# COLLABORATIVE PLANNING FOR MILITARY OPERATIONS:
## Emerging Technologies and Changing Command Organizations

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## Abstract

Contemporary military problems have been characterized as "wicked": unique, crisis-driven, undertaken with limited resources. The technology to plan these operations collaboratively has the potential to alter the previous "top-down" nature of command relationships by its impact on the planning process. Accordingly, collaborative technologies represent not only an enhanced command and control system, but a fundamentally different one. No longer are only commands linked in their efforts to plan, but individual planners are able to pool their efforts across conventional command and control hierarchies. This paper will explore the issues associated with the potential impacts of these technologies from an organizational perspective.

## 1. Introduction

The ability to collaboratively plan military operations with the aid of state-of-the-art information technology has been a perceived requirement for command and control systems for the past several years. Driving this requirement has been a variety of factors, not the least of which is the realization that emerging technology will enable interaction between dispersed military commands on a scale previously unattainable. Beyond the technological capabilities lies the changing nature of force employment, which makes the close collaboration of these commands an operational necessity. As our increasingly smaller and burdened forces struggle to adapt to new and non-traditional missions, the ability of the US military to rapidly share and act upon information on a theater-wide and global basis has become an imperative.

A variety of technological approaches to supporting collaboration during the military planning process, driven by a host of initiatives with varied programmatic goals, has been attempted in the recent past. Significantly, this lack of a single technical approach to the issue of collaboration reflects a wider operational disparity. In fact, there is no common model of how collaboration should be undertaken by military planners. As a result, each unified command and service appears

to be establishing its own unique rules and procedures for collaborating during operational planning.

This paper will argue that the issue of collaboration in military planning and decision making is essentially an organizational and cultural one with technological implications for future command and control systems. An understanding of these implications will allow the crafting of command and control systems which will, at least, support meaningful collaboration in military decision making and, hopefully, lead to improved processes for decision making through an evolution of the organizational and cultural environment in which these processes occur.

## 2. Collaboration in the Military Decision Making Environment

As a foundation for this paper's discussion, a definition of collaboration is a necessity. Turning to a generic definition provided by William A. Kraus, collaboration, at its most basic level can be considered "…a cooperative venture based on shared power and authority." [Kraus, 19]

Although developed for general management theory as opposed to military command and control, Kraus' brief definition provides a useful point of departure for several reasons. First, it casts the issue of collaboration within an organizational framework, allowing an ensuing discussion based on inter and intra organizational relationships, a necessity in considering how military commands work together in planning and decision making. Secondly, this definition focuses the discussion on a "venture," or, in the case of this paper, the activity of planning military operations and making decisions relative to these operations. Collaboration, therefore, is a focused activity. Finally, Kraus' recognition that power and authority are elemental to cooperation is critical: the results of military collaboration will be implemented via a command - or organizational - structure defined by legal responsibilities and authority.

### 2.1 *Why Collaboration?*

Three factors have moved the ability to collaborate to the heart of contemporary command and control issues. The first is the uncertain operational environment facing today's US military forces. An increasingly unstable world and corresponding policy of global engagement in response to this instability have required US military forces to undertake increasingly complex operations. Second, these operations have been assigned to a steadily shrinking force, often stretched thin in an attempt to respond to multiple, unforeseen crises. Finally, the rapid pace of information technology has provided the potential for military planning staffs to effectively share large amounts of data under "real time" conditions.

### 2.2 *The Current Environment for Military Decision Making*

The combination of these three factors has reshaped the command and control environment for current military operations: non-traditional tactics, employed on short notice by geographical dispersed forces, linked by high technology, off-the-shelf tools. This environment has of necessity changed the fundamentals of operational planning for both joint and service operations. The model for crisis planning, as reflected in doctrine and the Joint Operational Planning System

(JOPES), is based on a formal six-step process which structures the development of an Operations Order (OPORD) from the initial indications of a crisis through execution of a plan responding to the crisis. While useful as a framework for plan development, this canonical model is generally acknowledged as rarely followed in practice. Instead, the rapid pace at which contemporary crises develop calls for parallel rather than sequential, step-wise planning of a military response.

