
**USING ELECTRONIC MEETING SYSTEMS TO AID
DEFENSE DECISIONS**

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Defense decisionmaking is inevitably collaborative because it involves a range of stakeholders. The challenge is to ensure that collaboration adds value instead of producing lowest-common-denominator results.

Collaborative technologies help people develop a common perspective and make it possible to collaborate across time and space. Figure 13.1 is a matrix of collaboration, showing different combinations of time and space—from synchronous (same time, predictable) and colocated (same place) in the upper left, through asynchronous (unpredictable) and uncolocated (different place and unpredictable) in the bottom right. Illustrative collaborative tools and techniques are provided for each space-time combination.

The potential of computer-mediated communications tools for enhancing effectiveness is driving widespread interest in them. Collaboration typically disrupts existing organizational, social, computing, and network infrastructures,¹ so an organizational structure that legitimizes collaboration across hierarchical lines is a key condition of success.² Groupware provides a powerful vehicle for transforming

¹See, for example, S. Poltrock, "Some Groupware Challenges Experienced at Boeing," available at <http://orgwis.gmd.de/~prinz/cscw96ws/poltrock.html>.

²See, for example, W. J. Orilkowski, "Learning from Notes: Organizational Issues in Groupware Implementation," *Proceedings of the ACM, Conference on CSCW '92*, 1992, pp. 362–369; B. Vadenbosch and M. M. Ginzberg, "Lotus Notes and Collaboration," *Journal of Management Information Systems*, Vol. 13, No. 3, pp. 65–81; A. S. Clarke

		Time		
		Synchronous (same, predictable)	Asynchronous	
			Predictable	Unpredictable
Space	Same place	Electronic meeting systems	Work shifts	Shared space, group calendaring
	Different places but predictable	Tele/video/desktop conferencing	Electronic mail	Shared applications and files, collaborative writing
	Different places and unpredictable	Interactive multicast seminars, text chat	Electronic bulletin boards	Discussion databases, workflow systems

Figure 13.1—Collaboration Across Time and Space

stovepipe processes into more-integrated decisionmaking. Defense planning, in particular, can be dramatically improved.

This chapter addresses how one kind of groupware, electronic meeting systems (EMSs), can be used for simultaneous collaboration. Also included is a description of the detailed application of one EMS (Ventana Corporation’s GroupSystems) to defense planning.

ELECTRONIC MEETING SYSTEMS

An EMS includes three processes that are designed to improve group productivity.³ Table 13.1 shows these processes and some of their advantages.

(ed.), *Groupware: Collaborative Strategies for Corporate LAN's and Intranets*, Prentice Hall, Upper Saddle River, NJ, 1997; and <http://copernicus.bbn.com/lab/ocsc/papers/Full.text.html>.

³For more detail, see Jay F. Nunamaker, Jr., Robert O. Briggs, and Daniel D. Mittleman, “Electronic Meeting Systems,” in David Coleman and Raman Khanna (eds.), *Groupware: Technology and Applications*, Prentice-Hall, Inc., 1995.

Table 13.1
EMS Processes and Some of Their Advantages

Process	EMS Advantages
Communication through common media (computer network, videoconference, teleconference)	Increases the number of people who can participate in a meeting through simultaneous input
Thought processes to form an action plan to accomplish a common goal (formulate, evaluate, and select or prioritize alternatives)	Generates more ideas of higher quality through various collaborative activities to generate, organize, and evaluate ideas; anonymity allows free debate on ideas
Information access to enable group members to support the thought processes using timely, accurate, and complete information	Tools can reduce information overload, increase productivity through access to a larger information base, and enhance organizational learning via electronic transcripts

An EMS focuses on group dynamics, using computer-aided parallel communications, structured and focused thought processes, and applications and tools to improve information access. Used well, an EMS can enhance defense planning by stimulating social interaction and thinking, and can accelerate strategic planning, problem solving, and the setting of priorities because its ability to exploit simultaneous input facilitates idea generation, persuasion, and decision selection.

The results produced by a decision support process depend on the participants, the leadership, and the exercise design, as well as on the underlying technology. Successful decision support exercises are those that identify and represent the problem clearly, generate and evaluate alternatives, and then select among those alternatives. An idealized flow chart of the process shows its phases:

- Define the problem
- Formulate a decision objective
- Generate decision criteria, weighting them as appropriate
- Generate alternatives
- Discuss alternatives

- Prioritize alternatives
- Rate how well each alternative meets each criterion
- Compare the scores for the alternatives and prioritize the alternatives accordingly
- Capture the pros and cons of each leading alternative for presentation to decisionmakers.

