Enhancing Joint Task Force Cognitive Leadership Skills[1]

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Abstract

Military ground forces in Joint Task Forces (JTFs), both now and in the future, are likely to perform operations in which they must be interdependent with the cultures of other Services, governmental agencies, multi-national forces, and the populations of countries in which operations are occurring. JTF staff member exposure to other services may be limited; they may not be familiar other Service competencies. Today's war also requires cognitive skills from a warfighter who must deal with social, cultural, and language barriers. The focus of this project is on overcoming these barriers through jointness in leadership training. We conducted front-end analysis to determine the components of shared mental models of JTF staff members' understanding of jointness, cultural differences among the Services, and operational capabilities and environments where these issues are especially important. Based on this analysis, we developed approaches to training that can rapidly enhance the cognitive leadership skills required for ground component officers and non-commissioned officers to be effective in a Joint Task Force.

1. Introduction

A United States Joint Task Force (JTF) is comprised of organizational units from the US Army, Navy, Air Force, and Marines. JTF membership may also include organizations from the National Guard, reserve forces, the Coast Guard, and other governmental agencies. Ground component forces current and future are likely to perform operations in which they must understand and be interdependent with the cultures of multiple services, governmental agencies, and countries in which operations are occurring. Component forces of varied service origin in a Joint Task Force must bring to bear their optimal capability set to ensure

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mission success. For JTF staff members, having complete awareness and understanding of sister service capabilities and their respective service cultures is paramount to mission planning, and ultimately to mission success.

JTF staff member exposure to other services' capabilities, outside first assignment to a JTF, traditionally comes through service member professional and personal interaction at service formal military schools, colleges, and universities, including the US Army Command & Staff College, Marine Corps University, and US Naval War College. Additionally, some service members are extended the opportunity to participate in Joint Professional Military Education. However, not every JTF staff member has the opportunity to attend formal school, or necessarily gain the appreciation for other service competencies even while in formal school. This paper proposes a computer-mediated training environment that can rapidly enhance the cognitive leadership skills required for ground component officers and non-commissioned officers to be effective in a Joint Task Force.

2. Background

2.1. Joint Operations

The US Army sees Joint Operations as a foundation for future warfighting (US Army, 2003a). The fundamental joint warfighting unit is a United States Joint Task Force (JTF), comprised of organizational units from the US Army, Navy, Air Force, and Marines. JTF membership may also include organizations from the National Guard, reserve forces, the Coast Guard, and other governmental agencies. JTFs include an air component, a ground component, a naval component, and other special component(s) as required. Component forces of varied Service origin in a Joint Task Force bring to bear their optimal capability set to ensure mission success; DOD (2003) emphasizes utilizing the strengths of all available Services, coalition nations, and resources in an integrated and networked joint force to achieve strategic objectives. The outlook of the Chairman of the joint Chiefs of Staff, as documented in Joint Vision 2020, is the achievement of a fully interoperable joint force that is capable of full spectrum dominance in the 21st century. The Office of Force Transformation (2003), Army (US Army, 2003b), and Navy (Landay, 2006) also see joint operations as a pillar of the transforming US military.

Under the purview of Joint Forces Command, the Combatant Commands have developed Joint Operating Concepts (JOCs) to provide the operational context for force transformation and establish the linkage between strategic guidance and the integrated application of joint force capabilities. These include the Major Combat Operations JOC (DOD, 2004b), Stability Operations JOC (DOD, 2004c), Homeland Security JOC (DOD, 2004a), and Strategic Deterrence JOC (DOD, 2004d). These Joint Operating Concepts outline key military capabilities as well as execution principles for carrying out actions. For example, the Major Combat Operations JOC seeks decisive conclusions to combat; it sets out desired capabilities for Command and Control, Battlespace Awareness, Force Application, Focused Logistics, and Protection; and it sets forth eleven principles for action, such as "Employ a joint, interagency and multinational force with collaborative processes" and "Generate relentless pressure by deciding and acting distributively" (DOD, 2004b). This level of coordination

requires global situational awareness (DOD, 2004d), which, for JTF staff members, means that not only is having a complex understanding of the enemy essential, but also that having complete awareness and understanding of sister Service capabilities and their respective Service cultures is important both for mission planning and mission success.

Given that it relies on different Services working together effectively, jointness has a cognitive basis that is key to its success. This basis lies in a mutual understanding and shared sense of trust, identity, and commitment amongst personnel, leading to effective information exchange and a willingness to engage in cooperative behaviors. To date, however, little research has been directed toward this level of jointness, and further attention must be given to training and educating personnel into thinking and behaving jointly. As described above, not every JTF staff member has the opportunity to attend formal school, or to gain the appreciation for other Service competencies even while in formal school. As a result, current JTF staff members may not have a solid understanding of the capabilities that other Services contribute to the Joint Task Force.

To better serve the need for collaborative and shared situational awareness within Joint Task Forces, it is important to base training on a thorough understanding of human learning behavior and human interaction. Perla et al. (2000) used a game involving distributed team members to study how distributed teams build shared mental models. The results suggest that communication capability and shared visualization are important for effective teamwork. Ross-Witkowski (2004) summarized a workshop on operations analysis and network-centric operations. One of the recommendations with respect to coalitions was that the military needs to study how trust is transmitted between coalition partners.

Coalition operations, as defined in JP 1-02, are an ad hoc arrangement between two or more nations for common action. They are similar to joint operations in that they bring together Services with different cultures, and they are therefore an important source for gleaning information about joint operations. Models have, for example, been produced of collegial decision making in an effects-based coalition operations context (McCrabb, 2002). Additionally, a recent working group on coalition operations determined that traditional coalition organization is ineffective in contemporary wars (CMO, 2000). Among other problems, the working group found too great an emphasis on interoperability of coalition technologies and too little emphasis on cooperation and other social and psychological issues. The group's recommendations included improving allied joint doctrine, the allied joint training system, and the allied joint professional military education system. More emphasis needs to be placed on the cognitive aspects of joint and coalition operations.

2.2. Culture

When forces are established on the ground for extended periods of time, the ground component often becomes the focal point of the JTF. Thus, ground component forces current and future are likely to perform operations in which they must understand and be interdependent with the cultures of multiple Services, governmental agencies, and countries in which operations are occurring. Military analysts are becoming increasingly aware of the important role which cognitive and social science factors play in military operations (Glasow and Ross-Witkowski, 2003).

To better understand cultural differences, Klein et al. (2000) describe factors used to model and describe cultures. These factors include power distance, dialectical reasoning, counterfactual thinking, risk assessment and uncertainty management, and activity orientation. Power distance, for example, measures the distribution of power in a culture; in cultures with high power distance, the power distribution is very unequal, whereas cultures with low power distance are more egalitarian. Handley and Levis (2001) examined differences in culture, military procedures, and command and control processes between the cooperating command centers in a multinational coalition. They developed a coalition model, using the cultural dimensions of power distance and uncertainty avoidance. In their simulations, virtual coalitions consisting of different combinations of nationalities were simulated and were measured on the timeliness and accuracy of their responses. Homogenous command centers scored highest on either one parameter or the other, while multi-national command centers scored highly in both parameters. This suggests that a combination of cultures, working together in concert, may provide better responses than a single-culture military.