The requirements for planning military operations - speed, complexity, economy - are the stuff of contemporary headlines, from Somalia to East Timor. The preeminence of crisis planning in routine military operations is obvious, although the authorized JOPES six-step model has not been altered. The shortcomings of this process are not at issue in this paper; it is openly recognized the JOPES process is merely a guide and it is altered to fit each new planning problem. Of more interest are the inter workings of the military staff elements engaged in crisis planning and their use of collaboration in developing timely crisis response plans for US forces. Regardless of the potential for emerging information technologies to support this collaboration, it is essential that the nature of these staffs be considered as a foundation for improving their use of collaboration.

### 2.3 *Military Crisis Planning: An Organizational Perspective*

During a recent joint task force (JTF) exercise, a prototype collaboration tool was tested between the theater commander-in-chief (CINC) headquarters and the JTF commander's (CJTF's) headquarters. One of the tools allowed multiple participants to "brainstorm" solutions to a problem via a web-based application, eventually voting on the solutions. In this particular instance, the CINC's Operations Planning Team (OPT) was conducting its mission analysis and listing the tasks which would, after approval by the CINC, be assigned to the CJTF. The members of the CJTF's Joint Planning Group (JPG) were able to witness the deliberations of the OPT, gaining an insight into their anticipated mission. These officers clearly appreciated the potential of the application, but their enthusiasm turned to dread when they realized that the OPT would have the capability to witness and participate in their deliberations via as well. The upshot of the test - that the application should be turned off and not used - highlights one of the most significant roadblocks to the use of collaboration technologies by military staff, even in time sensitive crisis situations.

It is tempting to characterized the JPG officers' reluctance as "paranoia" and even suggest their reaction somewhat Luddite. However, they had a point: through his staff, the CJTF should be able to develop his plan in relative peace, free from the CINC's oversight. In fact, implicit in assignment as CJTF is the confidence that this officer is the most appropriate choice to undertake the mission at hand. If the CJTF's staff seems a little too testy about their independence, their concerns are rooted in the current model for military staff organization. Analyzing this organization is a key first step in addressing is use of collaboration in planning.

In terms of organization theory, the joint staff - at either the theater or JTF echelon - would appear to be a bureaucracy in the classic model. Max Weber, the early organizational theorist and sociologist, characterized the modern bureaucracy as a structure based on strict lines of authority.

The competence of the official within the bureaucracy was a paramount concern: not only was competence important for its own sake, but it was the foundation of the professionalism of the official as well a elemental to his or her ethical behavior. [Weber, 196-204.] Moreover, the model of the classic bureaucratic structure provides two additional attributes which are directly applicable to the conduct of operational planning in modern crises leadership and communication.

