widely-use Office 97 Suite. Most functions and menus are easier to use than before. Once introduced to the function by a systems professional, the commander should find it easy to publish documents to the Web. Publishing documents this way is a good candidate for the commander's "monthly reports" or similar product.

Office 2000 does make it easier to integrate tactical and support functions by the widespread use of HTML Web standards. Publishing documents to a Web will allow wide sharing of data.

Inasmuch as the industry is using Microsoft Office products, this package does meet common industry standards. Office 2000's HTML Web documents adhere well to the standards of the World Wide Web Consortium (W3C).

Designed to run on a personal computer, Office 2000 needs 64k of memory and a Windows 95/98 or NT 4.0 operating system. Although Microsoft literature suggest a Pentium II processor or better is required, the software will run on an AMD K6 chip.

The product is true commercial off-the-shelf software (COTS). List price to upgrade a basic Suite is about \$200. By the Fall of 1999 there will be dozens of books published describing how to use the software.

The use of the product to publish to the Web, and basic compatibility with previous versions of the product, will ease the transition from garrison to deployment. Through their Internet connections, forces can access outside information, whether they are deployed or in garrison. As long as they can maintain a connection to the web, users

will be able to publish and share document they create with the software. Likewise, forces at home, or at other locations, can access files that deployed forces have published to their servers, or share a common server.

The program can be considered a stovepiped system in that best results are had when all users are working from Office 2000, Internet Explorer 5.0, Windows 95/98/NT 4.0, and Windows NT servers. However, the software can also break a lot of stovepipes. E-mail, chat, whiteboards, presentation broadcasting, and file sharing are all functions that have been built into government software such as JOPES and COMPASS. The release of Office 2000 provides new versions of all of these tools with no R&D costs to the military.

In summary, Microsoft Office 2000 easily meets nearly all the criteria for providing collaborative computing tools to crisis action planners, and for meeting the needs of military systems. The program falls short primarily in the requirement of commands to adopt Microsoft-specific systems for best use, and to a lesser extent on the requirement for remote users to adopt the most recent versions of Internet Explorer.

VII. CONCLUSIONS AND RECOMMENDATIONS

The Microsoft Office 2000 application suite is best suited for small planning teams that want to exploit Web technology, already have Microsoft NT servers, and are ready to train their crisis action planners to use the software. Large commands that are not willing to adopt Microsoft technology across the board or whose planning teams are required to communicate with Windows 3.x users will not be satisfied with the product.

The best feature of the package is the ability of Word, Excel, and PowerPoint users to save products as web documents and publish them to a web server, sharing them

with the world. More advanced features such as discussions, notifications, web broadcast, meetings, and interactive Excel spreadsheets, all have applicability to collaborative crisis action planning. But these features are probably complicated enough to require a small, coordinated group to use properly. Of these advanced features, pre-loading PowerPoint briefs that can be broadcast over the Web on request is most promising.

Until now however, most users have been kept from the web because of the need to learn dedicated web-authoring tools. Staff planners who wanted to share documents over the Internet required "webmasters" who would load each document by hand to the web. In a crisis situation, this could be dozens of documents every hour. Now users can post documents to a web themselves from a common Office 2000 application, such as Word, and that document will be viewable on the web. Likewise, another user can not only view the document on the Web, but load it, edit it, and repost that document back to the Web, with changes or comments highlighted.

These claimed capabilities are significant for operational planners. Planners may be able to post products to a web themselves without requiring knowledge of web authoring. They will be using tools they are already familiar with. They will be using software that is an incremental upgrade from products their command already uses. They will be using software that may also be widely accepted throughout the DoD. They will be using tools that may be somewhat compatible with older versions of the same software, which is widely accepted throughout DoD. Several planners will be able to edit, comment on, and repost the same document, and to have those documents viewable worldwide (to authorized users) by forces that have high interest in those documents. All

of these capabilities will be available for less than \$300 each, and with no developmental costs to the government.

The software package will work best in a small planning group, all using Microsoft Office 2000 on Pentium II computers, sharing a Microsoft NT Web server. As the requirement to communicate products outside the planning cell increases, the need to modify products to remain compatible with non-Office 2000/Internet Explorer 4/5 users increases. Systems professional assistance will be needed to set-up directory structures, and a webmaster will have to create homepages and link newly published documents.

Readers who want to consider applying similar collaborative computing functions to crisis action planning using other commercial software should examine WordPerfect Office 2000 or Lotus Development Corporations SmartSuite 98, which have received favorable reviews in the computer press. The Ultimate Bulletin Board is an excellent place to begin a review of alternative discussion software. Whatever products are used, groups that want to make appropriate use of collaborative technology will have to establish new schemes for organizing, collecting, producing, and validating information.

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