However, McFate and Jackson (2005) note that the military does not have a centralized office for cultural knowledge. They suggest that creating one may help current programs avoid getting lost in bureaucracy. Such programs include the development of a human behavioral model that takes personality and cultural factors into account (Zachary et al., 2005), effects-based modeling which seeks to improve mental models of commanders and teams through computerized training exercises (Bakken et al., 2004), and also deals with distributed computing issues such as establishing a cultural framework for the interoperability of personnel along with their computational infrastructure (Slay, 2002).

2.3. Military Culture

Builder (1989) argues that each service's concepts of warfighting are based on how the services perceive their glory days of 1944-1945, the end of World War II. For example, he argues that the Navy's finest moments came in the Pacific, where the US fleet overcame the Japanese fleet to win dominance in the Pacific. Consequently, according to Builder, fleet-vs.-fleet fighting became the dominant warfighting concept for the Navy, and the service spent the next several decades preparing to win a similar conflict against the Soviet Union, should it be necessary. In the Atlantic, the Navy spent World War II taking part in tasks such as escorting convoys and minesweeping, which, although necessary, were less glamorous than actions in the Pacific, and were therefore often overlooked in the services's subsequent perceptions of itself.

Similarly, Builder argues, the Air Force's finest moments came as it achieved air superiority over Europe, and the Army's finest moments came as it fought its way into Germany after the D-Day landings at Normandy. Consequently, in the decades following World War II, the Air Force's perception of warfighting involved heavy bombing and dog-fighting, but not necessarily close bombing runs in support of ground troops. The Army, meanwhile, prepared itself to fight a ground-based war in Central Europe. Even though engagements in Korea and Vietnam suggested that modern warfare was evolving, Builder argues that the Air Force and

Army concepts of warfighting remained rooted in the successes of World War II rather than the more frustrating experiences later on.

2.4. Leadership

NATO (2004) notes that soldiers are often involved in functions which involve much more interaction with civilians and foreign cultures than they may have been trained to handle. Interacting with foreign cultures often means handling different levels of power distance, tolerance of ambiguity, and individualism than a leader is used to dealing with. The cultural adaptability of teams, and especially their leaders, is therefore essential to mission success.

Requirements for leaders in today's military are becoming increasingly complex, and while some worry that current leaders are not up to the task (Ulmer, 1998), the Army has responded by making the improvement of leader and team performance one of its main research objectives (ARI, 2005). Improvement is often needed in areas which are not traditionally emphasized but have come to be key to contemporary leaders, such as functioning in joint operations and integrating coalition forces (Leonard et al., 2006). Cognitive factors such as information processing have become as important to leaders as observable behaviors (Brown, 2002); thus, in an effort to identify cognitive processes underlying military leaders' decisions, groups have even produced a computer model whose decisions in a tactical scenario were similar to those made by actual Joint Task Force commanders (Sokolowski, 2003).

Situational awareness (SA) for leaders has been the focus of a large amount of cognitive training efforts. Strater et al. (2004) developed computer-based training designed to increase SA in platoon leaders. The program consisted of two short modules, the first teaching time management and task prioritization skills, and the second focusing more generally on the information required for developing good SA. The program was tested using cadets in the Norwegian Army and Navy, who were instructed during a training exercise to attack a suspected enemy special forces camp. However, SA cues indicated that the camp in fact housed refugees, and squads were tested to see if their confidence in their SA would override orders to attack. Half of the cadets had received SA training, and although only two of eight squads recognized not to attack the camp, the two squads were both led by cadets who had received the SA training.

Similar work has focused on communication and situational awareness for military leaders. One of the findings of Strater et al. (2003) was that young leaders experience communication problems more often than they experience problems determining the combat readiness of their troops. Strater et al. (2001) have also employed methods for measuring situational awareness. In training exercises, two different methods were used to measure platoon leader situational awareness. The first method, the Situation Awareness Global Assessment Technique (SAGAT), was computer-based; the second, the Situation Awareness Behaviorally Anchored Rating Scale (SABARS), was based on observation by human reviewers.

2.5. Current Training Methods

Currently, DOD is developing multiple computer-mediated software tools that challenge traditional training. For example, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) developed *Think Like a Commander* (TLAC) training materials that deal with battlefield thinking habits that are characteristic of expert tactical thinkers (Shadrick and Luccier, 2004). In TLAC, a tactical scenario is presented using a slide presentation, and a tactical senior mentor leads a class of students through a structured analysis of the case. The Army Excellence in Leadership (AXL) project at the University of Southern California's Institute for Creative Technologies is advancing basic concepts developed in the TLAC environment using Hollywood storytelling techniques to create fictional filmed case studies which address specific leadership issues (Hill et al., 2004). In addition, the ARI ELECT project is developing training tools that will effectively train and sustain the Soldier-centered skills needed to function in current high stress environments. Several past SBIR projects developed individual leadership training modules (ARI, 2005), and five topics of the current SBIR solicitation will develop computer-mediated training environments tailored specifically to leadership skills development.

These programs form an important basis for understanding key capabilities required in a training tool for the military. These elements include:

- Existing electronically, allowing for easy distribution from a central location;
- Pretests or specific criteria to determine when a soldier is properly prepared to participate in a particular exercise;
- Tools which allow rapid tailoring or modification of training materials;
- Semi-automated performance measurement and feedback; and
- Access to intelligent agents that, in collective training, can substitute for members of the training audience who are completing individual training or are not available for other reasons.

Other SBIR and research projects have been funded by ARI, TRADOC, and other DOD and non-DOD agencies as well. For example, the Virtual Soldier Skill Assessment project (Gately et al., 2005) developed a successful design and deployment of a prototype system to assess the cognitive decision-making skills of dismounted, small-unit (platoon, squad, or team) leaders in virtual urban environments. The question of what leaders of the future need to be prepared to do is an important one to address in developing training modules. Horey et al. (2004) reviewed and developed competency-based future leadership requirements and specifically highlight the importance of behavioral aspects of leadership, including comparison of Service framework constructs.

2.6. Mental Modeling

Mental modeling is a tool which may be used to map each Service's culture and then establish cross-Service communication. "Mental models" are an established concept in psychology. They have been the focus of extensive research (Morgan et al., 2002; Atman et al., 1994; Bostrom et al., 1992). Such research has shown that mental models are a complex web of deeply held beliefs that operate below the conscious level to affect how an individual defines a problem, reacts to issues, learns, and makes decisions about messages and options concerning topics that come to their attention through communications. It is also well established that people's mental models vary in important but often unpredictable ways, strongly affecting their decision processes (Fischhoff and Downs, 1997). Research has

demonstrated that the complexity of people's thinking makes it impossible to predict the effects of communication on people's mental models without empirical testing. However, testing methods must suit the research task. Polling and focus group methods lack sufficient depth to effectively identify and characterize mental models.