PRIORITIZING NAVAL PROGRAMS: AN EXAMPLE OF AN EMS IN USE

The Challenge

In early 1997, the Navy staff (N-8) was tasked to prepare the Navy for the first Quadrennial Defense Review (QDR). The Navy's dilemma was familiar to force planners: the Navy had developed a program in response to the defense planning guidance, and that program exceeded the *fiscal* guidance laid down by the defense secretary. Navy leadership argued to the Office of the Secretary of Defense (OSD) that it had long since eliminated the fat from its budget and requested additional funding. Simultaneously, the Navy moved to ensure that if it could *not* get additional funding, it would have the best backup plan it could devise.

In formulating its backup plan, the Navy asked the Decision Support Department (DSD) of the Naval War College to develop a methodology that would force planners to do collaborative, capabilities-based planning. DSD responded with an analytic exercise (carried out in spring 1997) that drew on decision support technologies and techniques. The results were delivered to the N-8 staff for incorporation in the Navy's input to the QDR.

The Navy's challenge was how to fit a \$90 billion requirement into a fiscal guidance of \$81 billion.⁴ One time-honored approach would have each head of a major program element resubmit a budget that trims that program by 10 percent. This may well be the "easiest" approach in that it introduces the least stress across the organization. It

⁴All budget quantities are expressed in fiscal year (FY) 1997 dollars.

seems “fair,” because everyone takes the same hit. But it almost always causes serious disruption from an overall planning perspective. Some programs can take a 10 percent cut with only marginal reductions in their effectiveness; others are so crippled by the cut that they might as well be eliminated.

Another common approach is to lock the heads of major programs in a room and don’t let them out until they have come up with a plan that fits the budget. The problem with this approach is clear: *Program prioritization becomes subject to competition—and then compromise—among the major program sponsors.* The distortion in the resulting program is evident when one looks at the uneven capabilities that result from such bargaining.

The alternative that the Navy leadership needed was clear: *a process to prioritize programs based on capabilities that naval forces need.* This is easier said than done, however. Many capabilities go into a military force, and they can be delivered in many ways. Targets, for instance, can be struck from the sea by carrier aircraft or missiles; missiles, in turn, can be launched from a surface ship or a submarine. The DSD staff set out to design an exercise that would

- Tie program priorities to required capabilities
- Involve hands-on participation by key resource sponsors
- Be transparent to participants
- Provide a clear audit trail of results.

At the outset, the exercise design team faced the fact that program prioritization is always dangerous. Every program that has made it far enough to be in the Navy’s program objectives memorandum (POM) is important; all of the programs bring some important military capability to the table. The challenge that Navy leadership laid down was as follows: programs that were multipurpose and high performing or narrow-purpose but critical to fielding key capabilities were to be identified and distinguished from programs that were narrow-purpose and whose contribution was marginal or could be covered in another way.

DSD was asked to concentrate on the investment account. True, the Navy would also look elsewhere to save money; its operations and

maintenance costs refused to decline even though every year saw fewer ships in the fleet. Additional rationalization of the Navy's base structure and facilities could also save money. Nevertheless, Navy leadership felt it had a good understanding of *where* to find savings in these other accounts; it simply did not know *how* to do so. The investment account was different, however. Developing and procuring one system when another would serve much better could haunt the Navy for as long as 30 years.

Overview of Methodology

The analytic approach adapted the strategy-to-task methodology developed at RAND during the 1980s and married it to decision support technology and methods. Experts who understood U.S. national security strategy as articulated in the President's National Security Strategy and the secretary of defense's guidance to the armed services were assembled. Their understanding of this and their knowledge of activities the military had been called on to perform in the recent past would enable them to project the activities military forces would likely be asked to carry out within the foreseeable future. This, in turn, would help them judge what capabilities the Navy would need. From there, it would be a straightforward, if complex, step to determining the programs needed to field those capabilities.

The design of phase I of the exercise—through determining capabilities—is shown as a flow chart in Figure 13.2.

Once a weighted set of capability requirements has been established, the next step is to assess how well the Navy programs satisfy those weighted requirements. Figure 13.3 shows the final output as a prioritized list of major programs in the Navy's investment budget based on the contribution each makes to the weighted set of capabilities the Navy would need. The exercise flow, and the EMS's part in it, can then be described in detail.