### 2.3.1 *Staff Communication and Leadership*

Leadership within the bureaucratic organization is along the organization's hierarchy. In the military this is commonly referred to as the "chain of command." The ubiquitousness of this structure makes it easy to overlook some of the more important considerations implicit in the relationships within the staff structure. These go beyond the usually articulated issue of who-writes-whose fitness report. As Chester Barnhard points out, the executive - or commander, or other military superior - is responsible not only for coordinating the efforts of the organization, but also, as part of his or her leadership, for ensuring that the communication necessary for the organization to function is occurring. [Barnhard, 181] Consider this in the context of the military staff planning an operation: the chain of command's responsibility must focus primarily on collaboration within the staff. Barhard takes this a step further, associating the "executive's" loyalty to the organization as the key to his or her effectiveness, much less personal success. [Barnhard, 183] It's little wonder that the JPG officers blanched at the prospect of sharing their work directly with their boss' boss.
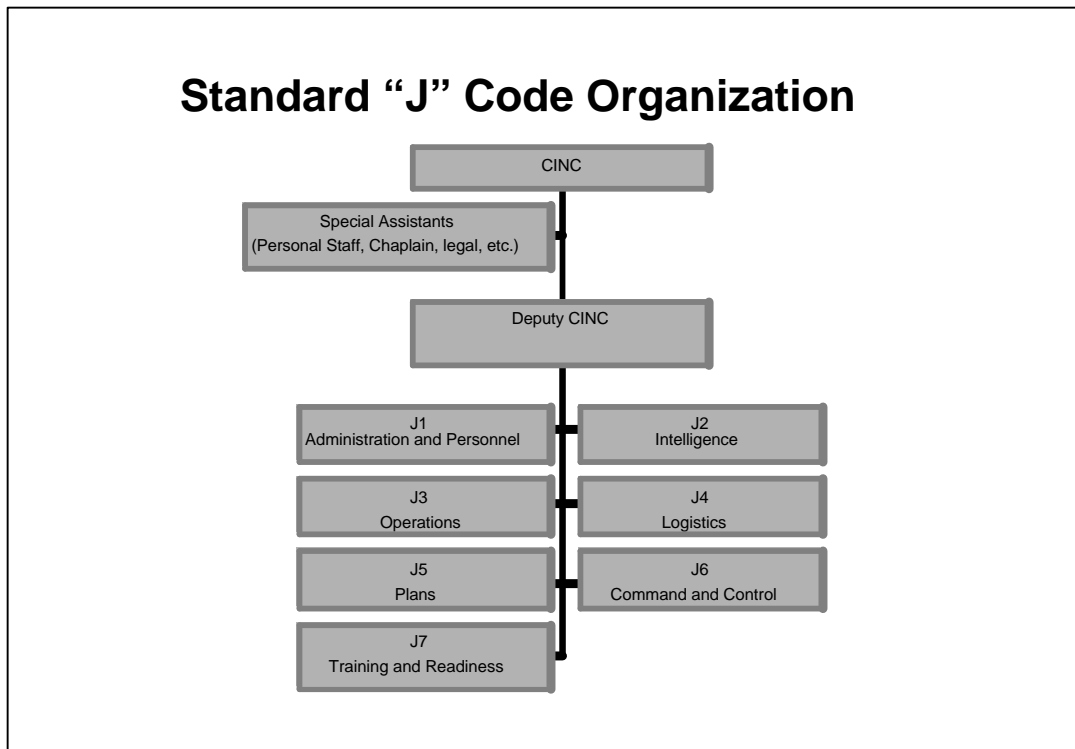


Figure 1. The J Code Staff Structure

### 2.3.2 *Specialization within the Staff*

Although over eighty years old, Weber's observations relative to specialization seem particularly applicable to the modern military staff. Despite calls for its abandonment in favor of a more horizontally integrated structure, the organization of today's staffs is along lines determined by function - personnel, intelligence, operations, etc. This approach, shown in Figure 1, organizes the staff by specialty, with each code, or directorate at the theater level, essentially responsible for the functioning of a discrete activity necessary for managing the commander's responsibilities.

Recent calls for dismemberment of this structure, which is commonly attributed to Napoleon, emphasize the need to address planning issues across staff lines. This is obviously necessary in crisis planning, and the horizontal integration of individual staff members into working groups, or "cells," is discussed below. However, the specialization of the current model recognizes the increasing complexity of all of the activities represented in the different codes. Each has evolved into its own subspecialty and it is not clear that abandoning the "Napoleonic" model would enhance staff effectiveness.

The vertical nature of this "Napoleonic" staff also serves the management issues hinted at by Barnhard. As the individual disciplines reflected in the "codes" have become more complex, the services have highlighted specialization in their in personnel management processes. Intelligence officers, logisticians, and personnel officers find personal and professional satisfaction working within their specialty as represented in the hierarchical staff organization. Moreover, they are exposed to the specific leadership necessary to mentor and prepare them professionally for advancement.