Mental models are usually used to conceptualize shared cognition, which has been shown to be an essential component of team effectiveness (Salas & Cannon-Bowers, 2001). Shared mental models are assumed to influence team performance through their impact on members' ability to engage in coordinated actions. Such shared mental models involve knowledge about the team's task, individual members' responsibilities, and potential situations the team may encounter.

Shared mental models can greatly facilitate communication and coordination in team settings (Graham and Matthews, 2000). Communication facilitates learning, helps build effective teams, and is an essential element of all collective human activity. In this way, it also is a foundation for successful leadership training. As mentioned above, the key to success in future operations lies in integrated contributions of all the partners in a Joint Task Force. It is thus important to develop cross-organizational links between different Services. However, meaningful dissemination of information depends on people's willingness to share and receive information, an area where communication and trust play vital roles.

Team members with similar knowledge bases and cognitive mechanisms are more likely to interpret information the same way and to make accurate projections about each other's decisions and actions. Without shared mental models, coordination and communication will likely take more time and effort, and more lapses will occur. Shared mental models can be enhanced by: (1) shared training, e.g., joint training or cross training on different job functions; (2) shared experiences, e.g., working together as a team or having similar experiences either together or individually; and (3) direct communications between team members to build up a shared mental model in advance of operations (Graham and Matthews, 2001).

2.7. Decision Analysis

Joint efforts are often hampered because those responsible for doing the planning are not familiar with or aware of the range of interests associated with an issue. From an "educating and informing" perspective, leadership training is fast evolving toward a process orientation, drawing upon state-of-the-art knowledge in communication sciences and decision analysis. Additionally, DOD leaders may benefit from using multi-criteria decision analysis (MCDA) to add formalism and structure to planning and communication challenges, including quantitative assessment of what must be modeled and how, who must be involved, and rules about what must be done given the mission goals.

MCDA refers to a group of methods used to impart structure to the decision-making process. Generally, these decision analysis methods consist of four steps: (1) creating a hierarchy of criteria relevant to the decision at hand, for use in evaluating the decision alternatives, (2) weighting the relative importance of the criteria, (3) scoring how well each alternative performs on each criteria, and (4) combining scores across criteria to produce an aggregate

score for each alternative (Linkov et al., 2005). Most MCDA methodologies share similar steps 1 and 3, but diverge on their processes for steps 2 and 4 (Yoe, 2002). A detailed analysis of the theoretical foundations of different MCDA methods and their comparative strengths and weaknesses is presented in Belton and Stewart (2002).

Elementary MCDA methods can be used to reduce complex problems to a singular basis for selection of a preferred alternative. However, these methods do not necessarily weight the relative importance of criteria or combine the criteria to produce an aggregate score for each alternative. While elementary approaches are simple and can, in most cases, be executed without the help of a computer, these methods are best suited for single-decision maker problems with few alternatives and criteria.

More sophisticated MCDA methods are capable of handling problems with many decision makers, alternatives, and criteria. Multi-attribute utility theory (MAUT) and the analytical hierarchy process (AHP) are methods that use optimization algorithms, while outranking uses a dominance approach. The optimization approaches employ numerical scores to communicate the merit of each option on a single scale. Scores are developed from the performance of alternatives with respect to individual criteria and then aggregated into an overall score. Individual scores may be simply summed or averaged, or a weighting mechanism can be used to favor some criteria more heavily than others. The goal of MAUT is to find a simple expression for the net benefits of a decision. Through the use of utility or value functions, MAUT transforms diverse criteria into one common scale of utility or value. MAUT relies on the assumptions that the decision maker is rational (preferring more utility to less utility, for example), that the decision maker has perfect knowledge, and that the decision maker is consistent in his judgments. The goal of decision makers in this process is to maximize utility or value. Because poor scores on criteria can be compensated for by high scores on other criteria, MAUT is part of a group of MCDA techniques known as "compensatory" methods.

Similar to MAUT, AHP (Saaty, 1994) aggregates various facets of the decision problem using a single optimization function known as the objective function. AHP prioritizes the decision alternatives based on their objective function values, ranging from highest to lowest. Like MAUT, AHP is a compensatory optimization approach. However, AHP uses a quantitative comparison method that is based on pairwise comparisons of decision criteria, rather than utility and weighting functions. All individual criteria must be paired against all others and the results compiled in matrix form. For example, in examining the tasks associated with small arms, AHP would require the decision maker to answer questions such as, "With respect to small arms, which task capability is more important, neutralizing a target or avoiding detection?" A numerical scale is used to compare the choices, and AHP moves systematically through all pairwise comparisons of criteria and alternatives. AHP thus relies on the supposition that humans are more capable of making relative judgments than absolute judgments. Consequently, the rationality assumption in AHP is more relaxed than in MAUT.

Unlike MAUT and AHP, outranking is based on the principle that one alternative may have a degree of dominance over another (Kangas et al., 2001). Dominance occurs when one option performs better than another on at least one criterion and no worse than the other on all

criteria (ODPM, 2001). However, outranking techniques do not presuppose that a single best alternative can be identified. Outranking models compare the performance of two (or more) alternatives at a time, initially in terms of each criterion, to identify the extent to which a preference for one over the other can be asserted. Outranking techniques then aggregate the preference information across all relevant criteria and seek to establish the strength of evidence favoring selection of one alternative over another. For example, an outranking technique may entail favoring the alternative that performs the best on the greatest number of criteria. Thus, outranking techniques allow inferior performance on some criteria to be compensated for by superior performance on others. They do not necessarily, however, take into account the magnitude of relative underperformance in a criterion versus the magnitude of over-performance in another criterion. Therefore, outranking models are known as "partially compensatory." Outranking techniques are most appropriate when criteria metrics are not easily aggregated, measurement scales vary over wide ranges, and units are incommensurate or incomparable (Seager, 2004).

3. Cognitive Leadership: Service Cultural Awareness Operational Capabilities and Environments

3.1. Front-End Analysis

We have conducted a front-end analysis to partially determine the awareness of Joint Task Force staff members of the cultural differences among the Services, the operational capabilities to which they are relevant, and the environments suitable to enhance awareness of cultural differences and associated capabilities.