Phase I: From Activities That Military Forces May Be Called on to Carry Out to Weighted Capability Requirements

Select the set of activities that military forces may be called on to carry out. The U.S. military responds to tasking from the national command authority that ultimately culminates in the authority of the

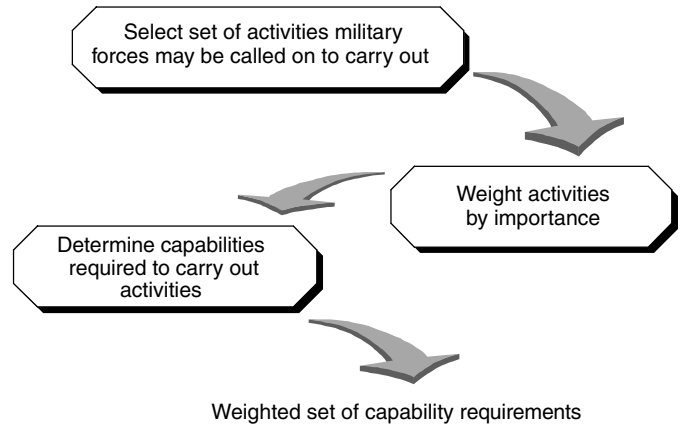


Figure 13.2—Analytic Approach, Phase I

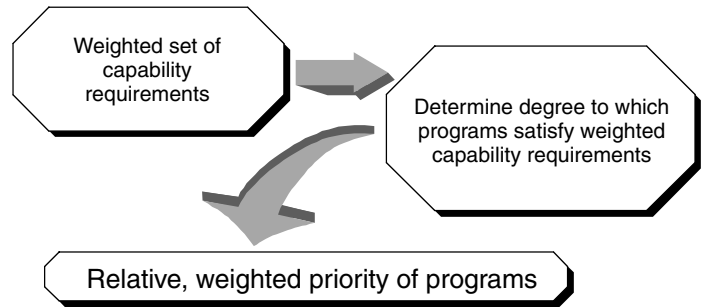


Figure 13.3—Analytic Approach, Phase II

U.S. president as commander in chief, with supplemental “advise and consent” authority resting in the U.S. Congress. Some 20 analysts (both military and civilian) from the Naval War College who were familiar with the details of the national security decisionmaking process gathered to develop a list of activities that military forces could be called on to do over the next two decades. Each analyst was asked to enter into the EMS notebook computer specific suggestions of activities with short descriptions. Each activity was displayed both on each participant’s notebook computer and on a screen in the

front of the room that was seen by all participants. The ability to see all the inputs limited the duplication of activities nominated and stimulated thinking.

When the participants had entered all the “activities” they could think of, the meeting facilitator led the group to review candidate activities displayed on the master screen. The group collectively examined the list, removed redundancy, and made the language more precise. The result was a long list of activities (listed in Table 13.2) that these experts felt the military could be called on to do in the foreseeable future.

A long unprioritized list is a poor foundation for making the hard choices, tradeoffs, and risk assessments that defense planners face in every Planning, Programming, and Budgeting System (PPBS) cycle. So the facilitator turned to the difficult task of prioritization.

Weight activities by importance. In the Bottom-up Review of 1993, Secretary of Defense Les Aspin had made a clear and simple judgment on the question of priorities: *The US military was to prepare to fight and win two nearly simultaneous major regional contingencies.* If the military met this standard, it could cope with other, “lesser included” contingencies. Hence, the guidance was, essentially, to prepare for the worst, and the resultant capabilities would be equal to any other challenge.

The group of experts felt that this formulation, while useful, was an oversimplification and broke down on careful examination. The devil was in the details. Some activities—e.g., maintaining a peace accord in Bosnia—turned out to be “different” cases, not “lesser included” cases. The equipment, types of units needed, and skills required were different from those of a force optimized for high-intensity conflict. Moreover, how much special attention to pay to “other” activities would have to depend on how important they were, which, the group decided, was determined both by the likelihood that the military would be called on to carry them out and the risk to U.S. national security interests were they not carried out successfully.