### 2.3.3 *Cell Growth: How Staffs Horizontally Integrate*

While the standard staff structure may maximize the expertise of individuals assigned to the staff, its inherent specialization requires that a comprehensive plan somehow integrate the efforts of all J-codes or directorates. The classic bureaucratic model would imply that this integration is done at the uppermost level of the staff, at the commander's level. Contemporary crisis situations call for a more streamlined approach which ensures that the best effort of each the specialists on the staff is folded into a plan before it reaches the commander for approval. The commonly used method for achieving this is the use of "cells" of members from various staff offices to address specific operational issues. The Figure 2 lists the more commonly "activated" cells for planning crisis operations in the Pacific Command's headquarters and those of subordinate CJTFs. Membership of these cells typically comes from the O3 to O5 level of the staff under O6 leadership.

## Typical "Cells" Used in Crisis Action Planning

| Function | Title |
|---|---|
| Intelligence and target planning | Joint Intelligence Support Element (JISE), Joint Targeting Board (JTB) |
| Operational planning | Operational Planning Team (OPT), Joint Planning Team (JPT), Joint Planning Group (JPG) |
| Logistics and movement planning | Logistics Readiness Center (JRC), Deployment Management Team (DMT), TPFDD Working Group, Joint Movement Center (JMC), Joint Petroleum Board (JPB) |
| Operations management and monitoring | Crisis Action Team (CAT), Current Operations Watch (COPS) |
| Personnel and medical | Joint Reception Center (JRC), Joint Medical Regulating Board (JMRC) |
| Public affairs | Joint Information Bureau (JIB), Joint Visitors Bureau |

Figure 2. Typical Planning Cells

As crisis planning has become more complex and time constrained, the tendency to pass the responsibility for developing pieces of the planning to a specialized cell has become more evident. Issues such as deployment of forces, psychological operations planning, and relief coordination require both expertise and coordination among various elements of the staff, necessitating the use of cells which integrate respective efforts. Organizational theorist Henry Mintzberg would refer to this as "horizontal decentralization," shifting the power of the organization away from the centralized hierarchical bureaucracy to mid-level "experts." [Mintzberg, *Structure,* 110-113] While Mintzberg associates this emergence of intra organizational cells with the maturation of the organization, a cautionary note should be sounded in the case of military commands. Planning cells on theater and JTF staffs have assumed a prominent role in crisis planning; however, they have seized little of the authority to make final decisions as Mintzberg implies. Instead, the final decisions in military operations still rest with the commander.

The rise of specialized cells during military planning has had implications beyond intra staff planning procedures. Because the specialized planning tasks that cells are formed to manage are shared throughout the theater, cells formed at each echelon have cause to deal with each other during planning. Figure 3 depicts how this interaction would typically be undertaken in the Pacific Command. The advantages of such exchanges are obvious: information is shared, rough plans are "fleshed out" and, most significantly, preliminary ideas are "bounced off" higher headquarters before formal adoption. In many cases these interactions are focused on technical issues as opposed to commander's policy. However, as in the example of the CINCPAC OPT and JTF JPG described above, cell leadership is usually highly sensitive to the bounds of its own authority.