The front-end analysis is a top-down examination that begins with the Joint Operating Concepts which serve as the guiding precepts for current and future war. The analysis sets forth a framework by which each Service's capabilities are presented *relevant* to each joint operational concept. Service Mission Essential Task Lists, albeit somewhat dated, describe *what* a Service warfighting command/unit is capable of doing. Within each Service, the major warfighting elements (Combat Arms, Combat Support, and Combat Service Support) serve as an additional level of granularity. Within the framework, the Service warfighting units are focused at the Brigade level and higher. When appropriate, examination of Service warfighter capability will be furthered described through the lens of DOTMLPF – Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, and Facilities. Finally, within the Doctrine element, a Service view of the battlefield (in terms of maneuver, fires, intelligence, logistics, force protection, information operations, and command & control) will also be presented.

The key components of the front-end analysis include:

- Joint Operating Concepts (JOC)
  - Major Combat Operations, *emphasized*
  - Stability Operations, *emphasized*
  - Homeland Security, *noted*
  - Strategic Deterrence, *not addressed*

- Service Mission Essential Task Lists (METL)
- Service Warfighting Unit, Brigade Level and Higher
- DOTMLPF elements as they pertain to the Warfighting Unit.
  - Doctrine: Maneuver, Fires, Intelligence, Logistics, etc.
  - Organization: Combat Arms, Combat Support, and Combat Service Support
  - Training: Live Fire / Force-on-Force / Simulation
  - Materiel: Unit Pacing Items
  - Leadership & Education: Rank & File
  - Personnel: Unit Strength
  - Facilities: Location / Deployment Means

Figure 1 and Figure 2 are pictorial representations of the construct for the front-end analysis.

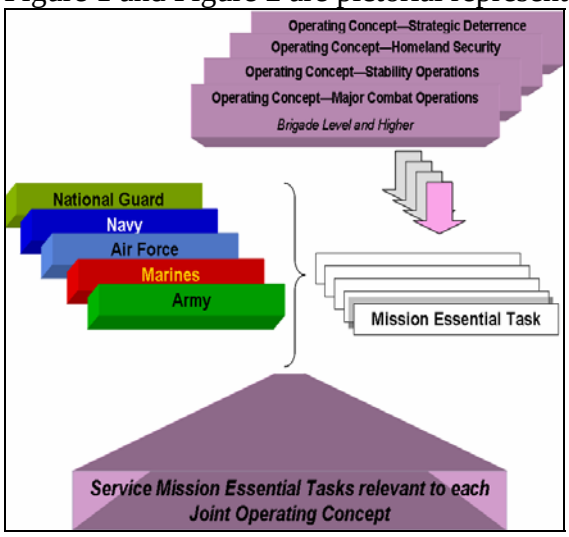
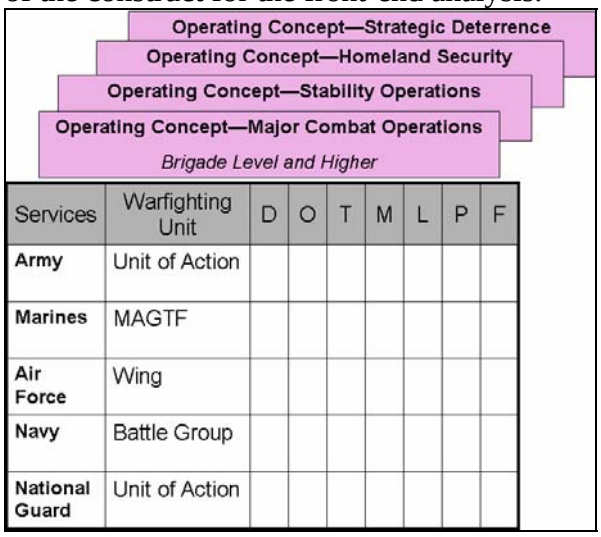


Figure 1: JOC-METL Relevance.



Services	Warfighting Unit	D	O	T	M	L	P	F
Army	Unit of Action							
Marines	MAGTF							
Air Force	Wing							
Navy	Battle Group							
National Guard	Unit of Action							

Figure 2: Service Warfighting Unit Construct.

The entire depth and breadth of information to be captured for each Service is beyond the scope of this paper. Although not fully verified, representative examples of the data capture are presented in Figure 3.

Service	Warfighting Unit	Doctrine	Organization	Training	Materiel	Leadership	Personnel	Facilities
Army	Unit of Action	Maneuver Warfare	Corps-Division, BCT, ACR	Combined Arms-Force on Force	M1A2, M2A2 (BFV), Apache			Strategic Reserve Storage Activity Europe, Air, Land systems
Marines	MAGTF	Expeditionary Maneuver Warfare-Ship To Objective Maneuver	MAGTF-MEF, MEB, MEU	Combined Arms-Live Fire	Osprey, F-18, AAV, LAV, M1A1			Prepositioned, Amphibious, Land and Air systems
Air Force	Wing	Air Warfare	MAJCOM-Wing, Group	Air Combat-Close Air Support, Air Interdiction	F/A -18E, F/A-22A			Expeditionary Airfields
Navy	Battle Group	Naval Warfare: Sea Power 21-Sea Shield, Sea Strike, Sea Basing	Task Force		Surface Ships Aircraft Carriers Submarines			Air and Sea based platforms
National Guard	Unit of Action	Maneuver Warfare	Division, BCT	Combined Arms-Force on Force	M1A2, M2A2 (BFV), Apache			Strategic Reserve Storage Activity Europe, Air, Land systems

Figure 3: Major Combat Operations-Service DOTMLPF.

3.2. Joint Operating Concepts

As described above, the US Army sees Joint Operations as a foundation for future warfighting (US Army, 2003a). The Joint Operating Concepts (JOCs) are top-level DOD warfighting concepts (Major Combat Operations, Stability Operations, Homeland Security, and Strategic Deterrence) which provide the framework and guiding precepts relevant to Joint Operations, looking forward to the future over the next 15 years. Within the JOC framework, the services find a discussion of concepts and warfighting attributes intended to shape the forces of the future, influencing the relevance and design of both current and programmed capabilities. A JOC defines the operational-level descriptions of how a Joint Force Commander will accomplish a strategic mission through conduct of operational-level military operations within a campaign. Furthermore, the JOC identifies challenges, key ideas for solving those challenges, effects to be generated to achieve objectives, essential capabilities likely needed to achieve objectives, and the relevant conditions in which the capabilities must be applied. Top level guidance is further provided through examination of the Joint Functional Concepts (JFCs) – Force Application, Force Protection, Focused Logistics, Battlespace Awareness, Command & Control, Network Centric Operations, Force Management, and Training. A third complement to the conceptual framework is provided through the Joint Integrating Concepts (JICs). Together, JFCs and JICs examine the effects needing to be generated in JOCs to determine functional requirements and narrowly scoped capabilities needed to meet an operational objective. The Joint Staff Planner should have an understanding of the JOCs, the JFCs, and the JICS to better appreciate the aim to collectively synergize the full complement of capabilities within the Joint Task Force. Figure 4 provides a pictorial relationship among the Joint Operations Concepts Family of documents.