Militaries are constantly undertaking activities quite different from fighting a major conflict, such as maintaining a forward presence to deter aggression or monitoring international agreements. And then there are some activities—such as nuclear warfare—that are highly

Table 13.2
Missions for DoD over the Next 20 Years

Short Form	Long Form
Constabulary	Provide constabulary assistance to U.S. domestic authorities
Counterdrug	Assist U.S. civilian agencies in countering drug trafficking
Counterimmigration	Help U.S. civilian agencies interdict illegal immigration
Counterinsurgency	Protect democracies by conducting counterinsurgency
Counterproliferation	Actively support counterproliferation activities
Counterterrorism	Assist U.S. civilian agencies in countering terrorism
Crisis response	Respond to a crisis rapidly
Deter MTW	Deter a major theater war (MTW)
Deter war with peer	Deter major war with a peer competitor
Deter WMD	Deter development and use of weapons of mass destruction (WMD)
Extend deterrence	Extend deterrence and defense coverage to a friendly nation
Fight and win MTW	Fight and win a MTW
Forward engagement	Conduct forward engagement
Humanitarian ops	Conduct humanitarian relief operations
Impose U.S. will	Impose U.S. will through military intervention
Intelligence	Collect intelligence
Int'l agreements	Monitor and enforce international agreements
Limited ops	Conduct limited operations to influence a major power
Peace ops	Support and/or conduct peacekeeping operations
Protect U.S. lives	Protect U.S. lives and property (to include noncombatant evacuation operations)
Punitive strikes	Conduct limited punitive strikes
Sanctions	Enforce sanctions

unlikely but would carry serious consequences for national security if they were to happen and the United States were unprepared. Both likelihood and consequence are thus integral to assessing an activity's importance. To capture these two factors, the facilitator asked participants to assess activities against two assertions:

1. The military is likely to be called on to carry out this activity.

2. Not performing this activity successfully poses significant risks to U.S. national security.

The participants assessed each activity, one at a time, against each assertion, selecting responses ranging from strongly disagree (1) to strongly agree (5). The EMS alternative analysis module then displayed the mean, standard deviation, and range of responses for each military activity. The responses entered by participants into their notebook workstations were anonymous (although participants could compare their responses against what the group did as a whole) in order to eliminate any influence some participants might feel from others with higher rank or stronger personalities. Truly independent assessments thus were possible. Participants were encouraged to append explanations to their assessments, which, in turn, would be displayed. This yielded a much richer understanding of the results, especially any “outliers.”

The responses were then binned. Activities with mean scores of 4.5 or above were placed in the Strongly Agree category, those with mean scores of 3.5 to 4.4 in the Agree category, and so on. The results are shown in Figures 13.4 and 13.5.

The facilitator then paused to review these results with the participants. Had the ensuing discussion revealed any misunderstandings of the assertions, the facilitator could have “polled” the group again once the assertions had been clarified. Repeating the poll was just a mouse-click away.

The group felt that frequency and risk were of comparable importance in evaluating activities and concluded that they should be given equal weight in a consolidated ranking (see Figure 13.6).

Note that the emerging numerical priority ranking constituted an important step beyond many strategy documents, which catalog a broad list of military missions but then implicitly concede that the next step, prioritization, is too hard, and so stop.

The group paused to reexamine whether giving equal weight to likelihood and consequence, or “criticality,” was appropriate. One participant argued that because the military’s job was to protect the United States and its interests from catastrophic harm, the ability to do so was the standard by which force capabilities should be judged.

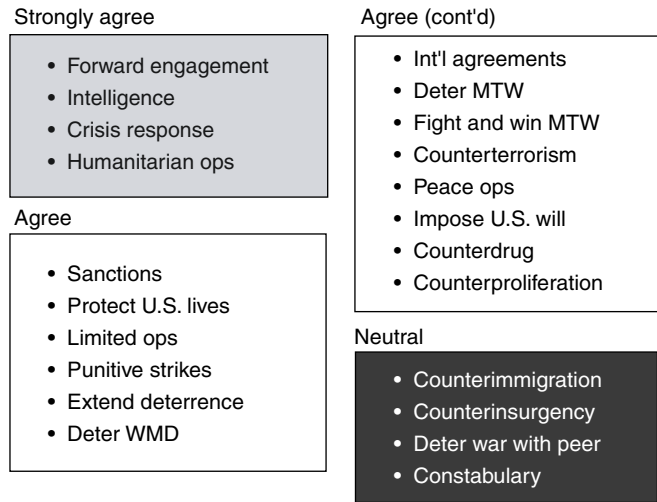


Figure 13.4—Responses to “The Military Is Likely to Be Called on to Carry Out This Activity”