**CINC - CJTF Relationship Between Cells**
For CINC PAC-COMSEVENTHFLT

*CJTF Cells*

OPT
OPT
JPG
TPFDD WG

*CINC Cells*

JICPAC — JISE
CAT — COPS
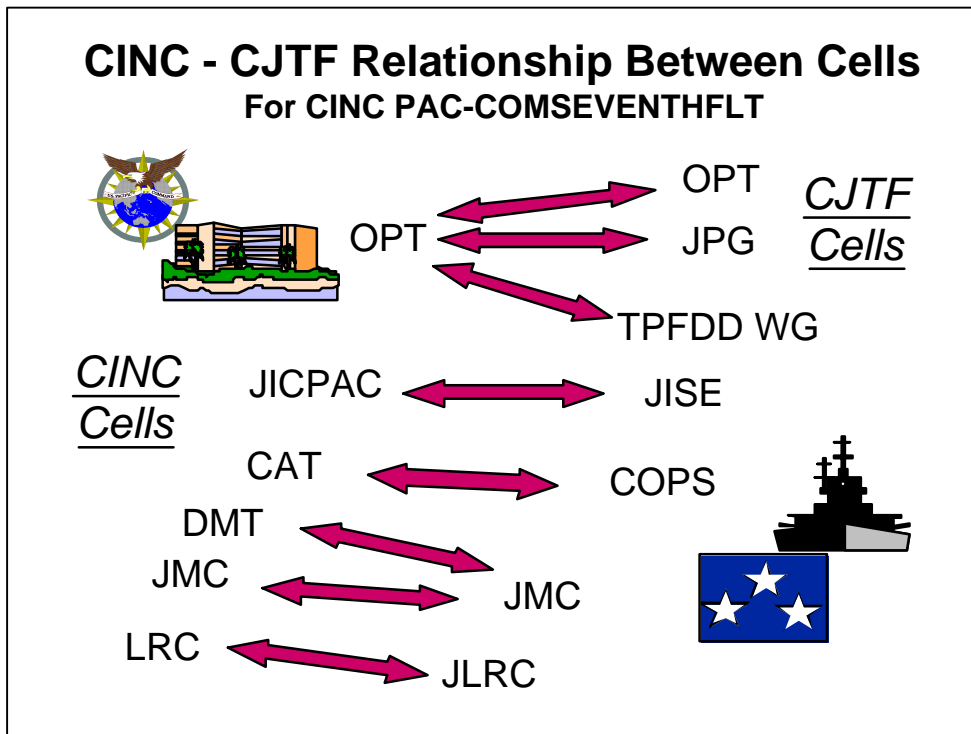DMT
JMC — JMC
LRC — JLRC

Figure 3. Planning Cell Interaction

Collaboration, both intra and inter staff, by cells is an increasingly evident factor in military planning for crisis operations and the rise of cells in this context has led to recent calls for abandonment of the "Napoleonic" staff structure and formal reorganization of operational staffs around a cell concept. This larger question is beyond the scope of this paper; however, it is clear from the current experience with cells that increased collaboration among specialist members of the staff is a benefit of their use. Similarly, this increased collaboration, although focused on narrow issues, extends outside the headquarters to senior and subordinate commands.

## 2.4 *Military Crisis Planning: A Group Effort*

The characterization of the current military's efforts at planning as a contrast between the formal staff organization and the use of cross-organizational functional cells sets the stage for a discussion of collaboration in military planning. Most importantly, it leads to the realization that military planning is a group effort, and crisis planning is a particular subset of this. Exploring the potential and pitfalls of collaboration during this planning must be built on recognition of attendant group interactions.

2.4.1 *Group Decision Making and Military Crisis Planning*

Blalock and Wilken have characterized group interaction in terms of the trade offs individual group members make working within the group. [Blalock and Wilken, 32-38] Their study, which focuses on the utility the individual sees in group exchange, is particularly useful on two levels when considering the behavior of military planners. First, Blalock and Wilken recognize that there exists a relationship between subgroups and larger groups from which these are formed. Secondly, Blalock's and Wilken's studies recognize that subgroups engender unique loyalties from members. [Blalock and Wilken, 315] Applying this to the process of crisis planning in both theater and JTF headquarters as described above, the following points are observable. Groups such as the OPT emerge as "players" on the staff, with an identify which often transcends the crisis planning the OPT may occasionally gather for. Moreover, assignment to these cells, particularly during time of crisis when their role is preeminent, becomes a priority for the directors or heads of the J codes who want to see their interests well represented in the various cells.

Blalock's and Wilken's observations highlight the often-difficult time headquarters planning cells have in executing their duties. Cell members have a dual responsibility: they not only represent the specialty of their directorate or J code, but they assume a larger responsibility to the specific function assigned to their cell. The implications of this dichotomous role dictate conditions not often met in the reality of daily staff work. First, assignment to planning cells is not always given to the most senior or experienced officers. Second, assignment to planning cells often conflicts with the regular workload of those assigned. Finally, assignment to a planning cell can result in long and irregular working hours which make communication outside the cell difficult. This final point is particularly significant in that the individual representing a directorate or J code in a planning cell may find it increasingly difficult to maintain contact with the superiors he or she putatively represents.