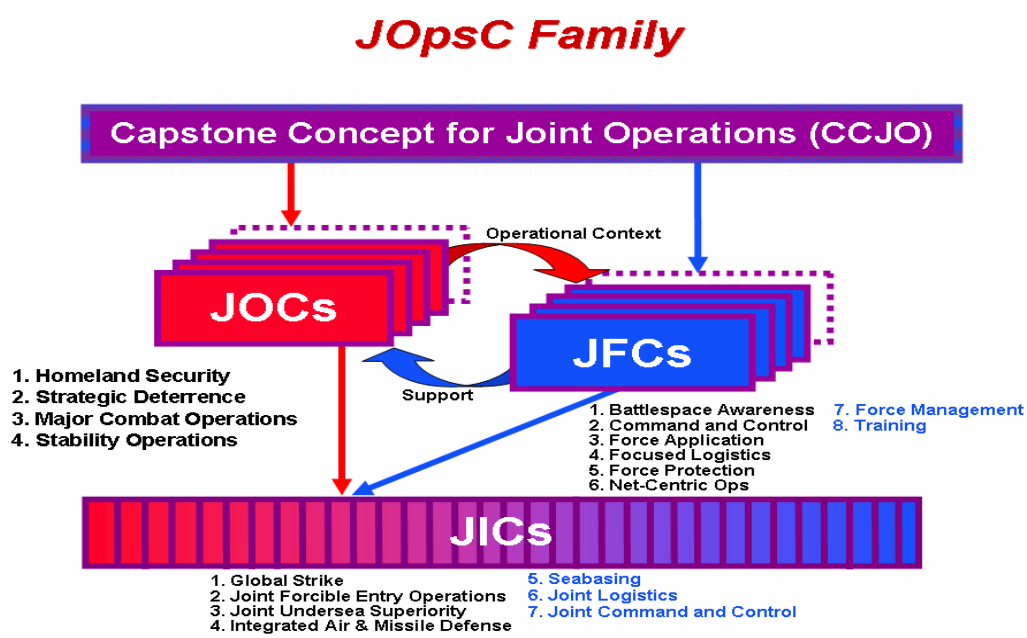


Figure 4: Family of Joint Operations Concepts Documents.

3.3. Universal Joint and Service Mission Essential Task Lists

The Chairman Joint Chiefs of Staff Manual (CJCSM) 3500.04D dated 1 August 2005 is entitled the Universal Joint Task List (UJTL). A document of nearly 900 pages, the UJTL serves as a menu of tasks, which serve as the foundation for capabilities-based planning across the range of military planning. When augmented with Service and applicable Defense agency task lists, the UJTL is a comprehensive, integrated description of functional tasks, conditions, measures, and criteria supporting all levels of DOD in executing the National Defense Strategy and Military Strategy (CJCSM 3500.04D, dated 1 August 2005, p. A-1).

Each Service describes its warfighting abilities utilizing another top-level document to list its service-specific tasks. In the broadest sense, the Service Task List lists mission tasks that each service's forces are capable to perform. In all, over 1100 service tasks are described among the services:

Service Tasks	
Service	**Number**
US Air Force Master Capabilities List (AFMCL)	194
US Army Universal Task List (AUTL)	433
Universal Naval Task List (UNTL)	315
US Marine Corps Task List (MCTL)	201
Total Service Tasks	**1143**

Table 1: Number of Service Tasks by Service.

Each Service has its own listing of tasks relevant to the tactical, operational, and strategic levels of war. While in some cases the lists pre-date the family of joint operational concepts, establishing relevance between the Service Task Lists and the JOpsC family of documents is

germane to infusing service competencies in a *joint* context. A representative Service tables (Army and Marine Corps) mapping JFCs to Service Tasks by JOC are presented below for major combat operations.

		Army			Marine Corps
BFA	**Task Identifier**			**Task Identifier**	
Maneuver	2.1	Perform Tactical Actions associated with Force Projection and Deployment		1.1	Conduct Expeditionary Operations
	2.2	Conduct Tactical Maneuver		1.1.1	Conduct Ship-to-Objective Maneuver
	2.3	Conduct Tactical Troop Movements		1.2	Offense
	2.4	Conduct Direct Fires		1.2.0.18	Conduct Noncombatant Evacuation Operations
	2.4.1	Conduct lethal Direct Fire against a Surface Target		1.2.1.16	Conduct Mobility Operations
	2.4.2	Conduct Non-lethal Direct Fire against a Surface Target		1.2.1.16.1	Breach Obstacles
	2.5	Occupy an Area		1.2.1.16.2	Condcut Gap Crossing Operations
	2.5.4	Conduct Drop Zone Operations		1.3	Defense
	2.5.5	Conduct Landing Zone Operations		1.3.3	Occupy and Control Battlespace
				1.3.17	Conduct Counter-Mobility Operations
				1.3.17.1	Place barriers and Obstacles
				1.4	Movement
				1.4.1	Forward Deploy Units
				1.4.4	Conduct Reception, Staging, Onward Movement, Integration
Fires	3.1	Decide Surface Targets to Attack		3.1	Conduct Direct Fires
	3.2	Detect and Locate Surface Targets		3.2	Conduct Indirect Fires
	3.3	Employ Fires to Influence the Will, and Destroy, Neutralize, or Suppress Enemy Forces		3.3	Conduct Non-lethal Engagement
	3.3.1	Conduct Lethal Fire Support		3.4.1.4	Coordinate NSFS
	3.3.2	Conduct Nonlethal Fire Support—Offensive Information Operations		3.4.1.6	Coordinate Close Air Support
	3.3.2.2	Conduct Electronic Attack			
Intel	1.1	Support to Situational Understanding		2.1	Plan Intel Support
	1.1.1	Perform Intelligence Preparation of the Battlefield (IPB)		2.1.2	Prepare and refine Intel and Intel prep of the Battlefield
	1.2	Support to Strategic Responsiveness		2.1.5	Plan and Coordinate Geodesy Imagery and Services (GI&S) Support
	1.3	Conduct Intelligence, Surveillance, and Reconnaissance (ISR)		2.1.6	Plan and Coordinate Signals Intel
	1.4	Provide Intelligence Support to Effects		2.1.8	Provide Tactical Counter-Intel/Human Intel Support
				2.2	Collect
				2.3	Produce
				2.4	Disseminate
				2.5	Utilize
		Army			**Marine Corps**
BFA	**Task Identifier**			**Task Identifier**	
Logistics	6.1	Provide Supplies		4.1	Supply
	6.2	Provide Maintenance		4.1.1	Arm the Force
	6.3	Provide Transportation Support		4.2	Transport
	6.3.2.1	Conduct A/DACG Activities		4.2	Plan and Coordinate Transportation Services
	6.4	Provide Sustainment Support		4.3	Maintain
	6.5	Provide Force Health Protection in a Global Environment		4.3	Provide Maintenance
				4.6.10	Provide Air Base Support Functions
				4.6.11	Provide Airfield Support
Command &Control	7.1	Establish Command Post Operations		5.1	Conduct Planning
	7.2	Manage Tactical Information		5.1.1	Analyze Current Situation
	7.3	Assess Tactical Situation and Operations		5.2	Communicate
	7.4	Plan Tactical Operations Using the Military Decision Making Process/Troop Leading Procedures		5.2.2	Establish & Conduct Coordination/Liaison
	7.4.1	Conduct the Military Decision Making Process		5.3	Direct Operations
	7.5	Prepare for Tactical Operations		5.3.1	Establish a Force Headquarters
	7.6	Execute Tactical Operations		5.4	Manage Resources
	7.8	Conduct Continuous Operations		5.4.1	Man the MAGTF
	7.1O	Conduct Pulic Affairs Operations		5.4.3.6	Operate Arrival and Departure Airfield Control Group
Force Protection	5.3	Conduct Survivability Operations		6.1	Local Security
	5.3.1	Protect against Enemy Hazards within the AO		6.1.1	Conduct Counter-Reconnaissance
	5.3.1.1	Protect Individuals and Systems		6.1.3	Conduct Local Security
	5.3.1.2	Prepare Fighting Positions		6.1.4	Conduct Survivability Operations
	5.3.1.3	Prepare Protective Positions		6.2	Protective Measures
	5.3.1.4	Employ Protective Equipment		6.2.1	Protect/Secure Operationally Critical Installations, Facilities and Systems
				6.2.2	Protect Systems and Capabilities
				6.2.5	Protect Air Land Water LOCs
				6.2.6	Conduct Electronic Warfare
				6.3	NBC Measures
				6.3.1	Employ Contamination Avoidance
				6.3.2	Identify NBC Hazards