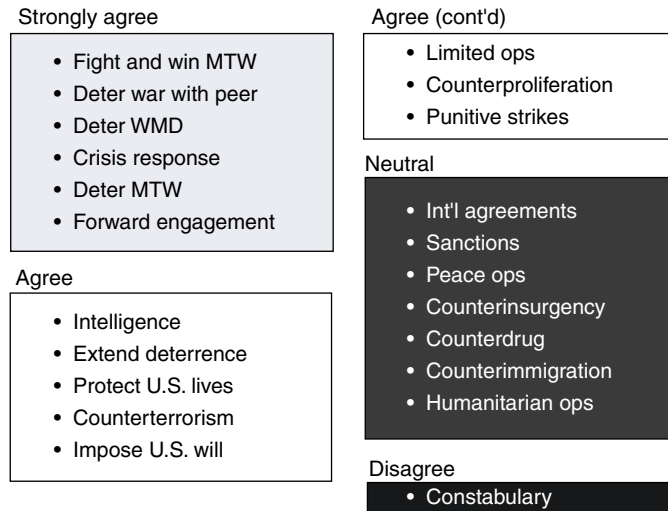


Figure 13.5—Responses to “Not Performing This Activity Successfully Poses Significant Risks to U.S. National Security”

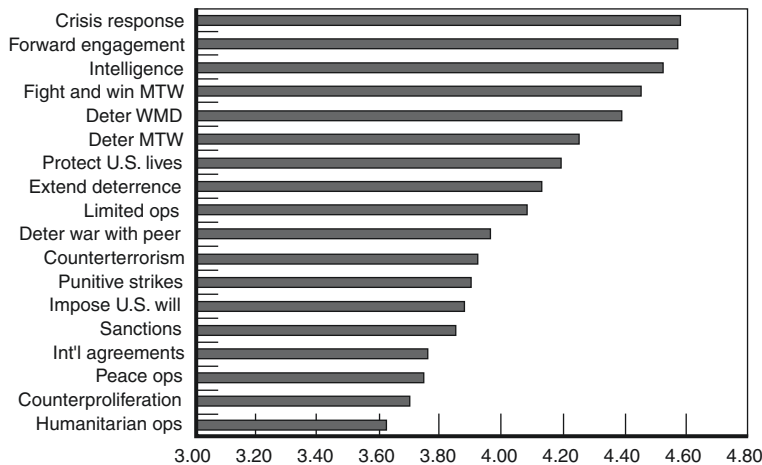


Figure 13.6—Ranking of the Importance of Military Activities

Others countered that U.S. military forces were being called on to respond to any number of situations that posed no serious threat in the short run to U.S. national security but that nonetheless required a competent response for two important reasons. First, a modest size crisis, if not checked promptly, could expand into a much larger problem. Second, the need to respond to these lesser contingencies was not going to disappear. To meet such needs, the military would be forced to strip from its forces units that would otherwise be earmarked as lead elements for any MTW that might break out. Planning deliberately for activities that must be done anyway would thus allow the military to minimize turbulence in its forces.

In this case, an equal weighting was retained. Had it not been, the EMS software would have permitted sensitivity analyses to be performed so that the group could see how priorities would change if the weighting changed. Thus, if the weighting moved to, say, 3:2, in favor of “criticality,” activities that implied high-intensity warfare with a strong military (such as “deter war with a peer”) would have increased modestly in importance.

Rank the relevance of naval forces in carrying out key military activities. The facilitator then asked the group to consider what naval

forces could contribute to joint operations that would increase the odds of those operations succeeding. Naval forces would play an important role in most of the activities, but in some their role would be more prominent, and in others they would be less suited than the forces of another service. In some cases, naval forces would have the primary responsibility; in others, a critical role (i.e., one without which the operation would be severely hampered); in yet others, only a marginal role.

The facilitator asked participants to assess activities against two assertions:

1. This activity is likely to be performed primarily by naval forces.
2. Naval forces are critical to the performance of this activity.

After discussing the role naval forces would play in carrying out these activities, the participants entered responses into their notebook workstations. One by one, each mission was displayed, and each participant entered a response from strongly disagree (1) to strongly agree (5). Figures 13.7 and 13.8 show the results after aggregation and binning. As expected, the two responses are highly correlated, as Figure 13.9 shows.

The results of these two polls were then averaged to portray the overall “utility” of naval forces for carrying out activities the military would be called on to execute. The top 15 priorities are shown in Figure 13.10.

Determine the capabilities that naval forces will need. The prioritized list (Figure 13.10) gave the group a basis for identifying the capabilities needed and, ultimately, which programs would provide those capabilities.