The tendency of planning cells to form a unique bond within a single headquarters is not restricted to the headquarters. As indicated above, the functional thrust of individual cells crosses command echelons. Experience indicates that the interaction between cells across echelons will also increase as the tempo of operations does. This interaction often results in a certain amount of distrust of planing cells by the hierarchical chain of command.

2.4.2 *The "Crisis" in Crisis Planning*

The most unique and distinguishing aspect of the planning process for military crisis operation is the stress under which the process is undertaken. Accordingly, the ability of the staff structure for planning should be considered relative to its suitability for making decisions under constrained conditions. The constraints of a theater or JTF staff in planning a crisis operation are essentially those of time and limited information. While the time constraint is not as fundamental as that facing a tactical commander –who may have only seconds to make life or death decisions –theater and JTF staffs must accomplish their planning within a compressed timeframe driven by a variety of requirements.

In general, a theater CINC's staff should be able to produce an OPORD within forty-eight hours from tasking by the National Command Authority (NCA). In most cases, the staff will have either thought out the crisis to some extent beforehand, or may even have a prepared plan available for the type of crisis developing. In either case, the actually task of planning during the notional forty eight hour window is focused on the key decisions of immediate importance: what are the specific objectives to be achieved, which forces can be used, how will these forces be employed to meet these objectives? The quality of these decisions and how they are made is a matter of continual focus by commanders as they train their staff, with studies suggesting that group interaction during crisis planning is a unique phenomenon. These studies indicate that, when faced with time constraints, members in decision-making groups have an uneven ability to process information and make choices. In laboratory results not unlike the conditions faced by theater or JTF planning cells, researchers at Purdue University found that members of small groups thrown together to make time-sensitive decisions tended to rely on older, dated information rather than updated information provided to them in the group setting. [Kelly and Karau, 1351] Significantly, these studies also revealed that members in such groups tended to be swayed in their judgements by the influence of the rest of the group. [Kelly *et. al.*, 19]

These results have a direct bearing on the issue of collaboration in military staff planning for crisis operations. They suggest that while the use of planning cells to integrate expertise makes sense, it does not obviate the need for careful sharing of data among the cell's members or the need for focused cooperation within the cell. The shift towards planning by cells places increasing responsibility for decision making on groups who only work together sporadically. This lack of practice creates the sort of conditions for poor decision making noted by Kelly in her studies: planning groups may practice in frequently, do not share information routinely, and approach their duties with a limited understanding of the issues before them. Add to this the concerns of Blalock and Wilken relative to the dark side of group dynamics and the need for better collaboration in crisis planning becomes evident.

3. **Technology and Collaboration for Military Planning**

A 1984 Army-sponsored study projecting the battlefield of the year 2000 characterized the future battlefield as a "wicked problem" according to the definition established by management theorists Ackoff, Mason, Mitroff, Rittel, and Webber. "Wicked problems" defy logical analysis; they cannot be decomposed into solvable subsets, they are usually unique, and their solutions often lead to more insidious problems. [Baliga *et. al.,* 263] Recent history attests to the accuracy of this prediction.

Nowhere is the "wickedness" of contemporary military operations more evident than in the effort to both predict and plan for their execution. The global nature of political and social unrest as well as the shrinking resources of the U.S. armed forces have spawned efforts to use integrated information to reduce uncertainty and risk in military operations. The technical approach in this effort has focused on collaboration technology as an easily leveraged, "off-the-shelf" capability. However, the organizational factors discussed above, as well as the shortcomings of these technologies themselves, have failed to substantially advance the state of operational planning.

## 3.1 *Collaborative Technologies and Military Planning: A Survey*

The marketplace has provided a variety of collaborative technology "tools" over the past several years. Figure 4 summarizes the more commonly used ones by type and use. As indicated, there is a wide disparity in the performance of these technologies and their perceived utility. In time, ongoing development efforts, mainly driven by the marketplace, will correct the former problem. The latter problem is a function of the organizational issues discussed above and will require a more concerted effort to address.