Table 2: Joint Operational Concept—Major Combat Operations: Joint Functional Concepts Relevant to Service Tasks.

Major Combat Operations: U.S. Army and USMC Battlefield Perspectives

Maneuver

The primary difference in this Battlefield Functional Area (BFA) is that the Army primarily conducts ground tactical maneuver, while the USMC conducts expeditionary operations, in particular ship to objective maneuver (STOM), although both Services fight as a part of a Land Component element.

The Army conducts airborne operations (drop zone and landing zone operations in the matrix respectively) as a part of maneuver to seize terrain, whereas the USMC conducts STOM to secure, reinforce and expand lodgment areas.

The USMC includes mobility tasks such as obstacle breaching, gap crossing, and river crossing operations as a part of the maneuver BFA, whereas the Army delineates such mobility tasks as a part of a separate BFA entitled Mobility/counter-Mobility/Survivability.

Both Services include force projection and deployment actions as related to the maneuver BFA such as conduction reception, staging, onward movement, and integration (RSOI) operations.

The USMC includes Noncombatant Evacuation Operations (NEO) as a subtask of offense under the maneuver BFA.

The Army incorporates the conduct of lethal and non-lethal direct fire against a surface target as a subtask under the maneuver BFA.

Fires

As previously noted above, IO is not a BFA within either Service; however, it's imperative to note that the Army conducts Non-Lethal Fire Support as a part of offensive IO within the fires BFA.

The Army includes electronic attack (electronic warfare) as a part of fires, whereas the USMC integrates EW under fires as well as force protection.

The USMC conducts Naval Surface Fire Support (NSFS) and employs Air Naval Gun Liaison Companies (ANGLICO) to "call in" NSFS.

The USMC includes the coordination of Close Air Support (CAS) as a task under fires.

The USMC includes the suppression of enemy air defenses (SEAD) as a fires task.

Intelligence

The most significant difference between the Army and USMC with regards to the intelligence BFA is the fact that the Army provides intelligence support to force protection and conducts police intelligence operations as a part of the intelligence BFA. Both of these Army intelligence subtasks are under the purview of the overarching task of support to situational understanding.

The USMC subdivides the intelligence BFA into the categories of plan, collect, produce, disseminate, and utilize, respectively.

Logistics

The primary difference between the two services within the logistics BFA is that the Army includes Arrival and Departure Airfield Control Group (A/DACG) operations in support of troop movement by air, whereas the USMC incorporates this task as a part of the Command and Control (C2) BFA.

Both Services are identical with regards to how they fix, arm, and refuel their respective forces as indicated in the matrix.

Command and Control

Although not depicted as a task by either Service, the Army primarily uses the Maneuver Control System (MCS) at brigade level to C2 forces, whereas the USMC uses Command and Control Personal Computer (C2PC) system.

The Army conducts the Military Decision Making Process (MDMP), whereas the USMC conducts a Rapid Planning Process.

The USMC explicitly enumerates the MAGTF as a task under resource management based on the fact that it doctrinally deploys as such.

The USMC includes A/DACG operations as apart of its C2 BFA.
The Army conducts public affairs operations as a supporting task in the C2 BFA. Inclusive in Army public affairs operations are the execution of information strategies, media operations, and maintenance of community relations which have both operational and strategic impact for a JTF.

Force Protection

The major difference to note is that the Army does not specify force protection as a BFA, whereas the USMC explicitly states it as such in its universal service task list. The Army's force protection tasks are implicitly stated as a part of a separate BFA entitled Mobility/Counter-Mobility/Survivability.
The USMC explicitly states survivability operations as a force protection task, whereas the army views these functions as separate and distinct and lists them under the Survivability BFA.
The USMC explicitly calls out the protection of air, land, and water lines of communication (LOCs) and conduct of electronic warfare (EW) as force protection tasks. The Army integrates EW under the fires BFA.

3.4. Service Warfighting Unit – Brigade and Higher

For the Joint Force Staff planner, the three DOTLMPF elements **Doctrine, Organization**, and **Materiel** serve as the key attributes to articulate the capabilities of a Service Warfighting Unit. Using the Marine Corps to demonstrate, the following is described: Marine Corps doctrine demands expeditionary, maneuver warfare with units organized via Marine Air-Ground Task Forces (MAGTF). The MAGTF is comprised of 4 elements: Command Element, Air Combat Element, Ground Combat Element, and a Combat Service Support Element. MAGTFs analogous to brigade level and higher are the Marine Expeditionary Force (approximately 45,000 personnel), the Marine Expeditionary Brigade (approximately 15,000 personnel), and the Marine Expeditionary Unit (approximately 2200 personnel). Overwhelming force is achieved through the use of combined arms delivered simultaneously. Simplistically stated, Force Application, a Joint Functional Concept for the Joint Operating Concept Major Combat Operations, is achieved by the Marine Organization applying their Doctrine through the use of their Materiel warfighting capabilities. Figure 6 and illustrate these points for Marines and Army.