As part of the 1990s effort to build a Joint Mission Essential Task List, the Navy developed its Department of the Navy (DoN) Warfare Task List, which sets out the capabilities that the Navy commits itself to maintaining in its forces. This list is reviewed and updated regularly to ensure it takes into account new capabilities that technology or new doctrine make possible. It is arranged hierarchically, which means the major categories lent themselves well to the exercise at

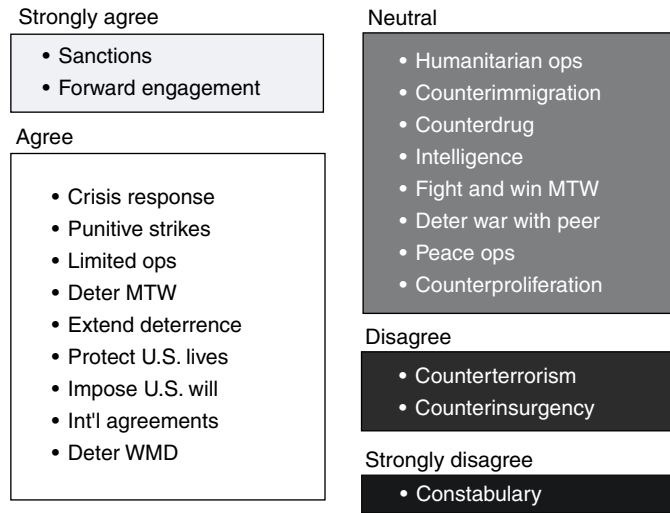


Figure 13.7—Responses to “This Activity Is Likely to Be Performed Primarily by Naval Forces”

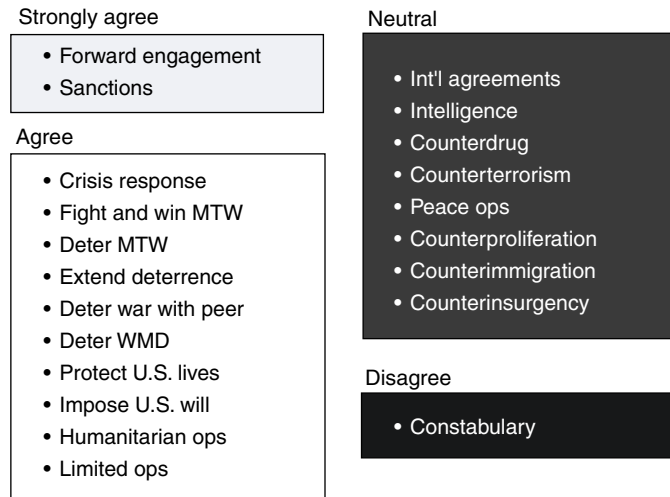


Figure 13.8—Responses to “Naval Forces Are Critical to the Performance of This Activity”

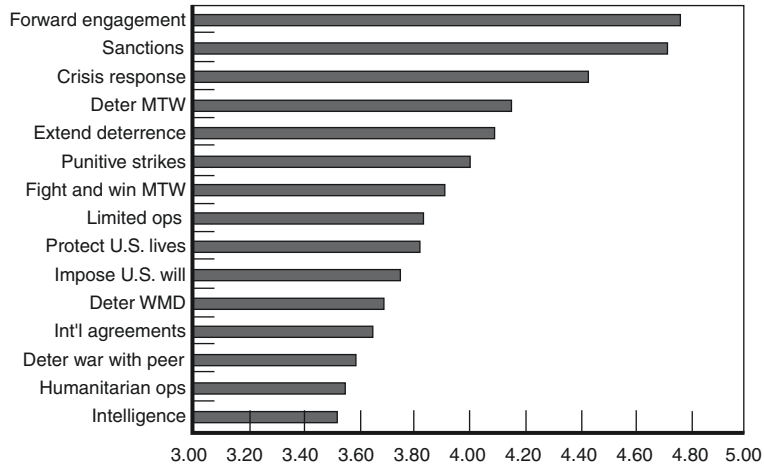


Figure 13.9—Ranking of the Relevance of Naval Forces in Carrying Out Key Military Activities

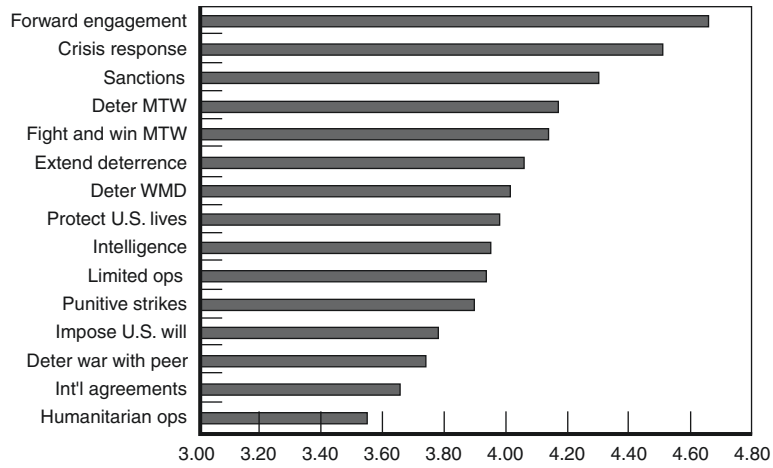


Figure 13.10—Ranking of the “Utility” of Naval Forces

hand. The DSD team preselected the following DoN warfare tasks from the list to use in arraying the various naval capabilities required:

- Airspace primacy
- Command and control of assigned U.S. and multinational forces
- Control of littoral land areas
- Fire support to forces ashore
- Forcible amphibious entry
- Forward deployed, combat-capable forces
- Gather and disseminate timely battlespace knowledge
- Precision strike
- Sub-surface primacy
- Surface primacy
- Sustained expeditionary logistics
- Theater missile defense
- Timely movement of forces and supplies by sea

One by one, each activity (e.g., fight an MTW) was displayed on the participants' screens, along with, one by one, the capabilities to be evaluated. Participants were asked to assess the contribution the capability shown made to the activity shown, the possible responses ranging from not critical (1) to highly critical (5).

The "score" for each activity-capability combination was the product of the activity's weight (shown in Figure 13.10) and the capability's degree of criticality. For example, if a participant deemed that providing theater missile defense was a capability critical (4) to the crisis response activity (4.5), the "score" for that combination would be 18 (i.e., 4×4.5). These scores were then summed for each capability to produce a "weighted capability requirement." A capability scored "high" on the list of weighted capabilities if it contributed disproportionately to the activities with the highest weights, or if it contributed a high value to a broad spectrum of missions. The results for the top 13 scorers are shown in Figure 13.11.

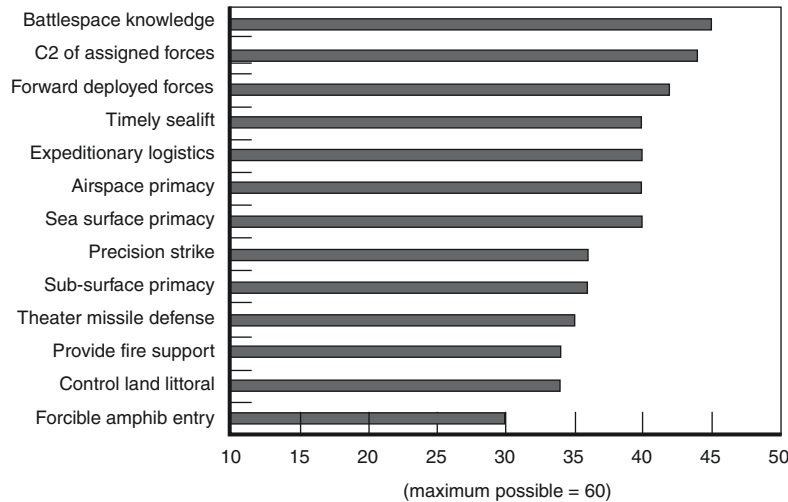


Figure 13.11—Capabilities Ordered According to Their Contribution to Weighted Activities Naval Forces Are Likely to Be Called on to Carry Out

Of particular note is the lead priority given to battlespace knowledge and effective C2. *Neither* of these two “most important” capabilities puts firepower or forces into the field. Instead, both allow the commander to understand the situation in the battlespace and to apply force or firepower more precisely and effectively.

The group singled this out as an important finding made possible by the methodology. Normally, discussions of capabilities measure effectiveness by focusing on the amount of force or, in more refined analyses, the amount of firepower a service can field. This focus biases programmatic priorities toward major weapons platforms. Because the value of battlespace knowledge and effective C2 is hard to measure and is rarely part of high-visibility programs, these two capabilities are typically put at a disadvantage when competing for resources. Even careful modeling and simulation generally understate their value. By now, most models can elevate the measure of merit to targets killed, thereby picking up the importance of such items as precision guided munitions (PGMs). But battlespace knowledge and

effective C2 remain elusive capabilities to model, so they seldom are assessed in ways that give prominence to their payoff.