## Collaborative Technologies Used in Planning

| Technology | Use | Comments |
|---|---|---|
| Web sites | General information and intelligence posting | Has become commonly accepted approach to "pushing" widely need information to staffs across echelons. |
| News groups | Tailored information to select groups within staffs | Limited use. Requires management to select and "push" information. Most often used among cells with need to pass selected info. |
| Groupware | Sharing info and ideas among several users at once. | Decreasing use as more sophisticated tools become available. Ease of use seems to be significant factor in appeal. |
| E-mail | Messaging between individuals and groups | Most common form of technology collaboration. Used extensively to pass attachment files. Casual use often creates version control and approval problems. |
| Voice "chat" | Discussion of issues, alert to critical issues | Bandwidth limitations and disparity in various tools have made use uneven. Most appreciated by junior action officers directly working on plan. |
| Whiteboard | Informal, short written messages | Includes more recent "IM" systems. Also popular with action officers. |
| "Brainstorming" tools | Mission analysis, course of action evaluation | Difficulty in learning and bandwidth limitations have hampered use. Speed often fails to keep pace with demands of crisis planning. |
| VTC | Strategy sessions between senior leaders | Bandwidth limitations restrict to most senior of forward deployed staffs. Must be scheduled in advance. While senior officers see as useful in finalizing plans, action officers use infrequently. |
| Virtual environments | Provide staffs a range of collaborative technologies in an integrated fashion. | Most common metaphor that of building/rooms paralleling physical headquarters. Technology not widely deployed. Effective use requires training and user "buy-in." |

Figure 4. Collaborative Planning Technologies

## 3.2 *Towards Increased Collaboration Reshaping the Military Organization*

Perhaps the greatest irony of the issue of technical collaboration in military planning is that the technologies are failing not because they provide too little access to planners, but because they may provide too much. While it would be glib to suggest that contemporary military planners consider too much collaboration a bad thing, the observed reluctance to seek wider use of collaborative technologies in planning is in some measure due to a sense among planners that the rampant exchange of increasingly available data does little to contribute to their effectiveness. Given the present tendency towards centralized decision making in military planning organizations, this is true. As Mintzberg points out, the influx of more information to a highly centralized effort does little to make decision making better. [Mintzberg, *Structuring,* 183] The

logical inference, consistent with organizational theories of the past several years, is that the military staff structure is in need of an overhaul. The prospect of this on a wide scale is unlikely. As indicated above, the weight of past effectiveness as well as bureaucratic inertia will no doubt keep the general structure of Figure 1 in place for the foreseeable future.

Acknowledging that the directorate or J code organizational model will persist in some form for the immediate future should not deter efforts to implement a more collaborative approach to crisis planning. A first step in this would be a serious process reengineering effort aimed at the crisis planning process at theater and JTF headquarters. "Process reengineering," or "business process reengineering" - BPR - is an organizational development technique which essentially looks at an organization's operational processes with the goal of revamping these process to fit new requirements. BPR has been most effective when linked with the implementation of new information technologies, such as are represented in Figure 4. Of particular note, BPR has been employed by organizations in an attempt to break down the hierarchical barriers to collaboration. [Moosbruker and Loftin, 289-290] BPR can be a tough sell in the military: it requires a dedicated effort at self-examination that is often time consuming and uncomfortable for leadership. However, such a commitment seems warranted in light of the potential for improved planning in what has become an admittedly increasingly difficult operational environment.

A commonly voiced opinion among technologists frustrated at attempts to broaden the use of collaborative technologies within the military is a belief that the current reluctance will pass in a few years when today's junior officers rise thorough the ranks to leadership positions. In theory these younger leaders, who have been raised with information technology at their fingertips, will embrace the full potential that new technologies offer in managing military problems. This view should be viewed skeptically. A brief tour of any operational command center will reveal that officers as senior as the O5 and O6 level are comfortable with networked workstations and use the tools available extensively. A more reasonable belief is that the culturalization of military officers will continue to stress the hierarchical nature of military command and control and decision making. The increased specialization noted above and inherent in the organizational structure of Figure 1 will possibly deepen this culturalization.