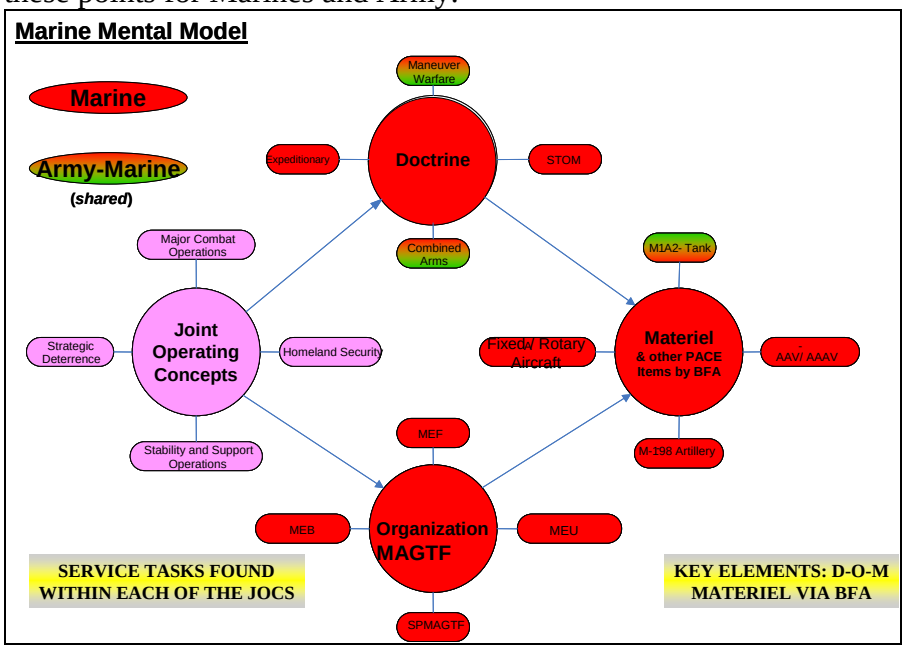


Figure 5: Joint Operating Concepts Relevant To Key Marine Corps DOTMLPF Elements.

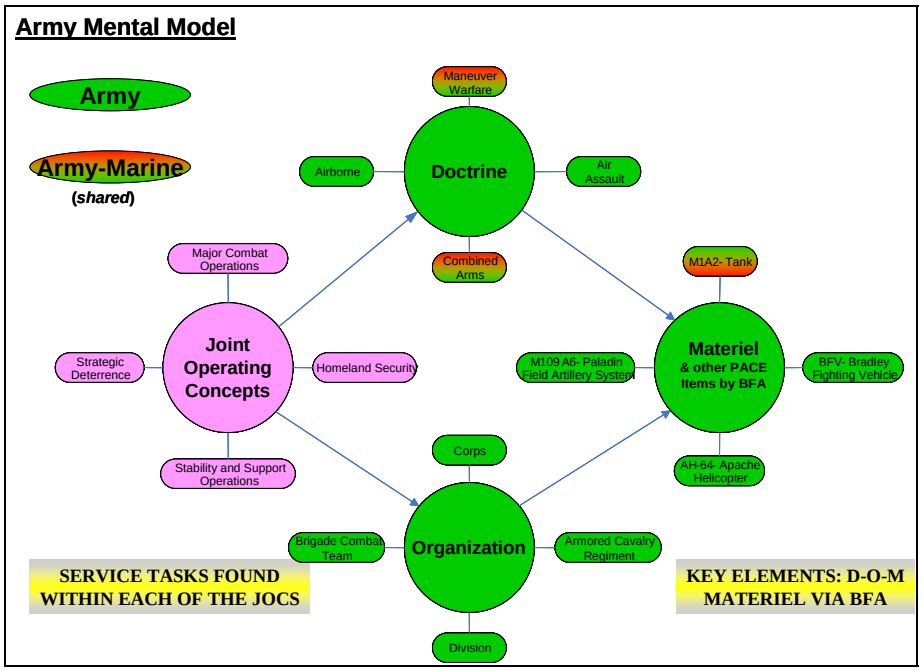


Figure 6: Joint Operating Concepts Relevant To Key Army DOTMLPF Elements.

Note the shared selected Doctrinal and Materiel elements between the Marine Corps and the Army. For joint mission planning, the Joint Task Force planner will need to be aware of complementary and redundant warfighting capabilities amongst the service warfighting units. While Figure 6 and Figure 7 are macro-level depictions of the mental model, complete database records will be created in Phase II to capture key elements of information. In a broader context reflective of the four major services, a representative example is provided in Table 5. Note pages, similar to those described above, offer clarification and additional detail. Service pacing items – items deemed critical to the successful conduct of combat missions – best describe warfighting ability. Key pacing items are described in terms of Battlefield Functional Areas. In the following example for the Battlefield Functional Area Maneuver, the following note pages are offered:

Maneuver

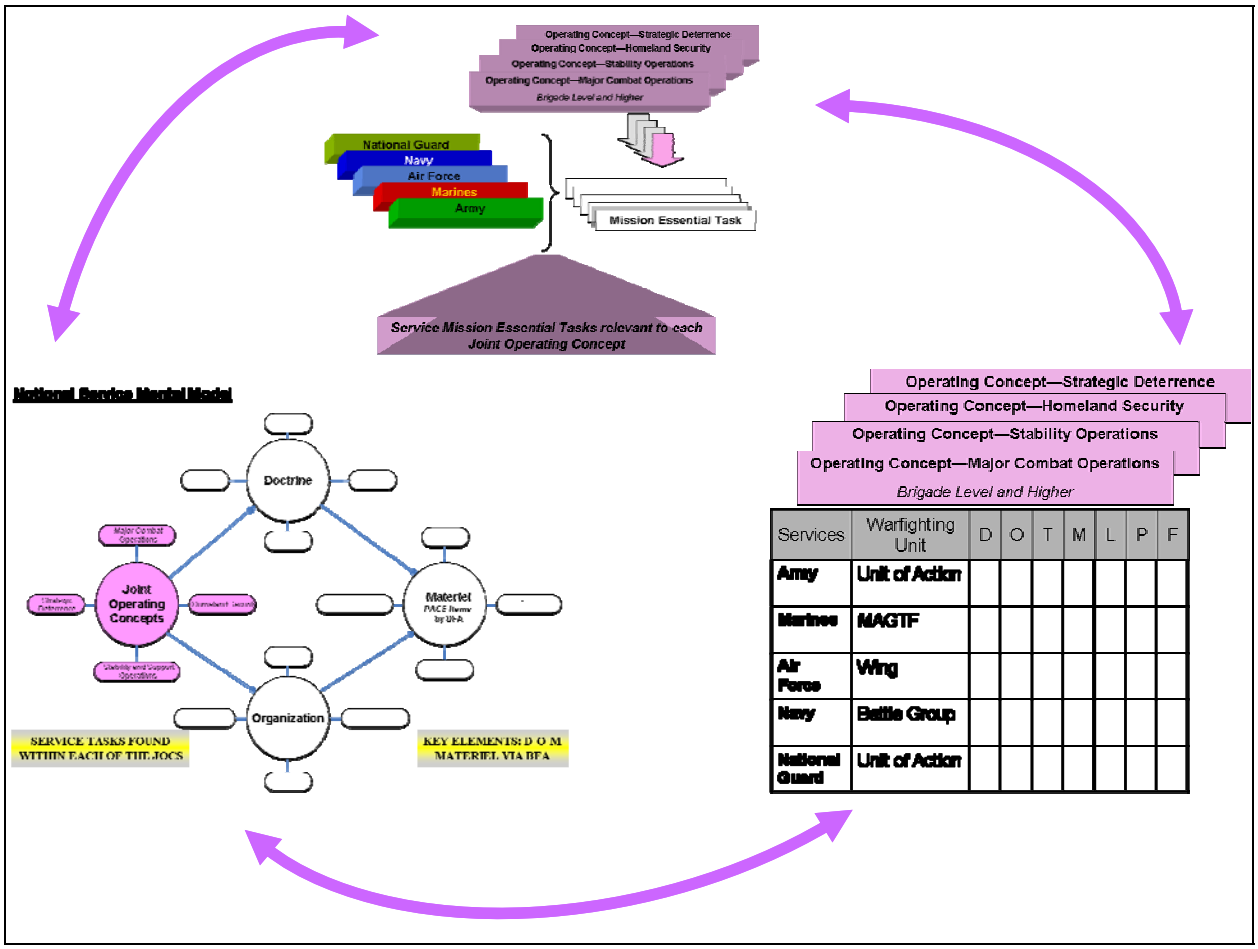
- Army: Primary ground maneuver systems are the M1A2 Tank and M2A2 BFV for brigade level commands. The Comanche is primarily designed for reconnaissance but can fulfill an attack role and was slated to replace the OH-58D (Recon helicopter) in 2006.
- Marines: The suite of Marine Corps maneuver vehicles is comprised of the AAV, AAAV, LAV, M1A1 Tank, and V-22 Osprey.
- Air Force: The primary fighter jets used for aerial combat are the F/A-18E and F/A-22A.

- Navy: Modern US Navy Guided Missile Cruisers perform primarily in a Battle Force role. Due to their extensive combat capability, these ships have been designated as

Battle Force Capable (BFC) units. These multi-mission ships are capable of sustained combat operations in any combination of Anti-Air, Anti-Submarine, Anti-Surface, and Strike warfare environments. They are built to be employed in support of Carrier Battle Groups, Amphibious Assault Groups, as well as interdiction and escort missions. Thirty-one SPRUANCE-class Destroyers were developed for the primary mission of anti-submarine warfare, including operations as an integral part of attack carrier forces. Utilizing highly developed weapons systems, SPRUANCE is designed to hunt down and destroy high speed submarines in all weather, but can also engage ships, aircraft, and shore targets. These multi-purpose combatants are also capable of providing naval gunfire support in conjunction with Marine amphibious operations worldwide. The Wolverine will be used for brown water operations and is the primary boat that outfits squadrons responsible for brown water operations that are assigned to the newly formed Navy Expeditionary Combat Command.

3.5. Summary

The key components of the front-end analysis facilitate a database structure of information relevant to Service warfighting units at the brigade level and higher. Figure shows the components of the construct for the Front End Analysis. The construct allows for the mapping of top-down joint warfighting concepts to service tasks, and then further describes capabilities via select elements of DOTMLPF with particular focus on Doctrine, Organization, and Materiel. Finally, the DOM is further described in terms of Battlefield Functional Areas. The data-mining, while rather extensive and potentially exhausting, will need to be verified by Service representatives.


Operating Concept—Strategic Deterrence
Operating Concept—Homeland Security
Operating Concept—Stability Operations
Operating Concept—Major Combat Operations
Brigade Level and Higher
National Guard
Navy
Air Force
Marines
Army
Mission Essential Task
Service Mission Essential Tasks relevant to each Joint Operating Concept
National Service Mental Model
Doctrine
Joint Operating Concepts
Materiel
Organization
SERVICE TASKS FOUND WITHIN EACH OF THE JOCS
KEY ELEMENTS: D O M MATERIEL VIA BFA
Operating Concept—Strategic Deterrence
Operating Concept—Homeland Security
Operating Concept—Stability Operations
Operating Concept—Major Combat Operations
Brigade Level and Higher
Services
Warfighting Unit
D
O
T
M
L
P
F
Army
Unit of Action
Marines
MAGTF
Air Force
Wing
Navy
Battle Group
National Guard
Unit of Action

"M" for Materiel (DOTMLPF)
Selected Pacing Items by Service
Relevant to Battlefield Functional Areas

Service	Maneuver	Fires	Intel	Logistics	C2	Force Protection
Army	M1A2, M2A2 (BFV), AH-64 Apache, OH-58D Kiowa Warrior, Comanche	M109A6 Paladin 155mm Self Propelled Howitzer (SPH), M198 Medium Towed Howitzer	LRAS3, Ground surveillance radar systems	M978 (Fuel Tanker), M985 (Ammo/Cargo Truck and Wrecker), CH-47 Chinook	M1A2, M2A2 (BFV)	M1A2, M2A2 (BFV), AH-64 Apache, Q36 and Q37 radars
Marines	AAV, AAAV, LAV, M1A1 V-22 Osprey	M198 MediumTowed Howitzer F/A -18, Cobra Gunship	Ground surveillance radar systems	Fuel Tankers, Ammo Trucks, V-22 Osprey	M1A1, F-18	M1A1, LAV Cobra Gunship
Air Force	F/A-18E, F/A-22A, F117A Nighthawk Stealth Fighter	B1 AND B2 Bombers, A10 Warthog	Reconaissance and surveillance aircraft	KC-135 Stratotanker	F/A-18E, F/A-22A	F/A-18E, F/A-22A, AN FPS 115 radar
Navy	Aircraft Carriers, Guided Missile Cruisers, Destroyers, Wolverines	Guided Missile Cruisers, Destroyers	Reconaissance and surveillance aircraft ANSPQ-11, SURTASS	Military Sealift Command (MSC) ships	Command ships (AGF-3, AGF-11) Amphibious Command ships (LCC-19, LCC-20)	Frigates
National Guard	M1A1, M2A2 (BFV), AH-64 Apache, OH-58D Kiowa Warrior	M109A4 SPH, M198 Medium Towed Howitzer	Ground surveillance radar systems	Ditto Army	Ditto Army	M1A1, M2A2 (BFV), AH-64 Apache

Table 3: Service Pacing Items Relevant to Combat Capability.