Phase II: Assessing the Department of the Navy Investment Program

As the last phase of the exercise, the group turned to the final task: prioritizing the Navy's investment program by assessing the largest DoN programs.⁵ These 22 programs, which represented 92 percent of the total DoN investment budget, were as follows:

- New class of aircraft carriers
- F-18 E/F combat aircraft
- V-22 Osprey
- DDG-51 (with Aegis air defense system)
- Air-cushioned amphibious vessel (ACAV)
- Joint Strike Fighter (JSF)
- Lightweight 155-mm artillery piece
- Arsenal ship
- SC-21 (now the DD21) destroyer
- AV-8B V/STOL remanufacture
- F-14 upgrade
- Transport helicopter upgrades
- P-3 Orion upgrade
- Standoff precision guided machines (e.g., JSOW, JDAM)
- AIM 9X air-to-air missile
- LPD 17 amphibious transport
- Theater ballistic missile defense (TBMD)
- Surface fire support (NSFS)

⁵Based on the sum of procurement and 6.3 (research and development [R&D]) dollars across the 1997–2002 FYDP.

- New attack submarine (NSSN)
- Unmanned aerial vehicles (UAVs)
- Cooperative engagement capability (CEC)
- EA-6B electronic warfare aircraft

Participants were presented with a description of each program and its place in the budget. They were then asked to evaluate the contribution—from not critical (1) to highly critical (5)—that each program made to the weighted capabilities derived in phase I. As the capabilities were displayed, one by one, participants assessed the contribution the program would make to them.

The “score” assigned to each capability-program combination was the product of the capability’s weight and the participant’s assessment of the degree to which the program contributed to the capability. These scores were then summed for each program to produce a weighted priority list of programs in the DoN budget. Figure 13.12 shows the results.

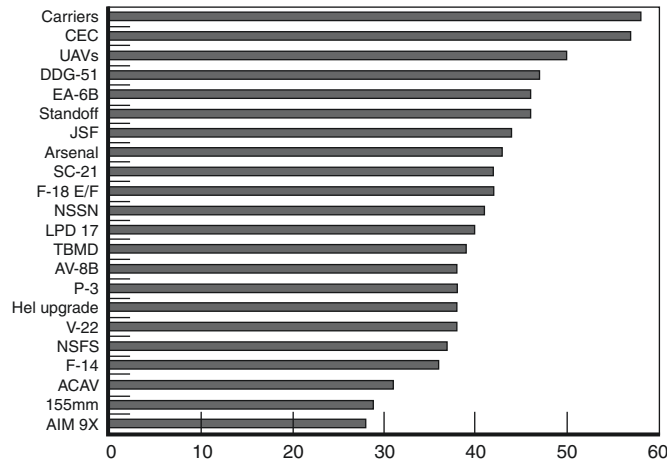


Figure 13.12—Weighted (Joint) Priority of Largest Navy Programs

A program could score high on the list of priorities if it contributed disproportionately to the capabilities with the highest weights, if it contributed at least moderately to a broad spectrum of capabilities, or if it contributed a high value to enough capabilities to push its score up. In this way, systems that contributed to a set of high-value capabilities or were important to a broad set of capabilities rose to the top.

A review of the results reveals the power of this analytic tool. The program for future carriers scored first. To be sure, it is hard to imagine a group of naval officers ranking the next generation of aircraft carriers anywhere other than first. That said, however, a carrier is a highly flexible military system, one that contributes a broad range of the required capabilities to the (weighted) military activities identified by the group.

More surprising to the naval leadership was the high priority that emerged for both CEC and UAVs. An examination of participants' entries, where they "explained" their assessments, revealed that this high priority grew out of a perception that these were critical to the high-priority capabilities they had identified earlier (see Figure 13.11). This, in turn, grew from the assessment that future military operations are likely to be carried out in an environment characterized by enemies with anti-access capabilities that include cruise and ballistic missiles. A good picture of the battlespace was judged to be critical, as well as a measure of defense—hence, the high priority assigned to the DDG-51 with its advanced air defense radar and potential to develop an anti-ballistic missile and anti-cruise missile capability. The same anti-access threat drove the robust standoff munitions buy to a high priority as well.

Other Possible Uses

This process yielded a list of programs prioritized by their contribution to the capabilities the Navy will need in the future and to the activities the Navy will likely be called on to undertake. The process provided a systematic look at the relative contribution each competing program (none of which was unimportant) might make to the naval service's future. The resulting list allowed senior Navy decisionmakers to focus on programs that ought to be fenced off as far as possible in budget deliberations. Yet this EMS technique is by no

means limited to determining priorities for capabilities or programs. It could be applied to operational concepts, R&D priorities, or any decisionmaking process being conducted under conditions of uncertainty.