### 3.3 *Changing Collaborative Technology for Military Planning*

The discussion to this point has focused on the military command and control structure's organizational shortcomings regarding the more effective use of collaborative technology. However, responsibility for the lack of success in developing and installing collaborative technologies in planning headquarters must be shared by the technology program offices developing collaborative tools. In general, the technical shortcomings of current collaboration technologies fall into three categories.

### 3.3.1 *Technical Limitations*

Many of the collaborative technologies demonstrated or prototyped for military planning function poorly in the operational environment in which crisis planning is undertaken. Moreover, many are

difficult to use and require extensive training or systems management. Significantly, most are classified as "developmental" and do not have the infrastructure necessary to support such efforts.

In addition, several of the collaborative tools in use or proposed require extensive bandwidth. Bandwidth is a prime resource for all military commands, particularly those deployed aboard ship or in the field, as CJTF headquarters will be. Military planners have found that the use of these technologies often hampers the flow of other vital crisis communications.

Finally, several collaborative technologies require unique computer platforms for hosting. The paucity of workstations in the often cramped deployed JTF headquarters will require that any collaborative applications be compatible with the Windows NT- IT21 environment. The need to install - and maintain - other server or client machines will make a collaborative technology unacceptable to military users.

### 3.3.2  *More is <u>NOT</u> More*

The ability to pass increasing amounts of data seems to be a precept of collaborative technology, despite warnings from Mintzberg and others that subgroups ̶such as planning cells - can drown in a sea of information. The problem in information gathering for crisis operations is not the lack of data, but the selection and understanding by planners of key data. Concepts for "just in time" data need to be carefully researched and incorporated into collaborative planning technologies.

### 3.3.3  *The Emphasis of Substance over "Flash"*

A cynical, but understandable, view among military officers confronted with collaborative technology is the belief that technology programs lead with tools that emphasize technology over utility. Interestingly, the specifics of this opinion shift with the rank of the officer involved. The video teleconference (VTC) is perhaps the best example of this: senior officers tend to use the VTC and appear comfortable with it. Junior officers generally feel that VTC sessions waste either time or communications resources for little gain.

Because no single view of which technologies are most important underlies this widespread cynicism, an obvious priority is a structured and validated research effort to establish collaboration technology needs as these technologies are being developed by the marketplace and government. This effort could be incorporated into the BPR effort suggested above, or done independently; however, it emerges as a requirement any time new collaboration technology is prototyped in an operational headquarters.

### 4.  **Concluding Observations**

The trend towards the increased use of cells and working groups in crisis planning has organizational overtones and potential impacts on the way our military staffs are constructed. Operationally, it also signals the need for increased collaboration, as the efficiency promised by these use of these cells will only be realized through increased information sharing and decentralized decision making. This is an uncomfortable position for traditional military command

and control advocates who favor distinct lines of command and information flow. As Kraus points out, a "tolerance for ambiguity" is a necessity in a collaborative organization, and such ambiguity is unsettling to commanders charged with executing complex plans under dangerous conditions. [Kraus, 115] Moreover, today's "Napoleonic" staff with a limited use of cells and working groups in selected situations offers an apparent "best of both worlds" mix: the traditional hierarchy of the directorate or J code structure concentrates the specialized expertise of staff members, while *ad hoc* cells and working groups offer the benefits of shared expertise in addressing critical planning problems.

Collaboration technology offers the potential to optimize the benefits of both the hierarchy of the current staff structure and the horizontal integration of the cells so important in current planning. For example, using these technologies staff members can participate in cells and working groups from their permanent offices, where access to the expertise of the entire directorate is available to the cell. Cells and working groups become "virtual" with members sharing ideas and information from the most efficient personal vantage point. Such a concept is reasonable and within the grasp of the technology available. However a partnership between military planners and collaborative technology developers, based on common understanding of how these technologies can support organizational growth, is needed to realize the full potential of both the technologies and the organization.

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